

Part 3

Distance and borders

Time

March 4th, 8:00~12:00

Contents

Winners or Losers? The Effects of Banking Consolidation on Corporate Borrowers	
Bonaccorsi Di Patti, E., and G. Gobbi (2007).....	1
Globalization of Financial Institutions: Evidence from Cross-Border Banking Performance	
Berger, A.N., R. Deyoung, H. Genay, and G. Udell (2000).....	28
To What Extent Will the Banking Industry be Globalized? A Study of Bank Nationality and Reach in 20 European Nations	
Berger, A.N., Q. Dai, S. Ongena, and D.C. Smith (2003).....	144
What do foreigners want? Evidence from targets in bank cross-border M&As	
Caiazza, S., A. Clare and A. F. Pozzolo (2012).....	182
Do domestic and cross-border M&As differ? Cross-country evidence from the banking sector	
Caiazza, S., A. F. Pozzolo and G. Trovato (2009).....	214
Banking Globalization and Monetary Transmission	
Cetorelli, N. and L. S. Goldberg (2011).....	242
Distance, Lending Relationships, and Competition	
Degryse, H., and S. Ongena (2005).....	286
Foreign Banks in Poor Countries: Theory and Evidence	
Detragiache, E., T. Tressel, and P. Gupta (2008).....	322
Mergers and acquisitions of financial institutions: a review of the literature	
DeYoung, R., D. Evanoff and P. Molyneux (2009).....	360
Bank Internationalization and Trade: What Comes First?	
Ferri, G. and Pozzolo A. F. (2009).....	384
Where Do Banks Expand Abroad? An Empirical Analysis	
Focarelli, D. and A. F. Pozzolo (2005)	410
Do multinational banks create or destroy economic value?	
Gulamhussen M. A., C. Pinheiro and A. F. Pozzolo (2010)	442
Were Multinational Bank Taking Excessive Risks Before the Recent Financial Crisis?	
Gulamhussen M. A., C. Pinheiro and A. F. Pozzolo (2011)	482
Does Distance Still Matter? The Information Revolution in Small Business Lending	
Petersen, M. A., and R. G. Rajan (2002)	516

Bank Cross-Border Mergers and Acquisitions (Causes, Consequences and Recent Trends)

Pozzolo A. F. (2009)	554
----------------------------	-----

Winners or Losers? The Effects of Banking Consolidation on Corporate Borrowers

EMILIA BONACCORSI DI PATTI and GIORGIO GOBBI*

ABSTRACT

We estimate the impact of bank mergers and acquisitions (M&As) on outstanding credit, credit lines, and the sensitivity of investment to cash flow using a large sample of Italian corporate borrowers. We distinguish between firms that experienced relationship termination as a consequence of bank M&As and those that did not. Our findings are consistent with bank M&As having an adverse effect on credit, particularly when the M&A is followed by relationship termination. The effect persists 3 years and then is absorbed, suggesting that firms are able to compensate for the negative shock.

IN THE PAST DECADE, MANY COUNTRIES EXPERIENCED a wave of mergers and acquisitions (M&As) that profoundly modified the structure of their banking industries (Group of Ten (2001)). One of the key questions that has emerged in the academic and policy debates is what the consequences of M&As are for bank borrowers.

The empirical literature on bank M&As studies extensively the effects of consolidation on bank performance and local market conditions, particularly in terms of efficiency and market power (see Berger, Demsetz, and Strahan (1999), Amel et al. (2004) for reviews). Other studies focus on the effects of consolidation on credit availability. Most of these studies compare the lending policies of banks of different sizes or investigate the market share effects of large versus small banks on credit volumes.

This literature generally finds that larger banks hold relatively fewer small business loans than small institutions (e.g., Berger, Kashyap, and Scalise (1995)), and they differ substantially from small banks in their lending practices (Berger et al. (2005), Berger, Klapper, and Udell (2001), Cole, Goldberg, and White (2004)).¹ However, other research shows that the impact of

*Emilia Bonaccorsi di Patti and Giorgio Gobbi are with Bank of Italy, Economic Research Department. We thank Allen Berger, Federico Bandi, Piero Cipollone, Giovanni Dell'Ariccia, Andrea Generale, Luigi Guiso, Han Hong, Anil Kashyap, Steven Ongena, Fabio Panetta, Richard Rosen, Greg Udell, participants at the Corporate Finance Brown Bag Lunch at the University of Chicago, the University of Modena, the 2003 Federal Reserve Bank of Chicago Conference on Bank Structure and Competition, the 2003 ECB-CFS Research Network on "Capital Markets and Financial Integration in Europe" in Helsinki, an associate editor, and an anonymous referee for their comments. The opinions expressed are those of the authors and do not necessarily represent those of the Bank of Italy or its staff. Roberto Felici provided excellent research assistance with the data.

¹ Large and complex organizations could have greater difficulty processing soft information and may have a comparative advantage in transaction-based lending rather than relationship-based lending (Stein (2002)).

changes in bank size on credit availability depends on the entire structure of the market (Berger, Rosen, and Udell (2005), Jayaratne and Wolken (1999)), with the local market shares of banks of different sizes not appearing to affect credit availability. As a consequence, even if the ratio of small business loans to total assets declines after large banks consolidate (Peek and Rosengren (1998), Strahan and Weston (1998)), there might be no long-run effect on credit availability.

Other studies raise the concern that one mechanism through which M&As may be a source of negative shocks to the credit supply is through their impact on bank–client relationships. Bank loans are often based on long-term relationships between borrowers and lenders. Not only can the information generated by the relationship be a source of rents for the bank, but it can also solve hold-up problems (e.g., Sharpe (1990), Petersen and Rajan (1995)). However, because information is often difficult to transfer to other lenders, it can be an important determinant of switching costs for borrowers.

Bank M&As are generally followed by extensive organizational change, employee turnover, and branch downsizing, which may lead to a loss of the knowledge accumulated within each of the merging banks. New management usually reassesses the risk of borrowers and might apply different standards to loan approval. The available evidence is consistent with relatively long transition periods during which difficulties in refocusing lending policies and integrating data processing systems and operations can dominate over potential efficiency gains (e.g., Rhoades (1998), Calomiris and Karceski (2000), Houston, James, and Ryngaert (2001)).

If these frictions produce a loss of soft information or if the new entity simply changes business focus, some bank–firm relationships may end up being severed. Even if termination is initiated by the borrower, since it usually takes time to build a new credit relationship, firms may face problems in finding other credit sources at the previous terms and conditions. The evidence shows that bank merger announcements have an adverse effect on the stock market returns of firms borrowing from the target banks (Karceski, Ongena, and Smith (2005)). This suggests that mergers may have effects that are similar to those of bank distress (e.g., Kang and Stulz (2000), Ongena, Smith, and Michalsen (2000)). Furthermore, econometric analyses of bank–firm relationship data indicate an increase in the probability of relationship termination, especially for customers of target banks (Sapienza (2002), Degryse, Masschelein, and Mitchell (2005)).

From a policy perspective there are a number of unanswered questions. What are the short- and medium-term effects of bank mergers on the supply of loans to individual borrowers? Do bank mergers reduce credit availability and, through this channel, influence the investment decisions of firms? Are borrowers able to compensate for adverse effects on credit availability of relationship termination by banks involved in mergers? The extent to which banking consolidation produces real effects depends on the magnitude of switching costs and on the importance of barriers to creating new credit relationships. Other institutions in the same markets could be willing to lend to positive net present value

borrowers that are no longer served by the banks involved in consolidation, as Berger et al. (1998) find.

We estimate the effect of borrower-specific shocks due to banking consolidation on the amount of bank loans and on firms' investment rates. In a first model, the bank M&A shock is the firm-specific share of credit issued by banks that are involved in M&As. In a second model, we split the shock into two types: (i) the share of credit issued by banks involved in M&As whose relationship with the firm was interrupted and (ii) the share of credit issued by banks involved in M&As whose relationship with the firm was not interrupted. The measured effect of bank M&As includes any adjustment by borrowers and rival banks to the behavior of the merged banks.

We conduct the empirical analysis on a large panel of Italian corporate borrowers, mostly small- or medium-sized and privately owned, for which credit relationship information and balance sheet data are available. We test for heterogeneous effects on subsamples of firms that are small, risky, and dependent on a small number of lenders as they are potentially more subject to switching costs.

The main results are the following. On average, firms borrowing from a bank involved in a merger as a bidder or as a target experience a temporary reduction in credit of approximately 1.5% and 2.0%, respectively. The negative shock is absorbed after 3 years. If the relationship between the firm and the merged bank is severed, loans are reduced by the entire amount issued under the terminated relationship, reverting to the pre-merger level after 3 years. In economic terms, the shock implies a temporary drop in credit of 9% after termination. Our findings are consistent with the results in the literature that banks reassess their portfolios after mergers and modify some of the terms and conditions on existing loans, inducing relationship termination. The results are also consistent with the evidence that short-run shocks to credit due to consolidation tend to be absorbed at the market level after some time (e.g., Berger et al. (1998)).

The paper is organized as follows. Section I discusses the data employed in the analysis. Sections II and III present the empirical analysis of the impact of bank M&As on credit and the results of the tests, respectively. Section IV provides the analysis of the sensitivity of investment to cash flow. Finally, Section V concludes.

I. Data and Key Explanatory Variables

The data cover a large sample of Italian corporate borrowers over the period 1990 to 1999. As Table I shows, merger activity in the banking industry was more intense between 1990 and 1995; acquisitions were more numerous after 1994. The data set includes information on credit received by each borrower, the M&A activity of the lending banks, and firm characteristics based on balance sheet and income statements.

We obtain our data from three sources. The first source is the Central Credit Register. The Register, which is coordinated by the Bank of Italy (the central

Table I
Mergers and Acquisitions in Italy

Mergers are defined as all cases in which two institutions form a new entity. Acquisitions include cases in which a bank or a bank-holding company acquires a controlling shareholding in another bank but both charters survive. The number of M&As does not include deals involving foreign subsidiaries. The share of targets' assets is in percentage points and is given by the sum of the assets of target banks divided by the banking industry total assets. Assets are measured at the end of the year before the deal.

Year	Total Number of Banks	Mergers		Acquisitions		Total	
		Number of Deals	Share of Targets' Assets	Number of Deals	Share of Targets' Assets	Number of Deals	Share of Targets' Assets
1990	1,156	19	1.06	4	0.37	23	1.43
1991	1,108	33	0.45	5	0.37	38	0.82
1992	1,073	20	3.04	1	0.01	21	3.05
1993	1,037	38	0.63	6	1.50	44	2.13
1994	994	42	1.59	10	1.90	52	3.49
1995	970	47	1.57	19	4.50	66	6.07
1996	937	37	0.47	19	1.08	56	1.55
1997	935	24	0.80	18	3.42	42	4.22
1998	921	27	2.65	23	11.02	50	13.67
1999	876	36	0.39	28	14.35	64	14.74

Source: Bank of Italy, Annual Report, various years.

bank), collects information from all banks on individual borrowers with bank debt above the threshold of 150 million lire (approximately 75,000 dollars in 1999).² The second source is the Bank of Italy archive on bank M&As. For each deal the institutions involved are classified as bidders or targets. The third source is the *Company Accounts Data Service* (CADS, "Centrale dei Bilanci" in Italian), a proprietary database that includes annual balance sheets and income statements of about 25,000 firms, largely privately owned. CADS is maintained by an agency owned by banks for the purpose of credit risk evaluation.

We select from the Credit Register all the information on those corporate borrowers for which balance sheets exist in CADS for at least 3 years during the period 1990 to 1999. The identity of the banks lending to these firms is matched with data on merger activity. We assign a dummy that is equal to 1 for each bank-year observation in which the bank is a bidder in a merger or an acquisition, and 0 otherwise. We construct a similar dummy for targets.

A dummy variable equal to 1 if one or more of its lenders are involved in M&As could be used to measure if a firm is affected by bank M&As. However, a binary variable would give equal weight to M&As of banks of different importance to the firm. We therefore prefer a weighted dummy variable, with weights given by the share of credit that each firm receives before the deal from banks that

² Before 1995 the reporting threshold was 80 million lire, approximately 40,000 dollars at the 1999 average exchange rate.

are involved in M&As. If there are multiple banks involved in M&As, their shares are aggregated at the firm level to construct measures of the “shock” potentially induced by bank consolidation. The variable *SHBIDBK* is the share of credit issued by banks that are bidders in each firm-year. Similarly, the variable *SHTARBK* is the share of credit issued before the deal by banks that are targets. If a merger occurs between time $t - 1$ and time t we assign the time index t to the merger shock variables *SHTARBK* and *SHBIDBK*. Finally, we define a third M&A variable, *SHBOTH*, as the share of credit issued by banks that were involved in the same merger or acquisition.

As Table II shows, on average the firms in our sample experience adverse credit shocks that amount to 19% (6%) of their credit from their lenders being bidders (targets) in M&As. The average shock in the case of firms borrowing from two banks that merged together is 1.5% of the firm’s credit.

The evidence in other studies shows that bank M&As increase the probability of relationship termination. It could be the case that aggregating all bank M&As without distinguishing whether the relationship between the merging bank and the firm is terminated or not produces noisy estimates and thereby confounds opposite effects for different customers. For this reason we construct variables that directly measure the share of each firm’s credit at time $t - 1$ provided by banks that are involved in M&As between $t - 1$ and time t and whose relationships with the firm are no longer in existence after time t (*SHM&ATER*). Symmetrically, we compute the share of credit provided by banks that are involved in M&As and whose relationships with the firm are not terminated (*SHM&ANOT*). Finally, as relationships can be discontinued for reasons that are unrelated to M&As, we compute the share of credit from banks that are not involved in M&As but whose relationships with the firm are terminated (*SHNOM&AT*). Firms whose lenders do not merge and whose relationships are not discontinued are the control group. In all cases we employ pro forma information on relationships, that is, we regard a relationship as continuing if the firm obtains credit at time t from at least one of the banks that merges between $t - 1$ and t .

The share of credit that the average firm obtains from banks that terminate the relationship after a merger is less than 1% (see Table II). Considering only observations for which termination occurs (8.7%), the average share affected is 9%. The average share from banks that merge and do not terminate their relationship is approximately 26%.

We exclude from the matched Credit Register–CADS sample firms with zero or negative equity capital or missing data on sales because their credit dynamics could reflect default or the impact of bankruptcy procedures. We also drop a small number of very large firms with sales of more than 100 billion lire (approximately 50 million dollars in 1999) because they are likely to receive a substantial share of their funding from international capital markets.

The resulting unbalanced panel contains more than 85,000 observations or more than 16,000 firms. The firms in the sample have average total assets of 19.3 billion lire and median total assets of 13.5 billion lire. On average, their outstanding loans are 12.6 million, 4.6 of which are credit lines, used and

Table II
Definitions of Variables and Descriptive Statistics

The sample period covers the years 1993 to 1999. *TOTCR* is the end-of-year firm-level outstanding total credit in million lire. *CLINES* is the end-of-year firm-level credit lines available. *INVRATE* is investment divided by previous-year total assets. *TOTCRTA* is total outstanding credit divided by end-of-previous-year total assets. *SHBIDBK_{t-k}* is the lag-*k* value of the share of the firm's credit issued by banks that were bidders in M&As. *SHTARBK_{t-k}* is the lag-*k* value of the share of the firm's credit issued by banks that were targets in M&As. *SHBOTH_{t-k}* is the lag-*k* value of the share of the firm's credit issued by banks that merged. *SHM&ATER_{t-k}* is the lag-*k* value of the share of the firm's credit issued by banks that lent to the firm prior to the merger and terminated the relationship. *SHM&ANOT_{t-k}* is the lag-*k* value of the share of the firm's credit issued by banks that were involved in M&As but whose relationship continued after the merger. *SHNOM&AT_{t-k}* is the lag-*k* value of the share of the firm's credit issued by banks not involved in M&As but whose relationship with the firm was terminated. Firm control variables are the following. *SHLARGE* is the share of credit from banks with total assets of at least 14 trillion lire. *SIZE* is the log of firm's gross total assets. *SALESGROWTH* is the rate of growth of sales in the current year. *FIXASSETS* is fixed tangible assets divided by total assets. *CASHFLOW* is net operating income divided by previous-year total assets. *LIQUIDITY* is cash and other liquid assets divided by previous-year total assets. *ZSCORE* is a score that measures credit risk, obtained with linear discriminant analysis; higher values indicate less risk. *MKTENTRY* is the share of branches of banks that were not present in the market in the previous year. *MKTHERF* is the loan market Herfindahl–Hirschman index of concentration. The market is defined as the province in which the firm has its headquarters. Small firms are firms with less than 5 billion lire of total assets; high credit risk firms are those in the bottom 20% of the *z*-score distribution.

Sample	All Firms		Small Firms		High Credit Risk Firms		Firms with 1–3 Lenders	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Dependent variables								
<i>TOTCR</i>	6,501	8,267	2,809	3,149	8,310	8,548	3,777	5,760
<i>CLINES</i>	2,341	3,146	1,067	1,150	2,294	2,963	1,682	2,640
<i>INVRATE</i>	0.051	0.095	0.063	0.113	0.047	0.085	0.058	0.107
<i>TOTCRTA</i>	0.341	0.215	0.363	0.226	0.427	0.203	0.272	0.214
Bank M&As shock variables								
<i>SHBIDBK</i>	0.194	0.231	0.193	0.245	0.200	0.211	0.184	0.291
<i>SHTARBK</i>	0.061	0.149	0.057	0.150	0.060	0.131	0.058	0.182
<i>SHBOTH</i>	0.014	0.072	0.010	0.064	0.014	0.068	0.006	0.057
<i>SHM&ATER</i>	0.008	0.051	0.008	0.057	0.008	0.043	0.008	0.064
<i>SHM&ANOT</i>	0.261	0.267	0.252	0.278	0.267	0.242	0.240	0.329
<i>SHNOM&AT</i>	0.024	0.094	0.024	0.094	0.026	0.084	0.026	0.121
<i>SHLARGE</i>	0.649	0.305	0.631	0.320	0.666	0.267	0.640	0.383
Control variables								
<i>SIZE</i>	9.533	0.811	8.689	0.604	9.604	0.789	9.161	0.876
<i>SALESGROWTH</i>	0.077	0.413	0.093	0.389	0.081	0.461	0.094	0.572
<i>FIXASSETS</i>	0.217	0.157	0.201	0.153	0.224	0.173	0.217	0.177
<i>CASHFLOW</i>	0.114	0.095	0.129	0.115	0.106	0.087	0.117	0.108
<i>LIQUIDITY</i>	0.058	0.088	0.062	0.091	0.043	0.073	0.066	0.103
<i>ZSCORE</i>	0.515	2.467	0.505	2.283	-1.135	1.849	1.242	2.831
<i>MKTENTRY</i>	0.008	0.013	0.007	0.013	0.007	0.013	0.008	0.017
<i>MKTHERF</i>	0.069	0.030	0.072	0.033	0.069	0.030	0.073	0.036
No. of obs.	85,407		20,102		16,441		9,731	

unused. Their average ratio of investment to total assets is 5.1%. The median number of lenders is 8.

II. The Effect of Bank M&As on Credit

A. The Empirical Model

In the first regression model total credit of firm i at time t is a function of the merger activity of banks lending to firm i at time $t - 1$, firm characteristics, and local market controls. Since we measure the impact of M&A shocks on the firm's total credit and not on each credit relationship or loan, the estimated effect captures not only changes in the behavior of the merged banks but also the reaction of the borrower and rival banks. If the merged bank reduces the amount of credit it is willing to provide to a firm but the firm is able to find another lender under the same conditions, our estimated effect will be nil. The equation is specified as

$$\begin{aligned}
 LNTOTCR_{it} = & \alpha + \sum_k \beta_k (L_{t-k}) SHBIDBK_{it-k} \\
 & + \sum_k \psi_k (L_{t-k}) SHTARBK_{it-k} + \sum_k \varphi_k (L_{t-k}) SHBOTH_{it-k} \\
 & + \gamma_1 SIZE_{it-1} + \gamma_2 SALES GROWTH_{it} \\
 & + \gamma_3 FIXASSETS_{it-1} + \gamma_4 CASHFLOW_{it-1} \\
 & + \gamma_5 LIQUIDITY_{it-1} + \gamma_6 ZSCORE_{it-1} \\
 & + \gamma_7 MKTHERF_{it-1} + \gamma_8 MKTENTRY_{it-1} + x_i + z_t + e_{it}. \quad (1)
 \end{aligned}$$

The lag operator L_{t-k} indicates that the bank M&A variables enter the regression with a lag structure to ensure completion of the post-merger transition period. Equation (1) is a reduced form resulting from firm-level demand for credit and credit supply conditions. The dependent variable is the log of total credit ($LNTOTCR$); we take the natural log to reduce heteroskedasticity. The interpretation of the coefficients of the merger shock variables turns out to be straightforward: The β_k , ψ_k , and φ_k are semi-elasticities that measure the percentage change in credit following a merger shock, measured as a percentage of the firm's credit sources.³ For example, if the share of credit a firm gets from a bank that is a bidder in a merger is 50%, a β_1 of -0.10 would mean that the firm faces a reduction of 5% in total credit outstanding the year after the merger.

In a second specification $LNTOTCR$ is replaced with credit lines available ($LNCLINES$), whether drawn, fully or partially, or not. In Italy, as in other

³ Denoting by $E(TOTCR|X)$ the conditional expectation of total credit ($TOTCR$) on the set of regressors of equation (1), X , when one of the merger shock variables x_j is increased by one unit the percentage change in $E(TOTCR|X)$ is approximated by: $(100 * \partial E(TOTCR|X) / \partial x_j) / (1/E(TOTCR|X)) = 100 * \partial \log[E(TOTCR|X)] / \partial x_j$. Under the assumption that X is independent from the stochastic term e_{it} we have: $100 * \partial \log[E(TOTCR|X)] / \partial x_j = 100 * \partial E(\log(TOTCR|X)) / \partial x_j = \beta_j$, where β_j is the estimated coefficient of x_j .

European countries, credit lines are usually determined by contractual arrangements between the firm and the bank over relatively long intervals. There are no explicit charges to the firm for holding unused credit lines.⁴ Normally, borrowers draw from their credit lines within the available maximum balance. If liquidity needs exceed the maximum granted, the firm can borrow more but it will face high cost, in terms of both fees and the interest rate it must pay. In general, borrowers tend to maintain substantial excess credit lines when their liquidity needs are low rather than taking the risk of overdrawing in the future. The median value of the ratio of credit lines used to credit lines granted is 0.31 in our data.

When a bank wants to limit credit supply quickly, an effective way to do so is to reduce the credit lines available to the firm. Nevertheless, a supply shift may not necessarily be apparent in credit lines granted if it occurs mainly via higher interest rates or a worsening of other terms and conditions. Total loans and credit lines granted provide complementary information. In the regression in which *LNCLINES* replaces *LNTOTCR* the bank merger shock variables are all computed as shares of the firm's total credit lines issued (used or unused) by banks that were involved in M&As.

As M&As change the size of banks, we need to separate the dynamic effect of the merger from the effect of a change in bank size on borrowers' credit. We control for the effect of bank size by including the variable *SHLRGBK*_{*t-k*} and its lags in all regressions. This variable measures the share of credit that each firm obtains from large banks in each period. A bank is considered large if it has gross total assets of at least 14 trillion lire.⁵

An additional motivation for including this variable is that in the case of Italy there is evidence of increasing specialization within the banking industry. As in the United States, large banks have been focusing their business away from traditional lending. If banks that are most active in M&As are large and if these banks tend to reduce credit because of business refocusing, our results could be driven by a spurious correlation between M&A activity and bank size.

We include the following firm characteristics and firm-specific supply conditions. The variable *SIZE* is the log of total assets. The variable *SALES**GROWTH* is the current-year rate of growth of sales, which proxies for current growth opportunities. The ratio of gross operating income to total assets (*CASHFLOW*) is a measure of operating performance. It also captures the availability of internally generated funds as a substitute for credit. The share of fixed assets (*FIXASSETS*) and the share of liquid assets (*LIQUIDITY*) control for the availability of collateral and for the demand for liquidity, respectively. These factors may influence the ability of the firm to get credit or its demand for external funds. Firms with more liquidity will demand less credit from banks since they

⁴ The liquidity risk incurred by the bank is compensated by a fee that is proportional to the maximum amount that the firm actually draws on the credit line in each quarter.

⁵ The threshold is consistent with the current Bank of Italy classification. Small banks are defined as those below 14 trillion. Other banks are further divided into medium, large, and major. We employ different thresholds and the results are unchanged.

would divest these assets first, as suggested by the pecking order hypothesis (Myers (1977)). The variable *ZSCORE* is a measure of credit risk that CADS provides to participating banks. It is obtained by linear discriminant analysis. Higher values of *ZSCORE* indicate lower credit risk.⁶

Local market credit supply conditions are likely to affect the availability of credit to firms in that market, especially for those for which reputation and local soft information matters. These conditions may change as a consequence of factors other than bank M&As. Furthermore, the likelihood that a firm finds alternative credit sources depends on the competitiveness of the local banking industry. We define local markets as provinces and consider the province in which the firm has its legal headquarters (95 provinces). We include in the regression the Herfindahl index of loan market concentration (*MKTHERF*) and a measure of entry by outside banks (*MKTENTRY*). Entry is measured as the share of branches in each province that is held by banks not present in that province in the previous year. We expect significant effects of these variables only for firms that operate on a relatively small scale.⁷

To limit potential endogeneity problems with respect to the effects of the merger shock variables, with the exception of *SALESGROWTH*, all the firm control variables are end-of-previous-year values. A vector of firm individual effects x_i controls for any characteristic that does not change over time, such as industry and location. Year dummy variables control for general demand and supply shifts that affect all firms. Descriptive statistics are in Table II.

Shocks to banks can have heterogeneous effects on borrowers facing higher switching costs, including those that are more dependent on relationship-based loans. On the one hand, adverse selection problems induced by firm opaqueness or other firm characteristics can limit mobility across banks. On the other hand, borrowers that have stronger bargaining positions, for example, because of size, may be able to extract merger-generated benefits in terms of greater availability of credit and/or better prices and covenants.

The empirical analysis is repeated employing three subsamples. The first subsample consists of small firms, as size is a standard proxy for the importance of relationship lending and for firm opaqueness. Small firms are those with less than 5 billion lire (approximately 2.5 million U.S. dollars at the 1999 exchange rate) of total assets in the first year they appear in the sample. Compared with the full sample, these firms have an average higher investment rate, sales growth, operating income, and credit rating. Considering the entire panel, their average size in terms of total assets is 7.4 billion lire, and they borrow from 6.2 banks (the median is six banks). The average of the bank M&A shock variables is very similar to that of the full sample.

⁶ The system is based on two models. The first model is a linear function of nine indicators obtained from balance sheet data and it distinguishes between “normal” and “not normal” firms. A second discriminant function of 10 indicators is then employed to improve the accuracy of the classification procedure for the class of “not normal” (poor performing) firms (see Altman, Marco, and Varetto (1994)).

⁷ Considering all the corporations and partnerships in the Credit Register in 2000, 50% borrowed from a bank branch located in the same municipality and 80% in the same province.

The second subsample consists of firms borrowing from no more than three banks. The number of lenders is measured at the end of the first year the firm appears in the sample. We select this benchmark because the median number of lenders in our data is 8 and there are too few cases of single-bank borrowers. The average number of lenders for this subsample is 4.3 because some firms start new relationships over time. Their average size is not small (14.7 billion lire of total assets) and their median size is 9.5 billion.

The third subsample consists of firms in the bottom 20% of the *ZSCORE* distribution. The *z* score is measured at the end of the first year the firm appears in the data set to avoid endogeneity problems with respect to the bank M&A shocks. Although observable creditworthiness is not a measure of a barrier generated by asymmetric information problems, it is a factor that limits the ability of firms to find alternative sources of credit. On average, high credit risk firms are larger than the full sample (20.1 billion lire of total assets), they hold 8.3 billion of bank debt, and they borrow from 8.9 banks. Descriptive statistics for the subsamples are reported in Table II.

B. Results

Table III shows the results of the estimation of equation (1). We first include five lags of the bank M&A variables and generally do not find statistically significant coefficients for the bank M&A variables after the third lag. Since the results are robust to the use of different lag structures, we report only those that correspond to the three-lag specification.

Firms borrowing from bidders experience a reduction in total credit in the 3 years following the shock (column 1). The coefficients of $SHBIDBK_{t-k}$ indicate an 8% reduction in credit. Since the merger shock variables are weighted dummy variables, the economic magnitude of the impact of M&As on credit should be evaluated at the sample means. The average of *SHBIDBK* (the share borrowed from banks that are bidders) is 19%. Consequently, the effect is an approximate 1.5% reduction in total credit. Borrowers of target banks experience a reduction in credit in the 3 years following the merger. The coefficients of $SHTARBK_{t-k}$ indicate that credit is 10% lower. At the sample mean of *SHTARBK* (0.06) the effect is a 0.6% reduction in the firm's total credit.

The economic magnitude of the effects of the bank M&A shocks is small at the sample mean. However, if one considers only the observations for which $SHBIDBK_{t-1}$ is greater than 0, the average share affected is 0.27, in which case the economic effect would be a 3% reduction in credit. Similarly, excluding the firm-years for which $SHTARBK_{t-1}$ is 0, the average share of credit affected by lenders being targets is 0.20, with an estimated reduction in credit of around 2%.

The variable *SHBOTH* is never statistically significant, which suggests that firms borrowing from both of the banks participating in the merger are better insulated from negative shocks, compared with customers of either bidders or targets. This finding is not consistent with strong market power effects because we would expect that firms borrowing from two banks merging together would be those that are affected the most.

Table III
Effect of M&As on Credit, All Firms, and Subsamples

The sample period covers the years 1993 to 1999. The dependent variable is the log of end-of-year firm-level outstanding total credit. Firm and year fixed effects are included in every regression (coefficients not shown). Robust standard errors are given below coefficients; standard errors are clustered at the firm level. $SHBIDBK_{t-k}$ is the lag- k value of the share of the firm's credit issued by banks that were bidders in M&As. $SHTARBK_{t-k}$ is the lag- k value of the share of the firm's credit issued by banks that were targets in M&As. $SHBOTH_{t-k}$ is the lag- k value of the share of the firm's credit issued by banks that merged. $SHLARGE BK$ is the share of credit from banks with total assets of at least 14 trillion lire. $SIZE$ is the log of firm's gross total assets. $SALESGROWTH$ is the rate of growth of sales in the current year. $FIXASSETS$ is fixed tangible assets divided by total assets. $CASHFLOW$ is net operating income divided by previous-year total assets. $LIQUIDITY$ is cash and other liquid assets divided by previous-year total assets. $ZSCORE$ is a score that measures credit risk, obtained with linear discriminant analysis; higher values indicate less risk. $MKTENTRY$ is the share of branches of banks that were not present in the market in the previous year. $MKTHERF$ is the loan market Herfindahl–Hirschman index of concentration. The market is defined as the province in which the firm has its headquarters. Small firms are firms with less than 5 billion lire of total assets; high credit risk firms are those in the bottom 20% of the z -score distribution.

Sample	All Firms	Small Firms	High Credit Risk Firms	Firms with 1–3 Lenders
Dependent Variable	(1) $LNTOTCR$	(2) $LNTOTCR$	(3) $LNTOTCR$	(4) $LNTOTCR$
Bank M&A shocks				
$SHBIDBK_{t-1}$	-0.079*** 0.029	-0.106* 0.055	-0.032 0.053	-0.157** (0.073)
$SHBIDBK_{t-2}$	-0.085*** 0.030	-0.098* 0.056	-0.004 0.056	-0.198** (0.080)
$SHBIDBK_{t-3}$	-0.087** 0.029	-0.114** 0.054	0.014 0.055	-0.201*** (0.072)
$SHTARBK_{t-1}$	-0.111*** 0.038	-0.011 0.065	-0.131* 0.073	-0.196** 0.098
$SHTARBK_{t-2}$	-0.101** 0.041	-0.026 0.083	-0.078 0.073	-0.235** 0.113
$SHTARBK_{t-3}$	-0.102** 0.041	-0.064 0.081	-0.048 0.075	-0.195* 0.110
$SHBOTH_{t-1}$	-0.021 0.044	-0.171** 0.082	0.024 0.071	-0.032 0.192
$SHBOTH_{t-2}$	-0.000 0.051	-0.106 0.095	0.102 0.082	0.028 0.212
$SHBOTH_{t-3}$	-0.009 0.064	-0.130 0.135	0.050 0.085	-0.023 0.240
$SHLARGE BK_{t-1}$	0.289*** (0.042)	0.144* (0.083)	0.248** 0.105	0.293** 0.119
$SHLARGE BK_{t-2}$	-0.043 (0.036)	-0.136* (0.073)	-0.025 0.083	0.012 0.099
$SHLARGE BK_{t-3}$	-0.165*** (0.035)	-0.070 (0.063)	0.021 0.073	-0.122 0.083
Firm controls				
$SIZE$	0.885*** 0.033	0.761*** 0.058	0.861*** 0.073	0.740*** 0.135
$SALESGROWTH$	0.089*** 0.020	0.117*** 0.036	0.038 0.063	0.106** 0.047

(continued)

Table III—Continued

Sample	All Firms	Small Firms	High Credit Risk Firms	Firms with 1–3 Lenders
Dependent Variable	(1) <i>LNTOTCR</i>	(2) <i>LNTOTCR</i>	(3) <i>LNTOTCR</i>	(4) <i>LNTOTCR</i>
<i>FIXASSETS</i>	1.178*** 0.109	1.617*** 0.219	0.794*** 0.193	1.239*** 0.391
<i>CASHFLOW</i>	0.329*** 0.116	0.239 0.157	0.314* 0.188	0.074 0.321
<i>LIQUIDITY</i>	−0.951*** 0.134	−0.526** 0.234	−0.694*** 0.208	−0.911* (0.472)
<i>ZSCORE</i>	−0.100*** 0.008	−0.085*** 0.015	−0.056*** 0.015	−0.085*** (0.024)
<i>MKTENTRY</i>	−0.004 0.300	0.531 0.637	0.493 0.462	−0.184 (0.999)
<i>MKTHERF</i>	0.242 0.476	−0.724 1.127	−0.869 0.943	1.146 (1.555)
<i>CONSTANT</i>	−0.732** 0.339	0.460 0.531	−0.179 0.761	0.049 (1.329)
No. of obs.	85,407	20,102	16,441	9,731
Adj. R^2	0.738	0.702	0.728	0.698

Significance levels are: *between 5% and 10%, **between 1% and 5%, and ***1% or less.

The share of credit issued by large banks has a positive statistically significant effect after 1 year but a negative significant effect after 3 years. The coefficients do not suggest a systematic decrease in credit availability for firms that had a large share of loans from large banks.

The coefficients of most of the firm characteristics are statistically significant and have the expected signs. Firm size has a positive effect on the volume of credit. Firms whose sales grow faster tend to have more loans. The share of fixed assets is positively correlated with the volume of credit, whereas liquidity is negatively correlated, as expected. The variable *CASHFLOW* has a positive coefficient, indicating that firms that are more profitable are able to get more credit (this effect dominates over the demand-side effect that firms with fewer profits demand more credit). The coefficient of *ZSCORE* is negative and statistically significant. Higher z scores, indicating lower credit risk, are correlated with lower bank credit, controlling for other factors including firm total assets. The reason is that leverage is one of the key factors employed in the discriminant analysis that generates the z score, and higher bank debt increases leverage and the probability of default. The local market structure variables have no effect on total credit.

C. Subsamples

The results of the sample splits are reported in columns 2–4 of Table III.⁸ Small firms are subject to a reduction in total credit if one or more of their

⁸ For robustness purposes we apply the criteria on a year-by-year basis and the results are unchanged.

lenders are bidders in a merger or acquisition (column 2, Table III). There is no statistically significant effect on credit if the lenders are targets, as opposed to a negative temporary effect for the entire sample.

One noteworthy difference with respect to the results from the full sample is that small firms experience a temporary reduction in outstanding credit if two of their lenders merge together. The latter finding is specific to small firms and is consistent with the prior that small firms are potentially more subject to market power, at least in the short run.

Column 3 of Table III reports the results of the regressions for the high credit risk firms. Although the signs of the coefficients of $SHBIDBK_{t-k}$ and $SHTARBK_{t-k}$ are negative, they are not statistically significant, with one exception. The coefficients of the $SHBOTH_{t-k}$ are insignificant.

Finally, as shown in column 4, firms borrowing from up to three banks face a reduction in total credit, whether the shock originates from their lender being a bidder or a target. In the first case the coefficients range from -0.16 for the first lag to -0.2 for the third. The corresponding reduction in credit is of the order of 3% at the sample mean. In the case of lenders being targets the coefficients are all around -0.2 , which is equivalent to a credit reduction of 1.2%.

D. Credit Lines

We estimate equation (1) replacing total credit with *LNCLINES*. In the interest of brevity we do not report these results. The merger shock variables are weighted by the shares of credit lines instead of total credit in this specification. The results differ from those obtained in the regression of total credit because the coefficients of the M&A variables are generally not significant for the full sample and the subsamples. Only *SHTARBK* has a barely significant positive effect after 1 year (but not robust to the number of lags in the regression), and negative after 3 years.

The coefficients of the control variables are mostly consistent with those of the total credit regression. Two exceptions are noteworthy. The coefficient of *ZSCORE* is positive when the dependent variable is credit lines granted. This result is consistent with our interpretation of credit lines granted as a variable that changes mainly in response to supply factors. The second difference is that market entry has a statistically significant negative effect on credit lines granted in some of the regressions. This finding is consistent with a number of theoretical studies that show how banking competition may increase adverse selection problems, reducing credit availability (e.g., Dell'Ariccia, Friedman, and Marquez (1999)).

The absence of M&A effects on credit lines granted is consistent with bank mergers having an impact on the cost of credit or the other loan terms and conditions rather than a direct quantity rationing effect. Although borrowers are able to find alternative credit sources, as suggested by the fact that the negative shock vanishes over time, bank M&As appear to generate some frictions in credit markets and adjustment costs for borrowers involved. This interpretation is consistent with the evidence on the impact of M&As on interest rates in Sapienza (2002).

E. Further Tests

For robustness purposes we estimate an alternative specification of the credit equations. The dependent variable is the ratio of credit to 1-year lagged total assets. Employing the ratio should ensure that our results are robust to potential biases because of undue weight of large firms, even in the presence of firm fixed effects and a firm size control variable. The results from our main specification suggest that the relationship between the level of credit and the merger variables is nonlinear. For this reason we include first- and second-order terms of the M&A variables. When only the first-order terms are included, the signs are consistent with our main results but the coefficients are not statistically significant.

In the quadratic model the derivative of $SHBIDBK_{t-1}$ at the mean is -0.007 , significant at the 10% level. Although the first two lags are not significant at the mean, the third-lag derivative is close to the effect estimated for the log model (a 1.5% reduction in credit). At the sample mean the value of the ratio of total credit to lagged total assets is 0.34. A 1.5% reduction in the numerator is equivalent to a decrease in the ratio to 0.335, which is in line with the effect estimated with the ratio model. Similarly, the first- and second-lag derivatives of $SHTARBK$ are negative but not significant. The third-lag derivative is -0.016 and is 5% significant. This value is of the same order of magnitude as that of the log model. The nonlinearity of the model and the presence of a large number of zeros for the M&A variables could explain the difference in the level of significance of the coefficients in the two specifications.

To ensure that our main results are not driven by large differences in firm size across observations we estimate equation (1) on a number of subsamples split by size, measuring size in each year instead of the first year the firm appears in the sample. Firms with total assets above 30 billion lire are not affected by M&A shocks. The signs of the merger variables tend to become mostly positive, especially for firms above 60 billion of total assets. The results are the strongest for the subsample of medium-sized firms (between 5 and 30 billion of total assets). The coefficients of the three lags of both the variables $SHBIDBK$ and $SHTARBK$ are negative, significant, and close in magnitude to the effects of the full sample. The estimation with the subsample of the smallest firms (below 5 billion of total assets) yields negative and larger coefficients for the first and second lags of $SHTARBK$, with the other M&A variables being not significant.

III. The Effects of Relationship Termination on Credit

A. The Empirical Model

Employing a negative binomial regression model, we regress the number of terminated relationships for each firm as a function of the bank M&A shocks, the number of relationships at $t - 1$ and various control variables. We find that the variable $SHTARBK$ is associated with a higher number of relationships interrupted in the following year, consistent with prior evidence in the literature.

The variable *SHBOTH* has a positive and statistically significant effect on termination, whereas *SHBIDBK* has a small negative effect. We do not report these results in the interest of brevity.⁹ Similar results obtain with a probit model of whether the firm faces relationship termination in each year.

The termination of a relationship can have a negative impact on the availability of credit if firms face costs in starting new relationships and/or securing more credit from their other lenders. Even positive net present value borrowers may face frictions in replacing discontinued credit sources. The estimated reduction in total credit discussed in Section II.B is the average effect of bank M&A shocks, pooling borrowers that experienced termination with those that did not (continuing borrowers). Since the two effects could differ substantially, we estimate them separately according to the following regression model:

$$\begin{aligned} LNTOTCR_{it} = & \alpha + \sum_k \beta_k (L_{t-k}) SHM\&ATER_{it-k} \\ & + \sum_k \psi_k (L_{t-k}) SHM\&ANOT_{it-k} + \sum_k \varphi_k (L_{t-k}) SHNOM\&AT_{it-k} \\ & + \gamma OTHERCONTROLS_i + x_i + z_t + e_{it}. \end{aligned} \quad (2)$$

The variable *SHM&ATER* indicates the share of the firm's total outstanding credit at time $t - 1$ that is issued by a bank involved in a merger and that no longer lends to the firm at time t . The variable *SHM&ANOT* is the share of the firm's total outstanding credit at time $t - 1$ issued by a bank that has merged but still lends to the firm at time t . Finally, *SHNOM&AT* is the share of credit issued at time $t - 1$ by banks that are not involved in M&As but no longer lend to the firm at time t . In all cases termination is defined as the interruption of any kind of loan or credit line (used or unused) issued by the bank to the firm considered. To limit the number of regressors, in this regression model we do not distinguish between the termination of relationships between the firm and banks that are bidders or targets.¹⁰ We estimate equation (2) once with *LNTOTCR* and once with *LNCLINES* as the dependent variable. The control variables are the same as in equation (1).

B. Results

As Table IV shows, the termination of relationships by banks involved in M&As is followed by a 100% reduction in the total credit issued under those relationships after the first year. The estimated coefficient is not statistically different from -1 . It is 0.36–0.38 after 2 and 3 years, respectively. On an average, relationship termination is followed by an initial credit reduction of the same magnitude as the loans issued under that relationship. The effect tends to

⁹ The results of a probit model on relationship-level data are consistent with those in Sapienza (2002).

¹⁰ The results are not substantially different when we distinguish termination by bidders, targets, etc.

Table IV
Effect of Relationship Termination on Credit, All Firms, and
Subsamples

The sample period covers years 1993 to 1999. The dependent variable is the log of end-of-year firm-level outstanding total credit. Firm and year fixed effects are included in every regression (coefficients not shown). Robust standard errors are given below coefficients; standard errors are clustered at the firm level. $SHM\&ATER_{t-k}$ is the lag- k value of the share of the firm's credit issued by banks that lent to the firm prior to the merger and terminated the relationship. $SHM\&ANOT_{t-k}$ is the lag- k value of the share of the firm's credit issued by banks that were involved in M&As but whose relationship continued after the merger. $SHNOM\&AT_{t-k}$ is the lag- k value of the share of the firm's credit issued by banks not involved in M&As but whose relationship with the firm was terminated. Firm control variables are the following. $SHLARGE\&BK$ is the share of credit from banks with total assets of at least 14 trillion lire. $SIZE$ is the log of firm's gross total assets. $SALESGROWTH$ is the rate of growth of sales in the current year. $FIXASSETS$ is fixed tangible assets divided by total assets. $CASHFLOW$ is net operating income divided by previous-year total assets. $LIQUIDITY$ is cash and other liquid assets divided by total assets. $ZSCORE$ is a score that measures credit risk, obtained with linear discriminant analysis; higher values indicate less risk. $MKTENTRY$ is the share of branches of banks not present in the market in the previous year. $MKTHERF$ is the loan market Herfindahl-Hirschman index of concentration. The market is defined as the province in which the firm has its headquarters. Small firms are firms with less than 5 billion lire of total assets; high credit risk firms are those in the bottom 20% of the z -score distribution.

Sample	All Firms	Small Firms	High Credit Risk Firms	Firms with 1-3 Lenders
Dependent Variable	(1) $LNTOTCR$	(2) $LNTOTCR$	(3) $LNTOTCR$	(4) $LNTOTCR$
$SHM\&ATER_{t-1}$	-1.037*** 0.190	-0.453 0.298	-1.545*** 0.539	-1.081** 0.460
$SHM\&ATER_{t-2}$	-0.361** 0.175	0.240 0.313	-0.228 0.283	-0.223 0.399
$SHM\&ATER_{t-3}$	-0.382** 0.168	0.087 0.299	-0.042 0.311	-0.578 0.389
$SHM\&ANOT_{t-1}$	-0.069** 0.024	-0.082* 0.045	-0.046 0.044	-0.135** 0.062
$SHM\&ANOT_{t-2}$	-0.083*** 0.025	-0.102** 0.046	-0.018 0.046	-0.201*** 0.070
$SHM\&ANOT_{t-3}$	-0.079*** 0.024	-0.113*** 0.047	-0.000 0.044	-0.179*** 0.063
$SHNOM\&AT_{t-1}$	-0.555*** 0.097	-0.459*** 0.176	-0.651*** 0.225	-0.026 0.246
$SHNOM\&AT_{t-2}$	-0.427*** 0.094	-0.247 0.165	-0.421* 0.245	-0.181 0.229
$SHNOM\&AT_{t-3}$	-0.070 0.099	-0.128 0.158	0.107 0.210	0.131 0.239
$SHLARGE\&BK_{t-1}$	0.274*** 0.042	0.141* 0.083	0.228** 0.102	0.282** 0.117
$SHLARGE\&BK_{t-2}$	-0.037 0.035	-0.130* 0.071	-0.019 0.081	0.017 0.097
$SHLARGE\&BK_{t-3}$	-0.164*** 0.034	-0.079 0.062	0.029 0.072	-0.122 0.082
Firm controls included in all regressions (not shown)				
No. of obs.	85,406	20,101	16,441	9,731
Adj. R^2	0.740	0.702	0.732	0.702

Significance levels are: *between 5% and 10%, **between 1% and 5%, and ***1% or less.

be absorbed after 3 years. Considering the sample average of $SHM\&ATER_{t-1}$ (0.008), the economic effect of termination is negligible (a reduction in credit of less than 1%). Nevertheless, considering only the firm-year observations for which $SHM\&ATER_{t-1}$ is greater than zero, the average share affected by termination is around 9% of credit. The estimated coefficient indicates that these firms would have 9% less credit after termination. The fact that the shock is absorbed is consistent with firms being able to compensate for the severed relationship.

The immediate reduction in credit following termination by merged banks is about twice as large as in the case of termination by banks not involved in M&As. A Wald test rejects the null of equal coefficients for $SHM\&ATER_{t-1}$ and $SHNOM\&AT_{t-1}$. A possible explanation is that in the absence of mergers, relationships naturally observe turnover for a number of different reasons and the estimated coefficient averages over cases in which the relationship is severed by the bank and cases in which the firms leaves the bank voluntarily. Voluntary termination in the absence of shocks should have a negligible adverse effect on credit availability. In the subsequent years, the effect of relationship termination approaches 0.

The coefficients of $SHM\&ANOT_{t-k}$ are negative and significant. Continuing relationships with banks involved in M&As are associated with a modest (7–8%) reduction in the outstanding credit secured by the merged bank(s). Again, the reduction lasts for 3 years. At the sample mean of $SHM\&ANOT$ (0.26), credit remains 1.8% lower for 3 years after the merger.

The effect of termination for small firms is negative but not significant (Table IV, column 2). The coefficients are smaller than for the full sample, conflicting with the expectation that small firms are especially vulnerable to bank shocks. The pattern for continuing relationships with merged banks is the same as that found for the full sample and the coefficients are not statistically different.

In the case of high credit risk firms, the impact of $SHM\&ATER$ on credit is not statistically different from 100%, but lasts only 1 year. The termination of relationships without banks being involved in mergers is associated with a negative effect that is not statistically different from the estimated reduction for the entire sample. None of the coefficients of $SHM\&ANOT$ and its lagged values are statistically different from 0.

Finally, firms with one to three lenders experience a negative and temporary impact of termination associated with M&As (not statistically different from 100%). The effect of termination with banks not involved in M&As is negative and coefficients are in the range of -0.13 and -0.18 .

The data do not support the conjecture that firms that are small, more risky, and dependent on fewer banks are especially sensitive to the consequences of bank M&As compared with the full sample. One possible explanation could be that multiple banking helps insulate borrowers from shocks to their lenders, even in the case of three banks. To assess this possibility further analysis would be required on very small borrowers, possibly with one lender. This is not possible because of the few small-borrower observations available in our sample.

C. Credit Lines

The impact of relationship termination on credit lines is negative and statistically significant, consistent with our findings for total credit (Table V). However, the estimated effects tend to be smaller. It could be the case that firms have less elastic demand for credit lines and are willing to accept a worsening of conditions in the short run. This interpretation is consistent with the result (not shown) that used credit lines decline, possibly reflecting greater costs of new credit lines. In addition, other work shows that borrowers with longer relationships pay lower interest rates and are less likely to pledge collateral (Berger and Udell (1995), Degryse and Van Cayseele (2000), Harhoff and Körting (1998)).

Having one's lender merge and continue the relationship is not associated with a reduction in credit lines granted, consistent with our prior findings for equation (1). The negative impact of termination on credit lines available holds across the subsamples, although the statistical significance of the second and third lags declines, perhaps reflecting a greater effort to stabilize credit lines by firms with higher switching costs.

D. Further Tests

For robustness purposes we estimate the credit equation for termination replacing the log of total credit with the ratio of credit to total assets (see Section II.E). Table VI provides the results of the ratio specification. The results show a robust and large termination effect, both in the case of clients of banks that merged and of banks that did not merge. Considering the first lag of *SHM&ATER*, the derivative at the sample mean is -0.18 , indicating that 1 percentage point increase in the share of terminated loans would be followed by a 0.18% decline in the ratio of credit to total assets. The results for the subsamples are robust to this change in specification.

E. Does Credit Quality Drive Termination and Credit Volumes?

A possible reason for the decline in credit volume after the termination of a relationship could be that termination reflects a worsening of the firm's creditworthiness that is not adequately controlled for in the regression. That is, an omitted variable that represents a negative innovation in the quality of the borrower may determine both termination and the reduction in loans. However, as we discuss below, the results of a number of tests are consistent with our results not being driven by an unobserved deterioration in credit quality.

Although on an average firms that experience relationship termination are slightly riskier and less profitable, this is already observed in the data at the time of termination and is controlled for in the regression. Regressing current profitability (operating margin divided by total assets) on dummies for termination following M&As, on dummies for with no M&As, and on time fixed effects, we find that the terminated firms are less profitable (by around 1%) than those not terminated, regardless of the involvement of lenders in M&As.

Table V
Effect of Relationship Termination on Credit Lines, All Firms, and Subsamples

The sample period covers years 1993 to 1999. The dependent variable is the log of end-of-year firm-level outstanding total credit. Firm and year fixed effects are included in every regression (coefficients not shown). Robust standard errors are given below coefficients; standard errors are clustered at the firm level. $SHM\&ATER_{t-k}$ is the lag- k value of the share of the firm's credit issued by banks that lent to the firm prior to the merger and terminated the relationship. $SHM\&ANOT_{t-k}$ is the lag- k value of the share of the firm's credit issued by banks that were involved in M&As but whose relationship continued after the merger. $SHNOM\&AT_{t-k}$ is the lag- k value of the share of the firm's credit issued by banks not involved in M&As but whose relationship with the firm was terminated. Firm control variables are the following. $SHLARGE\&BK$ is the share of credit from banks with total assets of at least 14 trillion lire. $SIZE$ is the log of firm's gross total assets. $SALESGROWTH$ is the rate of growth of sales in the current year. $FIXASSETS$ is fixed tangible assets divided by total assets. $CASHFLOW$ is net operating income divided by previous-year total assets. $LIQUIDITY$ is cash and other liquid assets divided by total assets. $ZSCORE$ is a score that measures credit risk, obtained with linear discriminant analysis; higher values indicate less risk. $MKTENTRY$ is the share of branches of banks not present in the market in the previous year. $MKTHERF$ is the loan market Herfindahl–Hirschman index of concentration. The market is defined as the province in which the firm has its headquarters. Small firms are firms with less than 5 billion lire of total assets; high credit risk firms are those in the bottom 20% of the z -score distribution.

Sample	All Firms	Small Firms	High Credit Risk Firms	Firms with 1–3 Lenders
Dependent Variable	(1) $LNCLINES$	(2) $LNCLINES$	(3) $LNCLINES$	(4) $LNCLINES$
$SHM\&ATER_{t-1}$	-0.721*** 0.077	-0.577*** 0.133	-0.759*** 0.186	-0.531** 0.218
$SHM\&ATER_{t-2}$	-0.292*** 0.071	-0.271** 0.118	-0.207 0.193	-0.130 0.166
$SHM\&ATER_{t-3}$	-0.190*** 0.067	-0.252 0.165	-0.065 0.152	-0.271 0.228
$SHM\&ANOT_{t-1}$	0.019 0.012	0.001 0.022	0.027 0.032	0.021 0.030
$SHM\&ANOT_{t-2}$	0.002 0.013	0.008 0.025	0.028 0.034	-0.037 0.035
$SHM\&ANOT_{t-3}$	0.001 0.013	0.000 0.023	0.052 0.034	-0.031 0.031
$SHNOM\&AT_{t-1}$	-0.520*** 0.051	-0.469*** 0.095	-0.469*** 0.118	-0.335** 0.146
$SHNOM\&AT_{t-2}$	-0.286*** 0.052	-0.381*** 0.072	-0.190* 0.098	-0.034 0.119
$SHNOM\&AT_{t-3}$	-0.157*** 0.048	-0.282*** 0.073	-0.188* 0.099	-0.060 0.171
$SHLARGE\&BK_{t-1}$	-0.024 0.026	-0.049 0.045	-0.053 0.055	0.070 0.083
$SHLARGE\&BK_{t-2}$	0.012 0.023	-0.005 0.043	0.015 0.046	0.000 0.077
$SHLARGE\&BK_{t-3}$	0.027 0.020	0.004 0.036	0.072 0.044	0.007 0.051
Firm controls included in all regressions (not shown)				
No. of obs.	85,044	20,031	16,388	9,595
Adj. R^2	0.810	0.804	0.790	0.787

Significance levels are: *between 5% and 10%, **between 1% and 5%, and ***1% or less.

Table VI
Effect of Relationship Termination on Credit to Total Assets, All Firms, and Subsamples

The sample period covers years 1993 to 1999. The dependent variable is the log of end-of-year firm-level outstanding total credit. Firm and year fixed effects are included in every regression (coefficients not shown). Robust standard errors are given below coefficients; standard errors are clustered at the firm level. $SHM\&ATER_{t-k}$ is the lag- k value of the share of the firm's credit issued by banks that lent to the firm prior to the merger and terminated the relationship. $SHM\&ANOT_{t-k}$ is the lag- k value of the share of the firm's credit issued by banks that were involved in M&As but whose relationship continued after the merger. $SHNOM\&AT_{t-k}$ is the lag- k value of the share of the firm's credit issued by banks not involved in M&As but whose relationship with the firm was terminated. Firm control variables are the following. $SHLARGE\&BK$ is the share of credit from banks with total assets of at least 14 trillion lire. $SIZE$ is the log of firm's gross total assets. $SALESGROWTH$ is the rate of growth of sales in the current year. $FIXASSETS$ is fixed tangible assets divided by total assets. $CASHFLOW$ is net operating income divided by previous-year total assets. $LIQUIDITY$ is cash and other liquid assets divided by total assets. $ZSCORE$ is a score that measures credit risk, obtained with linear discriminant analysis; higher values indicate less risk. $MKTENTRY$ is the share of branches of banks not present in the market in the previous year. $MKTHERF$ is the loan market Herfindahl–Hirschman index of concentration. The market is defined as the province in which where the firm has its headquarters. Small firms are firms with less than 5 billion lire of total assets; high credit risk firms are those in the bottom 20% of the z -score distribution.

Sample	All Firms	Small Firms	High Credit Risk Firms	Firms with 1–3 Lenders
Dependent Variable	(1) $TOTC\&RTA$	(2) $TOTC\&RTA$	(3) $TOTC\&RTA$	(4) $TOTC\&RTA$
$SHM\&ATER_{t-1}$	−0.187*** 0.024	−0.194*** 0.054	−0.299*** 0.057	−0.178*** 0.066
$\frac{1}{2}(SHM\&ATER_{t-1})^2$	0.361*** 0.060	0.376*** 0.133	0.635*** 0.192	0.326** 0.150
$SHM\&ATER_{t-2}$	−0.082*** 0.025	−0.128** 0.053	−0.176*** 0.066	−0.017 0.083
$\frac{1}{2}(SHM\&ATER_{t-2})^2$	0.162** 0.066	0.279*** 0.130	0.398* 0.223	0.016 0.192
$SHM\&ATER_{t-3}$	−0.056** 0.025	−0.095* 0.051	−0.034 0.070	−0.191** 0.079
$\frac{1}{2}(SHM\&ATER_{t-3})^2$	0.123* 0.068	0.299** 0.143	0.165 0.228	0.363* 0.191
$SHM\&ANOT_{t-1}$	0.005 0.006	0.003 0.014	0.014 0.019	0.011 0.019
$\frac{1}{2}(SHM\&ANOT_{t-1})^2$	−0.019 0.015	−0.018 0.031	−0.046 0.046	−0.040 0.040
$SHM\&ANOT_{t-2}$	−0.005 0.007	−0.004 0.014	−0.005 0.020	−0.013 0.020
$\frac{1}{2}(SHM\&ANOT_{t-2})^2$	0.012 0.016	0.007 0.032	0.031 0.052	0.014 0.043
$SHM\&ANOT_{t-3}$	−0.013* 0.006	−0.023 0.014	0.000 0.019	−0.006 0.020
$\frac{1}{2}(SHM\&ANOT_{t-3})^2$	0.029* 0.016	0.040 0.033	0.008 0.049	0.000 0.044
$SHNOM\&AT_{t-1}$	−0.134*** 0.014	−0.113*** 0.032	−0.117*** 0.038	−0.038 0.045

(continued)

Table VI—Continued

Sample	All Firms	Small Firms	High Credit Risk Firms	Firms with 1–3 Lenders
Dependent Variable	(1) <i>TOTCRTA</i>	(2) <i>TOTCRTA</i>	(3) <i>TOTCRTA</i>	(4) <i>TOTCRTA</i>
$\frac{1}{2}(SHNOM\&AT_{t-1})^2$	0.245*** 0.034	0.232*** 0.084	0.200 0.124	0.074 0.099
$SHNOM\&AT_{t-2}$	−0.082*** 0.015	−0.081*** 0.034	−0.040 0.042	−0.009 0.049
$\frac{1}{2}(SHNOM\&AT_{t-2})^2$	0.161*** 0.036	0.175** 0.089	0.130 0.127	0.015 0.109
$SHNOM\&AT_{t-3}$	−0.032** 0.014	−0.021 0.032	−0.005 0.040	−0.003 0.046
$\frac{1}{2}(SHNOM\&AT_{t-3})^2$	0.070** 0.035	0.028 0.083	0.081 0.129	0.014 0.104
<i>SHLARGE</i> BK_{t-k} and firm controls included in all regressions (not shown)				
No. of obs.	84,405	19,632	16,128	9,624
Adj. R^2	0.742	0.731	0.682	0.732

Significance levels are: *between 5% and 10%, **between 1% and 5%, and ***1% or less.

However, when we regress the change in profitability (between $t - 1$ and t) on the termination dummies and the year fixed effects, the firms that experience termination of relationships with merged banks are slightly more profitable, although the coefficient is barely significant. In contrast, those that experience termination of relationships with banks that do not merge are less profitable. Regressing the change in the operating margin between t and $t + 1$ on the termination dummies and time fixed effects we find that it is not predicted by either type of termination. The firms appear to be different in a persistent way, partly because of differences in their size, and these factors are mainly absorbed by the firm fixed effects.

Other tests are inconsistent with unobservable changes in credit quality driving our results. It is reasonable to argue that banks involved in M&As should not have more information than lenders that are not involved in consolidation. If anything, they have less information if local branch managers are fired or soft information is lost. If the termination were driven by an unobserved (to the econometrician) deterioration in the firm's creditworthiness, the probability of severing a relationship with the same firm would be correlated across lenders. Instead, in our data the correlation between the two types of terminations is 0.03, suggesting that the two phenomena are not generally driven by a common omitted variable.

We separate out those cases in which firms are terminated only by banks involved in M&As, but the firms borrow from multiple banks. The cases of termination only by merged banks should be less influenced by the potential problem of an unobserved change in creditworthiness if the firm has continuing relationships with other lenders. We construct a dummy variable, D , that is equal to 1 if the firm has a relationship terminated with a nonmerged bank,

and 0 otherwise. We replace the variable *SHM&ATER* with the two variables $TER1 = SHTERM\&A * D$ and $TER2 = SHTERM\&A * (1 - D)$ in the regression and drop all firm-years for which the number of lenders is equal to 1. The coefficient of *TER1* is negative and significant, and greater than 1 in absolute value. The second and third lags are negative, significant, and larger than the combined coefficient. The coefficient of *TER2* is -0.78 , and is statistically different from -1 . When all observations are included, the coefficient is -0.87 . The coefficients of the second and third lags are negative, but not significant. These results support the conjecture that even when M&As are followed by termination without any other bank severing the relationship, they are followed by a reduction in credit, though less persistent.

We test directly whether including a measure of future profitability could change the estimated effect of termination. We add to the regressors the contemporaneous and one-lead operating margin divided by total assets (*CASH-FLOW*) since it is the performance measure that should be influenced the least by the volume of bank credit that the firm has (leverage, *z*-score, etc., are directly affected by outstanding credit). Deterioration in credit quality would eventually show up in the balance sheet and income statement. The main results are unchanged.

Finally, we estimate a two-step model based on Heckman (1979). Following the method suggested by Wooldridge (1995) for fixed-effects panel data models, the probability of termination is estimated with a probit model on *SHBIDBK*, *SHTARBK*, *SHBOTH*, and the other control variables, plus the lagged number of bank relationships since firms with many relationships have a higher probability of termination. We estimate the probit separately on each yearly cross-section. In the second step the selection correction terms based on the Mills ratios and their lags are included in the credit equation, together with the variables *SHM&ATER*, *SHM&ANOT*, *SHNOM&AT*, and their lags. The variable *SHM&ATER* retains a negative and significant effect on credit for the first lag, with a coefficient of -0.94 . The second and third lags have negative but statistically insignificant coefficients. Termination without M&As maintains a negative coefficient, but is barely significant for the first and second lag. When only the contemporaneous correction terms for selection are included, the results are fully consistent with our main results, both in terms of economic magnitude and statistical significance. Relaxing the functional form assumption for the selection term and using a fourth-degree polynomial in the propensity score (see Heckman et al. (1998)), we obtain results that are fully consistent with our main findings.

IV. The Effect of M&As on Investment

Our second test focuses on the impact of bank M&As on investment and on the sensitivity of investment to cash flow. Bank M&As appear to have a negative impact on credit volumes but the economic magnitude of the effect is relatively small. Moreover, the negative effect of M&As on outstanding credit but not on credit lines is consistent with an increase in the cost of credit or in temporary

frictions in credit supply conditions, for example, new credit standards and longer approval procedures.

In the end, we wish to know whether the real decisions of firms are affected by changes in credit availability and/or the cost of credit following bank M&A shocks. If the observed reduction in credit reflects shifts in credit supply to the firm that are large enough to affect real decisions, we should observe an impact on the degree to which the firm is financially constrained. As suggested by the literature, firms that are more constrained in their access to external financing have a higher sensitivity of investment to the availability of internal funds (Fazzari, Hubbard, and Petersen (1988)). In the analysis below we estimate the effect of having one's lender(s) involved in M&As on the sensitivity of investment to cash flow.

A. The Empirical Model

In this section we modify equation (1) by replacing credit with the investment rate (investment flow divided by previous-year total assets) and adding a vector of interaction terms between the bank M&A variables and a proxy for cash flow. If bank M&As affect credit availability, the coefficients of the interaction terms should be statistically different from 0. Our approach is similar to Hoshi, Kashyap, and Scharfstein (1991).

We compare the same firms over time and relate changes affecting their lenders to (potential) changes in the firms' financing constraints. An advantage of using panel data is that we can control for variables that are relatively stable over the period considered for each firm and that are usually difficult to measure, for example, investment opportunities.

Specifically, we estimate the model

$$\begin{aligned}
 INVRATE_{it} = & \alpha + \sum_k \beta_k (L_{t-k}) SHBIDBK_{it-k} \\
 & + \sum_k \psi_k (L_{t-k}) SHTARBK_{it-k} + \sum_k \varphi_k (L_{t-k}) SHBOTH_{it-k} \\
 & + \sum_k \xi_k [(L_{t-k}) SHBIDBK_{it-k} * CASHFLOW_{it-k}] \\
 & + \sum_k \delta_k [(L_{t-k}) SHTARBK_{it-k} * CASHFLOW_{it-k}] \\
 & + \sum_k \theta_k [(L_{t-k}) SHBOTH_{it-k} * CASHFLOW_{it-k}] \\
 & + \gamma OTHERCONTROLS_i + x_i + z_t + e_{it}.
 \end{aligned} \tag{3}$$

The investment rate of firms (*INVRATE*) is computed as the ratio of gross fixed investment to total assets at the end of the previous year. We test hypotheses about the vectors ξ_k , δ_k , and θ_k being statistically different from 0. In equation (3) the sensitivity of investment to cash flow can differ between firms that experience bank consolidation and those that do not. If bank M&As increase financing constraints the investment–cash flow sensitivity should be

greater for firms whose lenders have been involved in M&As than for those whose banks have not.¹¹

The investment equation is estimated using within-group fixed effects and time dummy variables to control for changes in the user cost of capital under the assumption that such changes are the same for all firms.

B. Results

For the sake of brevity the results are not reported as most of the coefficients on the key variables are not significant. Consistent with the findings in the literature, investment increases with the availability of internally generated funds (*CASHFLOW*). The coefficient is equal to 0.05 for firms not borrowing from banks involved in M&As and is similar to the findings of Houston and James (2001) in the case of firms borrowing from multiple banks. Controlling for other characteristics, firms borrowing from banks involved in M&As either as bidders or targets have a higher investment rate in the year after the merger. A negative effect after 3 years obtains if the lender(s) is(are) a target.

Moreover, having one's lender(s) involved in M&As is associated with a reduction in the sensitivity of investment to cash flow in the year following the merger. The coefficient of the interaction term between the M&A shock variables and *CASHFLOW* is negative and statistically significant for the first lag. The economic magnitude of the differential effect is significant. At the sample mean of *SHBIDBK*_{*t*-1} (0.195) the cash flow sensitivity coefficient is 0.043, compared with 0.05 for firms whose lenders do not merge. At the sample mean of *SHTARBK*_{*t*-1} the sensitivity is 0.046, again smaller than the benchmark. An increase in sensitivity obtains in the case of the third lag of *SHBOTH*, but the coefficient is significant at the 10% level.

The coefficients of the other variables in the investment equations are generally consistent with the results in the literature. In particular, investment is positively related to the expansion of sales, as expected, and firms that are relatively larger, with higher leverage and a larger share of fixed assets tend to invest less most likely because they are older and have less unexploited investment opportunities.

The investment equation is estimated for the three subsamples of firms with higher switching costs, that is, greater asymmetric information problems. There are no significant effects of bank M&As on the investment sensitivity to cash flow in these subsamples. The coefficients measuring the sensitivity of investment to cash flow of small firms and of firms with few lenders (1–3 banks) are higher than for the full sample.¹²

¹¹ We recognize that a higher sensitivity of investment to cash flow cannot be unequivocally interpreted as a measure of financing constraint, as suggested by Kaplan and Zingales (2000). Nevertheless, our data are consistent with the prevailing findings in the literature, for example, that small firms have a higher sensitivity (see Hubbard (1998)).

¹² The coefficient decreases for firms with a large number of lenders, as expected, and becomes statistically insignificant. This suggests that those firms do not rely on internally generated funds to finance investment (not shown).

One potential explanation for the absence of statistically significant effects could be that our subsamples are mixing firms that are constrained with firms that have access to other financial resources or that are generally not financially constrained. We further restrict the sample to firms that should already be constrained before the bank M&As, keeping those that are in the top 20% of the distribution of leverage in the first year they appear in the sample. Even in this case, we do not find any effect of bank M&As.

C. Relationship Termination and Investment

Finally, we estimate equation (3), replacing the bank M&A variables with the relationship termination variables. The results are consistent with those above. Firms that face relationship termination with merging banks appear to be unaffected. Firms whose relationships are severed by banks that do not merge invest less after 2 years but the negative effect vanishes thereafter. The first two interaction terms are positive but not significant, whereas the third is negative and nearly insignificant by standard levels. Firms whose lenders merge but do not interrupt the relationship have a lower sensitivity of investment to cash flow after 1 year, and no effect in the following years.

Relationship termination affects small firms only marginally, as shown by the positive and statistically significant coefficient of the interaction term between *CASHFLOW* and the second lag of *SHNOM&AT*. However, the effect is temporary. The coefficients of the interactions with termination by merged banks are positive but not significant, suggesting that either these firms are able to find other sources of funding or relationship termination could be the result of the firm's decision. Finally, no effect is found in the data for high credit risk borrowers and for those that have one to three lenders. In conclusion, there is no robust evidence of an increase in financing constraints on investment following the involvement of a firm's lender in M&As.

V. Concluding Remarks

We study the impact and medium-term effect of bank M&As on both firm-level credit volumes and the sensitivity of investment to cash flow. The analysis shows that corporate borrowers experience a reduction in outstanding credit that is around 8–10% of the pre-merger share of credit borrowed from the banks that merged. Relationship termination has a larger adverse impact on credit volumes, specifically, a reduction in credit of around 100% of the amount issued under the interrupted relationship. The effects of the M&A shocks last 3 years. Because of multiple lending, the average share of credit borrowed from each bank is small in our data, as is the economic effect of M&As. We do not find any evidence of effects of bank M&As on firm investment or on the sensitivity of investment to internally generated funds.

The results are consistent with consolidation in the banking industry being a source of temporary shocks to corporate borrowers' credit supply, especially when M&As are followed by termination of some relationships, possibly reflecting frictions in credit markets.

REFERENCES

- Altman, Edward I., Giancarlo Marco, and Franco Varetto, 1994, Corporate distress diagnosis: Comparisons using linear discriminant analysis and neural networks (the Italian experience), *Journal of Banking and Finance* 18, 505–529.
- Amel, Dean, Colleen Barnes, Fabio Panetta, and Carmelo Salleo, 2004, Consolidation and efficiency in the financial sector: A review of the international evidence, *Journal of Banking and Finance* 28, 2493–2519.
- Berger, Allen N., Rebecca E. Demsetz, and Philip E. Strahan, 1999, The consolidation of the financial services industry: Causes, consequences, and implications for the future, *Journal of Banking and Finance* 23, 135–194.
- Berger, Allen N., Anil K. Kashyap, and Joseph M. Scalise, 1995, The transformation of the U.S. banking industry: What a long, strange trip it's been, *Brookings Papers on Economic Activity* 2, 55–218.
- Berger, Allen N., Leora F. Klapper, and Gregory F. Udell, 2001, The ability of banks to lend to informationally opaque small businesses, *Journal of Banking and Finance* 25, 2127–2167.
- Berger, Allen N., Richard J. Rosen, and Gregory F. Udell, 2005, The effects of market size structure on competition: The case of small business lending, Unpublished manuscript, Federal Reserve Board.
- Berger, Allen N., A. Saunders, J. M. Scalise, and Gregory F. Udell, 1998, The effects of bank mergers and acquisitions on small business lending, *Journal of Financial Economics* 50, 187–229.
- Berger, Allen N., and Gregory F. Udell, 1995, Relationship lending and lines of credit in small firm finance, *Journal of Business* 68, 351–382.
- Berger, Allen N., Nathan H. Miller, Mitchell A. Petersen, Raghuram G. Rajan, and Jeremy C. Stein, 2005, Does function follow organizational form? Evidence from the lending practices of large and small banks, *Journal of Financial Economics* 76, 237–269.
- Calomiris, Charles W., and Jason Karceski, 2000, Is the bank merger wave of the 1990s efficient? Lesson from nine case studies, in Steven N. Kaplan, ed. *Mergers and Productivity* (University of Chicago Press/NBER).
- Cole, Rebel A., Lawrence G. Goldberg, and Lawrence J. White, 2004, Cookie cutter vs. character: The micro structure of small business lending by large and small banks, *Journal of Financial and Quantitative Analysis* 39, 227–252.
- Degryse, Hans, Nancy Masschelein, and Janet Mitchell, 2005, SMEs and bank lending relationships: The impact of mergers, CEPR Discussion Paper no. 5061 (Centre for Economic Policy Research, London).
- Degryse, Hans, and Patrick Van Cayseele, 2000, Relationship lending within a bank-based system: Evidence from European small business data, *Journal of Financial Intermediation* 9, 90–109.
- Dell'Ariccia, Giovanni, Ezra Friedman, and Robert Marquez, 1999, Adverse selection as a barrier to entry in the banking industry, *RAND Journal of Economics* 30, 515–534.
- Fazzari, Steven M., R. Glenn Hubbard, and Bruce C. Petersen, 1988, Financing constraints and corporate investment, *Brookings Papers on Economic Activity* 1, 141–195.
- Group of Ten, 2001, *Report on the consolidation in the financial sector* (Bank for International Settlements, Basel, Switzerland).
- Harhoff, Dietmar, and Timm Körting, 1998, Lending relationships in Germany—Empirical evidence from survey data, *Journal of Banking and Finance* 22, 1317–1353.
- Heckman, James J., 1979, Sample selection bias as a specification error, *Econometrica* 47, 153–161.
- Heckman, James J., Hidehiko Ichimura, Jeffrey Smith, and Petra Todd, 1998, Characterizing selection bias using experimental data, *Econometrica* 66, 1017–1098.
- Hoshi, Takeo, Anil K. Kashyap, and David S. Scharfstein, 1991, Corporate structure, liquidity, and investment: Evidence from Japanese industrial groups, *Quarterly Journal of Economics* 106, 33–60.
- Houston, Joel F., and Christopher M. James, 2001, Do relationships have limits? Banking relationships, financial constraints and investment, *Journal of Business* 74, 347–374.

- Houston, Joel F., Christopher M. James, and Michael D. Ryngaert, 2001, Where do merger gains come from? Bank mergers from the perspective of insiders and outsiders, *Journal of Financial Economics* 60, 285–331.
- Hubbard, R. Glenn, 1998, Capital market imperfections and investment, *Journal of Economic Literature* 36, 193–224.
- Jayaratne, Jith, and John D. Wolken, 1999, How important are small banks to business lending? New evidence from a survey of small firms, *Journal of Banking and Finance* 23, 427–458.
- Kang, Jun-Koo, and Rene M. Stulz, 2000, Do banking shocks affect borrowing firm performance? An analysis of the Japanese experience, *Journal of Business* 73, 1–23.
- Kaplan, Steven N., and Luigi Zingales, 2000, Investment-cash flow sensitivities are not valid measures of financing constraints, *Quarterly Journal of Economics* 115, 707–712.
- Karceski, Jason, Steven Ongena, and David C. Smith, 2005, The impact of bank consolidation on commercial borrower welfare, *Journal of Finance* 60, 2043–2082.
- Myers, Stewart C., 1977, The determinants of corporate borrowing, *Journal of Financial Economics* 5, 147–175.
- Ongena, Steven, David C. Smith, and Dag Michalsen, 2000, Firms and their distressed banks: Lessons from the Norwegian banking crisis, *Journal of Financial Economics* 67, 81–112.
- Peek, Joe, and Eric S. Rosengren, 1998, Bank consolidation and small business lending: It's not just bank size that matters, *Journal of Banking and Finance* 22, 799–819.
- Petersen, Mitchell A., and Raghuram G. Rajan, 1995, The effect of credit market competition on lending relationships, *Quarterly Journal of Economics* 110, 407–443.
- Rhoades, Stephen A., 1998, The efficiency effects of bank mergers: An overview of case studies of nine mergers, *Journal of Banking and Finance* 22, 273–291.
- Sapienza, Paola, 2002, The effects of banking mergers on loan contracts, *Journal of Finance* 57, 329–368.
- Sharpe, Steven A., 1990, Asymmetric information, bank lending and implicit contracts: A stylized model of customer relationships, *Journal of Finance* 45, 1069–1087.
- Stein, Jeremy, 2002, Information production and capital allocation: Decentralized versus hierarchical firms, *Journal of Finance* 57, 1891–1921.
- Strahan, Philip E., and James P. Weston, 1998, Small business lending and the changing structure of the banking industry, *Journal of Banking and Finance* 22, 821–845.
- Wooldridge, Jeffrey, 1995, Selection corrections for panel data models under conditional mean independence assumptions, *Journal of Econometrics* 68, 115–132.

Globalization of Financial Institutions: Evidence from Cross-Border Banking Performance

Allen N. Berger

Board of Governors of the Federal Reserve System
and Wharton Financial Institutions Center

Robert DeYoung

Federal Reserve Bank of Chicago

Hesna Genay

Federal Reserve Bank of Chicago

Gregory F. Udell

Kelley School of Business, Indiana University

Abstract

We address the causes, consequences, and implications of the cross-border consolidation of financial institutions by reviewing several hundred studies, providing comparative international data, and estimating cross-border banking efficiency in France, Germany, Spain, the U.K., and the U.S. during the 1990s. We find that, on average, domestic banks have higher profit efficiency than foreign banks. However, banks from at least one country (the U.S.) appear to operate with relatively high efficiency both at home and abroad. If these results continue to hold, they do not preclude successful international expansion by some financial firms, but they do suggest limits to global consolidation.

Key words: Banks, Mergers, Small businesses, X-efficiency, International Finance.

This paper can be downloaded from the
Social Science Research Network Electronic Paper Collection:
http://papers.ssrn.com/paper.taf?abstract_id=203509

**Globalization of Financial Institutions:
Evidence from Cross-Border Banking Performance**

Allen N. Berger
Board of Governors of the Federal Reserve System
Washington, DC 20551 U.S.A.
and
Wharton Financial Institutions Center
Philadelphia, PA 19104 U.S.A.

Robert DeYoung *
Federal Reserve Bank of Chicago
Chicago, IL 60604 U.S.A.

Hesna Genay
Federal Reserve Bank of Chicago
Chicago, IL 60604 U.S.A.

Gregory F. Udell
Kelley School of Business, Indiana University
Bloomington, IN 47405 U.S.A.

Forthcoming in:
Brookings-Wharton Papers on Financial Services, Vol. 3, 2000.

JEL classification codes: G21, G28, G34, E58, L89

Key words: Banks, Mergers, Small businesses, X-efficiency, International Finance.

The opinions expressed do not necessarily reflect those of the Federal Reserve Board, the Chicago Reserve Bank, or their staffs. The authors thank Bob McCormack and Raghu Rajan for insightful discussants' comments; Charles Calomiris, Ed Ettin, Bob Litan, Tony Santomero, and other participants at the Brookings-Wharton conference and seminars at Purdue University and the Federal Reserve Bank of Kansas City for their clarifying remarks; Emilia Bonaccorsi, Nicola Cetorelli, Gayle DeLong, Michel Dietsch, Carmine Di Noia, Larry Goldberg, Iftekhar Hasan, Ana Lozano-Vivas, Loretta Mester, Laurence Meyer, Stewart Miller, Phil Molyneux, Darren Pain, Jose Pastor, Rudi Vander Vennet, Ingo Walter, and Juergen Weigand for invaluable help with the preparation of this article; and Kelly Bryant, Portia Jackson, Rita Molloy, and Ozlen Savkar for outstanding research assistance.

* Please address all correspondence to Robert DeYoung, Economic Research Department, Federal Reserve Bank of Chicago, 230 South LaSalle Street, Chicago, IL 60604, 312-322-5396 (voice), 312-322-2357 (fax), robert.deyoung@chi.frb.org.

**Globalization of Financial Institutions:
Evidence from Cross-Border Banking Performance**

Abstract

We address the causes, consequences, and implications of the cross-border consolidation of financial institutions by reviewing several hundred studies, providing comparative international data, and estimating cross-border banking efficiency in France, Germany, Spain, the U.K., and the U.S. during the 1990s. We find that, on average, domestic banks have higher profit efficiency than foreign banks. However, banks from at least one country (the U.S.) appear to operate with relatively high efficiency both at home and abroad. If these results continue to hold, they do not preclude successful international expansion by some financial firms, but they do suggest limits to global consolidation.

1. Introduction

Mergers and acquisitions among very large financial institutions are becoming more frequent in markets around the world, attracting the attention of policy makers, researchers, and the financial press, and continually reshuffling the rankings of the world's largest financial service firms. Most of these "megamergers" have combined commercial banking organizations within a single nation. In the U.S., recent mergers and acquisitions (M&As) between large banking organizations — such as BankAmerica-NationsBank, Banc One-First Chicago and Norwest-Wells Fargo — rank among the largest M&As in terms of market values in any industry in U.S. history. In Europe, megamergers like UBS-Swiss Bank Corp. are similarly creating giant banking organizations that are well in excess of the sizes of the world's largest banks of just a few years past. In Japan, the three-way combination of Fuji Bank, Dai-Ichi Kangyo Bank, and Industrial Bank of Japan is creating the world's first trillion dollar bank.

More to the point of this paper, there is also a trend toward cross-border M&As between large financial service firms in different nations. These cross-border M&As often involve large universal-type institutions that provide multiple types of financial services in multiple nations. One prominent example is the Deutsche Bank-Bankers Trust megamerger, which provided a leading European universal bank greater access to wholesale commercial and investment banking resources in the U.S. In Europe, there has been considerable cross-border consolidation of all types of financial institutions following substantial deregulation of cross-border economic activity in both financial and nonfinancial markets. For the securities and insurance industries, the market values of cross-border M&As involving European financial institutions have actually exceeded the values of within-nation M&As in recent years (Berger, Demsetz, and Strahan 1999).

The increased M&A activity raises important research and policy questions about the causes and consequences of consolidation and the future structure of the financial services industry. There is an extensive research literature on the motives for and consequences of consolidation, covering efficiency, market power, and managerial topics. Presumably, much of the increase in consolidation represents market responses to deregulation that made it more possible and less costly to consolidate, such as the Riegle-Neal Act in the U.S. and the Single Market Programme in the European Union (EU). Future consolidation may be motivated by recent policy changes, such as the Gramm-Leach-Bliley Act in the U.S. and monetary union in the EU. These policy changes may precipitate further consolidation of large institutions, with important social consequences for systemic risk,

the safety net, monetary policy, etc., as well as for efficiency and market power in the financial services industry.

In this paper, we address these issues in three main ways. First, we extensively review several hundred research studies on the causes and consequences of consolidation, covering the topics of efficiency, market power, managerial, and government motives and consequences. Second, we provide a number of relevant descriptive statistics, including data comparing financial systems in different nations, information on cross-border provision of financial services through both cross-border lending and the establishment of physical presences in foreign nations, and the market values of within-nation and cross-border M&As. The literature review and descriptive statistics are intended in part to provide reference material to promote future research. Third, we analyze cross-border banking efficiency in five home countries. This analysis is designed to address our main hypotheses (described below) about cross-border banking efficiency, and which may help foretell the extent to which global financial institutions may penetrate financial markets around the world.

For our purposes, we broadly define the efficiency effects of consolidation to include any cost, revenue, or risk factors that affect shareholder value other than changes in the exercise of market power in setting prices. While we acknowledge the importance of factors other than efficiency in consolidation decisions, our approach reflects a presumption that cross-border consolidation is sustainable in the long-run only if it increases efficiency or does not reduce efficiency substantially. In this framework, we expect that foreign-owned institutions would be at least as efficient on average as domestic institutions. Efficiently managed organizations would gain shares in foreign markets and export their superior skills or policies and procedures to other nations. However, the empirical evidence in the literature (and in our own analysis below) typically finds the opposite result – foreign institutions are generally less efficient than domestic institutions. We analyze what is underlying this mysterious finding by developing and testing two main hypotheses, the *home field advantage* hypothesis versus the *global advantage* hypothesis.

Under the *home field advantage* hypothesis, domestic institutions are generally more efficient than institutions from foreign nations. This advantage could occur in part because of organizational diseconomies to operating or monitoring an institution from a distance. Operating problems could include turf battles between staff in different nations or high costs and turnover in persuading managers to work abroad. Monitoring problems may make it difficult to evaluate the behavior and effort of managers in a distant market or make it difficult to determine how well they are performing relative to other institutions in that market. Organizational diseconomies

may also make it difficult to establish and maintain some retail deposit relationships with households or lending relationships with small and mid-sized enterprises, because such accounts may require local information and a local focus. The home field advantage could also occur in part because of barriers other than distance, including differences in language, culture, currency, regulatory and supervisory structures, other country-specific market features, bias against foreign institutions, or other explicit or implicit barriers. The home field advantage may be manifested as disadvantages to foreign banks in terms of higher costs of providing the same financial services or lower revenues from problems in providing the same quality and variety of services as domestic institutions.

Under the *global advantage hypothesis*, some efficiently managed foreign institutions are able to overcome these cross-border disadvantages and operate more efficiently than the domestic institutions in other nations. These organizations may have higher efficiency when operating in other nations by spreading their superior managerial skills or best-practice policies and procedures over more resources, lowering costs. They may also raise revenues through superior investment or risk management skills, by providing superior service quality/variety that some customers prefer, or by obtaining diversification of risks that allows them to undertake higher risk-higher expected return investments.

We consider two forms of the global advantage hypothesis. Under the general form, efficiently managed foreign banks headquartered in many nations are able to overcome any cross-border disadvantages and operate more efficiently than domestic banks in other nations. Under the limited form of the hypothesis, only the efficient institutions in one or a limited number of nations with specific favorable market or regulatory/supervisory conditions in their home countries can operate more efficiently than domestic institutions in other nations. Home country favorable market conditions may include stiff product market competition that provides a proving ground for efficient organizations, an active market for corporate control that prevents cross-border consolidation that reduces shareholder value, access to a well-developed securities market that allows for exploitation of scope efficiencies, or access to an educated labor force with the ability to adapt to new technologies, new financial instruments, and new techniques for risk management. Favorable regulatory/supervisory conditions may include access to universal banking powers to offer multiple types of financial services, or relatively relaxed prudential regulation/supervision or strong safety net guarantees that allow the organizations to undertake high risk-high expected return financial strategies. Alternatively, relatively tough home supervision/regulation may give some institutions global advantages by certifying their quality or reducing the risks of their contractual counterparties.

As will be seen, distinguishing empirically between the two forms of the global advantage hypothesis is an important key to unlocking the mystery of why foreign institutions are on average less efficient than domestic institutions and to determining why prior studies may have drawn a starkly different conclusion from our conclusion given below.

We test the hypotheses using data from five home countries – France, Germany, Spain, the UK, and the U.S. – countries for which data on a significant number of foreign-owned commercial banks are available. We also extend our analysis by including foreign banks from other nations such as Canada, Italy, Japan, the Netherlands, South Korea, and Switzerland. For each home country, we estimate separate cost and profit frontiers from which we estimate domestic and foreign bank efficiency. The hypothesis tests compare the mean domestic bank efficiency against the mean efficiency of banks from each foreign nation.

This empirical approach improves upon prior cross-border tests of the home field advantage versus global advantage hypothesis, which either a) examined foreign and domestic efficiency in only one country, which cannot alone distinguish between the hypotheses because the institutions from that home country might have a global advantage, b) did not distinguish among nations of foreign ownership, which cannot test the limited form of the global advantage hypothesis, and/or c) combined data from different home countries to estimate efficiency jointly or pooled the efficiency estimates from banks in the several countries, which creates problems of comparison because of significant differences in the market and regulatory/supervisory environments of these nations. None of the prior studies have all three of these drawbacks, but all have at least one to our knowledge. We address these drawbacks by a) examining the efficiency of foreign and domestic banks in five different home countries, rather than one; b) distinguishing among nations of origin of foreign institutions to test the limited form of the global advantage hypothesis; and c) conducting completely separate analyses of data from banks located in different countries to avoid problems created by differences in economic environments. While our method taxes the availability of the data by relying on smaller sample sizes, it better allows us to distinguish among the hypotheses we are testing.

1.1 An overview of the paper

Section 2 presents some background information, including trends in cross-border provision of financial services, regulatory changes that have fostered cross-border consolidation, and trends in cross-border M&As. By way of preview, the data indicate that commercial banks and other depositories remain a primary source of firm

finance in most industrialized nations; that cross-border flows of bank finance remain large relative to cross-border issues of debt and equity securities; and that cross-border M&As of financial institutions have been increasing in recent years.

Section 3 reviews the extant research evidence on the efficiency motives and consequences of cross-border consolidation of financial institutions. By way of preview, the extensive prior research suggests very few strong conclusions regarding the efficiency effects of cross-border consolidation. The scale, scope, and product mix efficiency literatures provide very little information on cross-border performance, which may differ from the scale, scope, and mix effects within a single nation. The X-efficiency research is more promising, but also does not provide solid evidence on the hypotheses. The literatures on the X-efficiency effects of M&As, international comparisons of X-efficiency, and the X-efficiency effects of deregulation all have various deficiencies for examining cross-border efficiency. The literature on the X-efficiencies of foreign versus domestic institutions within a single nation — the most important type of evidence in our opinion for evaluating our hypotheses — also has some drawbacks in implementation, which are addressed in our empirical analysis in Section 5.

Section 4 reviews extant research evidence on non-efficiency motives for and consequences of cross-border consolidation. By way of preview, the literature suggests that market power motives, managerial motives, and governmental motives all play important roles in consolidation decisions and outcomes. Perhaps most significant, the consolidation of financial institutions appears to occur frequently in response to government deregulation that makes M&As more possible and/or less costly to consummate.

Section 5 reports our tests of the home field advantage and global advantage hypotheses for cross-border bank ownership in the five home countries noted earlier. By way of preview, we find that domestic banks generally have higher cost and profit efficiency than foreign banks on average, although these differences are not always statistically significant. This is consistent with most of the findings in the extant literature, where it has been interpreted as supporting the home field advantage hypothesis. However, we do **not** draw this same conclusion. Rather, by digging deeper and disaggregating the results by foreign nation of origin, we find that the data appear to reject the home field advantage hypothesis in favor of the limited form of the global advantage hypothesis. These results, should they continue to hold in the future, may have important implications for the future structure of financial markets. The finding that foreign banks are less efficient on average than domestic banks suggests that efficiency considerations may limit the global consolidation of the financial services industry

and leave substantial market shares for domestic institutions. However, our finding in favor of the limited form of the global advantage hypothesis also suggests that additional cross-border consolidation may be in the offing, and that financial institutions from some countries may capture disproportionate shares of global market.

Section 6 summarizes our main results, draws conclusions based on the results, qualifies the conclusions with a number of caveats, and suggests directions for future research. Appendix 1 contains a comparative overview of structure of credit markets in major industrialized nations.

2. Some background on cross-border financial services and institutions

This section provides a backdrop for our investigation of the cross-border consolidation of the financial services industry. We begin with a brief discussion of recent trends in the cross-border provision of financial services. Next, we examine deregulation that has reduced impediments to cross-border ownership of financial institutions. Finally, we investigate whether M&As of financial institutions have increased in the wake of this deregulation.

2.1 Trends in cross-border provision of financial services

One of the factors motivating cross-border consolidation of financial institutions may be the increase in the general level of economic integration across national borders. Reductions in trade barriers, declines in transportation costs, and advancements in communications technology in recent years have led to an acceleration of international economic integration. International transactions in goods and services account for an ever increasing fraction of the world economy. For example, trade in goods increased from 21% of world GDP in 1987 to 30% by 1997 (World Bank, 1999).

The recent increase in international commerce has created a demand for international financial services. A financial institution can use a variety of channels to deliver financial services to a business customer in a foreign country. The institution can provide the services directly to the foreign business from its home country headquarters. The institution can participate in a syndicate that finances a large loan or securities issue that is originated by another financial institution that is located in the foreign country. Finally, the institution can obtain a physical presence in the foreign country (by acquiring a financial institution there or by opening a branch or subsidiary) and provide the service in the foreign country.

This latter of these distribution channels — establishing a physical presence — entails a number of costs, such as the organizational diseconomies to operating or monitoring an institution from a distance or other cross-

border disadvantages. However, establishing a physical presence in the foreign country offers some potentially offsetting advantages, including a) more effective servicing and monitoring of retail customers, and b) an opportunity to compete for retail and wholesale customers in the foreign country. As shown in subsection 2.3 below, recent deregulation has reduced the costs of this delivery channel.

Securities markets also reflect the trend toward globalization. International issues of debt securities, equity securities, and cross-border flows of bank funds have all increased in recent years. From 1993 through 1998, international bonds (bonds issued by foreign residents plus Eurobond issues) increased from a little over \$1.3 trillion to over \$2.6 trillion, which doubled from 8% to 16% the share of international bonds to total bonds outstanding in world markets. (All data in this paragraph are from BIS, 1999, and are stated in terms of 1982 dollars for purposes of comparisons.) International equity issues have also increased substantially, from less than \$50 billion in 1996 to over \$70 billion in 1998 in real terms. Despite these increases, the international flow of bank funds remains at least as large as international bond issues, and is substantially larger than international equity issues. For example, in 1998 international syndicated loan facilities totaled \$574 billion, compared to about \$413 billion for net debt security issues and a little over \$70 billion of international equity issues. Similarly, the international assets of banks reporting to the BIS totaled nearly \$7 trillion in 1998, compared to the \$2.63 trillion of international debt securities mentioned above. In other words, banks are the largest conduit of international flows of capital.

2.2 Regulatory changes that have fostered the consolidation of financial institutions

The deregulation of geographic restrictions and the harmonization of regulatory and supervisory environments have provided important boosts to the consolidation of financial institutions. A sequence of laws over the past two decades, often referred to as the Single Market Programme, has made it more possible and less costly for financial institutions to operate across national borders within the EU. The First Banking Co-ordination Directive of 1977 created a framework for establishing a single banking market across the Member States of the EU. The First Directive established minimum requirements for authorizing credit institutions; it introduced (but did not implement) the concept of ‘national treatment’ by which a foreign branch would be subject to the banking restrictions of its home country rather than the host country; it forbade host countries from denying entry of a foreign bank on the basis of ‘economic need’; and it began the process of unifying prudential regulations across the Member States. The Single European Act of 1986 in effect created a single uninterrupted economic

marketplace stretching across the EU. It went into effect in February 1992, and eliminated all physical, legal, and technical barriers to the cross-border movement of labor, goods, services, and (importantly for financial institutions) capital. The Second Banking Co-ordination Directive of 1989 liberalized the trade of financial services across EU borders. It introduced a single banking license valid throughout the EU; limited branching and product mix restrictions to those imposed by a bank's home country regulators; ended the practice of requiring cross-border branches to hold extra-normal levels of capital; and harmonized minimum capital requirements across countries (although for purposes of monetary policy and prudential regulation it allowed host countries to set liquidity ratios). Importantly, the Second Directive made universal banking the norm in the EU by default: any nation not allowing these powers risked putting its own banks at a competitive disadvantage. The Second Directive was implemented in 1993 and 1994. At the same time, a series of directives was introduced to achieve a European single securities market and to establish a 'single passport' for investment firms (Benink, 1993; Molyneux, Altunbas, and Gardner, 1995).

In the U.S., a series of less well-coordinated deregulatory actions has enabled increased consolidation of financial institutions. In the 1980s, most of the individual states began to pass laws permitting out-of-state bank holding companies to enter into their state via acquisition of an existing bank. These state rule changes, which were often extended only on a reciprocal basis to banking companies in states with similar laws, gradually eroded the existing federal restrictions on interstate banking. The Riegle-Neal Act of 1994 eliminated most of the remaining restrictions on interstate banking and branching and thus legitimized and extended the state rule changes. Riegle-Neal was fully implemented in June 1997, although some states opted-in early and other states enacted legislation to temporarily delay its implementation. Riegle-Neal did for geographic expansion in the U.S. what the Second Directive did for geographic expansion in the EU, but until recently, U.S. banking laws still forbade most types of universal banking. Over time, however, the restrictions on separation of commercial banking from securities and insurance activities were gradually eroding. For example, the Federal Reserve began allowing commercial bank holding companies to underwrite corporate debt and equity on a restricted basis through Section 20 affiliates in 1987. The initial revenue limit from this underwriting was raised from 5% of the subsidiary's total revenue to 10% in 1989 and to 25% in 1996. The recently passed Gramm-Leach-Bliley Act of 1999 effectively removed many of the remaining restrictions on combining commercial banking, securities underwriting, and insurance in consolidated organizations.

2.3 Trends in cross-border M&As of financial institutions

Figures 2.1 and 2.2 display the aggregate value (purchase price in 1998 dollars) of financial institution M&As in the U.S. and the EU from 1986 to 1998 (two-year moving averages). The figures include M&As both between and among commercial banks, insurance companies, and securities firms.¹ The figures show the annual trends for three different types of M&As. In Figure 2.1, domestic M&As are combinations of two institutions within the U.S., entry M&As are acquisitions of U.S. firms by non-U.S. firms, and expansion M&As are acquisitions of non-U.S. firms by U.S. firms. In Figure 2.2, the corresponding items are intra-EU M&As, entry M&As, and expansion M&As.

The figures reveal three similarities between the U.S. and the EU M&A trends. First, the value of domestic or Intra-EU M&As has generally exceeded the value of cross-border (entry and/or expansion) M&As. Second, the values of all three types of M&As have generally increased over time. Third, the value of cross-border M&As has increased disproportionately in recent years. However, there are some differences in exact timing and detail across the two figures, and these differences are broadly consistent with the differences in regulatory history and more recent changes in regulation.

The U.S. trends are dominated by domestic M&As throughout, reflecting the state and federal interstate banking rule changes during the 1980s and 1990s. The large jump at the end of the U.S. domestic M&A time series is attributable primarily to a small number of very large M&As (e.g., Citicorp-Travelers, BankAmerica-NationsBank, Banc One-First Chicago and Norwest-Wells Fargo). Cross-border M&As involving U.S. financial institutions increased substantially since the mid-1990s, although they are still small relative to domestic M&As.

M&A activity in the EU was virtually nil at the start of our sample period, but began to increase rapidly around 1987. The value of intra-EU M&As began to decline around 1992, and then increased again in the late 1990s. The two inflection points (1987 and 1992) correspond roughly with the passage and implementation of the Single Europe Act and the Second Banking Directive. Entry and expansion M&As involving EU institutions was very small for most of the sample, but took off in the mid-1990s. By the end of the sample period, the value of international M&As into and out of the EU was on a par with the value of intra-EU M&As.²

3. The motives for and consequences of cross-border consolidation: Efficiency factors

Different economic agents have different motives in consolidation decisions. Shareholders may engage in cross-border consolidation activity in order to maximize value by improving the financial institution's efficiency

and/or increasing their market power in setting prices. Cross-border consolidation may also be driven by the personal motives of professional managers when corporate governance structures do not sufficiently align managerial incentives with those of shareholders. In addition, governments often play important roles in constraining or encouraging cross-border consolidation activity by changing the explicit or implicit regulatory or supervisory limits on consolidation, by directly approving or disapproving individual M&As, or by providing M&A assistance during periods of financial crisis. Consistent with the roles played by shareholders, managers, and governments, we divide our review of the motives for and consequences of cross-border consolidation of financial institutions into four categories: efficiency, market power, managerial, and government. In this section, we review the extant evidence on efficiency as it relates to cross-border consolidation. We review the evidence on the latter three categories in Section 4 below.

We define efficiency improvements from consolidation in the broadest possible terms here to include any effects that increase the consolidating firms' existing shareholder value other than increasing the exercise of market power in setting prices. This definition includes the possibility that cross-border consolidation may allow the institutions to achieve a superior scale, scope, or mix of output. Cross-border consolidation may also be associated with changes in managerial behavior or organizational focus that increase shareholder value by improving X-efficiency. To the extent that cross-border consolidation improves scale, scope, product mix, or X-efficiency, the global advantage hypothesis may be supported and to the extent that cross-border consolidation decreases these different types of efficiency, the home field advantage hypothesis may be supported. As will be demonstrated, one type of efficiency analysis — the X-efficiency of foreign versus domestic institutions within the same country — is particularly relevant for testing our two main hypotheses.

3.1 Scale, scope, and product mix efficiency

Efficiency gains from exploiting scale economies is often cited as a motivation for financial institution consolidation. Potential improvements in scope and product mix efficiencies may also be a motivating factor, particularly for universal-type consolidation. We consider cost (scale, scope, and product mix) efficiencies first, followed by revenue efficiencies, and finally efficiencies related to the risk-expected return tradeoff.

3.1.1 Cost scale, scope, and product mix efficiency

Practitioners often refer to the need for large scale to reduce average costs to competitive levels. However, most of the research on bank scale economies found that the average cost curve had a relatively flat U-

shape with medium-sized banks being slightly more cost scale efficient than either large or small banks. Average costs were usually found to be minimized somewhere in the wide range between about \$100 million and \$10 billion in assets (Hunter and Timme 1986, Berger, Hanweck, and Humphrey 1987, Ferrier and Lovell 1990, Hunter, Timme, and Yang 1990, Noulas, Ray, and Miller 1990, Berger and Humphrey 1991, Mester 1992b, Bauer, Berger, and Humphrey 1993, Clark 1996). Similar U-shaped average cost curves or conflicting cost scale results were found for securities firms (Goldberg, Hanweck, Keenan, and Young 1991) and insurance companies (Grace and Timme 1992, Yuengert 1993, Gardner and Grace 1993, Hanweck and Hogan 1996, Rai 1996, Toivanen 1997, McIntosh 1998, Cummins and Zi 1998).³ These findings generally suggest no cost scale efficiency gains and possibly cost scale efficiency losses from further consolidation of the type of large institutions typically involved in international activity. Consistent with this, a recent study that simulated pro forma M&As between large banks in different nations in the EU found that these M&As were more likely to increase costs than to decrease them (Altunbas, Molyneux, and Thornton 1997).

Most of this research used data on financial institutions from the 1980s, and it is possible that recent technological progress may have increased scale economies in producing financial services, creating opportunities to improve cost scale efficiency through consolidation, even for large institutions. The tools of financial engineering, such as derivative contracts, off-balance-sheet guarantees, and risk management may be more efficiently exploited by large institutions. In addition, financial and regulatory innovations in securities activities (such as 144A private placements and the shift toward bought deals in underwriting) may be relevant only for large commercial and investment banks.⁴ Moreover, some new delivery methods for customer services, such as Internet banking, phone centers, and ATMs, and may also exhibit greater economies of scale than traditional branching networks (Radecki, Wenninger, and Orlow 1997). As well, advances in payments technology may also have created scale economies in back-office operations and network economies that may be more easily exploited by large institutions (Bauer and Hancock 1993, Bauer and Hancock 1995, Bauer and Ferrier 1996, Hancock, Humphrey, and Wilcox 1999). Consistent with these arguments, some recent research on bank cost scale efficiency using data from the 1990s suggests that there may be substantial scale economies even at larger bank sizes, possibly due in part to technological progress (Berger and Mester 1997). An important caveat is that these technologies embodying scale economies may currently or in the future be accessed at low cost by small institutions through franchising or outsourcing to firms specializing in the technologies or through shared access

to networks.

There have been a number studies of cost scope and product mix efficiencies of providing multiple products within a single type of financial institution, e.g., providing deposits and loans within a commercial bank. Scope efficiencies are often difficult to estimate because there are usually no specializing firms in the data sample, creating extrapolation problems for evaluating costs of hypothetical specializing firms with zero outputs for some products. As a result, many studies use measures of product mix efficiencies that evaluate at points near zero outputs or use concepts such as expansion-path subadditivity which combine scale and product mix efficiencies. Although there are exceptions, these studies usually found very little evidence of substantial cost scope or product mix economies or diseconomies within the banking, securities, or insurance industries (Kellner and Mathewson 1983, Berger, Hanweck, and Humphrey 1987, Mester 1987, 1993, Hunter, Timme, and Yang 1990, Berger and Humphrey 1991, Goldberg, Hanweck, Keenan, and Young 1991, Grace and Timme 1992, Ferrier, Grosskopf, Hayes, and Yaisawarng 1993, Hanweck and Hogan 1996, Noulas, Miller, and Ray 1993, Pulley and Humphrey 1993, Rai 1996, Toivanen 1997, Meador, Ryan, and Shellhorn 1998, Berger, Cummins, Weiss, and Zi 1999).

For cross-border consolidation, it is particularly important to evaluate the scope and product mix efficiencies of universal-type institutions -- i.e., the effects of combinations among commercial banks, securities firms, and insurance companies -- because the institutions engaging in cross-border consolidation are often of this type. Cost economies from universal-type combinations may be realized from sharing physical inputs like offices or computer hardware; employing common information systems, investment departments, account service centers, or other operations; obtaining capital by issuing public or private debt and/or equity in larger issue sizes that reduce the impact of fixed costs; or reusing managerial expertise or information. For example, a consolidated commercial bank and insurer may lower total costs by cross-selling, using each other's customer data base at a lower cost than building and maintaining two data bases. Similarly, information reusability (Greenbaum, Kanatas, and Venezia 1989) may reduce costs when a universal bank acting as an underwriter conducts due diligence on a customer with whom it has had a lending or other relationship (Rajan 1996). The evidence on the underwriting activities of Section 20 subsidiaries of U.S. bank holding companies (BHCs) is consistent with this hypothesis — these companies certify their private information about companies with whom they have had a lending relationship when they are underwriting their securities (Gande, Puri, Saunders, and Walter 1997).

However, cost scope and product mix **diseconomies** may also arise because of coordination and

administrative costs from offering a broad range of products, often outside the senior management's area of core competence (Winton 1999). Universal banking may also be associated with less financial innovation because of reduced incentives of commercial banks and investment banks to produce innovative financial solutions to attract corporate customers from one another (Boot and Thakor 1996).

It is not known how well the research just reviewed on cost scope and product mix efficiencies within a type of financial institution represent the efficiencies across institution types. The relatively few studies of the scope and product mix efficiencies associated with universal banking in continental Europe are mixed. One study of European universal banking found very small scope economies (Allen and Rai 1996), one study found some limited evidence of scope economies, but no consistent evidence of expansion-path subadditivity (Vander Vennet 1999), and one study found mostly diseconomies of producing loans and investment services within German universal banks (Lang and Welzel 1998). However, these studies may not be good predictors of universal banking as it evolves in the future. Specifically, commercial banking and underwriting in the banking-oriented continental Europe of the past may bear little resemblance to commercial banking and underwriting activities in market-oriented financial systems such as the U.S., the U.K., and possibly continental Europe and elsewhere in the future.

3.1.2 Revenue scale, scope, and product mix efficiency

It is important to consider revenue efficiencies as well as cost efficiencies when evaluating cross-border or global consolidation. The increase in scale associated with consolidation may create revenue scale economies because some customers may need or prefer the services of larger institutions. For example, large wholesale customers may need loan facilities or issue public debt or equity in quantities that cannot be handled by small institutions. However, some small customers may prefer the more personalized or relationship-based services often associated with small financial institutions, creating revenue scale diseconomies.

A related revenue efficiency effect that is particularly relevant for cross-border consolidation concerns the benefits from serving customers that operate in multiple nations, which often require or benefit from the services of financial institutions that operate in the same set of nations. That is, multinational nonfinancial firms may want to do business with multinational financial institutions. Presumably, the cross-border consolidation of financial institutions in recent years derives at least in part from the cross-border consolidation of nonfinancial industries (and vice versa as well). Part of this revenue efficiency comes from financial institutions following their existing customers across international borders, maintaining the benefits of existing relationships. For

example, some analyses found that many foreign banks initially entered the U.S. to help service home country clients that were starting U.S. operations (Goldberg and Saunders 1981, Budzeika 1991, Grosse and Goldberg 1991, Seth and Quijano 1993, Terrell 1993). One analysis found that foreign direct investment in a U.S. state was a positive determinant of foreign banking assets in the state, also consistent with follow-your-customer behavior (Goldberg and Grosse 1994).

Financial institutions may also be able to exploit revenue scope and product mix economies by cross-selling different types of financial services. These revenue scope economies may occur because of consumption complementarities arising from reductions in consumer search and transactions costs. For example, some customers may be willing to pay more for the convenience of one-stop shopping for their commercial banking and insurance needs. Similarly, a corporate customer may prefer to reveal its private information to a single consolidated entity that provides its commercial and investment banking needs. Revenue economies can also arise from sharing the reputation that is associated with a brand name that customers recognize and prefer. These reputation economies might arise, for instance, if a universal bank leverages off its reputation built in commercial banking when forging a stronger reputation in investment banking, or vice versa (Rajan 1996).

Consolidation of different types of financial institutions may alternatively create revenue scope diseconomies. Such diseconomies may arise if specialists from different types of financial services have better knowledge and expertise in their areas and can better tailor products for individual customers, and thereby charge higher prices than joint producers. Revenue scope diseconomies might also arise to the extent that combining commercial banking and investment banking creates the appearance of conflicts of interest. The market may underprice securities underwritten by a universal bank for its existing loan customers because of concerns that the proceeds from the issue will be used to pay off (or otherwise enhance the value of) distressed loans extended to that customer by the bank. As a result, commercial loan customers might shy away from using their own universal bank's underwriting services. The empirical research suggests that universal banks have successfully addressed this problem (e.g., Ang and Richardson 1994; Kroszner and Rajan 1994, 1997; Puri 1994, 1996, Gande, Puri, Saunders, and Walter 1997; and Gande, Puri, and Saunders 1998).

A few recent studies have examined the effects of financial institution scale, scope, and product mix on revenue efficiency and profit efficiency (which incorporates both cost and revenue efficiency). The scale results are ambiguous, with some evidence of mild ray scale efficiencies in terms of joint consumption benefit for

customers (Berger, Humphrey, and Pulley 1996), and profit efficiency sometimes being highest for large institutions (Berger, Hancock, and Humphrey 1993, Berger, Cummins, Weiss, and Zi 1999, Cummins and Weiss 2000), sometimes being highest for small institutions (Berger and Mester 1997), and sometimes about equal for large and small institutions (Clark and Siems 1997). In terms of scope and product mix efficiencies, one study found little or no revenue scope efficiency between deposits and loans in terms of charging customers for joint consumption benefits (Berger, Humphrey, and Pulley 1996), while a study found revenue scope diseconomies from providing life insurance and property-liability insurance together, consistent with a greater ability of specialists to tailor products to their customers' needs (Berger, Cummins, Weiss, and Zi 1999). Studies of profit scope efficiencies both within banking and within insurance found that joint production is more efficient for some firms and specialization is more efficient for others (Berger, Hancock, and Humphrey 1993, Berger, Cummins, Weiss, and Zi 1999). One study of universal banks in Europe found that they typically had both higher revenues and higher profitability than specializing institutions (Vander Venet 1999).

3.1.3 Risk-expected-return tradeoff scale, scope, and product mix efficiency

The prospect of efficiency gains from improvements in the risk-expected return tradeoff may also motivate cross-border consolidation. The greater scale, more diverse scope or mix of financial services, or increased geographical spread of risks associated with cross-border consolidation may improve the institutions' risk-expected return tradeoff. This improved tradeoff fits into our broad definition of efficiency gains to the extent that the increased diversification reduces the impact on shareholder wealth of the expected costs associated with financial distress, bankruptcy, and loss of franchise value.

Taking the risk-expected return tradeoff into account also allows for possible scale, scope, and product mix efficiencies in managing risk. For example, larger institutions may be able to deploy sophisticated models of credit and market risks more efficiently. In addition, for commercial banks and other regulated/supervised financial institutions, regulatory rules like prompt corrective action and supervisors with discretion may restrict the activities or impose other costs on institutions in poor financial conditions, giving additional value to keeping risks low. Note that an improvement in the risk-expected return tradeoff does not necessarily mean that the institutions would have lower risk -- they may still choose a higher risk-higher expected return point on the improved frontier.⁵

We note that these risk considerations would not affect shareholder value and therefore would not be

included in our definition of efficiency under an assumption of perfect capital markets with no informational opacity, no distress/bankruptcy/franchise costs, and no regulatory/supervisory intervention. Investors in perfect capital markets would diversify their own risks by owning shares of different institutions and thereby negate any diversification value from the institutions they own purchasing other institutions.

However, capital markets imperfections may be quite important for financial institutions. Under the modern theory of financial intermediation (e.g., Diamond 1984,1991, Boyd and Prescott 1986, Boot and Thakor 1997), financial institutions are delegated monitors with economies of scale and/or comparative advantages in the production of information about informationally opaque assets. These institutions exist to solve these information problems, and diversification of large pools of the opaque assets is part of this solution. In addition, many small financial institutions are owner-managed, and the owner/managers have a substantial portion of their personal or family wealth invested in their institutions. Diversifying this risk away by selling a substantial portion of their investment is problematic because of loss of control and because of the illiquidity of institutions that are not publicly traded. Thus, these institutions are likely managed in a way that reflects the risk aversion of their owners.⁶

Financial institutions are also concerned with risk because of government regulation and supervision. Governments typically provide a safety net for at least some of their nations' financial institutions, which absorbs some of the losses or provides liquidity in the event of the failure or distress of the institutions. The safety net may include deposit insurance, unconditional payment guarantees, access to the discount window, help in arranging private-sector funding or M&A partners, forbearance, or other explicit or implicit government guarantees. It is often argued that the safety net provides moral hazard incentives to take on more risk than would otherwise be the case, and that this incentive to risk-taking becomes stronger as an institution's equity capital or charter value gets very low (e.g., Merton 1977, Marcus 1984, Keeley 1990). However, prudential regulation/supervision works in the opposite direction, imposing costs on risk-taking and giving incentives for value maximizing institutions to reduce risk to avoid penalties. Prudential regulations designed to deter risk-taking include risk-based capital requirements, risk-based deposit insurance premiums, prompt correct action rules, legal lending limits, etc., and prudential supervision includes regularly scheduled examinations backed by threats of cease-and-desist orders, withdrawal of deposit insurance, closure, limits on growth, and prohibition of dividend payments, etc.

Some empirical evidence suggests that large U.S. banking organizations appear to act in a risk-averse fashion, trading off between risk and expected return (e.g., Hughes, Lang, Mester, and Moon 1996,1997, Hughes and Mester 1998). However, it is difficult to determine whether this tradeoff is for the benefit of shareholders versus whether managers of professionally-managed institutions are protecting their own job security at the expense of shareholder value. Managerial incentives with regard to risk are discussed below.

The available empirical evidence research also suggests that at least some types of cross-border consolidation are likely to improve the risk-expected return tradeoff. The literature on commercial banks in the U.S. generally found that larger, more geographically diversified institutions tend to have better risk-expected return tradeoffs (e.g., McAllister and McManus 1993, Hughes, Lang, Mester, and Moon 1996,1997,1999, Hughes and Mester 1998, Demsetz and Strahan 1997). Similarly, international diversification has been found to improve the risk-expected return tradeoff and profit efficiency in the reinsurance industry (e.g., Cummins and Weiss 2000). More relevant to the issue of universal-type financial institutions, some simulation-type studies combined the rates of return earned by U.S. banking organizations and other financial institutions from the 1970s and 1980s with mixed results (Kwast 1989, Rosen, Lloyd-Davies, Kwast, and Humphrey 1989, Boyd, Graham, and Hewitt 1993). Another study of U.S. firms also found that risk could be reduced by combining banks with securities firms and insurance companies (Saunders and Walter 1994). Other studies of combining commercial banking and insurance companies in the U.K. (Llewellyn 1996) and combining commercial banking organizations with securities firms in the U.S. (Kwan 1998) showed favorable results for the risk-expected return frontier.⁷

To get further insight as to the potential for improvements in the risk-expected return frontier from geographic diversification, Table 3.1 gives information about the distribution of bank earnings across nations. The table shows the means and correlations of bank earnings across international borders, giving information for the U.S., Japan, and all but one of the EU nations (insufficient data were available for Ireland). The data are for 1979-1996, except as noted. The correlations across nations are quite low. These nations often had changes in regulatory/supervisory structure that were not coordinated, they had different currencies, and their economies were usually not well integrated. However, it is surprising just how much lower the correlations among bank earnings across these nations are and how many of the correlations are negative. Even within the EU -- which has moved closer to the model of the U.S. national market by harmonizing regulatory/supervisory structures, beginning the process of monetary union, and removing tariffs and entry barriers -- the correlations are

surprisingly low. For each of the 14 EU nations shown, there are at least three negative correlations of bank earnings with those of the 13 other EU nations. These data suggest very strong diversification possibilities and opportunities to improve the institutions' risk-expected return tradeoffs through cross-border consolidation, even within the EU.

3.2 X-efficiency

Improvements in X-efficiency may also be an important motive for and consequence of cross-border consolidation. Improvements in X-efficiency — movements toward the optimal point on the best-practice efficient frontier — may be accomplished through consolidation if the M&A improves the managerial quality of the organization or changes its focus. X-efficiency may be improved, for example, if the acquiring institution is more efficient *ex ante* and tends to bring the efficiency of the target up its own level by spreading its superior managerial expertise or policies and procedures over more resources. Alternatively, the M&A event itself may have the effect of awakening management to the need for improvement or may be used as an excuse to implement substantial unpleasant restructuring.⁸

We consider both cost and profit X-efficiency.⁹ Cost X-efficiency improvements occur when an institution moves closer to what a best-practice institution's cost would be for producing the same output bundle using the same input prices and other environmental conditions. Profit X-efficiency improvements occur when an institution moves closer to the profit of a best-practice institution under the same conditions. Profit X-efficiency is a more inclusive concept than cost X-efficiency. Profit X-efficiency incorporates cost X-efficiency, the effects of scale, scope, and product mix on both costs and revenues, and to some degree the effects of changes in the risk-expected return tradeoff. Profit X-efficiency also corresponds better to the concept of value maximization than cost X-efficiency, since value is determined from both costs and revenues. Differing types of profit X-efficiency are discussed below.

We review the results of four types of X-efficiency studies. The first is the effects of M&As on financial institution X-efficiency. These are important to the prospects for X-efficiency gains from cross-border consolidation, given that cross-border market penetrations are usually performed via M&As, rather than via opening new branch offices. Second, we examine the research on international comparisons of financial institution X-efficiency. This bears on our hypotheses, in that the institutions from one or a few nations are more likely to expand across borders under the limited form of the global advantage hypothesis if the institutions from

these nations are much more X-efficient than those from other nations. Third, we review the research evidence on the X-efficiencies of foreign versus domestic institutions within a single nation. This is the most important type of evidence in our opinion for evaluating the global advantage versus home field advantage hypotheses because it is the only direct evidence on the extent to which financial institutions are able to monitor and control their subsidiaries operating in other nations. Finally, we examine evidence on the effects of deregulation, especially the reduction of entry barriers, on X-efficiency. This may contribute to the debate on the hypotheses, given that this type of deregulation precedes most cross-border consolidation.

3.2.1 The effects of financial institution M&As on X-efficiency

The extant research suggests a substantial potential for X-efficiency improvement from consolidation. Average X-inefficiencies on the order of about 20% of costs and about 50% potential profits are typical findings (Berger and Humphrey 1997). Simulation evidence also suggests that large X-efficiency gains are possible if the best-practice acquirers reform the practices of inefficient targets (Savage 1991, Shaffer 1993).

The research also suggests that many institutions engage in M&As for the purpose of improving X-efficiency. Many studies have found that acquiring institutions are more efficient *ex ante* than targets (Berger and Humphrey 1992b, Altunbas, Maude, and Molyneux 1995, Focarelli, Panetta, and Salleo 1998, Pilloff and Santomero 1998, Rhoades 1998, Vander Venet 1998, Cummins, Tennyson, and Weiss 1999, Fried, Lovell and Yaisawarng 1999, Cummins and Weiss 2000). It has also been found that acquiring banks bid more for targets when the M&A would lead to significant diversification gains, consistent with a motive to improve the risk-expected return tradeoff and increase profit X-efficiency (Benston, Hunter and Wall 1995).

A number of studies measured the change in cost X-efficiency after M&As. Studies of U.S. commercial banking generally show very little or no cost X-efficiency improvement on average from the M&As of the 1980s, on the order of 5% of costs or less (Berger and Humphrey 1992b, Rhoades 1993, DeYoung 1997, Peristiani 1997). Studies of U.S. banks and other types of financial institutions using 1990s data are mixed, but sometimes showed more cost efficiency gains (Berger 1998, Rhoades 1998, Cummins, Tennyson, and Weiss 1999, Fried, Lovell, and Yaisawarng 1999). Studies of M&As of credit institutions in Europe found that some groups of M&As, particularly cross-border consolidations, tended to improve cost efficiency, whereas other types tended to decrease cost efficiency (Vander Venet 1996,1998). Studies of Italian banks (Resti 1998) and U.K. building societies (Haynes and Thompson 1999) found significant cost efficiency gains following M&As.

Studies of profit X-efficiency usually paint a more favorable picture of M&As. Studies of the profit efficiency effects of U.S. bank M&As from the 1980s and early 1990s found that M&As improved profit efficiency, and that this improvement could be linked to an increased diversification of risks and an improved risk-expected return tradeoff (Akhavain, Berger, and Humphrey 1997, Berger 1998). After consolidation, the institutions tended to shift their asset portfolios from securities to loans, have more assets and loans per dollar of equity, and to raise additional uninsured purchased funds at reduced rates, consistent with a more diversified portfolio. Other studies using similar measures to profit X-efficiency found consistent results (Fixler and Zieschang 1993, Berger and Mester 1999, Hughes, Lang, Mester, and Moon 1999).

There are also a number of event studies of the effects of M&As on stock market values. The change in the total market value for the acquiring and target institutions together (adjusted for changes in overall stock market values) provides an estimate of the effect of the M&A on shareholder value, which embodies the present value of expected future changes in all types of efficiency plus changes in the expected exercise of market power over prices. Although these effects cannot be disentangled, in some circumstances, inferences can be made about whether the market expects improvements in efficiency. Specifically, since it is unlikely that M&As would reduce market power, a finding of a decrease in market value would suggest an expected deterioration in efficiency and a find of no change in market value would signal either no change or a decrease in expected efficiency.

The empirical results for U.S. data are mixed. Some studies found increases in the combined value around the times of M&A announcements (Cornett and Tehranian 1992, Zhang 1995), others found no improvement in combined value (Hannan and Wolken 1989, Houston and Ryngaert 1994, Pilloff 1996), while still others found that the measured effects depended upon the characteristics of the M&A (Houston and Ryngaert 1996,1997, Siems 1996). A study of domestic and cross-border M&As involving U.S. banks found more value created by the cross-border M&As, although it also found that more concentrated geographic and activity focus had positive effects on value (DeLong 1999). One study found that foreign banks that enter the U.S. via acquisition tend to acquire domestic banks that already have performance problems, and despite achieving some performance improvements at the target bank, generally are not successful in raising the acquired banks' performance up to the levels of their domestic peers (Peek, Rosengren, and Kasirye 1999).

There is some evidence that M&As in Europe increase combined value. One study that examined M&As among banks and between banks and insurers in Europe found positive combined returns mostly driven by

domestic bank-to-bank deals and diversification of banks into insurance (Cybo-Ottone and Murgia 1998). This study attributed the differences in findings from many of the U.S. studies to differences in structure and regulation in Europe. However, another study of European bank M&As found that abnormal combined returns were not significantly different from zero (van Beek and Rad 1997).

3.2.2 International comparisons of X-efficiency

A number of studies compared the average X-efficiency of institutions in different nations, focusing on the operations of institutions operating within each nation, rather than cross-border operations. For example, one study evaluated the efficiency of banks operating within Norway, within Sweden, and within Finland relative to a common frontier made up of the best-practice institutions from the three nations (Berg, Forsund, Hjalmarsson, and Suominen 1993). Similar studies compared the average X-efficiencies of institutions across different sets of nations (e.g., Fecher and Pestieau 1993, Bergendahl 1995, Bukh, Berg, and Forsund 1995, Allen and Rai 1996, Ruthenberg and Elias 1996, European Commission 1997, Pastor, Perez, and Quesada, 1997, Bikker, 1999, Maudos, Pastor, Perez, and Quesada 1999a, Wagenvoort and Schure 1999). The results often showed that some institutions of some nations are substantially more efficient than the institutions of other nations, although the ordering among nations sometimes differed across the studies. We also note that Swedish banks tended to be measured as superior performers, despite the fact that these banks suffered a crisis in the early 1990s requiring substantial government intervention, and that U.S. banks sometimes were measured as inferior performers, despite the common cross-border result that U.S. banks tend to be more efficient than foreign competitors in the U.S.

While these studies may be informative, they are not very helpful for evaluating the global advantage versus home field advantage hypotheses for two main reasons. First, the economic environments faced by financial institutions differ across nations in important ways. It is likely that measured X-efficiency would vary considerably with the amount of supervisory and regulatory intervention in the financial system. As well, nations differ significantly in the intensity of competition among their financial institutions, in the level and quality of service associated with their financial products, in their capital market development, and in their markets for labor and other factors of production, all of which may affect measured efficiency. As a result, a finding of greater X-efficiency for institutions in one nation does not necessarily imply that they would be more efficient in the environments of other nations.

Second, and more important, even if all of the environmental differences did not exist or were well

controlled for with econometric procedures, the performance of institutions within their own borders may not be representative of how well they may perform as foreign-owned entities in other nations, which is the information most pertinent to testing our hypotheses. Even if institutions are very efficient in their home country, they may have difficulty in other nations in part because of organizational diseconomies to operating or monitoring an institution from a distance or because of difficulties in overcoming differences in language, culture, currency, regulation, and other barriers.

Some recent studies have made progress in dealing with the first problem by controlling for some of the environmental differences across nations. These studies include variables measuring banking market conditions (e.g., income per capita, population, deposit, and branching densities), market structure and regulation (e.g., concentration ratio, average equity capital ratio, risk, and firm specialization (Pastor, Lozano, and Pastor 1997, Maudos, Pastor, Perez, and Quesada 1999b, Pastor 1999, Pastor, Lozano-Vivas, and Hasan 1999, Dietsch and Lozano-Vivas forthcoming). Of course, control variables for a firm's environment, risk, and specialization are often specified in efficiency measurement, but these recent studies have taken this further by investigating the effects of these variables on measured efficiency. In one case, these environmental variables, along with the efficiency scores, have been used to predict what the efficiency of institutions from one country would be if they operated in another country (Pastor, Lozano-Vivas, and Hasan 1999). These authors studied commercial banks in 10 European nations (Belgium, Denmark, France, Germany, Italy, Luxembourg, the Netherlands, Portugal, Spain, the U.K.) and predict, for example, that banks from Spain, Denmark, Portugal, and Belgium would have high efficiency scores if they cross into other European nations.

Although this research is interesting, we caution against drawing such strong conclusions about cross-border performance from it. It is difficult to control for environmental differences across nations. More important, not even perfect environmental controls address the second problem of potential organizational diseconomies and other difficulties in operating or monitoring financial institutions across borders.

3.2.3 The X-efficiency of foreign versus domestic institutions within a single nation

Some recent studies have compared the X-efficiencies of foreign versus domestic institutions operating within the borders of a single nation. This avoids the econometric problem of controlling for all the environmental differences across nations, since all of the institutions studied face essentially the same environmental conditions. More important for our purposes, this is only direct evidence on the extent to which financial institutions are able

to monitor and control operations on a cross-border basis, which is critical to distinguishing between the home field advantage and global advantage hypotheses.

Studies of U.S. data generally found that foreign-owned banks are significantly less cost efficient on average than domestic banks (Hasan and Hunter 1996, Mahajan, Rangan, and Zardkoohi 1996, Chang, Hasan, and Hunter 1998) and less profit X-efficient on average than domestic institutions (DeYoung and Nolle 1996). Unfortunately, this type of evidence alone cannot distinguish between our hypotheses. The data are consistent with both the home field advantage hypothesis and with a case of the limited form of the global advantage hypothesis in which U.S. banks tend to be the most efficient. The data are also consistent another case of the limited form of the global advantage hypothesis in which foreign banks from a limited group of other nations tend to be more efficient than the domestic U.S. banks, but this cannot be determined because the authors did not break out their data by foreign nation of origin. More evidence is needed to differentiate among these hypotheses — data from more home countries and disaggregation of the results by nation of foreign ownership.

Some of the research on other nations found that foreign institutions have about the same average efficiency as domestic institutions. One study found that foreign banks in EU countries that were acquired in the past three years had about the same cost efficiency as domestic banks (Vander Venet 1996); one study found that foreign banks in Spain are about equally profit efficient to domestic banks (Hasan and Lozano-Vivas 1998), and one study found that foreign banks in India were somewhat more efficient than domestic banks held by private sector investors, but that both were less efficient than domestic banks held by the government (Bhattacharya, Lovell, and Sahay 1997). Again, the results were not reported by nation of origin, making it difficult to narrow down which hypotheses are consistent with the data. If the banks from some of the foreign nations tend to have higher efficiency than those from the home country and other foreign nations, this would support the limited form of the global advantage hypothesis.

Some other research using data from non-U.S. countries found very different results. These studies measured profit efficiency for 14 home countries (Belgium, France, Germany, Italy, Switzerland, Portugal, Spain, Australia, Canada, Denmark, the Netherlands, Chile, Mexico, the U.K.), classified into four groups based on banking system development and regulatory/supervisory environment (Miller and Parkhe 1999, Parkhe and Miller 1999). They found that domestic banks were more efficient on average than foreign institutions (including U.S.-owned banks), although foreign banks from the same type of environment as the host nation generally fared better

than other foreign institutions. Although they appropriately measured separate frontiers for the institutions located in each country, they pooled the efficiency estimates from the foreign and domestic banks in the several nations in each group (after normalizing the estimates to have a common mean and standard deviation), which may create problems of comparison because of the different environments of these nations. Their logit analysis of whether foreign bank efficiency is above versus below the mean takes into account the signs, but not the magnitudes of the efficiency differences.

3.2.4 The X-efficiency effects of deregulation

One of the most important issues in the current policy debate is the effect of deregulation on efficiency, given that much of the observed cross-border consolidation has followed significant deregulation. For example, as discussed above, much of the consolidation within the EU has followed reductions in its cross-border entry barriers and harmonization of its regulatory structures.

Most of the studies measuring performance change over time use the concept of productivity change, rather than X-efficiency change. Productivity change is a measure of the change over time in the performance of an industry as a whole (rather than an individual institution) and incorporates both changes in managerial best practice in the industry and changes in cross-section X-efficiency or dispersion from best practice.

A number of studies examined productivity change during the banking deregulation in the U.S. (e.g., Hunter and Timme 1991, Berger and Humphrey 1992a, Bauer, Berger, and Humphrey 1993, Humphrey 1993, Elyasiani and Mehdiian 1995, Devaney and Weber 1996, Wheelock and Wilson 1996, Humphrey and Pulley 1997, Alam 1998, Berger and Mester 1999). It was often found that measured cost productivity declined in the 1980s primarily because depositors got the benefit of higher interest rates after the deposit rate ceilings were lifted. The increase in competition appeared to be primarily a social good, although it was measured as a poorer performance for the banking industry.¹⁰ Recent research suggested that the decline in measured cost productivity may have continued well into the 1990s, but that improvements in revenues more than offset the higher costs, yielding improvements in profit productivity (Berger and Mester 1999). The data were consistent with the hypothesis that banks offered wider varieties or higher quality of financial services that raised costs but also raised revenues by more than the cost increases, and that banks involved in M&As were responsible for much of these findings.

The results of deregulation in other individual nations were sometimes found to be favorable to financial institution performance, as in Norway (Berg, Forsund, and Jansen 1992) and Turkey (Zaim 1995) and sometimes

found to be mixed or unfavorable, as in Spain (Lozano 1998, Grifell-Tatje and Lovell 1997, Hasan, Hunter, and Lozano-Vivas forthcoming). Finally, one study of the changes in productivity, cost X-efficiency, and profit X-efficiency in a number of EU nations from 1992 to 1996 found small improvements in efficiency and attributed most of the changes in productivity to technological progress, rather than the effects of EU deregulation (Dietsch, Ferrier, and Weill 1998).

3.3 Implications of the efficiency research

The efficiency research reviewed here, while extensive, suggests very few strong conclusions regarding the efficiency effects of cross-border consolidation. The scale efficiency literature is somewhat uncertain, but suggests that there may be gains from large scale consolidation based on technological, financial, and regulatory changes in the 1990s. The scope and product mix efficiencies literature also provides mixed results and very little information on cross-industry efficiencies. The scale, scope, and product mix literatures also provide little information on cross-border performance, which may differ from the scale, scope, and mix effects within a single nation without significant internal entry barriers or differences in language, culture, regulation, etc. that may raise the costs of becoming large.

The X-efficiency research reviewed here is more promising, but also does not provide solid evidence regarding cross-border efficiency nor does it distinguish well between our home field advantage and global advantage hypotheses. The literature on the effects of M&As on financial institution X-efficiency often suggest efficiency gains, but most of the evidence is based on within-nation consolidation, which does not take into account organizational diseconomies or other difficulties in operating or monitoring across borders. The literature on international comparisons of X-efficiency has significant problems in estimating efficiency against a common frontier because market and regulatory/supervisory differences are so great. More important, this literature does not address the issue of potential organizational diseconomies and other difficulties of cross-border operations. The literature on the X-efficiency effects of deregulation found somewhat mixed results, but mostly focused on deregulation within a nation, rather than the types of deregulation that facilitate cross-border consolidation.

The evidence on the X-efficiencies of foreign versus domestic institutions within a single nation is the most important type of evidence in our opinion for evaluating our hypotheses, because it is the only direct evidence on the extent to which financial institutions are able to monitor and control their subsidiaries operating in other nations. However, the extant literature does not provide much guidance for distinguishing between the

hypotheses because the prior studies either a) examined foreign and domestic efficiency in only one country, which cannot alone distinguish between the hypotheses because the institutions from that home country might have a global advantage, b) did not distinguish among nations of foreign ownership, which cannot test the limited form of the global advantage hypothesis that institutions from only one or a limited number of foreign nations have an advantage, and/or c) combined efficiency information from different home countries, which creates problems of comparison because of significant differences in the market and regulatory/supervisory environments of these nations. None of the prior studies have all three of these drawbacks, but all have at least one to our knowledge. We address these drawbacks in our original empirical in Section 5 below by a) examining the efficiency of foreign and domestic banks in five different home countries, rather than one; b) distinguishing among nations of origin of foreign institutions to test the limited form of the global advantage hypothesis; and c) conducting completely separate analyses of data from banks located in different countries to avoid problems of comparison because of differences in the economic environments across nations.

4. The motives for and consequences of cross-border consolidation: Topics other than efficiency

We complete our review of the extant research evidence on the motives for and consequences of cross-border consolidation, covering topics other than efficiency. Specifically, we cover market power motives and consequences (subsection 4.1); managerial motives and consequences (subsection 4.2); and government motives and social consequences (subsection 4.3).

4.1 Market power motives for and consequences of cross-border consolidation

Most of the research on the market power effects of consolidation focuses on M&As within a single nation and their effects on small retail customers. More specifically, the focus is typically on the effects of M&As between institutions that are in the same local market on small depositors and small businesses. These in-market M&As may increase local market concentration and allow the consolidated institution to increase shareholder value by setting prices less favorable to small retail customers (e.g., lower deposit rates, higher small business loan rates). Consistent with this focus, it has been found that U.S. households and small businesses almost always choose a local financial institution (Kwast, Starr-McCluer, and Wolken 1997).

4.1.1 The effects of cross-border consolidation on market power over retail customers

Cross-border consolidation does not directly increase local market concentration for the products typically purchased by small retail customers. Nonetheless, cross-border consolidation may affect the exercise of

market power over these customers by: a) affecting consolidation within nations; b) changing the competitive dynamic among cross-border institutions; and/or c) enhancing competitive rivalry by increasing the contestability of domestic banking markets. We discuss each of these possibilities in order.

4.1.1.1 The effects of cross-border consolidation on consolidation within nations

Cross-border consolidation or the threat of it may lead to consolidation of financial institutions within nations, raising local market concentration. To protect previously existing market power or entrenched management, institutions within nations may engage in M&As to help fend off potential foreign competitors. In addition, efficiency motives may help motivate the local M&As. When reductions in cross-border entry barriers create opportunities to improve scale, scope, product mix or X-efficiencies by invading the markets in other nations, institutions may first engage in in-nation M&As to grow large enough to compete in international markets.

The research evidence generally suggests that higher local market concentration that may be created by consolidation within a nation is likely to raise market power in setting prices on retail financial services. Studies on the effects of bank M&As on pricing found that M&As that involve very substantial increases in local market concentration tend to raise market power in setting prices, but the effects of other M&As were ambiguous (Akhavein, Berger, and Humphrey 1997, Sapienza 1998, Simons and Stavins 1998, Prager and Hannan 1999). Other studies usually found that banks in more concentrated markets charge higher rates on small business loans and pay lower rates on retail deposits (e.g., Berger and Hannan 1989, 1997, Hannan 1991), and that their deposit rates were "sticky" or slow to respond to changes in open-market interest rates, consistent with the exercise of market power (Hannan and Berger 1991, Neumark and Sharpe 1992, Hannan 1994, Jackson 1997). It has been suggested that market power over small customers may have declined in recent years because of an increase in the degree of contestability of financial services markets and new technologies for delivering financial services, but the empirical evidence on this issue is mixed (Hannan 1997, Cynrak and Hannan 1998, Radecki 1998).

4.1.1.2 The market power consequences of competing in many markets

Cross-border consolidation may also affect the exercise of market power within individual markets even if there is no change in local market concentration for several reasons. First, at least to some extent, institutions tend to charge uniform prices throughout the organization, even when the local market structures differ substantially across the markets in which they compete. For example, one study found that large U.S. banks often set uniform rates for deposits and loans across geographic markets within a state or region, although the

reasons for this are not clear (Radecki 1998). Uniform pricing may occur because it is easier to administer, because of public relations concerns about fairness, or because of other factors.

Evidence on bank fees on retail deposit and payments services shows very little relationship with measures of local market concentration in the 1990s, and that multistate BHCs tend to charge higher fees to retail customers than other banks (Hannan 1998). These results similarly suggest that factors other than local market concentration are important in the exercise of market power. For example, this pricing strategy may be designed to help engineer a shift from serving small customers toward serving large customers.

In addition, cross-border consolidation may result in the same institutions competing against each other in multiple countries. The theory of multimarket contact suggests that if firms face each other in multiple markets, there could be either more or less market power exercised. There could be more exercise of market power because the firms may mutually forbear. That is, they may set high prices rather than compete to avoid retaliation in other markets. There could also be less exercise of market power, at least in the short run, if firms price strategically to signal their costs or to drive competitors out of business. The data are mixed as to the effects of multimarket contact on prices for retail banking products (Mester 1987,1992a, Pilloff 1999).

4.1.1.3 The effects of cross-border consolidation on market contestability

Finally, cross-border consolidation or the threat of cross-border entry may reduce the exercise of market power because of increased market contestability. One way this may occur is if the existing financial institutions in a market alter their limit pricing behavior, setting prices more favorable to customers to deter foreign entry. This may also occur if efficient foreign producers enter and provide services at more favorable prices and take market share away from inefficient local producers that were formerly protected by cross-border entry barriers. In the EU, a key prediction of the 1988 Cecchini study (Commission of the European Communities 1988a,b) on the impact of the Single Market Programme was that cross-border competition would create considerable potential for prices to converge and fall to the level of the lowest cost producers.

Indeed, the creation of a single market for financial services in the EU is an important test of this phenomenon. Since the adoption of the Treaty of Rome in 1957, the EU has adopted legislation designed to promote competition in financial services through the creation of a single banking license and harmonization of regulation (Molyneux, Altunbas and Gardner 1996). The adoption of a single currency is likely to increase financial institution competition further by reducing entry barriers and by lowering currency risk, which may

increase the willingness of some customers to shop for financial services in other nations. It is argued in subsection 4.3.3 below that the deepening of capital markets in the EU is likely to provide additional competition to banks in the most banking-oriented nations of continental Europe. This encroachment of securities markets may increase the competitive pressure on banks by giving business customers additional opportunities to raise capital by issuing commercial paper, public debt, or public equity in place of bank loans and by giving savers additional opportunities to invest in money market funds, mutual funds, or other traded assets in place of bank deposits (De Bandt and Davis 1998).

There has been some recent empirical investigation into the issue of whether the single market for financial services in the EU has succeeded in terms of this policy objective. The evidence generally suggests that only a modest impact of the regulatory changes on loan, fee and deposit prices (European Commission 1997). The impact does not appear to be uniform across countries. Specifically, the decline in prices tended to be greater in countries where regulation had been the tightest prior to the implementation of the Second Banking Directive in 1993 such as Spain, Portugal, and Greece. Also, the modest decline in prices was somewhat greater for corporate services than retail services.

Several studies have also analyzed changes in market power using econometric models. One study used the Rosse-Panzar statistic to evaluate changes in competitive conditions in banking in major EU nations between 1986 and 1989 and found that the monopolistic competition that prevailed at the beginning of the period did not change substantially over time (Molyneux, Lloyd-Williams, and Thornton 1994). Another study of the EU used similar methodology and found no major change in competitive banking conditions between 1989 and 1996 (Bikker and Groeneveld 1998). However, one study found more price competition that was linked to interest rate deregulation in individual countries (Cerasi, Chizzolini, and Ivaldi 1998).

A caveat to this analysis is that there may not be a single uniform market for financial services even in one nation. For example, one study found that foreign banks in Switzerland exercised more market power than domestic banks suggesting that foreign and domestic financial services might be at least somewhat differentiated products (Shaffer 1999). Such differentiation tends to limit the potential for reductions in market power and price convergence from reductions in barriers to entry.

4.1.2 The effects of cross-border consolidation on market power over wholesale customers

The impact of cross-border consolidation on the wholesale market for financial services might be quite

different from its impact on retail markets. On the one hand, it may be difficult to exercise market power against large wholesale customers because these customers often have sufficient resources to choose among many suppliers on a global basis, and because product differentiation may be less important in wholesale commercial banking, securities, and insurance service markets than in retail markets. On the other hand, the number of suppliers in wholesale markets is considerably smaller than in retail markets, and cross-border consolidation may reduce the number of wholesale financial institutions. For example, the ten-firm concentration ratios in U.S. domestic corporate stock and bond underwriting and in Euromarket underwriting exceed 80% and 50%, respectively (Investment Dealers Digest 1999). Evidence from the 1980s also suggests the presence of some market power in the securities industry (Hayes, Spence, and van Praag Marks 1983, Pugel and White 1985).

More recent work sheds further light on this market. A study of the mid-size IPO market in the U.S. found that over 90% of the issues paid precisely the same 7% underwriting fee (Chen and Ritter 1999). The authors argued that in the absence of market power, the percentage fee would be declining in issue size due to economies of scale in spreading fixed costs. In addition, IPO fees in other nations (e.g., Australia, Japan, Hong Kong, Europe) are approximately half as high (Lee, Lochhead, Ritter, and Zhao 1996). These data suggest that there is market power exercised in pricing for this mid-issue size range in the U.S. market. However, for large deals, spreads were found to be lower and clustering was absent (Chen and Ritter 1999). Arguably, the mid-issue size range may be more of a national market while the large-size range may be more of a global market.

Deregulation may have affected the competitiveness of the wholesale securities industry. As noted above, the Federal Reserve began allowing BHCs to underwrite corporate debt and equity through Section 20 affiliates in 1987, and the restrictions were later further relaxed. While BHCs have not had as much impact on the equity side of the market, they have made a significant impact on the debt side. For example, in 1998 six BHCs were listed among the top fifteen underwriters of investment grade debt (Investment Dealers Digest 1999). Recent studies found evidence that a decline in underwriting fees has been associated with BHC entry into this market (e.g., Beatty, Thompson and Vetsuypens 1998, Gande, Puri, and Saunders 1998). This evidence, combined with the data on high prices in the U.S., suggests that cross-border consolidation may have the potential to reduce the exercise of market power in the mid-issue size IPO market and other national wholesale financial markets. However, it is also possible that cross-border consolidation might increase the exercise of market power in the large-size IPO market and other global wholesale financial markets.

An additional concern is how cross-border M&As between commercial banking organizations and investment banks (e.g., Deutsche Bank-Morgan Grenfell/Bankers Trust-Alex. Brown) will affect pricing given that universal-type organizations simultaneously operate in two key markets in which wholesale customers raise funds. These combinations create universal banks which may potentially acquire power over customer access to both the private and public markets, although the effect may be limited if at least one of the markets is competitive (Rajan 1994, 1996).

4.2 Managerial motives for and consequences of cross-border consolidation

Cross-border consolidation may be driven in some cases by managerial motives, rather than the goal of maximizing shareholder value. In professionally managed organizations, entrenched managers may make decisions regarding cross-border consolidation based on their own preferences for compensation, perquisites, power, job security, etc. As will be shown, cross-border consolidation may either strengthen or weaken the hands of entrenched managers directly by affecting the market for corporate control or governance, or indirectly by changing the market power of their firms.

4.2.1 Managerial motives for cross-border consolidation

Consistent with the presence of these agency problems, there is evidence that banking organizations may overpay for acquisitions when corporate governance structures do not sufficiently align managerial incentives with those of owners. For example, banks that have addressed control problems through high levels of managerial shareholdings and/or concentrated ownership experience higher (or less negative) abnormal returns around the time of acquisition than other acquirers. In addition, abnormal returns at bidder banks are increasing in the sensitivity of the CEO's pay to the performance of the firm and to the share of outsiders on the board of directors (Allen and Ceboyan 1991, Subrahmanyam, Rangan, and Rosenstein 1997, Cornett, Hovakimian, Palia, and Tehranian 1998). Moreover, bank managers with more stock-based wealth or compensation tend to make fewer acquisitions (Bliss and Rosen 1999). This evidence suggests that entrenched managers with little pay sensitivity to performance or few constraints imposed by outside directors may engage in M&As that do not maximize shareholder wealth.

The corporate finance literature has identified size-related compensation and perquisites as key motives behind the decisions of professional managers (e.g., Murphy 1985, Jensen and Murphy 1990), and these may play important roles in the cross-border consolidation decisions of some financial institution managers. However, to

the extent that the compensation boost from consolidation is linked to firm performance, consolidation in general is value maximizing and not reflective of exploitative behavior on the part of management. Compensation studies in both corporate finance (e.g., Jensen and Murphy 1990, Hall and Liebman 1998) and in banking (e.g., Barro and Barro 1990, Hubbard and Palia 1995) generally show positive links between managerial compensation and both firm performance and firm size, consistent with the both efficiency and managerial motives for consolidation. Also consistent with managerial motives, a recent study also found that CEO compensation rose after bank M&As, even if the stock price fell (Bliss and Rosen 1999). However, the personal compensation motive may not be as great in cross-border consolidation decisions in banking as it formerly was, or as it is elsewhere. Research has found that the sensitivity of pay to performance in banking has increased since deregulation (e.g., Crawford, Ezzell, and Miles 1995, Hubbard and Palia 1995); that compensation in banking may be more sensitive to performance than other industries (e.g., Houston and James 1995); and that pay-performance sensitivity may be greater at large banks (e.g., Demsetz and Saldenber 1999), which tend to be those engaging in cross-border consolidation.

Perquisite consumption by managers may likewise be a motive behind some cross-border financial institution consolidation. Evidence of expense preference behavior has been found in banking in a number of studies (e.g., Hannan and Mavinga 1980, Smirlock and Marshall 1983, James 1984, Brickley and James 1987, Mester 1989, 1991). This literature often found that the data were consistent with managers exercising preferences for additional employees, and of course consolidation is the most straightforward way to increase number of employees. There is also some evidence that consumption of perquisites and reduced work effort by managers may be related to market power, so there may be additional incentives to engage in types of consolidation that increase market power. Similarly, managers may engage in cross-border consolidation because of the prestige or hubris associated with managing a larger or more expansive empire (Roll 1986).

The corporate finance literature has also identified diversification of personal risk as a motive behind the decisions of professional managers (e.g., Amihud and Lev 1981, Morck, Shleifer, and Vishny 1990, May 1995). Financial institution managers may engage in cross-border consolidation that diversify the risks of the institution beyond the point that would be in the interest of shareholders for the purpose of enhancing their own job security and protecting the value of their firm-specific human capital. As discussed above, there is evidence that large commercial banking organizations act in a risk-averse fashion, although this evidence does not by itself necessarily

imply non-value maximizing behavior. However, other work has specifically linked managerial control to bank behavior and found that managerially controlled banks exhibit less risk (Saunders, Strock, and Travlos 1990).

In some circumstances, however, maximizing job security could encourage management to increase institution risk. If the financial institution is in a declining industry, managers may have incentives to increase risk in order to increase the probability that their institution is one of the survivors (Gorton and Rosen 1995).

Managers may also try to enhance their job security by preventing some cross-border consolidation that would otherwise be in the interest of shareholders. As discussed above, managers may try to protect their jobs by engaging in domestic M&As. This may help fend off hostile takeovers or prevent foreign entry by creating institutions that are too large to be taken over easily, or by taking over the market niche of potential foreign entrants. Other evidence also suggests that managers may try to prevent their institutions from becoming takeover targets. One study found that banks in which managers hold a greater share of the stock are less likely to be acquired, consistent with the possibility that managers with large ownership stakes block outside acquisitions to protect their jobs (Hadlock, Houston, and Ryngaert 1999).

4.2.2 Consequences of cross-border consolidation for the pursuit of managerial goals

Cross-border consolidation or its threat could also affect the magnitude of the corporate governance problems in the financial services industry, although the net impact could go either way. As the evidence above suggests, managers may be able to exercise their own preferences rather than maximize shareholder wealth because of weaknesses in corporate control systems. These weaknesses may more often occur for regulated financial institutions than nonfinancial corporations, since regulatory requirements may inhibit an active takeover market for institutions that are not maximizing value. In the U.S. and other nations that have prohibited or significantly constrained universal banking, there may be substantial barriers to the acquisition of commercial banks by other types of institutions. The regulatory approval/disapproval process and other prudential requirements may also deter some acquirers. The evidence is consistent with these arguments. Hostile takeovers that replace management are rare in U.S. banking (Prowse 1997), although they do occur (e.g., Wells Fargo-First Interstate). An alternative explanation for the paucity of hostile takeovers of large, publicly traded U.S. banks is that strong internal corporate controls at these firms prevent entrenchment by adequately disciplining managers, making private market discipline less necessary (Demsetz, Saidenberg, and Strahan 1997).

Cross-border consolidation may address these control problems by improving managerial incentives and

monitoring, particularly if more efficiently controlled organizations tend to acquire less efficiently controlled institutions. However, it is also possible that the monitoring of managers may worsen after cross-border consolidation. As discussed above, one reason for the home field advantage hypothesis is that it may be difficult for organizations to monitor the managers of their foreign subsidiaries.

Cross-border consolidation may also strengthen or weaken the hands of entrenched managers by affecting the market power of financial institutions. Market power might complicate corporate governance by giving managers more leeway to pursue their own goals. The exercise of market power in setting prices may increase profits and raise shareholder value and allow managers to proceed according to their own objectives without being easily detected. Consistent with this, one study found that U.S. banks in more concentrated local markets had substantially lower cost efficiency (Berger and Hannan 1998). Also consistent with this argument, a number of studies found little effect of concentration on bank profits, even though concentration tends to increase market power in pricing (e.g., Berger 1995, Maudos 1996, Berger and Hannan 1997, Berger, Bonime, Covitz, and Hancock 1999). Presumably, some of the profits from the exercise of market power were diverted to higher perquisite consumption, other expense preference behavior, and/or a reduced effort to maximize efficiency or a "quiet life" for the managers. As discussed in the prior subsection, cross-border consolidation or its threat may increase or decrease the exercise of market power.

The net effect of cross-border consolidation on the behavior of managers in pursuing their own objectives directly through affecting corporate control or indirectly through affecting market power is unknown. However, if the effects of removing cross-border entry barriers is similar to the effect of removing state barriers in the U.S., the data suggest that these actions are likely to refocus managers toward improving efficiency in place of satisfying their personal goals. Corporate control appears to have improved as intrastate and interstate banking deregulation increased the number of potential acquirers, reduced the market share of poorly run banks, and generally improved performance (Schranz 1993, Hubbard and Palia 1995, Jayaratne and Strahan 1996,1998).

4.3 Government motives for and social consequences of cross-border consolidation

Governments also play important roles in constraining or encouraging consolidation activity. Governments often restrict the types of M&As permitted by putting explicit limits on cross-border M&As or M&As between different types of financial institutions (e.g., commercial banks with investment banks). Similarly, governments may require that foreign entry occur by M&A with existing domestic institutions, rather

than by opening new offices, to help protect the franchise value of domestic institutions. Governments also affect consolidation directly through approval/disapproval decisions for individual M&As. During periods of financial crisis, governments sometimes provide financial assistance or otherwise aid in the consolidation of troubled financial institutions or acquire these institutions in part or in whole themselves.

Governments may also affect cross-border consolidation decisions in less explicit ways. Any decisions that affect the cross-border consolidation of nonfinancial firms or international trade -- such as European Monetary Union or tariffs/quotas on other nations -- affect the efficiency motives behind cross-border consolidation. As discussed above, revenue efficiency may increase from cross-border consolidation as the consolidated institutions can better serve customers that operate in multiple nations. Government actions that harmonize or fail to harmonize financial systems or payments systems may affect cross-border consolidation decisions as well. It has been argued that despite the removal of many of the explicit cross-border entry barriers within the EU, cross-border consolidation of commercial banks in Europe may have been relatively sparse because of differences in the use of paper versus book entry, settlement cycles and methods, and payments systems (Giddy, Saunders and Walter 1996, White 1998). As well, European and other cross-border consolidation may be tempered by structural differences among the capital markets, tax, and regulatory regimes of the nations (Lannoo and Gros 1998).

There are a number of potential motives underlying some of these government actions or inactions. It has been argued that in some cases, governments may also block foreign takeovers or permit M&As within the nation for reasons of national pride -- governments may wish to have the largest institutions in their nations be domestically owned (Boot 1999). In contrast, it has also been argued that harmonization and other government actions to permit more cross-border entry may reflect an increased strength of interest groups that benefit from technological innovations and globalization of financial services (Kroszner 1999). Alternatively, it has been argued that these actions may simply reflect regulators' official acquiescence to de facto entry that was already occurring (Kane 1999a).

It may reasonably be argued that consolidation of banks across state and industry borders within the U.S. and across international borders in Europe and elsewhere have been driven in significant part by government deregulation. The time series we presented in Figures 2.1 and 2.2 showed an association between geographic market deregulation and the volume of financial institution M&A activity, especially in the EU. In the U.S., the

removals of restrictions on interstate banking starting in the 1980s and concluding with the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 (which permits interstate branching in almost all states) permitted the managers of commercial banks to pursue efficiency, market power, and other goals through consolidation. Research evidence suggests that much of the consolidation was related to this deregulation (Berger, Kashyap, and Scalise 1995, Jayaratne and Strahan 1998). In addition, the liberalization of Glass-Steagall restrictions on banking powers -- in which the Federal Reserve allowed BHCs to underwrite corporate debt and equity through Section 20 affiliates within limits -- permitted a number of M&As between BHCs and securities firms (Gande, Puri, and Saunders 1998, Saunders 1999). While real limits remain on nationwide interstate consolidation in the U.S., the recently passed Gramm-Leach-Bliley Act removed many of the remaining restrictions on combining commercial banking, investment banking and insurance activities.¹¹ If this U.S. experience is representative, similar consolidation across borders in the EU may be forthcoming as a result of the banking directives and other harmonizations of regulatory/supervisory structures. The implementation of monetary union may also increase cross-border consolidation by increasing trade, by reducing the currency conversion costs of institutions operating in multiple nations, and by reducing costs to consumers of purchasing services from foreign institutions.¹²

In the remainder of this section, we discuss the research findings for some of the major social consequences of cross-border consolidation, systemic risk and the government safety net (subsection 4.3.1); availability and prices of financial services for small retail customers (4.3.2); availability and prices of financial services for large wholesale customers (4.3.3); and other macroeconomic effects (4.3.4). Other goals of government goals and policies (e.g., enforcement of the Community Reinvestment Act) are excluded here.

4.3.1 Systemic risk and safety net consequences of cross-border consolidation

Systemic risk may be broadly defined as the risk that credit or liquidity problems of one or more financial market participants creates substantial credit or liquidity problems for participants elsewhere in the financial system. The contagion effects can be transferred through the financial system through failures to settle in the payments system, through panic runs that follow the revelation of one or more institutions' problems, or through falling prices, liquidity problems, or markets failing to clear when large volumes of securities are offered for sale simultaneously.

Changes in systemic risk from cross-border consolidation have important potential social consequences,

including possible financial market gridlock, problems in the payments system, and difficulties in implementing monetary policy, as well as the costs of financial distress, bankruptcy, and loss of franchise value to other institutions caught up in the contagion. Much of the overall justification for the government safety net and other government involvement in financial institution supervision and regulation rests on systemic risk concerns.

Cross-border consolidation may affect systemic risk and the government's cost of maintaining the safety net if the consolidation changes the risks of individual institutions involved in the M&As. It may also affect systemic risk by increasing the sizes of the institutions. This may increase systemic risk because the systemic consequences of the failures of larger and larger institutions may be increasingly more severe. However, systemic risks may also decrease if the smaller number of larger institutions increases the efficiency of monitoring by government supervisors or other market participants.

Systemic risk may also either increase or decrease with cross-border consolidation. On the one hand, the effects of a systemic crisis within one nation may be mitigated because some of the institutions are diversified across national borders and can use their foreign operations as sources of strength. On the other hand, these transfers of funds may help spread a crisis by weakening the institutions in the other nations.

Cross-border consolidation may also expand the safety net and raise the government's cost of maintaining the safety net in at least four other ways. First, if the government provides more safety net protection to larger institutions because they may be considered "too big to fail" or for other reasons, then safety net costs are increased by consolidation which creates larger institutions that receive stronger explicit or implicit government guarantees. Thus, in addition to the moral hazard incentive to take on more risk, the presence of the safety net also may encourage consolidation by institutions trying to become too big to fail (e.g., Kane 1999b, Saunders and Wilson 1999). To offset these costs, governments use prudential regulation/supervision to try to control risk-taking, and may block or discourage M&As that appear likely to increase safety net or systemic risk costs substantially.

Second, cross-border consolidation may expand the safety net by extending government guarantees to types of financial institutions that normally receive much less safety net protection. Consolidation that creates universal-type institutions by combining commercial banks with securities firms or insurance companies may extend the safety net because commercial banks typically receive much more protection than these other types of institutions. Much of the current debate over operating structure centers on the issue of how best to control this

potential extension of the safety net (e.g., Kwast and Passmore forthcoming, Whalen forthcoming). The potential costs of extending the safety net may be the greatest for combinations of commercial banks with nonfinancial firms, which typically receive much less government protection (Boyd, Chang, and Smith 1998).

Third, cross-border consolidation may expose one government's safety net to losses incurred by the offices or subsidiaries of its institutions operating in other nations. That is, when a domestic institution acquires offices or subsidiaries in other nations, the home country safety net may be exposed to the risk that those foreign entities bear losses and drain some or all of the equity of the home country parent institution. This may be particularly costly in some small nations in which the size of potential financial institution losses from abroad and at home are very large relative to the nation's GDP (Dermine 1999b). However, to some extent, these additional safety net exposures are offset by reduced exposures in the host foreign nations.

Fourth, cross-border consolidation may increase the cost of coordinating the regulatory responses among various national authorities to the failures of large banking organizations. For instance, national central banks in the EU, rather than the European Central Bank, have the lender-of-last-resort responsibilities under the Maastricht Treaty. The cost of resolving future failures among pan-European banking organizations might be higher due to differences in the incentives of national governments to bail out various institutions and the impact of these policies on European monetary policy (Dermine 1999b, Wihlborg 1999).

4.3.2 Availability and prices of financial services for small retail customers

Cross-border consolidation may also raise social concerns about the availability and prices of financial services for retail customers who often depend on locally-based financial institutions. As discussed above, cross-border consolidation may be associated with increases or decreases in efficiency or with increases or decreases in the market power of financial institutions over small retail depositors and borrowers. These changes in efficiency or market power may in turn result in either more or less favorable availability and prices of services for these customers. Rather than go into detail on all of these possible causes and consequences, we concentrate here on the evidence on three specific ways in which cross-border consolidation may affect financial institutions' supplies of retail services -- increases in financial institution scale, increases in organizational complexity, and dynamic changes in focus or organizational behavior associated with the cross-border consolidation process itself.

4.3.2.1 The effects of increases in financial institution scale on the supply of retail services

The increases in financial institution scale associated with cross-border consolidation may induce the

institutions to shift away from providing certain services to small retail customers. This may occur because large institutions may encounter Williamson (1967, 1988) type organizational diseconomies from providing these retail services alongside the capital market services provided to wholesale customers that typically purchase services from multinational financial institutions. This may be particularly the case for relationship-based services to small retail customers, such as some types of small business loans which demand intimate knowledge of customer, business owner, and local market.¹³ It may be costly to provide these services in institutions that primarily provide wholesale services to customers that operate in global markets. In addition, if the financial institutions face upward sloping supply curves of funds, the improved opportunities to provide funds to large wholesale customers may crowd out funding to small retail customers.

It is also possible that the large, diversified financial institutions that result from cross-border consolidation may provide an efficient, stable flow of retail services to small customers, particularly during times of financial stress. The institutions that consolidate across borders may be better able to withstand financial crises in any one nation and continue to provide services to its households and small businesses. In contrast, small, undiversified institutions may more often have to withdraw credit and other service from small customers in times of financial stress. Moreover, even in periods without financial stress, the large, institutions created by cross-border consolidation may act as efficient internal capital markets that allocate financial resources across borders where and when they are most productive.

The research evidence is consistent with the prediction that increases in financial institution scale are associated with reduced supplies of small business credit by these institutions. Several studies found that large U.S. banks devote lesser proportions of their assets to small business lending than small institutions (e.g., Berger, Kashyap, and Scalise 1995, Keeton 1995, Levonian and Soller 1995, Berger and Udell 1996, Peek and Rosengren 1996, Strahan and Weston 1996, Berger, Saunders, Scalise, and Udell 1998). As banks get larger, their proportions of assets devoted to small business lending (measured by domestic commercial and industrial loans to borrowers with bank credit less than \$1 million) declines from about 9% of assets for small banks (assets below \$100 million) to about 2% for very large banks (assets over \$10 billion).

Some evidence also suggests that it is specifically relationship-dependent small business borrowers that tend to receive less credit from large banks. One study found that large banks tend to charge about 1 percentage point less on small businesses loans and require collateral about 25% less often than small banks, other things

equal (Berger and Udell 1996). These data suggest that large banks tend to issue small business loans to higher-quality transactions-based credits, rather than relationship-based loans that tend to have higher interest rates and collateral requirements. Similarly, one study found that large U.S. banks tend to base their small business loan approval decisions more on financial ratios, whereas the existence of a prior relationship with the borrowing firm mattered more to decisions by small banks (Cole, Goldberg, and White 1999). Consistent with this, another study found that large U.S. banks more often lend to larger, older, more financially secure businesses, consistent with the predicted focus on transactions-driven lending, and vice versa for small banks focusing on relationship-driven lending (Haynes, Ou, and Berney 1999).

The data are also consistent with the argument that large financial institutions may provide efficient, stable flows of retail credit services. One study found that during the U.S. credit crunch of the early 1990s, a \$1 decline in equity capital at a small bank reduced business lending more than a \$1 decline at a large bank and that the financial distress of large financial institutions had fewer adverse effects on the health of small businesses in their states (Hancock and Wilcox 1998). Other studies found that loan growth by banks in multibank BHCs was less constrained by the banks' own financial conditions than by the financial condition of their holding company, consistent with the argument that BHCs serve as internal capital markets to provide efficient, stable loan funding (Houston, James, and Marcus 1997, Houston and James 1998).

4.3.2.2 The effects of increases in organizational complexity on the supply of retail services

The arguments about the effects of increased organizational complexity from cross-border consolidation are similar to those for increased financial institution scale. Many of the institutions engaging in cross-border consolidation are likely to 1) add layers of management; 2) expand the number of nations in which they operate; and/or 3) increase the number of different types of wholesale financial services they provide. Similar to the effects of increases in financial institution scale, it may be difficult to maintain strong local relationships and process relationship-based information when 1) there are more layers of management through which to pass the local information; 2) there are more local conditions to monitor; and/or 3) there are more wholesale businesses drawing the attention of the institution. Also similar to the arguments for scale above, the increased organizational complexity may improve stability in the delivery of retail credit and other services, as risks may be better diversified and/or more sources of financial strength are available.

Two dimensions of complexity that have been studied are out-of-state ownership and multibank BHC

affiliation in the U.S. Out-of-state ownership is analogous to foreign ownership, and multibank BHC affiliation is analogous to being a separately chartered entity in a multinational financial institution. Out-of-state ownership was usually found to have a negative effect on small business credit (Keeton 1995, Berger and Udell 1996, Berger, Saunders, Scalise, and Udell 1998, Berger, Bonime, Goldberg, and White 1999), although one study found no effect (Whalen 1995) and one study found that recent interstate acquisitions may provide at least a temporary offsetting boost to small business lending (Berger, Saunders, Scalise, and Udell 1998). Multibank BHC affiliation was also generally found to have a negative effect on small business lending (Berger and Udell 1996, Berger, Bonime, Goldberg, and White 1999, DeYoung, Goldberg, and White 1999). However, empirical analyses that specified simultaneously multiple dimensions of organizational complexity generally found mixed results with some dimensions of complexity positively associated with small business lending and other dimensions negatively associated (e.g., Berger and Udell 1996, Berger, Saunders, Scalise, and Udell 1998, Berger, Bonime, Goldberg, and White 1999).

4.3.2.3 The dynamic effects of the consolidation process on the supply of retail services

The cross-border consolidation process itself may also be associated with dynamic changes in the treatment of retail customers. M&As are dynamic events that often involve significant changes in organizational focus that might shift the organizations away from or toward serving retail customers. There also may be disruptions during the consolidation process that affect the ability to serve retail customers during the transition period and may drive away some retail customers. Other changes in organizational focus/managerial behavior associated with cross-border consolidation may also alter the availability and pricing of services to small customers. For example, the consolidated institution may change the policies and procedures of the foreign subsidiary to bring them into accord with the acquirer's pre-consolidation focus on either retail or wholesale services.

Also important are the external effects of cross-border consolidation, or the dynamic reactions of other institutions in the same markets as the consolidating institutions. The changes in competitive conditions created by the cross-border M&As may affect the behavior of rival institutions that may either augment or offset the actions of the consolidating firms. For example, if consolidating institutions reduce their availability of credit to some small businesses, other institutions may pick up some of the dropped credits if it is value maximizing for them to do so. Only by including these external effects can the total effects of cross-border consolidation be

determined.

A number of studies analyzed the effects of U.S. bank M&As on small business lending by the consolidating institutions (e.g., Keeton 1996, 1997, Peek and Rosengren 1996, 1998, Strahan and Weston 1996, 1998, Craig and Santos 1997, Kolari and Zardkoohi 1997a,b, Zardkoohi and Kolari 1997, Walraven 1997, Berger, Saunders, Scalise, and Udell 1998). The measured outcomes are inclusive of any effects of the changes in the institutions' scale and organizational complexity, as well any changes in their focus or managerial behavior associated with the consolidation process. The most relevant results for predicting the effects of cross-border consolidation are those for M&As in which one or more of the banking organizations is large, given that the institutions involved in cross-border consolidation are typically quite large. The literature generally found a reduction in small business lending from this type of M&A (although M&As between small organizations were often found to increase small business lending).

Some research also measured the external effect or dynamic responses to consolidation of other financial institutions in the same local markets. One study found that increases in small business lending of other banks in the same local market tended to offset much, if not all of the negative effects on small business lending of M&As, although this external effect was not precisely measured (Berger, Saunders, Scalise, and Udell 1998). In contrast, another study found a very small external effect of M&As on the lending of small banks in the same market, and the measured effect depended on the age of the bank, with the positive effect primarily occurring for more mature small banks (Berger, Bonime, Goldberg, and White 1999).

Another way the external effect may be manifested is through increased market entry. That is, there may be an external effect in terms of additional provision of services by institutions that were not in the market prior to consolidation. One way that this might occur is that loan officers who leave the consolidated institution take some of their relationship-based loan portfolios with them and start a de novo bank. This effect may be substantial, given that studies have found the result that recent entrants tend to lend much more to small businesses than do other banks of comparable size (Goldberg and White 1998, DeYoung 1998, Berger, Bonime, Goldberg, and White 1999, DeYoung, Goldberg, and White 1999). However, the research on the effects of M&As on entry are mixed -- one study found that M&As increase the probability of entry (Berger, Bonime, Goldberg, and White 1999) and another found that M&As decrease the probability (Seelig and Critchfield 1999).

Finally, some studies have examined the treatment of small business borrowers and depositors based on

the consolidation of their banks, other banks in the market, or the size distribution of banks in their markets. Their results may be viewed as indicative of the net effect of consolidation on the supply of retail services, inclusive of the effects of the consolidating institutions and the external reactions of other preexisting and entering firms. One study examined the probability that small business loan applications will be denied by consolidating banks and other banks in their local markets and found no clear positive or negative effects (Cole and Walraven 1998). Another study examined a number of dimensions of how well the borrower is treated after its lender is acquired and found mixed results for the effects of consolidation on satisfaction of borrowing needs, loan approval/rejection, shopping for lenders, loan rates, etc. (Scott and Dunkelberg 1999). A third study found that the probability that a small firm obtains a line of credit or pays late on its trade credit does not depend in an important way on the presence of small banks in the market (Jayaratne and Wolken 1999). A fourth study examined the effects of M&As on the number of bank branches in local markets in the U.S. and found that only in-market M&As reduced the number of branches per capita, but other M&As that would be analogous to cross-border consolidation had little effect on branch office availability (Avery, Bostic, Calem, and Canner 1999). The results of these studies and the other evidence summarized here suggest that the total effects of consolidation on retail customers may be relatively small.

4.3.3 Availability and prices of financial services for large wholesale customers

Cross-border consolidation of the financial services industry may also raise issues about the availability and prices of financial services for wholesale customers. Two separate trends have been occurring that may affect wholesale customers, which must be distinguished. The first is the consolidation of the institutions that are associated with wholesale capital markets. These institutions include securities firms, universal banks, commercial banks, and other institutions that underwrite securities, act as brokers, traders, and market makers in the secondary markets, and/or offer other wholesale corporate financing products such as derivatives or M&A advisory services. There is also consolidation of the stock, bond, and derivatives exchanges, the institutions that comprise the secondary market on which the securities are traded.

The second trend is the globalization of wholesale capital markets, which may occur without the consolidation of financial institutions. This trend arguably began with the first Eurobond underwriting in 1964. The Euromarket began in London and has now spread to other locations such as the Bahamas, Singapore, Bahrain, Hong Kong, the U.S., and Japan. There has also been a trend toward globalization in the corporate

securities and derivatives markets. For example, the New York Stock Exchange and the London Stock Exchange now both list substantial numbers of foreign companies.

Importantly, the trends toward consolidation of institutions and globalization of markets are intertwined. For example, some of the wholesale institution consolidation may be associated with economies of scale in the global markets into which the customers issue new securities. For example, with the advent of the "bought deal" in the Eurobond market and its spread to the U.S. (facilitated by the Rule 415, shelf registration), investment banks are required to commit large sums of capital nearly instantaneously. Cross-border consolidation provides an important avenue for financial institutions to amass the scale and scope needed to raise capital to underwrite in this global market. Wholesale customers, in turn, may benefit from a lower issuance cost in the primary market.

Institution consolidation and market globalization are also intertwined in the secondary markets, where larger markets beget larger institutions and vice versa. Examples of this are the signing of the strategic alliance between the London Stock Exchange and the Deutsche Bourse in July 1998 and the signing of a memorandum of understanding among eight European exchanges (Amsterdam, Brussels, Frankfurt, London, Madrid, Milan, Paris, Switzerland) in May 1999 to work toward harmonization of their markets and establish a Pan-European equity market. In these two cases, the introduction of the euro may have been a key facilitating event, reducing the segmentation of wholesale capital markets along national lines. There have also been other efforts to consolidate exchanges across national and currency boundaries (e.g., EUREX and the CBOT), and more may be forthcoming.

There may be considerable benefits to issuers and investors when exchanges consolidate. Viewed as networks, exchanges can increase the utility of their customers as they increase their size (Economides 1993, 1996). Greater size may create economies of scale in clearing and settlement and improve liquidity, which may, in turn, lower the cost of capital to the customers who list their securities on these exchanges. Modeled as networks, it can be shown that integration among stock exchanges, particularly in the form of "implicit" mergers, may promote social welfare (Di Noia 1999, 2000). Implicit mergers involve agreements among exchanges to cross-list, but do not involve total and legal integration. Benefits arise out of network externalities (customer utility rises with exchange membership) and some competition is preserved because the mergers are not explicit. Cross-border mergers and alliances can also allow participants to defray transactions and operating costs and enable them to introduce new technologies (ECB 1999, Steinherr 1999). It is also possible that technological advances that provide alternative delivery channels (e.g. electronic links and screen trading) may create new

sources of competition and lead to specialization in the provision of exchange services (Dermine 1999a, Di Noia 1999, 2000, Steinherr 1999). In either case, increased competition and consolidation among exchanges can lead to more efficient provision of listing and trading services, increase the attractiveness of capital markets to investors, and lower the cost of capital to listing firms. The evidence on scale economies associated with the size of exchanges themselves (as opposed to ancillary activities such as clearing and settlement) suggest that they may be limited although there may be significant X-efficiency gains available from consolidation (Cybo-Ottone, Di Noia, and Murgia 2000). However, estimation of economies of scale in securities exchanges is problematic because of difficulties associated with determining the inputs and the outputs and because many of the M&As have not yet reached fruition (Cybo-Ottone, Di Noia, and Murgia 2000).

Another segment of the customer market that may benefit from consolidation of the securities markets is high growth, often technology-based, start-up firms, although such firms do not fit our classification of wholesale customers. High growth start-ups often require substantial private external equity financing in the earlier stages of their growth cycle from individual investors ("angels") or from formal venture capitalists (Berger and Udell 1998). As a condition for investment, both types of private equity investors require a viable exit strategy, a market where they can sell their equity stake via an initial public offering (IPO) if the firm is successful. An IPO, in turn, requires a vibrant small cap stock market -- something that is currently absent in continental Europe. The development of such a market (possibly out of EASDAQ or Euro.NM) could lead to a significant increase in high-tech entrepreneurial activity similar to the U.S.

4.3.3.1 Banking-oriented finance versus markets-oriented finance

An analysis of the effects of consolidation on wholesale customers must also be viewed in the context of a separate but closely related phenomenon -- changes in the mix of funding between intermediated markets (intermediated finance) and securities markets (direct finance). The principal contrast is between a "markets-oriented" financial system like the U.S. and a "banking-oriented" system like Germany.

Tables 4.1 and 4.2 provide an indication of the differences among countries in terms of the mix between intermediated and direct finance. Specifically, they demonstrate that U.S. financial system lies substantially closer to the market-oriented end of this spectrum than the financial systems of other industrialized nations. Table 4.1 shows that in 1997 the total banking assets in the U.S. were equal only 52% as large as the market capitalization of the U.S. stock and bond markets, while the ratio for all of the other countries (excepting Luxembourg) was

considerably greater, indicating that the financial systems in other industrialized nations are much more bank-oriented. Table 4.2 provides corroborating evidence from corporate balance sheets. In 1994, debt securities provided more than four times as much financing (82% versus 18%) for U.S. corporations than did bank loans. In contrast, bank loans were more important sources of financing than debt securities in Canada, Japan, and most European countries. The data in these tables reflect the fact that U.S. securities markets are more developed than of other nations, and thus are relatively more important than banks as a source of external finance for U.S. corporations.

These differences also reflect a tradeoff between liquidity and corporate governance mechanisms.¹⁴ In the U.S., highly-developed securities markets reduce the cost of capital by increasing liquidity to investors. However, managerial control problems are exacerbated by the atomistic ownership of large corporations. This problem is addressed in the U.S. system primarily through the market for corporate control (i.e., the takeover market), through performance-based managerial compensation, and through monitoring by market outsiders and institutions (e.g., large bondholders, bond rating agencies). In Japan and Germany, however, the corporate governance problem is addressed by the consolidation of ownership of corporations in large financial institutions, rather than the stock market. This reduces the incentive (free rider) problem in monitoring management that arises when ownership is diffuse. The parallel growth of these two types of systems among developed economies, it has been argued, may have been principally due to the evolution of different legal environments (Prowse 1995). For example, regulatory constraints in Germany and Japan against issuing corporate bonds and commercial paper were major factors in promoting bank dependence among large firms. It can also be argued that banking-oriented systems may be better suited to solve moral hazard and adverse selection problems in lending. This suggests that a banking-oriented system may be the preferred architecture for countries with poor information infrastructures such as the formerly centrally planned economies of Eastern Europe (Udell and Wachtel 1995). Banking-oriented systems may also offer better intertemporal risk-sharing at the cost of less cross-sectional risk taking than markets-oriented systems (Allen and Gale 1997).

The legal and economic institutions that determine whether a country's financial system is markets-oriented or banking-oriented can change over time. For example, a series of legislative changes in France between 1978 and 1984 were designed to increase the role of capital markets and reduce the dependence of French companies on bank financing. The reduction in bank finance in France between 1983 and 1994 suggests that

those changes were effective. Equity and bond markets in most European countries have grown significantly in recent years, due in part to regulatory changes like the “Big Bang” in the UK and the deregulation of guilder-denominated bond issues in the Netherlands (Bisignano 1991, Bowen, Hoggarth, and Pain 1999).

While financial institution consolidation and changes in financing mix are often discussed together, they need not occur together. It is conceivable, for example that continental Europe could experience considerable consolidation of both its securities markets and its banking markets but remain predominantly a banking-oriented system. Alternatively, consolidation could be accompanied by a shift in mix towards the securities markets and away from the intermediated markets. Similarly, the proportions of funding through universal-type institutions versus separate commercial banks, securities firms, and insurance companies could conceivably either increase or decrease, depending in part on which types of consolidation occur.

A shift from a banking-oriented system to a markets-oriented system in continental Europe or Japan could have a significant impact on large companies. Such a shift could arise, for example, if the network and scale efficiency benefits from consolidation of the securities markets are sufficiently large relative the benefits from consolidation of banks and other financial intermediaries discussed in earlier sections that they drive a shift in the mix toward direct finance at the expense of intermediated finance. The net benefit to large companies would depend in part on whether the reduction in the cost of capital from issuing liquid securities is greater than any increase in the cost of capital from a shift in governance mechanisms.

Of course a shift toward a markets-oriented financial system would likely be facilitated by growth -- possibly through consolidation -- of the investment banking industry that provides wholesale services in the primary and secondary markets. This growth may be skewed towards universal banking if universal banking is characterized by economies of scope (discussed earlier). There has already been a wave of nonfinancial M&A activity in Europe that has precipitated fierce competition for advisory business. Intra-European merger and acquisition activity between 1985 and 1988 averaged \$43 billion per year versus \$280 billion per year between 1995 and 1998 (Securities Data Company). In order for European universal banks to compete for this business -- particularly against U.S. investment banks who have acquired substantial expertise in the M&A advisory business -- they either have to develop this expertise internally or acquire it externally. It appears, for example, that in part Deutsche Bank has acquired this expertise by purchasing British and U.S. investment banks (Morgan Grenfell and Alex. Brown). Similarly, domestic institutions in Asia may seek to acquire foreign investment banks to compete in

the burgeoning Asian IPO business. To the extent that these type of acquisitions in the securities industry improve scale and scope efficiency and/or increase overall competitiveness, the cost of capital to larger companies should decline as a result of lower underwriting spreads and advisory fees.

A change in financial mix might also have an impact that operates through a link between mix and firm capital structure. However, the evidence on the impact of different financial systems on capital structure of firms is ambiguous. One study suggested that the differences between banking- and markets-oriented systems are reflected more in the sources of financing, and less in the capital structure of firms (Rajan and Zingales 1995). In contrast, two other studies found significant differences in the capital structures of companies across European countries (Rivaud-Danset, Dubocage, and Salais 1998, Delbreil, Cano, Friderichs, Gress, Paraque, Partsch, and Varetto 1998).

However, there is also evidence that this type of disintermediation away from banking-based finance to markets-based finance has not occurred in Europe. One study of flow of funds data in France, Germany, and the U.K. found no general trend (except in France) towards disintermediation or movement towards a markets-oriented system (Schmidt, Hackethal, and Tyrell 1999). In contrast, there may be a lengthening of the intermediation chain. It may be argued that the development of new financial products have primarily created markets for intermediaries, rather than end-users of these products (Allen and Santomero 1998). Consistent with this argument, most of the European funds (nearly 80% in some countries) are controlled by banking organizations (ECB 1999), and banks distribute more than half of these funds (Otten and Schweitzer 1998).

4.3.4 Other macroeconomic consequences of cross-border consolidation¹⁵

The consolidation of the financial services industry may have a number of macroeconomic effects. The most obvious of these would be the effects of any improvements in the efficiency of financial institutions (as discussed above), which may affect the economy through a reduction in the cost of capital. Depending on the degree of competition in financial markets, some of any gains may accrue to the issuers of financial claims in the form of a reduced cost of capital and/or to savers in the form of higher returns on their investments. In the intermediated markets, interest rates on loans might decrease and interest rates on deposits might increase. In the securities markets, trade execution, liquidity, access, and price may improve.

Other potential impacts of consolidation on the macroeconomy may operate through monetary policy. Traditional monetary theory argues that the transmission mechanism of monetary policy operates either through

an interest rate or a money channel. For the most part, this traditional theory was built on models of the economy in which there were only two assets, (non-interest bearing) money and (interest bearing) securities. Banks play a very passive role in these models, limited to benign caretakers of the money supply constrained by reserve requirements. Under the traditional theory, consolidation would have very little effect on the operation of monetary policy.

Relatively recently, however, a competing theory has emerged in which banks play a critical role. Under this "bank lending view," monetary policy in part operates through bank lending behavior.¹⁶ The reduction in bank reserves that accompanies a monetary policy tightening results in some banks reducing their supplies of loans. This reduction in loan supply forces some borrowers to reduce real spending and slow the macroeconomy because alternative means of funding are unavailable or unaffordable, at least in the short term (Bernanke and Blinder 1988). The effect is disproportionately greater on small bank-dependent companies that do not have access to the securities markets.¹⁷

Under the bank lending view, the impact of the monetary policy may depend on the structure of the banking industry. Small banks may be much more sensitive to shifts in monetary policy because their access to non-deposit money market funding is significantly less than large banks. The evidence suggests that small bank lending is more sensitive to changes monetary policy than large bank lending and that this sensitivity is greatest for those small banks who are the least liquid (Kashyap and Stein 1995, 1997a,b, Gibson 1996). It has been argued that countries with a higher fraction of bank-dependent borrowers, weaker banking systems, and fewer market alternatives to intermediated finance may be much more sensitive to monetary policy shocks (Kashyap and Stein 1997a). The nations of the EU were ranked according to these criteria. The U.K., Belgium and the Netherlands appeared to be the least sensitive to lending channel, whereas Italy and Portugal appeared to be the most sensitive (Kashyap and Stein 1997a). These asymmetric responses across member countries to a shift in monetary policy should continue under the common monetary policy of the European Central Bank.

Bank consolidation may reduce the effect of the lending channel in part by creating larger institutions with greater access to capital markets. In addition, cross-border consolidation may also reduce the effect of monetary policy through the lending channel by diversifying the effects of any one nation's monetary policy. To the extent that monetary policies are independent, the multinational banks can use more of the reserves from their operations in the nation with the looser monetary policy to lend in the nation with the tighter monetary policy. Of course,

this last effect is nullified to the extent that monetary policies tend to be coordinated or, in the case of the EU, there is a common monetary policy for multiple nations.

Financial service industry consolidation might also affect nonfinancial firms' access to funding and the macroeconomy by affecting the number of potential sources of funding. While consolidation does reduce the number of financial institutions, in some cases it may also increase the number of options available. If consolidation is associated with a shift from a banking-oriented system towards a market-oriented system, this could increase the menu of alternative markets in which firms may obtain financing. For example, the highly developed private placement market and the junk bond market in the U.S. represent alternatives to bank loan financing for lower quality firms. For investment grade firms, the commercial paper market and the medium term note market represent alternatives to the bank loan market. There is some evidence to suggest that firms shift their funding sources as macroeconomic conditions change, such as shifting from bank loans to commercial paper in the U.S. (Kashyap, Stein, and Wilcox 1993, 1996). Small firms may also benefit to the extent that larger firms increase their commercial paper issuance to finance more trade credit to small firms (Calomiris, Himmelberg, and Wachtel 1995). More generally, it may be the case that the impact of macroeconomic crises on economic activity may be mitigated by diversification across funding sources, as firms may shift sources when one source of funding fails (Greenspan 1999). It should be noted, however, that credit crunches may be correlated across markets. For example, evidence suggests that a contraction of supply occurred simultaneously in the early 1990s in the U.S. across three different markets -- the bank loan market, the junk bond market, and the below-investment grade segment of the private placement market (Carey, Prowse, Rea and Udell 1993).

5. Tests of Home Field Advantage versus Global Advantage Using International Data

In this section, we present our efficiency analysis of cross-border banking. We evaluate the relative efficiency of foreign versus domestic commercial banks in five 'home' countries -- France, Germany, Spain, the U.K., and the U.S. For each home country, we estimate separate cost and alternative profit frontiers and compare the efficiency of foreign and domestic banks. We also extend our tests by including foreign banks from other nations — we present efficiency statistics in all cases for which we have data for at least three banks from a given foreign nation. We use these relative efficiency comparisons to test the home field advantage hypothesis versus the two forms of the global advantage hypothesis discussed above. We test these hypotheses in light of the prior research on cross-border X-efficiency, which often found that foreign banks were less efficient than

domestic banks and concluded that the evidence supported the home field advantage hypothesis. However, as discussed above in Section 3.3, the methodologies used in these previous studies may not be able to properly distinguish among the hypotheses. We address the drawbacks in the prior methodologies by: a) examining the performance of foreign and domestic banks in five different home countries; b) distinguishing among nations of origin of foreign institutions to test the limited form of the global advantage hypothesis; and c) conducting completely separate analyses of data from banks located in different countries to avoid problems of comparison because of differences in the economic environments across nations.

5.1 A brief summary of the estimation methods

Performing separate efficiency estimations in each of the five home countries allows us to specify the cost and alternative profit functions differently in each of these countries, depending on the activities in which banks are permitted to engage. This is especially relevant for universal banking powers, which were more often present in European nations than in the U.S. Separate treatment also allows us to adjust the specification and the estimation procedures when certain variables are available for one country but not for others.

Although we feel that our approach offers a number of methodological improvements, our approach does tax the availability of the data. Since we do not pool data across countries, each of our home country efficiency frontiers are estimated with fewer degrees of freedom. We limit our analysis to home countries for which our data sets contain a) data on enough banks to estimate the cost and profit frontiers with reasonable accuracy, and b) data for at least three foreign banks from at least two foreign nations during the sample period. Fortunately, our results suggest that these data limitations do not pose major problems. As shown below, we are still able to test domestic versus foreign efficiency for a large number of nation-pairs, many of which yield statistically and economically significant results.

5.1.1 Estimating X-efficiency for banks in the U.S.

In this subsection, we present a nontechnical overview of the procedures used to estimate cost and alternative profit X-efficiency for banks in the U.S. In the following subsection we describe how we altered these estimation procedures for the other four home countries. A more detailed technical appendix is available from the authors.

Both cost efficiency and alternative profit efficiency measure how well a bank performs relative to a "best-practice" institution that produces the same output bundle under the same environmental conditions. Cost

efficiency is measured from a standard cost function that specifies the quantities of four variable outputs (consumer loans, business loans, real estate loans, securities), the quantity of one fixed output (off-balance-sheet activity), the quantities of two fixed inputs (physical capital, financial equity capital), the prices of three variable inputs (purchased funds, core deposits, labor), and the ratio of market-average nonperforming loans to total loans (to control for business environment of the bank). The cost function is estimated using the Fourier-flexible functional form, which has been shown to fit banking data better than more conventional functional forms (McAllister and McManus 1993, Mitchell and Onvural 1996, Berger, Cummins, and Weiss 1997, Berger and DeYoung 1997, and Berger, Leusner, and Mingo 1997). Because this functional form fits the data globally, rather than just around the mean of the data, it allows us to measure more accurately the relative performance of banks with starkly different output bundles or other characteristics.

Alternative profit efficiency is derived from a profit function with the same right-hand-side variables as the cost function and is estimated using the same functional form. As described elsewhere (Berger and Mester 1997), alternative profit efficiency is a particularly useful concept when some of the standard assumptions of perfect markets do not hold.¹⁸ Importantly, alternative profit efficiency may capture some of the revenue effects of differences in investment or risk management skills that are not captured in cost efficiency, which neglects differences in revenue across banks. Alternative profit efficiency may also capture some of the revenue benefits of cross-border risk diversification if banks use these diversification gains as an opportunity to invest in higher risk/higher expected return projects. Finally, alternative profit efficiency may reflect revenue differences associated with service quality or product variety. For example, banks may "skimp" on loan underwriting, loan monitoring, cross-selling, customer convenience, or other activities important for producing high quality financial services and high levels of interest and non-interest revenue (Berger and DeYoung 1997). Since it is difficult to control for service quality, this skimping may mistakenly be measured as high cost efficiency (i.e., lower costs for a given quantity of output), but may be captured at least in part as low alternative profit efficiency, which captures both costs and revenues.

These efficiency measures have a fundamental advantage over simple accounting-based cost and profit performance ratios. The efficiency measures statistically remove the effects of differences in output bundles, input prices, etc. that affect accounting-based performance ratios, but are not necessarily related to the efficiency or managerial quality of the organization. This may be particularly important when comparing foreign and

domestic banks, which often have different output mixes. Thus, we reduce the potential problem of "comparing apples to oranges" by controlling for output mix and other non-efficiency factors when comparing the performance of foreign and domestic banks within a home country.

We use alternative profit efficiency as our main performance measure to test the home field and global advantage hypotheses, because it is a more comprehensive measure that includes both costs and revenues. We use cost efficiency as an ancillary measure to diagnose whether differences in profit efficiency are rooted in cost control, revenue generation, or both, and to compare our results to the previous cross-border cost efficiency literature.

We estimate the U.S. cost and alternative profit functions using data on 2,123 banks with greater than \$100 million in gross total assets (1998 dollars) and continuous, complete annual data for the six-year period from 1993 through 1998. Using the results of these estimations, we calculate cost efficiency and alternative profit efficiency for every bank in the data set (1,940 domestic banks and 43 foreign banks) using the distribution-free method, which distinguishes efficiency differences from random error by averaging the cost or profit function residuals over time (Berger 1993). We exclude small banks from the analysis because the vast majority of banks owned by international banking organizations are large, and because the efficiency data for the other four home countries generally include only large banks. The data are taken from the Call Report. Table 5.1 displays summary statistics for the data used in the U.S. efficiency estimations.

5.1.2 Estimating X-efficiency for banks in France, Germany, Spain, and the U.K.

We alter the U.S. specification in a number of ways to estimate efficiency for banks in France, Germany, Spain, and the U.K. First, we take our data from the Fitch-IBCA database, which presents financial statement data from financial institutions in different nations using internally consistent accounting definitions. This database reports a more limited amount of financial information than does the U.S. Call Report, and reports this information for a sample of (mostly large) financial institutions in each country. Second, we specify the European cost and profit functions using the quantities of four variable outputs (total loans, total non-equity securities, total equity securities, and commission revenues), the quantity of one fixed input (equity capital), and the prices of two variable inputs (labor and borrowed funds). This different specification partly reflects the broader insurance and securities powers of European banks (which we capture in the equity securities and commission revenues variables), and partly reflects the reduced level of detail in the IBCA database. Third, we use definitions supplied

by IBCA to identify and retain commercial banking firms, and to identify and discard other types of financial institutions. This further insures that we are estimating performance and testing our hypotheses based on a relatively homogeneous group of firms across nations. Fourth, we observe commercial banks in these countries annually over the six-year time period from 1992 through 1997 (rather than 1993 through 1998 in the U.S.), and include in the estimations any commercial bank that appears in the database in at least four of those six years. Our final samples included 215 commercial banks in France (158 domestic and 57 foreign); 206 commercial banks in Germany (121 domestic and 85 foreign); 76 commercial banks in Spain (60 domestic and 16 foreign); 124 commercial banks for the profit function in the U.K. (63 domestic and 61 foreign); and 57 banks for the cost function in the U.K. (26 domestic and 31 foreign). Table 5.2 displays summary statistics for the data used in these estimations.

5.1.3 Overall X-efficiency estimates

Our overall cost efficiency estimates (i.e., not differentiating between domestic and foreign ownership) are consistent with those found in the previous literature. The average estimated cost efficiency for banks in France is 70.9%, for banks in Germany is 79.3%, for banks in Spain is 91.5%, for banks in the U.K. is 79.2%, and for banks in the U.S. is 77.4%. An average cost efficiency of 70.9% as in France indicates that a best-practice bank producing the same output bundle under the same environmental conditions as the average bank could do so for an estimated 70.9% of the costs. The average estimated alternative profit efficiency for banks in France is 44.2%, for banks in Germany is 52.2%, for banks in Spain is 67.1%, for banks in the U.K. is 66.1%, and for banks in the U.S. is 66.7%. An average alternative profit efficiency of 44.2% as in France indicates that the average bank earns only an estimated 44.1% of the profits of a best-practice bank producing the same output bundle under the same environmental conditions.

We again emphasize that the efficiency estimates for one home country are not comparable to the efficiency estimates for the other four home countries. For example, the 91.5% mean cost efficiency for banks operating in Spain does not indicate that the average bank operating in Spain is more cost efficient than the average bank operating in the other home countries. The efficiency differences across home countries reflect market factors (e.g., the degree of competition, the development of securities markets, and the quality of the labor force), regulatory/supervisory factors (e.g., the enforcement of prudential limits on risk taking) and differences in specification of the frontier. In our tests below, we evaluate the home field advantage and global advantage

hypotheses **only** by comparing domestic bank efficiency versus foreign bank efficiency within each of our home countries. While this approach better allows us to distinguish among the main hypotheses, it unavoidably reduces sample sizes and statistical significance.

5.2 The relationship between the cross-border efficiency results and the hypotheses

Although we estimate ten separate efficiency frontiers (cost and profit for five home countries) and use the results to test the comparative efficiencies of a large number of nation-pairs, we can classify our results into four simple possible outcomes. In this section, we identify each of these four possible outcomes, map each outcome into support for or rejection of the home field versus global advantage hypotheses, and identify the implications of each outcome for the future of global integration of the financial services industry.

The first possible outcome is that foreign institutions are generally found to be **less** efficient than domestic institutions. This would support the home field advantage hypothesis that organizational diseconomies of operating or monitoring an institution from a distance or other advantages for domestic banks (e.g., language, culture, regulation, other barriers) are too difficult to overcome in most cases, even for efficiently operated cross-border organizations. This outcome, if it extrapolates to the future, may suggest that efficiency problems could limit the degree of globalization of financial institutions.

The second possible outcome is that foreign institutions are generally found to be **more** efficient than domestic institutions. This would support the general form of the global advantage hypothesis that efficiently managed foreign banks headquartered in many nations are able to overcome any cross-border disadvantages and operate more efficiently than the domestic banks. As discussed above, the higher efficiency may result from spreading superior managerial skills or best-practice policies and procedures, by obtaining diversification of risks that allows for higher risk-higher expected return investments, and/or by providing superior service quality/variety that raises revenues. This second outcome, if it extrapolates to the future, may suggest that efficient institutions from many nations could successfully expand on a global basis, limited only by non-efficiency constraints, such as regulatory/supervisory intervention or other barriers to entry.

The third possible outcome is that foreign institutions headquartered in one or a limited number of nations are found to be more efficient than domestic institutions. This would support the limited form of the global advantage hypothesis in which only efficiently managed foreign banks headquartered in nations with specific favorable conditions in their home countries are able to overcome any cross-border disadvantages and operate

more efficiently than the domestic banks. This third outcome, if it extrapolates to the future, may suggest that efficient institutions from this limited group of nations could successfully expand on a global basis if the conditions fostering their higher efficiency remain intact and if non-efficiency barriers do not prevent their expansion.

Finally, if neither domestic nor foreign institutions are found to be systematically more efficient – which essentially corresponds to all outcomes other than the first three listed here — then neither the home field advantage nor the global advantage hypotheses are supported by the data. This final potential outcome, if it extrapolates to the future, may suggest that global consolidation may be more likely to turn on issues other than efficiency maximization, such as managerial motives and government actions.

5.3 Empirical results

Table 5.3 shows the results of our cross-border alternative profit efficiency tests. Each cell of the table shows the mean estimated efficiency for banks in the group (top number), the number of observations (middle number), and the standard error of the mean estimated efficiency (bottom number). Each of the five columns of the table corresponds to an alternative profit frontier estimated for banks operating in one of the five home countries in our analysis. The first row displays the mean profit efficiency of the domestic banks in each home country. The second row displays the mean efficiency for all the foreign banks in each home country, without regard to their nation of ownership. The rows in the bottom panel correspond to subsets of foreign banks, grouped according to their nation of ownership. Cells with fewer than three foreign banks are left blank. The superscripts ** and * indicate that the mean efficiency of foreign banks in the cell is significantly *higher* than the mean for domestic banks at the 5 and 10 percent levels of significance in two-tailed tests, respectively. Similarly, the superscripts ## and # indicate that the mean efficiency of foreign banks in the cell is significantly *lower* than the domestic bank mean. Table 5.4 is constructed in similar fashion, except that the cells display estimates of cost efficiency.

The results displayed in Tables 5.3 and 5.4 can be summarized as follows. In most countries, domestic banks are found to have both higher mean profit efficiency and higher mean cost efficiency than the mean of all foreign banks operating in that country, although these differences are not always statistically significant. This result is consistent with most of the findings in the extant literature. This result has been previously interpreted as supporting the home field advantage hypothesis, but we do **not** draw this same conclusion. Rather, by

disaggregating the results by foreign nation of origin, we find that the data appear to reject the home field advantage hypothesis in favor of the limited form of the global advantage hypothesis. As shown below, the disaggregated results suggest that domestic banks may be more efficient than banks from most foreign countries; may be about equally efficient with banks from some foreign countries; but may be less efficient than banks from one of the foreign countries.

5.3.1 Domestic bank efficiency versus foreign bank efficiency

In France, Germany, and the U.K., cost efficiency and alternative profit efficiency are both higher on average for domestic banks than foreign banks. Some of these differences are small, although in Germany and the U.K. the difference in profit efficiency is economically large, over 4% of potential profits.

In Spain and the U.S., domestic banks exhibit either higher cost efficiency than foreign banks, or higher profit efficiency than foreign banks, but not both. In Spain, mean domestic cost efficiency is about 2.1% of costs higher than mean foreign bank cost efficiency, but on average domestic banks are less profit efficient than foreign banks by about 5.4% of potential profits. This implies that while domestic Spanish banks may have a slight cost advantage over their foreign rivals, their lower revenues overwhelm their lower costs. This may be due to making poor investment choices, to poor risk diversification that requires a relatively low risk-low expected return choice of investments, or to poor service quality such as skimping on expenditures necessary to monitor and service customers.

In the U.S., domestic banks are more profit efficient on average than foreign banks by a wide margin, 25.1% of potential profits, but domestic banks are on average slightly less cost efficient than foreign banks by 2.9% of costs. Both differences are statistically significant. The much higher profit efficiency suggests that the extra spending by U.S. domestic banks are likely not due to waste or inefficiency -- rather, these higher expenses more likely reflect efforts to produce a quality or variety of financial services that generate substantially greater revenues.¹⁹

5.3.2 Disaggregating foreign bank efficiency by nation of ownership

Thus far, our results are consistent with the main finding of the prior research in this field, i.e., that the average domestic bank is generally more efficient than the average foreign bank. In four of our five home countries, mean domestic bank profit efficiency is higher than mean foreign bank profit efficiency. In some cases, particularly the U.S., this efficiency edge is also economically large, accounting for a substantial percentage

of potential profits.. However, we cannot draw conclusions about our hypotheses without also disaggregating these results by nation of origin for the foreign banks. We show this disaggregation in the bottom panels of Tables 5.3 and 5.4.

In France, domestic banks have slightly higher mean cost and profit efficiency than foreign banks on average, but this masks considerable heterogeneity across the foreign banks by nation of origin. For example, U.S.-owned banks in France have the highest mean profit efficiency of 64.85%, which is more than 20% of potential profits higher than domestic French banks, and the difference is statistically significant. Interestingly, the Netherlands-owned banks in France have much higher measured cost efficiency, but much lower measured profit efficiency than domestic French banks, suggesting poor revenue performance for these banks. In contrast, Italian-owned banks in France have higher measured profit efficiency, but much lower cost efficiency than the domestic French banks.

In Germany, as in France, heterogeneity among the foreign institutions is again apparent once the results are disaggregated by nation of origin. Again, the U.S.-owned banks have the highest mean profit efficiency of all foreign institutions, and again the U.S.-owned institutions posted a higher mean profit efficiency than domestic banks (although the difference is not statistically significant). Note that domestic German banks have statistically higher mean profit efficiency than foreign banks from the Netherlands, Switzerland, and the UK, although the foreign UK banks have statistically higher cost efficiency than the domestic German banks. Again, these mixed cases suggest that studies that use only the less comprehensive cost efficiency measure can be misleading, because this measure does not account for differences in the ability to generate revenues. There is weak evidence that the strong profit efficiency of German domestic banks carries over to their foreign operations in France, although this result is not statistically significant and we do not have any data from German banks in foreign nations other than France to determine whether German banks may have a global advantage.

In Spain, our database contained only two foreign nations (France and the U.S.) that operated at three banks. On average, both of these sets of foreign banks are more profit efficient than the domestic banks, providing further evidence against the home field advantage hypothesis in Spain. The cost efficiency results continue to differ from the profit results in Spain, suggesting that most of profit efficiency advantage of the foreign banks is on the revenue side.

In the U.K., domestic banks have higher mean cost efficiency and higher mean profit efficiency than all of the foreign nations operating in the U.K. However, none of these differences are statistically significant, and they do not suggest that U.K. banks have a global advantage. U.K. banking organizations have only three or more banks in one other home country in our data set, Germany, where the cost and profit efficiency of U.K. banks are both statistically and economically significantly lower than domestic German banks. Thus, while it may be hard for foreign banks to do business in the U.K., U.K. -owned banks do not appear to be particularly efficient players outside their home country.

In the U.S., domestic banks have higher mean profit efficiency than the foreign banks from all other nations, and the difference is usually statistically significant and economically large. The much higher profit efficiency and somewhat lower cost efficiency of domestic U.S. banks relative to foreign banks in the U.S. suggests a strong advantage for U.S. domestic banks on the revenue side of the ledger. Furthermore, unlike the results for the other home countries, the domestic profit efficiency advantage of U.S. banks does not disappear when these banks go abroad — U.S.-owned banks earn higher-than-domestic levels of profit efficiency in France, Germany, and Spain.

Overall, these disaggregated data tend to support rejection of the home field advantage hypothesis in favor of the limited form of the global advantage hypothesis. In three of the five home countries, foreign banks from at least one other nation are more efficient on average than domestic banks, contrary to the predictions of the home field advantage hypothesis. Banks from one nation, the U.S., exhibit mean efficiency levels that are higher than domestic banks in all but one of the other home countries, supporting the limited form of the global advantage hypothesis. Banks from Germany also exhibit high mean efficiency levels both at home and abroad, although the foreign performance of German banks is based on a single, statistically insignificant result in only one foreign country. These data suggest that some efficient institutions from the U.S. (and perhaps Germany) may have overcome the difficulties of imposed by distance, language, culture, etc. to operate in foreign countries above the mean domestic efficiency levels, possibly because of specific favorable market or regulatory/supervisory conditions at home. However, determination of which home market conditions might give these banks an advantage is beyond the scope of this study.

A potential problem with our finding of support for the limited form of the global advantage hypothesis is a banking organization may use transfer pricing or other accounting methods to shift profits from an affiliate in

one country to an affiliate in another country for tax, regulatory, or other reasons. Thus, the generally high efficiency performance of the U.S. banks in other nations could reflect a shifting of net cash flow out of the domestic banks in the U.S. toward their foreign affiliates, and the poor performance of domestic Spanish banks could reflect a shifting of net cash flow to the Spanish-owned institutions in other nations. However, there are three pieces of evidence that suggest that this is **not** the case, and that banks which perform well abroad also tend to perform well at home. First, we find that U.S. banks are more profit efficient at home as well as abroad. This suggests a true efficiency advantage for U.S. banks, rather than simply a shift of net cash flow overseas.. Second, we find some evidence that the poor performance of Spanish banks at home is mirrored by similarly poor performance abroad. Our French data set contains two Spanish-owned banks (not displayed in Tables 5.3 or 5.4 because we constrained our tests to include only foreign-owned banks in groups of three or more), and these two banks had relatively low average profit efficiency (0.320) and a relatively high average cost efficiency of (0.850), figures that are consistent with the domestic performance of Spanish banks. Third, another study of cross-regional bank efficiency in the U.S. found that banking organizations that do well in other regions also tend to do well in their home region (Berger and DeYoung 2000). This supports a "national advantage hypothesis" which is similar to the global advantage hypothesis tested here, rather than accounting shifts of income.

5.4 Robustness tests using U.S. regional data

Although our main finding supports a global advantage for U.S. banks, we also find that domestic banks tend to have higher efficiency on average than foreign banks, consistent with previous studies of cross-border efficiency. In this section we use the larger and more detailed U.S. bank data set to further investigate the reasons for this result. First, we examine whether the higher average efficiency of domestic banks is caused by the diseconomies of operating or monitoring subsidiaries a long distance from headquarters versus by the difficulties of overcoming cross-border differences such as language, culture, and regulations. Second, we examine whether the higher average efficiency of domestic banks arises simply because foreign banks tend to locate in regions where it is difficult for **both** foreign and domestic banks to earn high profits.

We address the first question by dividing the U.S. into eight distinct geographic regions and evaluating the "cross-regional efficiency" of the U.S. domestic banks. That is, we compare the estimated efficiency of 1,883 "within-region" banks (domestic U.S. banks operating in the region in which their organization is headquartered) to the estimated efficiency of 57 "out-of-region" banks (domestic U.S. banks operating in a region different from

the one in which their organization is headquartered). The results of these tests are shown in Table 5.5, and they suggest a modest efficiency advantage to cross-regional ownership. Large banks owned by out-of-region organizations have a statistically significant cost efficiency edge of 3.1% of costs and a statistically insignificant profit efficiency edge of 2.3% of potential profits over banks owned within the region.²⁰ Given that the U.S. is a relatively homogenous nation with potentially large distances between banks and their headquarters, these results suggest that any organizational diseconomies of operating or monitoring subsidiaries from a distance can be overcome by efficient organizations. If these results extrapolate to the cross-border context, they suggest that other barriers — such as differences in language, culture, regulatory/supervisory structures, currency, or monetary policy — more likely explain why domestic banks tend to be more efficient than foreign banks on average.

We address the second of these questions by comparing the efficiencies of foreign and domestic banks in the U.S. within each of these geographic regions. The results of these tests are shown in Table 5.6, and they are consistent the results in Tables 5.3 and 5.4 that suggested an advantage for U.S. banks. The 43 foreign banks operate in just four of the eight U.S. regions (Mideast, Great Lakes, Southeast, and Far West), and are predominantly located in the regions that include the international banking centers of New York (Mideast), Chicago (Great Lakes), and San Francisco (Far West). In three of these four regions, the average foreign bank has significantly lower profit efficiency the average domestic bank, the only exception being the Southeast region with only two foreign banks. Furthermore, in three of the four regions there is no significant difference between foreign bank and domestic bank cost efficiency. Foreign banks' locational choices do not appear to be driving our results.

5.5 Implications of the tests of home field advantage versus global advantage

If the results of this research extrapolate to the future, they may have important implications for the structure of globalized financial markets. The finding here and in the literature that foreign banks are less efficient on average than domestic banks in most countries, if it continues into the future, suggests that efficiency considerations may limit the global consolidation of the financial services industry. Domestically-based institutions would continue to play a large role in the provision of financial services. Nonetheless, our results also suggest that some banking organizations can operate in foreign countries at or above the efficiency levels of domestic banks, paving the way for some additional global consolidation. Furthermore, the ability to operate efficiently

across borders appears to be linked to nation of ownership -- only the U.S. banks were able to operate efficiently across borders on a reasonably consistent basis. If this U.S. advantage continues, U.S.-based organizations may capture a significant share of any future globalization of financial institutions.

A potential goal of future research might be to try to determine which conditions in the U.S. might have fostered their apparent efficiency advantage. If it is based on market conditions like securities market development, then there is little that can be done by policy makers to affect financial institution efficiency. If instead, it is based on regulatory/supervisory factors like the deregulation of geographic restrictions and deposit interest rates, relatively easy bank chartering, then policy makers may have an important influence. If deregulation is important, then this might predict strong cross-border efficiency gains from the Single Market Programme in the EU and other liberalizations in other parts of the globe.

Our results may also have important implications for research methodology. As stated above, while the aggregated results in the top two rows of Tables 5.3 and 5.4 alone appear to support the home field advantage hypothesis, the more detailed results in the bottom panels of these two tables reveal support for the limited form of the global advantage hypothesis. These results suggest disaggregation by foreign nation of ownership in future research.

Our results also suggest that it is important to include a substantial number of different nations in the analyses. Had we a) only used European data in this study, our results may have supported the home field advantage hypothesis, since the nation with the global advantage would have been excluded; b) only used data from a single home country, our results would have supported either the home field advantage, the global advantage, or the limited global advantage hypothesis, depending on which country we investigated; and c) been able to expand our database to include additional home countries, we may have found global advantages for banks from additional countries as well.

Finally, our results support the future use of complete separate analyses of data from each home country. Estimating efficiency jointly or pooling the efficiency estimates from institutions in different countries may create problems of comparison because of significant differences in the environments of these countries.

6. Summary and Conclusions

In this paper, we address the causes and consequences of the cross-border consolidation of financial institutions and the implications of this consolidation for the integration of global financial markets. First, we

extensively review several hundred research studies on the causes and consequences of consolidation. Second, we provide comparative data on financial systems in different nations, trends in cross-border financing by banks and other financial institutions, and trends in cross-border M&As of financial institutions. Third, we perform an original analysis of cross-border banking efficiency in France, Germany, Spain, the U.K., and the U.S. during the 1990s. On average, we find that domestic banks in these countries have both higher cost efficiency and higher profit efficiency than foreign banks operating in that country -- a result that is consistent with most of the findings in the extant literature, where it has been interpreted as supporting the home field advantage hypothesis. However, after disaggregating our results by foreign nation of origin, we find that the data appear to reject the home field advantage hypothesis in favor of the limited form of the global advantage hypothesis. The disaggregated results suggest that domestic banks may be more efficient than foreign banks from most foreign countries; may be about equally efficient with foreign banks from some foreign countries; but may be less efficient than foreign banks from one (the U.S.) of the foreign countries.

These results, should they continue to hold in the future, may have important implications for the structure of globalized financial markets, for financial institution policy, and for future research. First, the finding here and in the extant literature that foreign banks are less efficient on average than domestic banks suggests that efficiency considerations may limit the global consolidation of the financial services industry. Thus, domestically-based institutions would continue to play a large role in the provision of financial services. Second, our finding that some banking organizations can operate in foreign countries at or above the efficiency levels of domestic banks suggests that additional global consolidation of financial markets may be in the offing. Third, our finding that banking organizations from some countries, particularly the U.S., are better able to operate efficiently across borders suggests that financial institutions from these countries may capture disproportionate shares of international financial services business in the future. Fourth, if future research finds that U.S. banks derive their apparent efficiency advantage from U.S. regulatory/supervisory conditions (e.g., easy geographic mobility) rather than from U.S. market conditions (e.g., a well developed securities market), then one might predict cross-border efficiency gains from similar liberalizations in other nations such as the Single Market Programme in the EU. Finally, our results suggest that future empirical investigations in this area should include a substantial number of home countries and institutions from a substantial number of foreign nations in the analysis. The results also

suggest that researchers disaggregate their analysis by foreign nation of ownership. These changes appear to be important for discerning between the home field advantage and global advantage hypotheses.

Because we base our conclusions on empirical results generated over a relatively short period of time, for a relatively short list of countries, and for a relatively small number of foreign banks, we make them cautiously and propose a number of important caveats. First, all five of the home countries we analyze are advanced economies; banks in many less advanced economies may be less likely to have home field advantages. Similarly, the patterns of relative domestic versus foreign bank efficiency may be substantially different in important countries which we were not able to include in our analysis due to data limitations (e.g., China, Japan, Russia). Second, the pattern of home field and global advantages that we reveal in our tests is likely to change over time. For example, the introduction of a common European currency, the full implementation of laws allowing expanded powers for banks, and the continued trend of M&As away from domestic deals and toward cross-border deals, could alter the balance of home field and global advantages. Third, while we focus on the performance of financial institutions that have acquired or established a physical presence in foreign countries, financial institutions can also provide cross-border financial services at a distance from their home country headquarters. Financial institutions that excel in one of these cross-border delivery channels might not excel at the other, and in the future we may see institutions from different countries choosing different combinations of these channels, perhaps depending upon whether they seek to provide retail services abroad. Fourth, because our tests employ accounting data for banks which are in most cases subsidiaries of larger banking organizations, it is possible that our results may be capturing the effects of transfer pricing that shifts profits from an affiliate in one country to an affiliate in another country for tax, regulatory, or other reasons. However, our results contain several pieces of evidence that run counter to this argument. For example, we find that banks with the best domestic performance also perform well abroad, and banks with the weakest performance abroad also perform poorly at home, suggesting that the underlying efficiency advantages and disadvantages of these banks may overwhelm the effects of any tax/regulatory profit shifting.

References

- Akhavein, Jalal D., Allen N. Berger, and David B. Humphrey. 1997. "The Effects of Bank Megamergers on Efficiency and Prices: Evidence from the Profit Function." *Review of Industrial Organization* 12: 95-139.
- Alam, Ila. M. S. 1998. "A Non-Parametric Approach for Assessing Productivity Dynamics of Large Banks." Tulane University.
- Allen, Franklin and Douglas Gale. 1997. "Financial Markets, Intermediaries, and Intertemporal Smoothing." *Journal of Political Economy* 105(3): 523-546.
- Allen, Franklin and Anthony M. Santomero. 1998. "The Theory of Financial Intermediation." *Journal of Banking and Finance* 21: 1461-1485.
- Allen, Linda and Anoop Rai. 1996. "Operational Efficiency in Banking: An International Comparison." *Journal of Banking and Finance* 20: 655-672.
- Allen, Linda and A. Sinan Cebenoyan. 1991. "Bank Acquisitions and Ownership Structure: Theory and Evidence." *Journal of Banking and Finance* 15(2): 425-448.
- Allen, Linda, Anthony Saunders, and Gregory F. Udell. 1991. "The Pricing of Retail Deposits: Concentration and Information." *Journal of Financial Intermediation* 1(4): 335-361.
- Altunbas, Yener, David Maude, and Phil Molyneux. 1995. "Efficiency and Mergers in the UK (retail) Banking Market." Bank of England.
- Altunbas, Yener, Phil Molyneux, and John Thornton. 1997. "Big Bank Mergers in Europe--An Analysis of the Cost Implications." *Economica* 64 317-329.
- Amihud, Yakov and Baruch Lev. 1981. "Risk Reduction as a Managerial Motive for Conglomerate Mergers." *Journal of Economics* 12(2): 605-617.
- Ang, James S. and Terry Richardson. 1994. "The Underwriting Experience of Commercial Bank Affiliates Prior to the Glass-Steagall Act: A Re-examination of Evidence for Passage of the Act." *Journal of Banking and Finance* 18(2): 351-395.
- Angelini, Paolo, Roberto Di Salvo, and Giovanni Ferri. 1998. "Availability and Cost of Credit for Small Businesses: Relationship and Credit Cooperatives." *Journal of Banking and Finance* 22(6-8): 925-954.
- Avery, Robert, Raphael N. Bostic, Paul Calem, and Glenn Canner. 1999. "Consolidation and Bank Branching Patterns." *Journal of Banking and Finance* 23 (2-4): 497-532.
- Bank for International Settlements. 1999. *International Banking and Financial Market Developments*. August 1998 and August 1999.
- Barro, Jason R., and Robert J. Barro. 1990. "Pay, Performance and Turnover of Bank CEOs." *Journal of Labor Economics* 8 (4): 448-481.
- Bauer, Hans and Dietrich Domanski. 1999. "The Changing German Banking Industry: Where do We Come from and Where are We Heading to?" In *The Monetary and Regulatory Implications of Changes in the Banking Industry*. Bank for International Settlements Conference Papers 7 (March): 208-225.

- Bauer, Paul W., Allen N. Berger, Gary D. Ferrier, and David B. Humphrey. 1998. "Consistency Conditions for Regulatory Analysis of Financial Institutions: A Comparison of Frontier Efficiency Methods," *Journal of Economics and Business* 50 (2): 85-114.
- Bauer, Paul W., Allen N. Berger, and David B. Humphrey. 1993. "Efficiency and Productivity Growth in U.S. Banking." *The Measurement of Productive Efficiency: Techniques and Applications*, edited by Harold O. Fried, C.A. Knox Lovell, and Shelton S. Schmidt. Oxford: Oxford University Press: 386-413.
- Bauer, Paul W. and Gary D. Ferrier. 1996. "Efficiency Measurement Issues for Payments Processing." *Journal of Money, Credit and Banking* 28(4): 1004-1039.
- Bauer, Paul W. and Diana Hancock. 1993. "The Efficiency of the Federal Reserve in Providing Check Processing Services." *Journal of Banking and Finance* 17(3): 287-311.
- Bauer, Paul W. and Diana Hancock. 1995. "Scale Economies and Technical Change in the Federal Reserve Automated Clearinghouse Payment Process." Federal Reserve Bank of Cleveland *Economic Review* 33: 14-29.
- Beatty, Randolph P., R. Thompson, and Michael R. Vetsuypens. 1998. "Issuance Costs and Regulatory Change in the Investment Banking Industry." Southern Methodist University.
- Beduc, Louis, Francoise Ducruezet, and Pierre P. Stephanopoli. 1991. "The French Financial System." In *Banking Structure in Major Countries*, edited by George G. Kaufman. Massachusetts: Kluwer Academic Publishers: 245-293.
- Benink, Harald A. 1993. *Financial Integration in Europe*. Dordrecht, the Netherlands: Kluwer Academic Publishers.
- Benston, George J., William C. Hunter, and Larry D. Wall. 1995. "Motivations for Bank Mergers and Acquisitions: Enhancing the Deposit Insurance Put Option Versus Earnings Diversification." *Journal of Money, Credit, and Banking* 27(3): 777-788.
- Berg, Sigbjorn Atle, Finn Forsund, Lennart Hjalmarsson, and Matti Suominen. 1993. "Banking Efficiency in the Nordic Countries." *Journal of Banking and Finance* 17: 371-388.
- Berg, Sigbjorn Atle, Finn R. Forsund, and Eilev S. Jansen. 1992. "Malmquist Indices of Productivity Growth During the Deregulation of Norwegian Banking, 1980-89." *Scandinavian Journal of Economics*, 94 (Supplement): S211-S228.
- Bergendahl, Goran. 1995. "DEA and Benchmarks for Nordic Banks." Gothenburg University. Gothenburg, Sweden (December).
- Berger, Allen N. 1993. "'Distribution-Free' Estimates of Efficiency in the U.S. Banking Industry and Tests of the Standard Distributional Assumptions." *Journal of Productivity Analysis* 4(3): 261-292.
- Berger, Allen N. 1995. "The Profit-Structure Relationship in Banking--Tests of Market-Power and Efficient-Structure Hypotheses." *Journal of Money, Credit, and Banking* 27(2): 404-431.
- Berger, Allen N. 1998. "The Efficiency Effects of Bank Mergers and Acquisition: A Preliminary Look at the 1990s Data." In *Bank Mergers & Acquisitions*, edited by Y. Amihud and G. Miller. Boston, MA. Kluwer Academic:

- Berger, Allen N., Seth D. Bonime, Daniel M. Covitz, Diana Hancock. 2000. "Why Are Bank Profits So Persistent? The Roles of Product Market Competition, Informational Opacity, and Regional/Macroeconomic Shocks." *Journal of Banking and Finance*, forthcoming.
- Berger, Allen N., Seth D. Bonime, Lawrence G. Goldberg, Lawrence J. White. 1999. "The Dynamics of Market Entry: The Effects of Mergers and Acquisitions on De Novo Entry and Small Business Lending in the Banking Industry." Board of Governors of the Federal Reserve System.
- Berger, Allen N., J. David Cummins, Mary A. Weiss. 1997. "The Coexistence of Multiple Distribution Systems for Financial Services: The Case of Property-Liability Insurance." *Journal of Business* 70(4): 515-546.
- Berger, Allen N., J. David Cummins, Mary A. Weiss, and Hongmin Zi. 1999. "Conglomeration Versus Strategic Focus: Evidence from the Insurance Industry." Board of Governors of the Federal Reserve System.
- Berger, Allen N., Rebecca S. Demsetz, and Philip E. Strahan. 1999. "The Consolidation of the Financial Services Industry: Causes, Consequences, and Implications for the Future." *Journal of Banking and Finance* 23 (2-4): 135-194.
- Berger, Allen N., and Robert DeYoung. 1997. "Problem Loans and Cost Efficiency in Commercial Banks." *Journal of Banking and Finance* 21(6): 849-870.
- Berger, Allen N., and Robert DeYoung. 2000. "The Financial Performance of Cross-Regional Commercial Banks in the U.S.: Some Clues Regarding the Eventual Structure of a Consolidating Industry." Board of Governors of the Federal Reserve System.
- Berger, Allen N., Diana Hancock, and David B. Humphrey. 1993. "Bank Efficiency Derived from the Profit Function." *Journal of Banking and Finance* 17(2-3): 317-347.
- Berger, Allen N. and Timothy H. Hannan. 1989. "The Price-Concentration Relationship in Banking." *Review of Economics and Statistics* 71 (May): 291-299.
- Berger, Allen N., and Timothy H. Hannan. 1997. "Using Measures of Firm Efficiency to Distinguish Among Alternative Explanations of the Structure-Performance Relationship." *Managerial Finance* 23: 6-31.
- Berger, Allen N., and Timothy H. Hannan. 1998. "The Efficiency Cost of Market Power in the Banking Industry: A Test of the "Quiet Life" and Related Hypotheses." *Review of Economics and Statistics* 80(3): 454-465.
- Berger, Allen N., Gerald A. Hanweck, and David B. Humphrey. 1987. "Competitive Viability in Banking: Scale, Scope, and Product Mix Economies." *Journal of Monetary Economics* 20(3): 501-520.
- Berger, Allen N. and David B. Humphrey. 1991. "The Dominance of Inefficiencies over Scale and Product Mix Economies in Banking." *Journal of Monetary Economics* 28(1): 117-148.
- Berger, Allen N. and David B. Humphrey. 1992a. "Measurement and Efficiency Issues in Commercial Banking." *Output Measurement in the Service Sectors, National Bureau of Economic Research, Studies in Income and Wealth*, 56, edited by Zvi Griliches, University of Chicago Press: 245-279.
- Berger, Allen N. and David B. Humphrey. 1992b. "Megamergers in Banking and the Use of Cost Efficiency as an Antitrust Defense." *Antitrust Bulletin*, 37 (Fall), 541-600.

- Berger, Allen N. and David B. Humphrey. 1997. "Efficiency of Financial Institutions: International Survey and Directions for Future Research." *European Journal of Operational Research* 98: 175-212.
- Berger, Allen N., David B. Humphrey, and Lawrence B. Pulley. 1996. "Do Consumers Pay for One-Stop Banking? Evidence from an Alternative Revenue Function." *Journal of Banking and Finance* 20(9): 1601-1621.
- Berger, Allen N., Anil K. Kashyap, and Joseph M. Scalise. 1995. "The Transformation of the U.S. Banking Industry: What a Long, Strange Trip It's Been." *Brookings Papers on Economic Activity* 2: 55-201.
- Berger, Allen N., John H. Leusner, and John J. Mingo. 1997. "The Efficiency of Bank Branches." *Journal of Monetary Economics* 40(1): 141-162.
- Berger, Allen N. and Loretta J. Mester. 1997. "Inside the Black Box: What Explains Differences in the Efficiencies of Financial Institutions?" *Journal of Banking and Finance* 21: 895-947.
- Berger, Allen N. and Loretta J. Mester. 1999. "What Explains the Dramatic Changes in Cost and Profit Performance of the U.S. Banking Industry?" Board of Governors of the Federal Reserve System.
- Berger, Allen N., Anthony Saunders, Joseph M. Scalise, and Gregory F. Udell. 1998. "The Effects of Bank Mergers and Acquisitions on Small Business Lending." *Journal of Financial Economics* 50(2): 187-229.
- Berger, Allen N. and Gregory F. Udell. 1995. "Relationship Lending and Lines of Credit in Small Firm Finance." *Journal of Business* 68 (July): 351-382.
- Berger, Allen N. and Gregory F. Udell. 1996. "Universal Banking and the Future of Small Business Lending." In *Universal Banking: Financial System Design Reconsidered*, edited by Anthony Saunders and Ingo Walter. Burr Ridge, IL: Irwin Publishing: 558-627.
- Berger, Allen N. and Gregory F. Udell. 1998. "The Economics of Small Business Finance: The Roles of Private Equity and Debt Markets in the Financial Growth Cycle." *Journal of Banking and Finance* 22(6-8): 613-673.
- Berlin, Mitchell and Loretta J. Mester. 1998. "On the Profitability and Cost of Relationship Lending." *Journal of Banking and Finance* 22(6-8): 873-897.
- Bernanke, Ben S. and Alan Blinder. 1988. "Credit, Money, And Aggregate Demand." *American Economic Review* 78: 435-439.
- Bernanke, Ben S. and Mark Gertler. 1995. "Inside The Black Box: The Credit Channel Of Monetary Policy Transmission." *Journal of Economic Perspectives* 9: 27-48.
- Bernanke, Ben S., Mark Gertler, and Simon Gilchrist. 1996. "The Financial Accelerator, and the Flight to Quality." *Review of Economics and Statistics* 78: 1-15.
- Bhattacharya, Amar, C. A. Knox Lovell, and P. Sahay. 1997. "The Impact of Liberalization on the Productive Efficiency of Indian Commercial Banks." *European Journal of Operational Research* 98: 332-345.
- Bikker, Jacob A. 1999. "Efficiency in the European Banking Industry: An Exploratory Analysis to Rank Countries." De Nederlandsche Bank. Amsterdam, the Netherlands.
- Bikker, Jacob A. and Johannes M. Groeneveld. 1998. "Competition and Concentration in the EU Banking Industry." Der

- Nederlandsche Bank. The Netherlands.
- Birchler, Urs W. and Georg Rich. 1991. "Bank Structure in Switzerland." In *Banking Structure in Major Countries*, edited by George G. Kaufman. Massachusetts: Kluwer Academic Publishers: 389-427.
- Bisignano, Joseph. 1991. "Banking in the European Economic Community: Structure, Competition, and Public Policy." In *Banking Structure in Major Countries*, edited by George G. Kaufman. Massachusetts: Kluwer Academic Publishers: 155-244.
- Blackwell, David and Drew B. Winters. 1997. "Banking Relationships and the Effect of Monitoring on Loan Pricing." *Journal of Financial Research* 20(2): 275-289.
- Bliss, Richard T. and Richard J. Rosen. 1999. "CEO Compensation and Bank Merger." Indiana University.
- Boot, Arnoud W. A. 1999. "European Lessons on Consolidation in Banking." *Journal of Banking and Finance* 23(2-4): 609-613.
- Boot, Arnoud W. A. and Anjan V. Thakor. 1996. "Banking Structure and Financial Innovation." In *Universal Banking: Financial System Design Reconsidered*, edited by Anthony Saunders and Ingo Walter. Irwin Publishing: 161-204.
- Boot, Arnoud W.A. and Anjan V. Thakor. 1997. "Financial System Architecture." *Review of Financial Studies* 10(3): 693-733.
- Bowen, Alex, Glenn Hoggarth, and Darren Pain. 1999. "The recent revolution of the U.K. banking industry and some implications for financial stability." In *The Monetary and Regulatory Implications of Changes in the Banking Industry*. Bank for International Settlements Conference Papers 7 (March): 251-294.
- Boyd, John H., Chun Chang, and Bruce D. Smith. 1998. "Moral Hazard Under Commercial and Universal Banking." Federal Reserve Bank of Minneapolis Working Paper No. 585.
- Boyd, John H., Stanley L. Graham, and R. Shawn Hewitt. 1993. "Bank Holding Company Mergers with Nonbank Financial Firms: Effects on the Risk of Failure." *Journal of Banking and Finance* 17(1): 43-63.
- Boyd, John H. and Edward C. Prescott. 1986. "Financial Intermediary-Coalitions." *Journal of Economic Theory* 38(2): 211-232.
- Braun, Christian, Dominik Egli, Andreas Fischer, Bertrand Rime, and Christian Walter. 1999. "The Restructuring of the Swiss Banking System." In *The Monetary and Regulatory Implications of Changes in the Banking Industry*. Bank for International Settlements Conference Papers 7 (March): 70-97.
- Brickley, J., and Christopher M. James, 1987. "The Takeover Market, Corporate Board Compensation, and Ownership Structure: The Case of Banking," *Journal of Law and Economics* 30 (April): 161-180.
- Brookes, Martin. 1999. "The Impact of EMU on Portfolio Management." In *European Banking after EMU*, edited by Christopher Hurst and Rien Wagenvoort. European Investment Bank Papers 4(1): 19-33.
- Bruni, Franco. 1990. "Banking and Financial Reregulation Towards 1992: The Italian Case." In *European Banking in the 1990s*, edited by Jean Dermine. Cambridge, MA: Basil Blackwell, Inc.: 231-257.
- Budzeika, George. 1991. "Determinants of the Growth of Foreign Banking Assets in the United States." Federal Reserve

- Bank of New York Research Paper 9112, (May).
- Bukh, P. N. D., Sigbjorn Atle Berg, and Finn R. Forsund. 1995. "Banking Efficiency in the Nordic Countries: A Four-Country Malmquist Index Analysis." University of Aarhus. Denmark (September).
- Calomiris, Charles, Charles Himmelberg, and Paul Wachtel. 1995. "Commercial Paper, Corporate Finance and the Business Cycle: A Microeconomic Perspective." *Carnegie-Rochester Series on Public Policy* 42: 203-250.
- Caminal, Ramon, Jordi Gual, and Xavier Vives. 1990. "Competition in Spanish Banking." In *European Banking in the 1990s*, edited by Jean Dermine. Basil Blackwell, Inc.: 261-305.
- Carey, Mark, Stephen Prowse, John Rea, and Gregory Udell. 1993. "Recent Developments in the Market for Privately Placed Debt." *Federal Reserve Bulletin*: 77-92.
- Cargill, Thomas F. and Shoichi Royama, 1992. "The Evolution of Japanese Banking and Finance." In *Banking Structure in Major Countries*, edited by George G. Kaufman. Massachusetts: Kluwer Academic Publishers: 333-388.
- Cerasi, Vittoria, Barbara Chizzolini, and Marc Ivaldi. 1998. "Sunk Costs and Competitiveness of European Banks after Deregulation." LSE Financial Markets Group Discussion Paper 290 (April).
- Chang, C. Edward, Iftekhar Hasan, and William C. Hunter. 1998. "Efficiency of Multinational Banks: An Empirical Investigation," *Applied Financial Economics* 8(6): 1-8.
- Chen, Hsuan-Chi and Jay R. Ritter. 1999. "The Seven Percent Solution." *Journal of Finance* (forthcoming).
- Clark, Jeffrey. 1996. "Economic Cost, Scale Efficiency and Competitive Viability in Banking." *Journal of Money, Credit, and Banking* 28: 342-364.
- Clark, Jeffrey and Thomas F. Siems. 1997. "Competitive Viability in Banking: Looking Beyond the Balance Sheet." Federal Reserve Bank of Dallas, Financial Industry Studies Working Paper No. 5-97.
- Cole, Rebel A. 1998. The Importance of Relationships to the Availability of Credit." *Journal of Banking and Finance* 22(6-8): 959-977.
- Cole, Rebel A., Lawrence G. Goldberg, and Lawrence J. White. 1999. "Cookie-Cutter Versus Character: The Micro Structure of Small Business Lending by Large and Small Banks." in *Business Access to Capital and Credit*, edited by Richard W. Lang. Federal Reserve Bank of Dallas: 362-389.
- Cole, Rebel A. and Nicholas Walraven. 1998. "Banking Consolidation and the Availability of Credit to Small Business." Federal Reserve Board.
- Commission of the European Communities. 1988a. *European Economy: The Economics of 1992*. No. 35. Brussels: EU (March).
- Commission of the European Communities. 1988b. *The "Cost of Non-Europe" In Financial Services*. Brussels: EU.
- Cornett, Marcia Millon, G. Hovakimian, Darius Palia, and Hassan Tehranian. 1998. "The Impact of the Manager-Shareholder Conflict on Acquiring Bank Returns."
- Cornett, Marcia Milton, and Hassan Tehranian. 1992. "Changes in Corporate Performance Associated with Bank Acquisitions." *Journal of Financial Economics* 31(2): 211-234.

- Craig, Ben R. and Joao A. C. Santos. 1997. "Banking Consolidation: Impact on Small Business Lending." Federal Reserve Bank of Cleveland.
- Crawford, Anthony J., John R. Ezzell, and James A. Miles. 1995. "Bank CEO Pay-Performance Relations and the Effects of Deregulation." *Journal of Business* 68(2): 231-256.
- Cummins, J. David, Sharon L. Tennyson, and Mary A. Weiss. 1999. "Consolidation and Efficiency in the US Life Insurance Industry." *Journal of Banking and Finance* 23(2-4): 325-357.
- Cummins, J. David and Mary A. Weiss. 2000. "The Global Market for Reinsurance: Consolidation, Capacity, and Efficiency." *Brookings-Wharton Papers on Financial Services* 3.
- Cummins, J. David and Hongmin Zi. 1998. "Comparison of Frontier Efficiency Methods: An Application to the U.S. Life Insurance Industry." *Journal of Productivity Analysis* 10(2): 131-152.
- Cybo-Ottone, Alberto, Carmine Di Noia, and Maurizio Murgia. 2000. "Recent Developments in the Structure of Securities Markets" Brookings-Wharton Papers on Financial Services. Forthcoming.
- Cybo-Ottone, Alberto and Maurizio Murgia. 1998. "Mergers and Shareholder Wealth in European Banking." Associazione Bancaria Italiana.
- Cyrnak, Anthony and Timothy H. Hannan. 1998. "Bank Lending to Small Businesses and the Use of CRA Loan Data to Measure Market Structure." Federal Reserve Board.
- De Bandt, Olivier. 1998. "EMU and the Structure of the European Banking System". Paper prepared for the SUERF CFS Conference: The Euro: Challenge and Opportunity for Financial Markets." Frankfurt, Germany. November 15-17, 1998.
- De Bandt, Olivier. 1999. "EMU and the Structure of the European Banking System." In *The Monetary and Regulatory Implications of Changes in the Banking Industry*. Bank for International Settlements Conference Papers 7 (March): 121-141.
- De Bandt, Olivier, and E. Philip Davis. 1998. "Competition, Contestability and Market Structure in European Banking Sectors on the Eve of EMU: Evidence from France, Germany and Italy with a Perspective on the United States." Paper presented at the VII Tor Vergata Financial Conference on "Post Euro Competition and Strategy among Financial Systems and Bank-Firm Relations." Rome, Italy. November 26-27, 1998.
- de Boissieu, Christian. 1997. "The French Banking Sector in the Light of European Financial Integration." In *European Banking in the 1990s*, ed. Jean Dermine. Cambridge, MA: Basil Blackwell, Inc.: 183-226.
- Delbreil, Michel, Jose Ramon Cano, Hans Friderichs, Benoit Gress, Bernard Paraque, Franz Partsch, and Franco Varetto. 1998. *Net Equity and Corporate Financing in Europe: A Comparative Analysis of German, Austrian, Spanish, French and Italian Manufacturing Companies With Share Capital during the Period 1991-1993*. European Committee of Central Balance Sheet Offices, Working Group on Net Equity.
- DeLong, Gayle L. 1999. "Domestic and International Bank Mergers: Shareholder Gains from Focusing versus Diversifying." Baruch College.
- Demsetz, Rebecca S. and Marc R. Saidenberg. 1999. "Looking Beyond the CEO: Executive Compensation at Banks." Federal Reserve Bank of New York.

- Demsetz, Rebecca S., Marc R. Saidenberg, and Philip E. Strahan. 1997. "Agency Problems and Risk Taking at Banks," Federal Reserve Bank of New York, Staff Report #29 (September).
- Demsetz, Rebecca S. and Phillip E. Strahan. 1997. "Diversification, Size, and Risk at Bank Holding Companies." *Journal of Money, Credit, and Banking* 29(3): 300-13.
- Dermine, Jean. 1998. "Eurobanking, The Strategic Issues." Paper prepared for the SUERF Colloquium on The Euro: A Challenge And Opportunity For Financial Markets, Frankfurt, Germany, October 15-17, 1998.
- Dermine, Jean. 1999a. "European Capital Markets: Does the Euro Matter?" In *European Capital Markets with a Single Currency*, edited by Jean Dermine and Pierre Hillion. Oxford: Oxford University Press: 1-32.
- Dermine, Jean, 1999b. "The Economics of Bank Mergers in the European Union, A Review of the Public Policy Issues." INSEAD Fontainebleau, France.
- Dermine, Jean. 1999c. "The Case for a European-wide Strategy." In *European Banking after EMU*, edited by Christopher Hurst and Rien Wagenvoort. European Investment Bank Papers 4(1): 137-143.
- Dermine, Jean and Pierre Hillion. (ed.) 1999. *European Markets with a Single Currency*. Oxford University Press.
- Devaney, Michael and Warren Weber. 1996. "Productivity Growth, Market Structure, and Technological Change: Evidence from the Rural Banking Sector." Southeast Missouri University.
- DeYoung, Robert. 1997. "Bank Mergers, X-Efficiency, and the Market for Corporate Control." *Managerial Finance* 23: 32-47.
- DeYoung, Robert. 1998. "Comment on Goldberg and White." *Journal of Banking and Finance* 22: 868-872.
- DeYoung, Robert, Lawrence G. Goldberg, and Lawrence J. White. 1999. "Youth, Adolescence, and Maturity at Banks: Credit Availability to Small Business in an Era of Banking Consolidation." *Journal of Banking and Finance* 23(2-4): 463-492.
- DeYoung, Robert and Iftekhar Hasan. 1998. "The Performance of De Novo Commercial Banks: A Profit Efficiency Approach." *Journal of Banking and Finance* 22(5): 565-587.
- DeYoung, Robert, Iftekhar Hasan, and Bruce Kirchhoff. 1998. "The Impact of Out-Of-State Entry on the Cost Efficiency of Local Commercial Banks." *Journal of Economics and Business* 50(2): 191-203.
- DeYoung, Robert and Daniel E. Nolle. 1996. "Foreign-Owned Banks in the U.S.: Earning Market Share or Buying It?" *Journal of Money, Credit, and Banking* 28(4): 622-636.
- Dietsch, Michel, Gary Ferrier, and Laurent Weill. 1998. "Banking Efficiency and European Integration: Productivity, Cost and Profit Approaches." Universite Robert Schuman de Strasbourg, France.
- Dietsch, Michel and Ana Lozano-Vivas. Forthcoming "How the Environment Determines Banking Efficiency: A Comparison between French and Spanish Industries." *Journal of Banking and Finance*.
- Diamond, Douglas W. 1984. "Financial Intermediation and Delegated Monitoring." *Review of Economic Studies* 51(3): 393-414.

- Diamond, Douglas W. 1991. "Monitoring and Reputation: The Choice between Bank Loans and Directly Placed Debt." *Journal of Political Economy* 99(4): 689-721.
- Di Noia, Carmine. 1999. "The Stock-Exchange Industry: Network Effects, Implicit Mergers, and Corporate Governance." Commissione Nazionale per le Società e La Borsa. *Quaderni di Finanza*. no. 33.
- Di Noia, Carmine. 2000. "Competition and Integration among Stock Exchanges in Europe: Network Effects, Implicit Mergers and Remote Access." *The European Financial Management Journal*. Forthcoming.
- Economides, Nicholas. 1993. "Network Economics with Application to Finance." *Financial Markets, Institutions, and Instruments* 5: 1-89.
- Economides, Nicholas. 1996. "The Economics of Networks." *International Journal of Industrial Organization* 14 (6): 673-699.
- Elsas, Ralf and Jan Pieter Krahnen. 1998. "Is Relationship Lending Special? Evidence from Credit-File Data in Germany." *Journal of Banking and Finance* 22(10-11): 1283-1316.
- Elyasiani, Elyas, and Seyed M. Mehdiian. 1995. "The Comparative Efficiency Performance of Small and Large U.S. Commercial Banks in the Pre- and Post-deregulation Eras." *Applied Economics* 27: 1069-1079.
- European Central Bank. 1999. "Possible Effects of EMU on the EU Banking Systems in the Medium to Long Term." Frankfurt, Germany.
- European Commission. 1997. "Impact on Services: Credit Institutions and Banking." *The Single Market Review* 2:4.
- Fazio, Antonio. 1999a. "The Restructuring of the Italian Banking System." Statement to the Joint Session of the Sixth Committees of the Italian Senate and Chamber of Deputies (April 20, 1999). Rome.
- Fazio, Antonio. 1999b. "The Italian Banking System, Competition, Efficiency, Growth." Speech given to the Annual Meeting of the Italian Bankers' Association (June 23, 1999). Rome.
- Fecher, Fabienne and Pierre Pestieau. 1993. "Efficiency and Competition in O.E.C.D. Financial Services". In *The Measurement of Productive Efficiency: Techniques and Applications*, edited by Harold O. Fried, C.A. Knox Lovell, and Shelton S. Schmidt, Oxford University Press, U.K.: 374-385.
- Ferrier, Gary D., Shawna Grosskopf, Kathy Hayes, and Suthathip Yaisawarng. 1993. "Economies of Diversification in the Banking Industry: A Frontier Approach." *Journal of Monetary Economics* 31: 229-249.
- Ferrier, Gary D. and C. A. Knox Lovell. 1990. "Measuring Cost Efficiency in Banking: Econometric and Linear Programming Evidence." *Journal of Econometrics* 46(1-2): 229-245.
- Fixler, Dennis and Kimberly Zieschang. 1993. "An Index Number Approach to Measuring Bank Efficiency: An Application to Mergers." *Journal of Banking and Finance* 17(2-3): 437-450.
- Focarelli, Dario, Fabio Panetta, and Carmelo Salleo. 1998. "Why Do Banks Merge: Some Empirical Evidence From Italy." In *The Changing European Financial Landscape*. European Summer Institute Centre for Economic Policy Research: 62-87.
- Fried, Harold O., C. A. Knox Lovell, and Suthathip Yaisawarng. 1999. "The Impact of Mergers on Credit Union Service

- Provision.” *Journal of Banking and Finance* 23(2-4): 367-86.
- Frieder, Larry A. and Peter Sherrill. 1997. “Customer Value Management: Decision Support and Knowledge Management as the Missing Links.” Federal Reserve Bank of Chicago *Proceedings of the Thirty-Third Annual Conference on Bank Structure and Competition*: 76-85.
- Fuentes, Ignacio and Teresa Sastre. 1999. “Implications of Restructuring in the Banking Industry: the Case of Spain.” In *The Monetary and Regulatory Implications of Changes in the Banking Industry*. Bank for International Settlements Conference Papers 7 (March): 98-120.
- Gande, Amar, Manju Puri, Anthony Saunders, and Ingo Walter. 1997. “Bank Underwriting of Debt Securities: Modern Evidence.” *The Review of Financial Studies* 10(4): 1175-1202.
- Gande, Amar, Manju Puri, and Anthony Saunders. 1998. “Bank Underwriting of Debt Securities: Modern Evidence.” *The Review of Financial Studies* 10(4): 1175-1202.
- Gande, Amar, Manju Puri, and Anthony Saunders. 1999. “Bank entry, competition and the market for corporate securities underwriting.” *Journal of Financial Economics* 54(2): forthcoming.
- Gardner, Lisa and Martin F. Grace. 1993. “X-Efficiency in the U.S. Life Insurance Industry.” *Journal of Banking and Finance* 17(2-3): 497-510.
- Genay, Hesna. 1998. “Assessing the Condition of Japanese Banks: How Informative are Accounting Earnings?” Federal Reserve Bank of Chicago *Economic Perspectives* Fourth Quarter: 12-34.
- Gibson, Michael, 1996. “The Bank Lending Channel of Monetary Policy Transmission: Evidence from a Model of Bank Behavior that Incorporates Long-term Customer Relationships.” Federal Reserve Board.
- Giddy, Ian, Anthony Saunders, and Ingo Walter. 1996. “Alternative Models for Clearance and Settlement: The Case of the Single European Capital Market.” *Journal of Money, Credit and Banking* 28(4): 986-1000.
- Goldberg, Lawrence G. and Robert Grosse. 1994. “Location Choice of Foreign Banks in the United States.” *Journal of Economics and Business* 46, 367-379.
- Goldberg, Lawrence G., Gerald A. Hanweck, Michael Keenan, and Allister Young. 1991. “Economics of Scale And Scope in the Securities Industry.” *Journal of Banking and Finance* 15: 91-107.
- Goldberg, Lawrence G. and Denise Johnson. 1990. “The Determinants of US Banking Activity Aboard”. *Journal of International Money and Finance* 9: 123-137.
- Goldberg, Lawrence G. and Anthony Saunders. 1981. “The Determinants of Foreign Banking Activity in the United States.” *Journal of Banking and Finance* 5: 17-32.
- Goldberg, Lawrence G. and Lawrence J. White. 1998. “De Novo Banks and Lending to Small Businesses.” *Journal of Banking and Finance* 22(6-8): 851-867.
- Gorton, Gary and Richard Rosen. 1995. “Corporate control, Portfolio Choice, and the Decline of Banking.” *Journal of Finance* 50 (December): 1377-1420.
- Grace, Martin and Stephen G. Timme. 1992. “An Examination of Cost Economies in the United States Life Insurance Industry.” *Journal of Risk and Insurance* 59(1): 72-103.

- Greenbaum, Stuart, George Kanatas, and Itzhak Venezia. 1989. "Equilibrium Loan Pricing Under the Bank Client Relationship." *Journal of Banking and Finance* 13: 221-235.
- Greenspan, Alan. 1999. Speech to the World Bank Group and International Monetary Fund (September 27).
- Grifell-Tatje, Emili and C. A. Knox Lovell. 1996. "Deregulation and Productivity Decline: The Case of Spanish Savings Banks." *European Economic Review* 40(6): 1281-1303.
- Grosse, Robert and Lawrence G. Goldberg. 1991. "Foreign Bank Activity in the United States: An Analysis by Country of Origin." *Journal of Banking and Finance* 15: 1093-1112.
- Gual, Jordi. 1999. "Deregulation, Integration and Market Structure in European Banking." IESE, University of Navarra.
- Hadlock, Charles J., Joel F. Houston, and Michael Ryngaert. 1999. "The Role of Managerial Incentives in Bank Acquisitions." *Journal of Banking and Finance* 23(2-4): 221-49.
- Hall, Brian J. and Jeffrey B. Liebman, 1998. "Are CEOs Really Paid Like Bureaucrats?" *Quarterly Journal of Economics* 103: 653-691.
- Hancock, Diana, David B. Humphrey, and James A. Wilcox. 1999. "Cost Reductions in Electronic Payments: The Roles of Consolidation, Economies of Scale, and Technical Change." *Journal of Banking and Finance* 23(2-4): 391-421.
- Hancock, Diana and James A. Wilcox. 1998. "The 'Credit Crunch' and the Availability of Credit to Small Business." *Journal of Banking and Finance* 22(6): 983-1014.
- Hannan, Timothy H. 1991. "Bank Commercial Loan Markets and the Role of Market Structure: Evidence from Surveys of Commercial Lending." *Journal of Banking and Finance* 15(1): 133-149.
- Hannan, Timothy H. 1994. "Asymmetric Price Rigidity and the Responsiveness of Customers to Price Changes: The Case of Deposit Interest Rates." *Journal of Financial Services Research* 8(4): 257-267.
- Hannan, Timothy H. 1997. "Market Share Inequality, the Number of Competitors, and the HHI: An Examination of Bank Pricing." *Review of Industrial Organization* 12(1): 23-35.
- Hannan, Timothy H. 1998. "Bank Fees and Their Variation Across Banks And Locations." Working Paper, Federal Reserve Board.
- Hannan, Timothy H. and Allen N. Berger. 1991. "The Rigidity of Prices: Evidence from the Banking Industry." *American Economic Review* 81(4): 938-945.
- Hannan, Timothy H. and Ferdinand Mavinga. 1980. "Expense Preference and Managerial Control: The Case of the Banking Firm." *Bell Journal of Economics* 11(2): 671-682.
- Hannan, Timothy H. and John D. Wolken. 1989. "Returns to Bidders and Targets in the Acquisition Process: Evidence from the Banking Industry." *Journal of Financial Services Research* 3(1): 5-16.
- Hanweck, Gerald A and Arthur Hogan. 1996. "The Structure of the Property/Casualty Insurance Industry," *Journal of Economics & Business* 48: 141-55.

- Harhoff, Dietmar and Timm Körting. 1998. "Lending Relationships in Germany – Empirical Evidence from Survey Data." *Journal of Banking and Finance* 22(10-11): 1317-1353.
- Hasan, Iftekhhar and William C. Hunter. 1996. "Efficiency of Japanese Multinational Banks in the United States," *Research in Finance* 14: 157-173.
- Hasan, Iftekhhar, William C. Hunter, and Ana Lozano-Vivas. (forthcoming). "Deregulation, Strategy, Bank Performance, and Efficiency: Spanish Experience." In *European Banking issues: Historical and Contemporary Perspectives*, edited by Irene Fenel-Henigman. JAI Press.
- Hasan, Iftekhhar and Ana Lozano-Vivas. 1998. "Foreign Banks, Production Technology, and Efficiency: Spanish Experience." Working Paper presented at the Georgia Productivity Workshop III. Athens, Georgia.
- Hayes, Samuel L. III, Michael Spence, and David Van Praag Marks. 1983. *Competition in the Investment Banking Industry*. Cambridge, MA, Harvard University Press.
- Haynes, George W., Charles Ou, and Robert Berney. 1999. "Small Business Borrowing From Large And Small Banks." In *Business Access to Capital and Credit*, edited by Richard W. Lang. Federal Reserve Bank of Dallas: 287-327.
- Haynes, Michael and Steve Thompson. 1999. "The Productivity Effects Of Bank Mergers: Evidence From The UK Building Societies." *Journal of Banking and Finance* 23: 825-846.
- Hoshi, Takeo and Anil Kashyap. 1999. "The Japanese Banking Crisis: Where did it come from and how will it end?" In the *NBER Macroeconomics Annual 1999* forthcoming.
- Hoshi, Takeo, Anil Kashyap, and David Scharfstein. 1990. "The Role of Banks in Reducing the Costs of Financial Distress in Japan." *Journal of Financial Economics* 27(1): 67-88.
- Houston, Joel F. and Christopher M. James. 1995. "CEO Compensation and Bank Risk - Is Compensation in Banking Structured to Promote Risk Taking?" *Journal of Monetary Economics* 36: 405-432.
- Houston, Joel F. and Christopher M. James. 1998. "Do Bank Internal Capital Markets Promote Lending?" *Journal of Banking and Finance* 22(6-8): 899-918.
- Houston, Joel F., Christopher M. James, and David Marcus. 1997. "Capital Market Frictions and The Role of Internal Capital Markets in Banking." *Journal of Financial Economics* 46(2): 135-164.
- Houston, Joel F. and Michael D. Ryngaert. 1994. "The Overall Gains from Large Bank Mergers." *Journal of Banking and Finance* 18(6): 1155-76.
- Houston, Joel F. and Michael D. Ryngaert. 1996. "The Value Added by Bank Acquisitions: Lessons from Wells Fargo's Acquisition of First Interstate." *Journal of Applied Corporate Finance* 9: 74-82.
- Houston, Joel F. and Michael D. Ryngaert. 1997. "Equity Issuance and Adverse Selection: A Direct Test Using Conditional Stock Offers." *Journal of Finance* 52(1): 197-219.
- Hubbard, R. Glenn and Darius Palia. 1995. "Executive Pay and Performance: Evidence from the U.S. Banking Industry." *Journal of Financial Economics* 39(1): 105-130.

- Hubbard, R. Glenn, Kenneth N. Kuttner, and Darius N. Palia. 1999. "Are There 'Bank Effects' in Borrowers' Costs of Funds? Evidence from a Matched Sample of Borrowers and Banks." Federal Reserve Bank of New York Staff Report No. 78.
- Hughes, Joseph P., William Lang, and Loretta J. Mester, and Choon-Geol Moon. 1996. "Efficient Banking Under Interstate Branching." *Journal of Money, Credit, and Banking* 28(4): 1043-1071.
- Hughes, Joseph P., William Lang, Loretta J. Mester, and Choon-Geol Moon. 1997. "Recovering Risky Technologies Using the Almost Ideal Demand System: An Application to U.S. Banking." Federal Reserve Bank of Philadelphia Research Working Paper No. 97-8.
- Hughes, Joseph P., William Lang, Loretta J. Mester, and Choon-Geol Moon. 1999. "The Dollars and Sense of Bank Consolidation." *Journal of Banking and Finance* 23(2-4): 291-324.
- Hughes, Joseph P. and Loretta J. Mester. 1998. "Bank Capitalization and Cost: Evidence of Scale Economies in Risk Management and Signaling." *Review of Economics and Statistics* 80(2): 314-325.
- Humphrey, David B. 1993. "Cost and Technical Change: Effects from Bank Deregulation." *Journal of Productivity Analysis* 4: 9-34.
- Humphrey, David B. and Lawrence B. Pulley. 1997. "Banks' Responses to Deregulation: Profits, Technology, and Efficiency." *Journal of Money, Credit, and Banking* 29(1): 73-93.
- Hunter, William C. and Stephen G. Timme. 1986. "Technical Change, Organizational Form, and the Structure of Bank Production." *Journal of Money, Credit and Banking* 18(2): 152-166.
- Hunter, William C. and Stephen G. Timme. 1991. "Technological Change and Production Economies in Large US Commercial Banking." *Journal of Business* 64: 339-362.
- Hunter, William C., Stephen G. Timme, and Won Keun Yang. 1990. "An Examination of Cost Subadditivity and Multiproduct Production in Large U.S. Banks." *Journal of Money, Credit and Banking* 22(4): 504-525.
- Hurst, Christopher and Rien Wagenvoort. (ed.) 1999. *European Banking after EMU*. European Investment Bank Papers 4(1).
- Investment Dealers Digest, January 11, 1999: 30-33.
- Jackson, William E. III. 1997. "Market Structure and the Speed of Price Adjustments: Evidence of Non-monotonicity." *Review of Industrial Organization* 12(1): 37-57.
- James, Christopher. 1984. "An Analysis of the Effect of State Acquisition Laws on Managerial Efficiency: The Case of the Bank Holding Company Acquisitions." *Journal of Law and Economics* 27(1): 211-26.
- Jayarathne, Jith and Philip E. Strahan. 1996. "The Finance-Growth Nexus: Evidence from Bank Branch Deregulation." *Quarterly Journal of Economics* 111: 639-670.
- Jayarathne, Jith and Philip E. Strahan. 1998. "Entry Restrictions, Industry Evolution and Dynamic Efficiency: Evidence from Commercial Banking." *Journal of Law and Economics* 41: 239-273.
- Jayarathne, Jith and John D. Wolken. 1999. "How Important are Small Banks to Small Business Lending? New Evidence from a Survey to Small Businesses." *Journal of Banking and Finance* 23(2-4): 427-458.

- Jensen, Michael C. and Kevin J. Murphy. 1990. "Performance Pay and Top-Management Incentives." *Journal of Political Economy* 98: 225-264.
- Kane, Edward J. 1999a. "How Offshore Financial Competition Disciplines Exit Resistance by Incentive-Conflicted Bank Regulators." National Bureau of Economic Research Working Paper No. 7156 (June).
- Kane, Edward J. 1999b. "When Should A Conscientious Central Banker Challenge A Banking Megamerger?" Boston College.
- Kashyap, Anil K. and Jeremy C. Stein. 1995. "The Impact Of Monetary Policy On Bank Balance Sheets." *Carnegie-Rochester Conference Series on Public Policy* 42: 151-195.
- Kashyap, Anil K. and Jeremy C. Stein. 1997a. "The role of banks in Monetary Policy: A survey with Implications for the European Monetary Union." Federal Reserve Bank of Chicago *Economic Perspectives* 11(5): 2-18.
- Kashyap, Anil K. and Jeremy C. Stein. 1997b. "What Do a Million Banks Have to Say About the Transmission of Monetary Policy." National Bureau of Economic Research Working Paper No. 6056 (June).
- Kashyap, Anil K., Jeremy C. Stein, and David W. Wilcox. 1993. "Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance." *American Economic Review* 83(1): 78-98.
- Kashyap, Anil K., Jeremy C. Stein, and David W. Wilcox. 1996. "Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance: Reply." *American Economic Review* 86(1): 310-14.
- Keeley, Michael. 1990. "Deposit Insurance, Risk, and Market Power in Banking." *American Economic Review* 80: 1183-1200.
- Keeton, William R. 1995. "Multi-Office Bank Lending to Small Businesses: Some New Evidence." Federal Reserve Bank of Kansas City *Economic Review* 80 (2): 45-57.
- Keeton, William R. 1996. "Do Bank Mergers Reduce Lending to Businesses and Farmers? New Evidence From Tenth District States." Federal Reserve Bank of Kansas City *Economic Review* 81 (3): 63-75.
- Keeton, William R. 1997. "The Effects of Mergers on Farm and Business Lending at Small Banks: New Evidence from Tenth District States." Federal Reserve Bank of Kansas City.
- Kellner, S. and G. Frank Mathewson. 1983. "Entry, Size Distribution, Scale, and Scope Economies in the Life Insurance Industry." *Journal of Business* 56: 25-44.
- Kolari, James and Asghar Zardkoohi. 1997a. "The Impact of Structural Change in the Banking Industry on Small Business Lending." Report to the Small Business Administration.
- Kolari, James and Asghar Zardkoohi. 1997b. "Bank Acquisitions and Small Business Lending." Texas A&M University .
- Kroszner, Randall S. 1999. "Is the Financial System Politically Independent? Perspectives on the Political Economy of Banking and Financial Regulation." University of Chicago (June).
- Kroszner, Randall S. and Raghuram G. Rajan. 1994. "Is the Glass-Steagall Act Justified? A Study of the U.S. Experience with Universal Banking Before 1933." *American Economic Review* 84(4): 810-832.

- Kroszner, Randall S. and Raghuram G. Rajan. 1997. "Organizational Structure and Credibility: Evidence from Commercial Bank Securities Activities before the Glass-Steagall Act." *Journal of Monetary Economics* 39: 475-516.
- Kwan, Simon. 1998. "Securities Activities by Commercial Banking Firms' Section 20 Subsidiaries: Risk, Return, and Diversification Benefits." Federal Reserve Bank of San Francisco Working Paper No. 98-10 (October).
- Kwast, Myron L. 1989. "The Impact of Underwriting and Dealing on Bank Returns and Risks." *Journal of Banking and Finance* 13(1): 101-125.
- Kwast, Myron L. and S. Wayne Passmore. Forthcoming. "The Subsidy Provided By The Federal Safety Net: Theory And Evidence." *Journal of Financial Services Research*.
- Kwast, Myron L., Martha Starr-McCluer, and John D. Wolken. 1997. "Market Definition and the Analysis of Antitrust in Banking." *Antitrust Bulletin* 42(4): 973-995.
- Lang, William W. and Leonard I. Nakamura. 1989. "Information Losses in a Dynamic Model of Credit ." *Journal of Finance* 44(3): 730-746.
- Lang, Gunter and Peter Welzel. 1998. "Technology and Cost Efficiency in Universal Banking: A Thick Frontier Approach." *Journal of Productivity Analysis* 10(1): 63-84.
- Lannoo, Karel and Daniel Gros. 1998. "Capital Markets and EMU: Report of a CEPS Working Party." Centre for European Policy Studies.
- Lee, Inmoo, Scott Lochhead, Jay Ritter, and Quanshi Zhao. 1996. "The Costs of Raising Capital." *Journal of Financial Research* 19: 59-74.
- Levonian, Mark and J. Soller. 1995. "Small Banks, Small Loans, Small Business." Federal Reserve Bank of San Francisco.
- Llewellyn, David. T. 1992. "The British Financial System." In *Banking Structure in Major Countries*, edited by George G. Kaufman. Massachusetts: Kluwer Academic Publishers: 429-468.
- Llewellyn, David. T. 1996. "Universal Banking and the Public Interest: A British Perspective." In *Universal Banking: Financial System Design Reconsidered*, edited by Anthony Saunders, and Ingo Walter. Irwin Publishing: 161-204.
- Lozano, Ana. 1998. "Efficiency and Technical Change for Spanish Banks." *Applied Financial Economics* 8: 289-300.
- Mahajan, Arvind, Nanda Rangan, and Asghar Zardkoohi. 1996. "Cost Structures in Multinational and Domestic Banking." *Journal of Banking and Finance* 20(2): 238-306.
- Marcus, Alan J. 1984. "Deregulation and Bank Financial Policy." *Journal of Banking and Finance* 8(4): 557-65.
- Matherat, Sylvie and Jean-Luc Cayssials. 1999. "The likely impact of changing financial environment and bank restructuring on financial stability: The case of France since the mid-1980s." In *The Monetary and Regulatory Implications of Changes in the Banking Industry*. Basle, Switzerland: Bank for International Settlements: 168-187.

- Maudos, Joaquin. 1996. "Market Structure and Performance in Spanish Banking Using a Direct Measure of Efficiency." University of Valencia. Valencia, Spain.
- Maudos, Joaquin, Jose Manuel Pastor, Francisco Perez, and Javier Quesada. 1999a. "Cost and Profit Efficiency in European Banks." Instituto Valenciano de Investigaciones Economicas (IVIE). Valencia, Spain.
- Maudos, Joaquin, Jose Manuel Pastor, Francisco Perez, and Javier Quesada. 1999b. "The Single European Market and Bank Efficiency: The Importance of Specialization." Instituto Valenciano de Investigaciones Economicas (IVIE), Valencia, Spain.
- May, Don O. 1995. "Do Managerial Motives Influence Firm Risk Reduction Strategies." *The Journal of Finance* 50: 1291-1308.
- Mayer, Colin. 1999. "European Capital Markets: Competition between Systems." In *European Banking after EMU*, edited by Christopher Hurst and Rien Wagenvoort. European Investment Bank Papers 4(1): 47-57..
- McAllister, Patrick H. and Douglas A. McManus. 1993. "Resolving the Scale Efficiency Puzzle in Banking." *Journal of Banking and Finance* 17(2-3): 389-405.
- McCauley, Robert N. and White William R. 1997. "The Euro and European Financial Markets." Bank for International Settlements Working Papers Number 41.
- McIntosh, James. 1998. "Scale Efficiency in a Dynamic Model of Canadian Insurance Companies." *Journal of Risk & Insurance* 65: 303-17.
- Meador, Joseph W., Harley E. Ryan, Jr., and Carolin D. Schellhorn. 1998. "Product Focus Versus Diversification: Estimates of X-Efficiency for the U.S. Life Insurance Industry." Northeastern University.
- Merrill Lynch & Co., Inc. 1999. "EMU: A Catalyst for Change in the European Financial Services Industry." In *Institutional Investor*, edited by David Fairlamb. European Editor and the Economist Intelligence Unit.
- Merton, Robert. 1977. "An Analytic Derivation of the Cost of Deposit Insurance and Loan Guarantees." *Journal of Banking and Finance* 1: 3-11.
- Mester, Loretta J. 1987. "Multiple Market Contact Between Savings and Loans." *Journal of Money, Credit, and Banking* 19(4): 538-549.
- Mester, Loretta J. 1989. "Testing for Expense Preference Behavior: Mutual Versus Stock Savings and Loans." *RAND Journal of Economics* 20: 483-498.
- Mester, Loretta J. 1991. "Agency Costs Among Savings and Loans." *Journal of Financial Intermediation* 1: 257-278.
- Mester, Loretta J. 1992a. "Perpetual Signaling with Imperfectly Correlated Costs," *RAND Journal of Economics* 23(4): 548-563.
- Mester, Loretta J. 1992b. "Traditional and Nontraditional Banking: An Information-Theoretic Approach." *Journal of Banking and Finance* 16(3): 545-566.
- Mester, Loretta J. 1993. "Efficiency in the Savings and Loan Industry." *Journal of Banking and Finance* 17(2-3): 267-286.

- Mester, Loretta J. 1997. "Measuring Efficiency at U.S. Banks: Accounting for Heterogeneity is Important." *European Journal of Operational Research* 98(2): 230-242.
- Mester, Loretta J., Leonard. I. Nakamura, and Micheline Renault. 1998. "Checking Accounts and Bank Monitoring." Federal Reserve Bank of Philadelphia Working Paper No. 98-25.
- Milbourn, Todd T., Arnoud W.A. Boot, and Anjan Thakor. 1999. "Megamergers and Expanded Scope: Theories of Bank Size and Activity Diversity." *Journal of Banking and Finance* 23(2-4): 195-214.
- Miller, Stewart R. and Arvind Parkhe. 1999. "Home-Country Environment as a Source of International Competitiveness: An Analysis of the Global Banking Industry." Michigan State University.
- Mitchell, Karlyn and Nur M. Onvural. 1996. "Economies of Scale and Scope at Large Commercial Banks: Evidence from the Fourier Flexible Functional Form." *Journal of Money, Credit, and Banking* 28(2): 178-99.
- Molyneux, Philip, Yener Altunbas, and Edward Gardener, 1996. *Efficiency in European Banking*. Chichester, England: John Wiley & Sons, Ltd.
- Molyneux, Philip, D.M. Lloyd-Williams, and John Thornton, 1994. "Competitive Conditions in European Banking." *Journal of Banking and Finance* 18(3): 445-459.
- Morck, Randal, Andrei Shleifer, and Robert W. Vishny. 1990. "Do Managerial Objectives Drive Bad Acquisitions?" *Journal of Finance* 45: 31-49.
- Morgan Stanley Dean Witter. 1998. Consolidation and the Eurobanks: Survivability and the 'Selfish Gene'. United Kingdom and Europe Investment Research. (October).
- Murphy, Kevin J. 1985. "Corporate Performance and Managerial Remuneration: An Empirical Analysis." *Journal of Accounting and Economics* 7 (1-3): 11-42.
- Nakamura, Leonard. I. 1993. "Commercial Bank Information: Implications for the Structure of Banking." In *Structural Change in Banking*, edited by M. Klausner and L.J. White. Irwin: 131-160.
- Neumark, David and Steven A. Sharpe. 1992. "Market Structure and the Nature of Price Rigidity: Evidence from the Market for Consumer Deposits." *Quarterly Journal of Economics* 107(2): 657-680.
- Nolle, Daniel E. 1995. "Banking Industry Consolidation: Past Changes and Implications," Office of the Comptroller of the Currency Working Paper 95-1 (April).
- Noulas, Athanasios G., Stephen M. Miller, Subhash C. Ray. 1993. "Regularity Conditions and Scope Estimates: The Case of Large-Sized U.S. Banks." *Journal of Financial Services Research* 7(3): 235-48.
- Noulas, Athanasios G., Subhash C. Ray, and Stephen M. Miller. 1990. "Returns to Scale and Input Substitution for Large U.S. Banks." *Journal of Money, Credit, and Banking* 22(1): 94-108.
- Ongena, Steven and David C. Smith. 1999. "Empirical Evidence on the Duration of Banking Relationships." Working Paper Norwegian School of Management.
- Otten, Roger and Mark Schweitzer. 1998. "A Comparison between the European and the U.S. Mutual Fund Industry." Maastricht University.

- Parker, Miles. 1999. "The Development of Mutual Funds in Europe: Recent Trends and Financial Implications." University of Warwick/ Bank of England.
- Parkhe, Arvind and Stewart R. Miller. 1999. "Is There a Liability of Foreignness in Global Banking? An Empirical Test of U.S. Banks' X-Efficiency." Michigan State University.
- Pastor, Gonzalo. 1993. "Financial Liberalization in Spain." In *Spain: Converging with the European Community*, edited by Michel Galy, Gonzalo Pastor, and Thierry Pujol. International Monetary Fund Occasional Paper 101 (February): 13-22.
- Pastor, Jose Manuel. 1999. "Credit Risk and Efficiency in the European Banking Systems: A Three Stage Analysis." Instituto Valenciano de Investigaciones Economicas (IVIE). Valencia, Spain.
- Pastor, Jose Manuel, Francisco Perez, and Javier Quesada. 1997. "Efficiency Analysis in Banking Firms: An International Comparison." *European Journal of Operational Research* 98: 396-408.
- Pastor, Jesus T., Ana Lozano-Vivas, and Iftekhar Hasan. 1999. "Cross-border Performance of the European Banking Systems." Universidad de Malaga, Spain.
- Pastor, Jesus T., Ana Lozano-Vivas, and Jose Manuel Pastor. 1997. "Efficiency of European Banking Systems: A Correction by Environmental Variables." Instituto Valenciano de Investigaciones Economicas (IVIE), Valencia, Spain.
- Peek, Joe and Eric S. Rosengren. 1996. "Small Business Credit Availability: How Important Is Size of Lender?" In *Financial System Design: The Case for Universal Banking*, edited by Anthony Saunders and Ingo Walter. Irwin Publishing: 628-655.
- Peek, Joe and Eric S. Rosengren. 1998. "Bank Consolidation and Small Business Lending: It's Not Just Bank Size That Matters." *Journal of Banking and Finance* 22(6): 799-819.
- Peek, Joe, Eric S. Rosengren, and Faith Kasirye. 1999. "The Poor Performance of Foreign Bank Subsidiaries: Were the Problems Acquired or Created?" *Journal of Banking and Finance* 23(2-4): 579-604.
- Peristiani, Stavros. 1997. "Do Mergers Improve the X-efficiency and Scale Efficiency of U.S. banks? Evidence from the 1980s." *Journal of Money, Credit, and Banking* 29(3): 326-337.
- Petersen, Mitchell A. and Raghuram G. Rajan. 1994. "The Benefits of Firm-Creditor Relationships: Evidence from Small Business Data." *Journal of Finance* 49 (1): 3-37.
- Petersen, Mitchell A. and Raghuram G. Rajan. 1995. "The Effect of Credit Market Competition on Lending Relationships." *Quarterly Journal of Economics* 110(2): 407-443.
- Pfister, Christian and Thierry Grunspan. 1999. "Some Implications of Bank Restructuring for French Monetary Policy." In *The Monetary and Regulatory Implications of Changes in the Banking Industry*. Bank for International Settlements Conference Papers 7 (March): 188-207.
- Pilloff, Steven J. 1996. "Performance Changes and Shareholder Wealth Creation Associated with Mergers of Publicly Traded Banking Institutions." *Journal of Money, Credit, and Banking* 28(3): 294-310.
- Pilloff, Steven J. 1999. "Multimarket Contact in Banking." *Review of Industrial Organization* 14: 163-192.

- Pilloff, Steven J. and Anthony M. Santomero. 1998. "The Value Effects of Bank Mergers and Acquisitions." In *Bank Mergers & Acquisitions*, edited by Y. Amihud and G. Miller. Kluwer Academic: 59-78.
- Pozdena, Randall Johnston and Volbert Alexander. 1992. "Bank Structure in Germany." In *Banking Structure in Major Countries*, edited by George G. Kaufman. Massachusetts: Kluwer Academic Publishers: 555-590.
- Prager, Robin A. and Timothy H. Hannan. 1999. "Do Substantial Horizontal Mergers Generate Significant Price Effects? Evidence from the Banking Industry." *Journal of Industrial Economics* 46(4): 433-452.
- Prowse, Stephen D. 1995. "Corporate Governance in an International Perspective: A Survey of Corporate Control Mechanisms Among Large Firms in the U.S., U.K., Japan and Germany." *Financial Markets, Institutions and Instruments* 4(1).
- Prowse, Stephen D. 1997. "Alternative Methods of Corporate Control in Commercial Banks." *Journal of Financial Research* 20(4): 509-527.
- Pugel, Thomas A. and Lawrence J. White. 1985. "An Analysis of the Competitive Effects of allowing commercial Bank Affiliates to Underwrite Corporate Securities." In *Deregulating Wall Street: Commercial Bank Penetration of the Corporate Securities Market*, edited by Ingo Walter. Wiley: 93-139.
- Pulley, Lawrence and David Humphrey. 1993. "The Role of Fixed Costs and Cost Complementarities in Determining Scope Economies and the Cost of Narrow Banking Proposals." *Journal of Business* 66(3): 437-462.
- Puri, Manju. 1994. "The Long-Term Default Performance of Bank Underwritten Security Issues." *Journal of Banking and Finance* 18, 397-418.
- Puri, Manju. 1996. "Commercial Banks in Investment Banking: Conflict of Interest or Certification Role?" *Journal of Financial Economics* 40(3): 373-401.
- Radecki, Lawrence J. 1998. "The Expanding Geographic Reach of Retail Banking Markets." Federal Reserve Bank of New York *Economic Policy Review* 4(2): 15-34.
- Radecki, Lawrence J., John Wenninger, and D. K. Orlow. 1997. "Industry Structure: Electronic Delivery's Potential Effects on Retail Banking." *Journal of Retail Banking Services* 19(4): 57-63.
- Rai, Anoop, 1996, "Cost Efficiency of International Insurance Firms," *Journal of Financial Services Research* 10: 213-33.
- Rajan, Raghuram G. 1994. "An Investigation into the Economics of Extending Bank Powers." University of Chicago.
- Rajan, Raghuram G. 1996. "The Entry of commercial Banks into the Securities Business: A Selective Survey of Theories and Evidence." In *Universal Banking: Financial System Design Reconsidered*, edited by Anthony Saunders and Ingo Walter. Irwin: 282-302.
- Rajan, Raghuram G. and Luigi Zingales. 1995. "What Do We Know about Capital Structure? Some Evidence from International Data." *Journal of Finance* 50 (5): 1421-1460.
- Resti, Andrea. 1998. "Regulation Can Foster Mergers, Can Mergers Foster Efficiency? The Italian Case." *Journal of Economics and Business* 50(2): 157-169.

- Rhoades, Stephen A. 1993. "The Efficiency Effects of (In-Market) Horizontal Bank Mergers." *Journal of Banking and Finance* 17(2-3): 411-422.
- Rhoades, Stephen A. 1998. "The Efficiency Effects of Bank Mergers: An Overview of Case Studies of Nine Mergers." *Journal of Banking and Finance* 22(3): 273-291.
- Rivaud-Danset, Dorothe, Emmanuelle Dubocage, and Robert Salais. 1998. "Comparison Between the Financial Structure of SME Versus Large Enterprise Using the BACH Data Base." Universite Paris-Nord – Faculte de Sciences Economiques. (December)
- Roll, Richard. 1986. "The Hubris Hypothesis of Corporate Takeovers." *Journal of Business* 59(2), Part 1: 197-216.
- Rosen, Richard J., Peter R. Lloyd-Davies, Myron L. Kwast, and David B. Humphrey. 1989. "New Banking Powers: A Portfolio Analysis of Bank Investment in Real Estate." *Journal of Banking and Finance* 13 (3): 355-366.
- Ruthenberg, David and Ricky Elias. 1996. "Cost Economies and Interest Rate Margins in a Unified European Banking Market." *Journal of Economics and Business* 48 (3): 231-249.
- Saidenberg, Marc R. and Philip E. Strahan. 1999. "Are Banks Still Important for Financing Large Businesses?" Federal Reserve Bank of New York, *Current Issues in Economics and Finance* 5 (12): 1-6.
- Sapienza, Paola. 1998. "The Effects of Banking Mergers on Loan Contracts." Northwestern University.
- Saunders, Anthony. 1999. "Consolidation and Universal Banking." *Journal of Banking and Finance* 23(2-4): 693-695.
- Saunders, Anthony, Elizabeth Strock, and Nicholas Travlos. 1990. "Ownership Structure, Deregulation, and Bank Risk-taking." *Journal of Finance* 45: 643-654.
- Saunders, Anthony and Ingo Walter. 1994. *Universal Banking in the United States: What Could We Gain? What Could We Lose?* Oxford University Press.
- Saunders, Anthony and Berry K. Wilson. 1999. "The Impact of Consolidation and Safety-Net Support on Canadian, U.S. and U.K. Banks:1893-1992." *Journal of Banking and Finance* 23 (2-4) 537-571.
- Savage, D. T. 1991. "Mergers, Branch Closings, and Cost Savings." Board of Governors of the Federal Reserve System.
- Schmidt, Reinhard H., Andreas Hackethal, and Tyrell Marcell. 1999. "Disintermediation and the Role of Banks in Europe: An International Comparison." *Journal of Financial Intermediation* 8: 36-67.
- Schrantz, Mary S. 1993. "Takeovers Improve Firm Performance: Evidence from the Banking Industry." *Journal of Political Economy* 101 (April): 299-326.
- Scott, Jonathan A. and William C. Dunkelberg. 1999. "Bank consolidation and small business lending: A small firm perspective." In *Business Access to Capital and Credit*, edited by Richard W. Lang. Federal Reserve Bank of Dallas: 328-361.
- Sealey, Calvin W., Jr. and James T. Lindley. 1977. "Inputs, Outputs, and a Theory of Production and Cost at Depository Financial Institutions." *Journal of Finance* 32(4): 1251-1266.
- Seelig, Steven A. and Timothy Critchfield. 1999. "Determinants of De Novo Entry in Banking." Federal Deposit

Insurance Corporation Working Paper 99-1.

- Seth, Rama and Alicia Quijano. 1993. "Growth in Japanese Lending and Direct Investment in the United States." *Japan and the World Economy* 5: 363-372.
- Shaffer, Sherrill. 1993. "Can Megamergers Improve Bank Efficiency?" *Journal of Banking and Finance* 17: 423-436.
- Shaffer, Sherrill. 1999. "Ownership Structure and Market Conduct Among Swiss Banks." University of Wyoming.
- Siems, Thomas F. 1996. "Bank Mergers and Shareholder Wealth: Evidence from 1995's Megamerger Deals." Federal Reserve Bank of Dallas *Financial Industry Studies* August: 1-12.
- Simons, Katerina and Joanna Stavins. 1998. "Has Antitrust Policy in Banking Become Obsolete?" Federal Reserve Bank of Boston *New England Economic Review* March-April 1998: 13-26.
- Smirlock, Michael and William Marshall. 1983. "Monopoly Power and Expense-Preference Behavior: Theory and Evidence to the Contrary." *Bell Journal of Economics* 14(1): 166-178.
- Steinherr, Alfred. 1999. "European Futures and Options Markets in a Single Currency Environment." In *European Capital Markets with a Single Currency*, edited by Jean Dermine and Pierre Hillion. Oxford: Oxford University Press: 171-204.
- Strahan, Philip E. and James P. Weston. 1996. "Small Business Lending and Bank Consolidation: Is There Cause for Concern?" Federal Reserve Bank of New York *Current Issues in Economics and Finance* 2: 1-6.
- Strahan, Philip E. and James P. Weston. 1998. "Small Business Lending and the Changing Structure of the Banking Industry." *Journal of Banking and Finance* 22(6-8): 821-845.
- Subrahmanyam, Vijaya, Nanda Rangan, and Stuart Rosenstein. 1997. "The Role of Outside Directors in Bank Acquisitions." *Financial Management* 26(3): 23-36.
- Sullivan, Richard and Kenneth Spong. 1998. "Does Manager Wealth and Insider Ownership Influence Risk? A Look at Ownership Structure, Manager Wealth, and Risk in Commercial Banks." Federal Reserve Bank of Kansas City *Financial Industry Perspectives* December: 15-40.
- Szego, Giorgio P. and Vittoria Szego. 1992. "The Structure of the Italian Financial System." In *Banking Structure in Major Countries*, edited by George G. Kaufman. Massachusetts: Kluwer Academic Publishers: 293-331.
- Terrell, Henry S. 1993. "U.S. Branches and Agencies of Foreign Banks: A New Look." *Federal Reserve Bulletin* 79 (October): 913-925.
- Toivanen, Otto. 1997. "Economies of Scale and Scope in the Finnish Non-Life Insurance Industry." *Journal of Banking and Finance* 21: 759-779.
- Toyoma, Haruyuki. 1999. "The Monetary, Regulatory, and Competitive Implications of the Restructuring of the Japanese Banking Industry." In *The Monetary and Regulatory Implications of Changes in the Banking Industry*. Bank for International Settlements Conference Papers 7 (March): 295-318.
- Udell, Gregory F. and Paul Wachtel. 1995. "Financial System Design for Formerly Planned Economies: Defining the Issues." *Financial Markets Institutions and Instruments* 4(2) May.

- van Beek, Luuk and Alireza Tourani Rad. 1997. "Market Valuation of Bank Mergers in Europe" *Financial Services*. Amsterdam.
- Vander Venet, Rudi. 1996. "The Effect of Mergers and Acquisitions on the Efficiency and Profitability of EC Credit Institutions." *Journal of Banking and Finance* 20(9): 1531-1558.
- Vander Venet, Rudi. 1998. "Causes and Consequences of EU Bank Takeovers." In *The Changing European Landscape*, edited by Sylvester Eijffinger, Kees Koedijk, Marco Pagano, and Richard Portes, Centre for Economic Policy Research. Brussel, Belgium: 45-61.
- Vander Venet, Rudi. 1999. "Cost and Profit Dynamics in Financial Conglomerates and Universal Banks in Europe." University of Ghent. Belgium.
- Wagenvoort, Rien and Paul Schure. 1999. "Who are Europe's Efficient Bankers?" In *European Banking after EMU*, edited by Christopher Hurst and Rien Wagenvoort. European Investment Bank Papers 4(1): 105-126.
- Walraven, Nicholas. 1997. "Small Business Lending by Banks Involved in Mergers." Board of Governors of the Federal Reserve *Finance and Economics Discussion Series* 97-25.
- Whalen, Gary. 1995. "Out-of-State Holding Company Affiliation and Small Business Lending." Office of the Comptroller of the Currency *Economic and Policy Analysis Working Paper* 95-4.
- Whalen, Gary. Forthcoming. "Trends in Organizational Form and their Relationship to Performance: The Case of Foreign Securities Subsidiaries of U.S. Banking Organizations." *Journal of Financial Services Research*.
- Wheelock, David C. and Paul W. Wilson. 1996. "Technical Progress, Inefficiency, and Productivity Change in U.S. Banking, 1984-1993." Federal Reserve Bank of St. Louis.
- White, William. 1998. "The Coming Transformation of Continental European Banking." Bank for International Settlements Working Paper No. 54.
- Wihlborg, Clas. 1999. "Supervision of Banks after EMU." In *European Banking after EMU*, edited by Christopher Hurst and Rien Wagenvoort. European Investment Bank Papers 4(1): 71-81.
- Williamson, Oliver. 1967. "The Economics of Defense Contracting: Incentives and Performance." In *Issues in Defense Economics*, edited R. McKean. New York: Columbia University Press.
- Williamson, Oliver. 1988. "Corporate Finance and Corporate Governance." *Journal of Finance* 43 (3): 567-591.
- Winton, Andrew. 1999. "Don't Put All Your Eggs in One Basket? Diversification and Specialization in Lending." University of Minnesota.
- World Bank. 1999. "Integration with the Global Economy." *World Development Indicators*.
- Yuengert, Andrew. 1993. "The Measurement of Efficiency in Life Insurance: Estimates of a Mixed Normal-Gamma Error Model." *Journal of Banking and Finance* 17(2-3): 483-496.
- Zaim, Osman. 1995. "The Effect of Financial Liberalization on the Efficiency of Turkish Commercial Banks." *Applied Financial Economics* 5 (5): 257-264.

Zardkoohi, Asghar and James Kolari. 1997. "The Effect of Structural Changes in the U.S. Banking Industry on Small Business Lending." Texas A&M University.

Zhang, Hao. 1995. "Wealth Effects of U.S. Bank Takeovers." *Applied Financial Economics* 5(5): 329-336.

Appendix 1. The Structure of Credit Markets in Different Countries²¹

This appendix provides a brief overview of regulatory changes in different countries (section A1.1); describes the structure of credit markets in various countries (section A1.2); and presents descriptive statistics for domestic and foreign banks in different nations (section A1.3).

A1.1 Regulatory changes in different countries

Traditionally, financial service firms have been heavily regulated and protected from competition. As a result, credit market structures in most countries have been highly fragmented and specialized on the basis of region, product line, and/or clientele. In the U.S., the operations of credit unions, thrifts, commercial banks, securities firms, and insurance companies were kept separate, and banks were restricted to a single state. In Japan, commercial banking, securities business, and insurance services were provided by separate entities. Banking services were highly segmented by both region and product line, and were provided by major Japanese banks (city, long-term credit, and trust banks), regional banks, financial institutions for small business, government financial institutions, financial institutions for agriculture, forestry, and fisheries, and the post office. In France, universal banks belonging to the French Bankers' Association (AFB) were distinct from mutual banks, cooperative banks, savings and provident banks with narrow business and/or regional focus, and were also distinct from finance companies, securities houses, brokerage firms, and other specialized institutions. The German system contained large universal banks, regional banks (and their central giro organizations), private banks, savings banks (and their central organizations), credit cooperatives, and specialized credit institutions like the Postal System and building loan associations. In Italy, the operations of public law banks, private banks, cooperative banks, savings and pledge banks, rural banks, and special credit institutions (e.g. industrial credit, real estate, agriculture, and fishery institutions) were separate. In Spain, competition among commercial and savings banks, as well as credit cooperatives, was limited by regulation. In Switzerland, a universal banking country, financial services were provided by large banks, cantonal and savings banks, rural banks, specialized credit institutions, and finance companies. In the U.K., clearing banks, investment banks, and building societies served distinct markets.

In addition to functional and geographic separation of credit institutions, credit markets were often characterized by interest rate regulations, restrictions on the form and composition of the assets and liabilities of institutions, and barriers to entry and exit. In a number of countries, such as France, Germany, Italy, and

Switzerland, the central and local governments were involved directly in the provision of financial services by fiat or through direct ownership of banks.

Over the past two decades, there has been considerable deregulation of the activities of credit institutions. In the U.S., deposit interest rates were deregulated, the restrictions on interstate banking were mostly removed, thrift powers were expanded, and most of the Glass-Steagall restrictions on banking powers were recently removed, as discussed above in Section 2. Since the 1980s, the lines separating various types of commercial banks in Japan have blurred and competition has intensified, as interest rates were deregulated, rules governing security issues were liberalized, and the permissible range of products were expanded. The “Japanese Big Bang” reforms that began to be implemented in 1997, and still continue, will tear down the barriers separating commercial banks, securities firms, and insurance.

In Europe, the Single Market Programme described in Section 2 effectively removed many of the cross-border restrictions on financial institutions. The individual nations also engaged in their own deregulation. During the late 1970s and early 1980s, legal changes in France encouraged the development of capital markets and introduction of new financial products. The major changes introduced by the Banking Act of 1984 overhauled the banking markets and greatly diminished the distinctions between the different types of institutions. In Italy, a legal framework for investment funds was introduced in 1983, branching restrictions were relaxed in 1989, the Banking Law of 1993 eliminated operational distinctions among credit institutions, and the Consolidated Law on Financial Intermediation of 1998 provided flexibility in the portfolio management activities of credit institutions. In Spain, a series of deregulations starting in the 1970s liberalized interest rates and branching, expanded the permissible activities of savings banks, removed operational differences between commercial and savings banks, removed restrictions on the activities of foreign banks, and (through changes in the tax laws) provided the framework for the development of investment funds. In the U.K., credit and exchange controls were removed during the 1970s and 1980s, permissible activities of building societies were expanded during the 1980s and 1990s, and securities markets were deregulated with the “Big Bang” in 1986.

A1.2 The structure of credit markets in different countries

Table A1.1 shows market structure in the Group of Ten countries. Owing to historical restrictions on branching and unit banking laws, the U.S. banking market appears to be more fragmented than markets in other

nations. In 1997, the U.S. had the largest number of credit institutions (22,331) and the smallest number of number of inhabitants per institution (11,997).

The market share of commercial banks in the number of institutions and branches vary across countries. In France, Spain, and the U.S., the number of banks and their branches exceeds the number of other institutions. In France, commercial banks and financial companies accounted for 53.4% and 29.7%, respectively, of all credit institutions in 1998 (table A1.2). In Spain, commercial banks account for the majority of institutions and branches (table A1.6). Similarly, in the U.S., insured commercial banks outnumber the insured savings institutions, credit unions, and other banks. In contrast, in Germany, Italy, and Japan, commercial banks and their offices represent a small fraction of the total banking markets. In Germany, commercial banks account for 9.5% of the total number of institutions and 11.4% of the total branch offices; credit cooperatives and their central institutions, savings banks, regional giro institutions and special credit institutions account for the remainder (table A1.3). Similarly, in Italy, limited company banks and foreign banks account for 29.6% of the total number of institutions (table A1.4), while cooperatives and mutual banks constitute the bulk of the remainder of institutions. In Japan, special purpose financial institutions (e.g. for financing of small businesses, agriculture, and fisheries) account for the majority of institutions and branches; Japanese commercial banks account for only 6.7% of the total number of institutions and 19.2% of the branches (table A1.5). However, in all markets, commercial banks have the largest market shares in terms of assets (tables A1.2--A1.8).

Banks in Belgium, France, Netherlands, and the U.K. appear to have the most branches per institution. The smaller number of branches per institution in Italy and the U.S. are remnants of historical restrictions on branching. In fact, since the 1989 deregulation of limits on branching, Italy has seen a 24% increase in the number of branches. Similarly, while the number of branches of U.S. institutions declined significantly over the 1990-93 period, there has been a slight increase in more recent years.

There has been an overall general decline in the number of institutions and their branches in the 1990s (table A1.1), with a corresponding increase in the number of inhabitants per institution and per branch (table A1.1).²² France, Germany, Japan, and the U.S. have experienced the largest declines in the number of institutions. In terms of the number of institutions, this decline has been relatively larger in the U.S. and Japan, but in percentage terms the restructuring was of the same order of magnitude in these four countries. In most countries, the majority of restructuring has occurred among small institutions. The reduction in the number of

German and Japanese institutions has been primarily among cooperative and rural banks. In the U.K., most of the restructuring has occurred as a result of M&A activity among domestic banks, and primarily among the smaller institutions.²³ Similarly, of the 44 exits from the Italian banking market that occurred in 1997, 32 involved mutual and cooperative banks (Bank of Italy, Annual Report 1998).

The share of total banking assets held by the largest five institutions has increased in all major countries except Norway (table A1.1). Canada, Finland, Portugal, and Sweden have experienced the largest increases in market concentration, while concentration ratios have been more stable in France, Japan, and Switzerland. Overall, concentration ratios in Germany, Italy, the U.K., and the U.S. are less than in other countries. Although national markets within continental Europe are fairly concentrated, the shares held by the top 5 institutions in continental Europe as a whole are relatively small (about 12%, not shown in tables, De Bandt, 1999). It has been argued that the potential impact of market integration and deregulation on EU-wide concentration ratio is likely to be influenced by the extent to which competition is based on fixed or variable costs (Gual, 1999).

A1.3 Activities of domestic and foreign banks in different countries

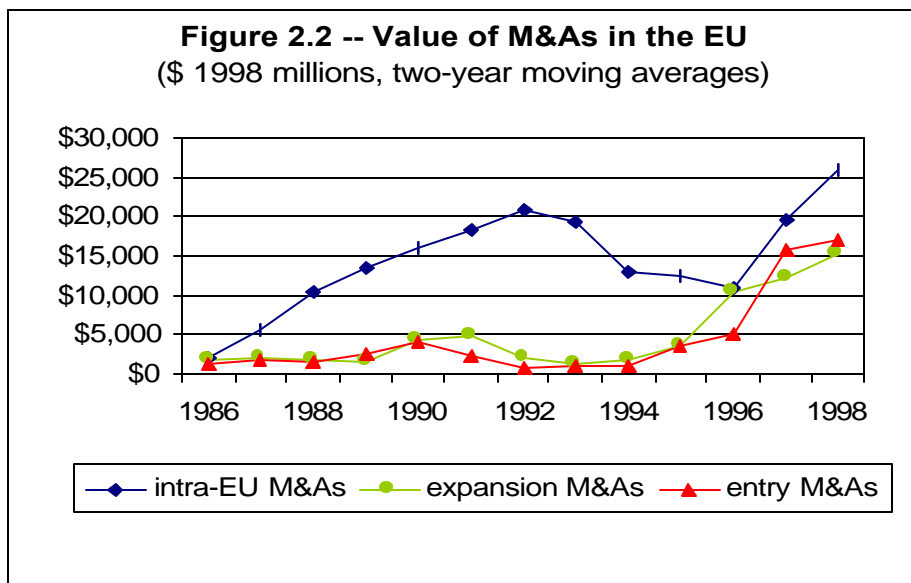
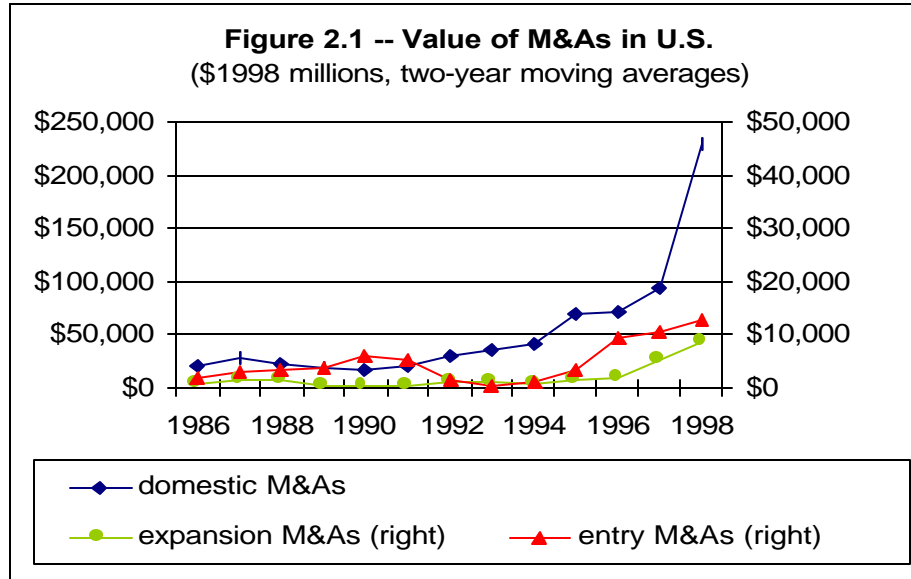
In recent years, the share of banking assets held by foreign banks has increased in most countries (table A1.1). In addition to providing more competition, the increase in foreign bank presence can alter the types of services provided by banking organizations in individual markets. For instance, entry by foreign banks that focus more on investment banking services might provide additional services to corporate customers. The data from France, Germany, Spain, the U.K., and the U.S. (tables A1.9 through A1.13) reveal three interesting patterns in the operations of foreign banks: (1) In each banking market, there are significant differences in the operations and profitability of foreign versus domestic banks; (2) in each country, there are significant differences in the business focus and profitability of banks from different foreign nations; and (3) banks headquartered in a single nation vary their business focus across foreign markets.²⁴

Except for the U.S., foreign banks are smaller than domestic banks in every nation.²⁵ With the exception of banks in Spain, foreign banks invest a greater fraction of their assets in securities and have lower ratios of loans to total assets than domestic banks. In France and Germany, foreign banks finance similar fraction of their assets with deposits as domestic banks. Foreign banks are more reliant on deposits than domestic banks in Spain, while foreign banks in the U.K. and the U.S. have a lower ratio of total deposits to total assets. In most countries, domestic banks have more retail deposits (demand, time, and savings) than foreign banks. The latter rely more

heavily on “other deposits” which is mostly composed of interbank deposits. Furthermore, in most countries, foreign banks have lower net interest income than domestic banks. The lower concentration of assets in loans, greater use of interbank deposits, and lower interest income for foreign banks suggest that foreign banks focus less on traditional banking intermediation and more on other banking services than domestic banks. The data also suggest that domestic banks are generally more profitable than foreign banks. This simple comparison of accounting profitability is consistent with our evidence on profit X-efficiency shown in Section 5.

Among foreign banks of different origin, there are significant differences in the operations of U.S., European, and Japanese banks in each market. For instance, in France and Germany, foreign banks from other European countries appear to focus more on traditional intermediation than U.S. banks. European banks have higher ratios of loans to total assets and deposits to total assets (particularly, demand deposits) than U.S. banks. In addition, U.S. banks earn more commission income per unit of assets than European banks in France, Spain, and the U.K. With the exception of Germany, Japanese banks are less profitable and focus more on security investments than their U.S. and European counterparts. These patterns suggest that foreign banks in any given country are not homogeneous and that treating them as a group, as is often done in the research literature summarized in Section 3, can obscure important differences.

The data also suggest that banks headquartered in a single nation vary their business focus across foreign markets. For instance, U.S. banks operating in France, Germany, and the U.K. invest a greater fraction of their assets in securities and finance a lower fraction of their assets through deposits than U.S. banks operating in Spain. The extent to which U.S. banks invest in equity securities also varies from market to market, ranging from 0.38% of total assets in Germany to nearly 4% in the U.K. Similarly, European foreign banks operating in France and Germany appear to focus more on traditional banking (loans, retail deposits) than European banks in Spain, the U.K., and the U.S. These results suggest that banks from the same country alter their business focus across the foreign markets in which they operate.



Source: Securities Data Company. Notes: "Expansion M&As" are acquisitions of foreign firms by domestic firms. "Entry M&As" are acquisitions of domestic firms by foreign firms. We treat the EU as a single economic region, so that the "intra-EU M&As" in Figure 2.2 is analogous to the "domestic M&As" in Figure 2.1.

Table 3.1 -- Correlation Analysis of Bank ROE Among Nations, Annual Data 1979-1996.

	SPAIN	FRANCE	AUSTRIA	BELGIUM	LUXEMBOURG	NETHERLANDS	GERMANY	UK	ITALY	PORTUGAL	DENMARK	FINLAND	GREECE	SWEDEN	JAPAN	US
SPAIN	1.000															
FRANCE	0.742	1.000														
AUSTRIA	0.274	0.586	1.000													
BELGIUM	-0.573	-0.654	0.019	1.000												
LUXEMBOURG	-0.463	-0.854	-0.324	0.705	1.000											
NETHERLANDS	0.170	0.223	0.768	0.185	0.102	1.000										
GERMANY	-0.286	-0.236	0.229	0.188	-0.336	0.210	1.000									
UK	-0.460	-0.543	-0.137	0.798	0.648	0.084	0.384	1.000								
ITALY	0.518	0.926	0.519	-0.436	-0.912	0.126	0.248	-0.473	1.000							
PORTUGAL	0.158	0.514	-0.250	-0.364	-0.229	-0.673	-0.176	-0.386	-0.025	1.000						
DENMARK	-0.240	-0.154	0.213	0.358	0.080	0.475	0.527	0.532	-0.182	-0.024	1.000					
FINLAND	0.419	0.519	0.526	0.077	-0.404	0.533	0.465	0.089	0.533	0.035	0.562	1.000				
GREECE	0.123	0.117	-0.296	-0.260	-0.329	-0.685	0.336	-0.075	0.099	0.475	-0.201	-0.207	1.000			
SWEDEN	0.207	-0.084	-0.283	0.013	0.292	-0.296	-0.203	0.082	-0.362	0.085	-0.005	-0.114	0.675	1.000		
JAPAN	0.268	0.740	0.654	-0.362	-0.783	0.314	0.393	-0.460	0.885	0.045	-0.017	0.455	-0.027	-0.473	1.000	
US	-0.588	-0.815	-0.522	0.477	0.585	-0.182	0.206	0.761	-0.686	0.079	0.243	-0.307	-0.278	0.015	-0.490	1.000

Source: All data taken from "Bank Profitability," OECD publication, 1998. Annual data from 1979-1996 for Spain, Germany, Luxembourg, Portugal, Denmark, Finland, Sweden, Japan, and the US. Annual data from 1981-1996 for Belgium. Annual data from 1984-1996 for Italy and the UK. Annual data from 1987-1996 for

Austria and the Netherlands. Annual data from 1988-1996 for France. Annual data from 1989-1996 for Greece.

ROE = aggregate commercial bank "profit after taxes" divided by aggregate commercial bank "capital and reserves."

Table 4.1 -- Credit Market Intermediation and Capital Markets, 1997

The ratio of book value to credit institutions' total assets to the capitalization of bond and equity markets.

Total Assets of Credit Institutions / (Equity + Bond Market Capitalization)	
Austria	3.41
Belgium	2.04
Canada	0.92
Denmark	0.97
Finland	1.13
France	2.35
Germany	1.88
Italy	1.26
Japan	2.31
Luxembourg	0.33
Netherlands	1.03
Portugal	2.87
Spain	2.91
Sweden	1.04
U.K.	1.41
U.S.	0.52

Sources: *Total assets of credit institutions*: Europe: European Central Bank. "Possible Effects of EMU on the EU Banking System in the Medium and Long Term." February 1999. U.S.: Board of Governors of the Federal Reserve System. "Flow of Funds Accounts of the United States." First Quarter, 1999. Canada: Bank of Canada. "Review." Spring 1999. Japan: Bank of Japan. "Economic Statistics Monthly." March 1999. *Capitalization of bond and equity markets*: International Federation of Stock Exchanges (FIBV). <http://www.fibv.com> (October 16, 1999).

Table 4.2 -- Relative Shares of Bank Loans and Debt Securities at Nonfinancial Firms in Various Countries, 1983 and 1994. (in percent; each row sums to 100%)

		Bank Loans	Debt Securities			Bank Loans	Debt Securities
Belgium	1983	84.6	15.4	Japan	1983	94.5	5.5
	1994	91.0	9.0		1995	90.4	9.6
Canada	1983	68.6	31.4	Netherlands	1983	92.9	7.1
	1994	61.9	38.1		1994	82.7	17.3
Finland	1983	69.9	30.1	Norway	1983	29.7	70.3
	1994	57.4	42.6		1994	10.8	89.2
France	1989	44.1	55.9	Spain	1983	83.7	16.3
	1995	21.6	78.4		1994	80.0	20.0
Germany	1985	51.1	48.9	U.K.	1983	83.9	16.1
	1994	56.9	43.1		1994	72.8	27.2
Italy	1983	74.4	25.6	U.S.	1983	36.4	63.6
	1995	85.7	14.3		1994	18.0	82.0

Sources: U.K. data supplied by Darren Pain, Bank of England. Germany data taken from Bauer and Domanski (1999).

Data from all other countries taken from: OECD, "Financial Statements of Nonfinancial Enterprises, 1996." Notes: "Bank loans" includes all short- and long-term loans from depository institutions. "Debt Securities" includes all short- and long-term bills, notes, bonds, and debentures.

Table 5.1 -- Summary Statistics for U.S. Data

	domestic banks	foreign banks
profits/assets	0.0269 (.00950)	0.0170 (.0118)
costs/assets	0.0413 (.00846)	0.0416 (.00910)
consumer loans/assets	0.0952 (.101)	0.0488 (.0872)
business loans/assets	.140 (.0925)	.242 (.181)
real estate loans/assets	.353 (.137)	.274 (.190)
securities/assets	0.3970 (.132)	0.4220 (.180)
off-balance sheet/assets	0.0197 (.0399)	0.0895 (.124)
equity/assets	0.0929 (.0272)	0.1050 (.0696)
market nonperforming loans/assets	0.0000 (.00000543)	0.0000 (.00000506)
price of purchased funds	0.0400 (.00883)	0.0416 (.00599)
price of core deposits	0.0221 (.00771)	0.0168 (.0102)
price of labor (thousands of 1998 \$)	39.3000 (8.41)	60.2000 (14.6)
gross total assets (millions of 1998 \$)	1277.7220 (9,798.282)	4472.7890 (8,571.339)
number of banks	1940	43
number of observations	11,640	258

Notes: Data from the Call Reports. The costs, profits, variable outputs, fixed outputs, and fixed inputs were scaled by gross total assets in table, but not in the regressions.

Table 5.2 – Summary Statistics for European Data

	France domestic banks	France foreign banks	Germany domestic banks	Germany foreign banks	Spain domestic banks	Spain foreign banks	UK domestic banks	UK foreign banks
profits/assets	0.0143 (0.0194)	0.0088 (0.0299)	0.0142 (0.0174)	0.0111 (0.0191)	0.0188 (0.0256)	0.0081 (0.0135)	0.0121 (0.0206)	0.0037 (0.0282)
costs/assets	0.0969 (0.0572)	0.0963 (0.0496)	0.0790 (0.0356)	0.0845 (0.0439)	0.0959 (0.0445)	0.1018 (0.0382)	0.0289 (0.0327)	0.0624 (0.0441)
loans/assets	0.5365 (0.2778)	0.4572 (0.2991)	0.5996 (0.2290)	0.3572 (0.2752)	0.4508 (0.2299)	0.5563 (0.2116)	0.4429 (0.3182)	0.2565 (0.2325)
non-equity securities/assets	0.4131 (0.2620)	0.5114 (0.2989)	0.3951 (0.2211)	0.6463 (0.2790)	0.5206 (0.2373)	0.4403 (0.2165)	0.4923 (0.3285)	0.6475 (0.2608)
equity securities/assets	0.0239 (0.0700)	0.0121 (0.0236)	0.0092 (0.0160)	0.0033 (0.0085)	0.0348 (0.0877)	0.0069 (0.0101)	0.0323 (0.1352)	0.0189 (0.0809)
commission income/assets	0.0170 (0.0312)	0.0102 (0.0257)	0.0103 (0.0188)	0.0164 (0.0333)	0.0118 (0.0099)	0.0097 (0.0104)	0.0118 (0.0397)	0.0057 (0.0200)
equity/assets	0.0879 (0.0899)	0.1040 (0.1069)	0.0732 (0.0647)	0.1329 (0.1416)	0.1399 (0.1386)	0.0842 (0.0869)	0.1506 (0.1810)	0.1708 (0.1345)
price of borrowed funds	0.0056 (0.0138)	0.0595 (0.0131)	0.0498 (0.0107)	0.0515 (0.0117)	0.0674 (0.0163)	0.0689 (0.0159)	0.0514 (0.0102)	0.0509 (0.6669)
price of labor (thousands of 1997 home currency)	61.8500 (7.4410)	65.8220 (4.1122)	110.7222 (19.8552)	133.8141 (15.7091)	17.7960 (3.2683)	16.7892 (3.3591)	31.1824 (9.6702)	36.7001 (6.2216)
total assets (millions of 1997 home currency)	8126.00 (32727.00)	1435.67 (2533.53)	16970.70 (65489.12)	3106.06 (6580.76)	5824.16 (14121.72)	1741.76 (1683.17)	6181.40 (16023.29)	2730.37 (6095.86)
number of banks	158	57	121	85	60	16	26	31
number of observations	867	312	642	439	329	83	231	238

Notes: Data from Fitch-IBCA. The costs, profits, variable outputs, fixed outputs, and fixed inputs were scaled by gross total assets in the table, but not in the regressions. For Spain, price of labor equals salaries and benefits/total assets. For U.K., costs are included only for 57 banks.

Table 5.3 – Cross-Border Alternative Profit Efficiency

Home country:	France	Germany	Spain	UK	US
All domestic banks	0.4459 158 0.0214	0.5404 121 0.0231	0.6596 60 0.0232	0.6833 63 0.0270	0.673 1940 0.0034
All foreign banks	0.4308 57 0.0279	0.4946 85 0.0240	0.7138 16 0.0340	0.6373 61 0.0273	0.418## 43 0.0411
all other EU banks	0.4082 34 0.0327	0.4545 23 0.0446	0.7465* 11 0.0395	0.6627 9 0.0948	0.628 6 0.0675
Belgium banks	0.2619## 6 0.0505	--	--	--	--
Canada banks	--	--	--	--	0.532## 11 0.0347
France banks	--	0.5539 5 0.0847	0.7699** 6 0.0399	--	--
Germany banks	0.4866 6 0.0811	--	--	--	--
Italy banks	0.6178** 10 0.0674	0.4517 4 0.1706	--	--	--
Japan banks	--	0.4591 17 0.0487	--	0.6406 10 0.0462	0.258## 14 0.069
Luxembourg banks	--	--	--	0.5669 3 0.0861	--
Netherlands banks	0.3884 5 0.0720	0.3571## 5 0.0789	--	--	0.628 3 0.1396
South Korea banks	--	--	--	--	0.257## 4 0.1477
Switzerland banks	0.6059 3 0.2066	0.4196## 7 0.0569	--	0.648 5 0.1111	--
UK banks	--	0.3368## 4 0.0772	--	--	--
US banks	0.6485* 6 0.1230	0.5845 17 0.0536	0.7243 3 0.0469	0.5801 12 0.0679	--

Each cell contains: mean efficiency, number of banks, standard error. Superscripts ** and * (or ## and #) indicate cell mean is significantly higher (or lower) than domestic mean at 5 and 10 percent levels.

Table 5.4 – Cross-Border Cost Efficiency

Home country:	France	Germany	Spain	UK	US
All domestic banks	0.7122 158 0.0126	0.7966 121 0.0099	0.9195 60 0.0062	0.8061 26 0.0158	0.773 1940 0.0019
All foreign banks	0.6995 57 0.0211	0.7889 85 0.0120	0.899 16 0.0128	0.7792 31 0.0234	0.801** 43 0.0141
all other EU banks	0.7189 34 0.0274	0.7648 23 0.0197	0.9088 11 0.0139	0.75 5 0.0709	0.855** 6 0.0381
Belgium banks	0.675 6 0.0563	--	--	--	--
Canada banks	--	--	--	--	0.833** 11 0.0189
France banks	--	0.7453 5 0.0604	0.8979 6 0.0176	--	--
Germany banks	0.7294 6 0.0576	--	--	--	--
Italy banks	0.6566 10 0.0493	0.7847 4 0.0220	--	--	--
Japan banks	--	0.8195 17 0.0297	--	0.7939 5 0.0483	0.754 14 0.0246
Luxembourg banks	--	--	--	--	--
Netherlands banks	0.9117** 5 0.0476	0.8172 5 0.0463	--	--	0.867 3 0.0729
South Korea banks	--	--	--	--	0.866** 4 0.0431
Switzerland banks	0.7517 3 0.1327	0.7576 7 0.0257	--	--	--
UK banks	--	0.7177# 4 0.0454	--	--	--
US banks	0.7169 6 0.0752	0.768 17 0.0276	0.8598 3 0.0450	0.7769 6 0.0598	--

Each cell contains: mean efficiency, number of banks, standard error. Superscripts ** and * (or ## and #) indicate cell mean is significantly higher (or lower) than domestic mean at 5 and 10 percent levels.

Table 5.5 – Cross-Regional Cost and Profit Efficiency, Domestic U.S. Banks

	cost efficiency	alternative profit efficiency
Banks in same region as its headquarters	0.767 1883 0.0019	0.672 1883 0.0033
Banks in different region than its headquarters	0.798 ** 57 0.0154	0.695 57 0.0303

The cells contain: mean efficiency, number of observations, standard error of the subsample mean. ** and * indicate that cell mean is significantly higher than the cell in top row at the 5% and 10% levels. ## and # indicate that cell mean is significantly lower than the cell in top row at the 5% and 10% levels.

Table 5.6 -- Regional Analysis of Domestic vs. Foreign U.S. Bank Efficiency

A. Alternative Profit Efficiency								
Bank's Location:	New Eng.	Mideast	Great Lakes	Plains	Southeast	Southwest	Rocky Mt.	Far West
Domestic banks	0.612 64 0.0206	0.614 269 0.0099	0.645 437 0.0058	0.667 264 0.0080	0.701 505 0.0058	0.746 205 0.0101	0.800 57 0.0183	0.647 139 0.0137
Foreign banks	--	0.221 ## 17 0.0622	0.554 ## 13 0.0416	--	0.859 ** 2 0.0572	--	--	0.481 ## 11 0.0598

B. Cost Efficiency								
Bank's Location:	New Eng.	Mideast	Great Lakes	Plains	Southeast	Southwest	Rocky Mt.	Far West
Domestic banks	0.798 64 0.0111	0.779 269 0.0053	0.785 437 0.0039	0.780 264 0.0049	0.765 505 0.0034	0.749 205 0.0055	0.792 57 0.0132	0.748 139 0.0081
Foreign banks	--	0.808 17 0.0277	0.828 ** 13 0.0172	--	0.738 2 0.0550	--	--	0.770 11 0.0248

The cells contain: mean efficiency, number of observations, standard error of the subsample mean.

U.S. Bureau of Economic Analysis (BEA) Regional Definitions:

New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont); Mideast (Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania); Great Lakes (Illinois, Indiana, Michigan, Ohio, Wisconsin); Plains (Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota); Southeast (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia); Southwest (Arizona, New Mexico, Oklahoma, Texas); Rocky Mountain (Colorado, Idaho, Montana, Utah, Utah); Far West (Alaska, California, Hawaii, Nevada, Oregon, Washington).

** and * indicate that cell mean is significantly higher than the cell in top row at the 5% and 10% levels.

and # indicate that cell mean is significantly lower than the cell in top row at the 5% and 10% levels.

Table A1.1 The Structure of Banking Markets in the Group of Ten Countries.

Panel A. Number of credit institutions, market share of the five largest institutions, and the number and market share of the branches and subsidiaries of foreign banks.

	Total number of credit institutions		Percent change	The market share of the five largest institutions in total assets		Market shares of the branches and subsidiaries of foreign banks		
	1990	1997	1990-97	1990	1997	Number	Asset share, 1995 (%)	Asset share, 1997 (%)
Belgium	122	136	11.48	48	57	71	28.4	36.3
Canada	2,920	2,413	-17.36	55	78	n.a.	n.a.	n.a.
France	779	519	-33.38	52	57	305	12.2	12.2 ^c
Germany	4,594	3,409	-25.79	13.9	16.1	153	4.2	4.3
Italy	1,065	937	-12.02	24	25	61	5.4	6.8
Japan ^a	6,279	4,266	-32.06	30	31	142	2.1	4.9
Netherlands	153	127	-16.99	73	79	49	9.7	7.7
Sweden	138	125	-9.42	70	90	18	9.8	1.6
Switzerland	458	362	-20.96	45	49	18	11.8	n.a.
U.K.	637	553	-13.19	22	28	387	51.6	52.1
U.S. ^b	31,842	22,331	-29.87	9	17	460	21.7	20.7

Panel B. Number of branches of credit institutions and number of inhabitants per institution and branch.

	Branches			Number of inhabitants per institution			Number of inhabitants per branch		
	Number	Number	Percent Change	Number	Number	Percent Change	Number	Number	Percent Change
	1990	1997	1990-97	1990	1997	1990-97	1990	1997	1990-97
Belgium	13,452	9,041	-32.79	81,815	74,853	-8.51	742	1,126	51.75
Canada	13,269	13,642	2.81	9,188	12,598	37.11	2,022	2,228	10.19
France	42,536	46,639	9.65	72,677	113,102	55.62	1,331	1,259	-5.41
Germany	77,326	59,695	-22.80	17,354	24,083	38.78	1,031	1,375	33.37
Italy	32,162	39,936	24.17	54,056	61,366	13.52	1,790	1,440	-19.55
Japan	68,142	69,022	1.29	19,686	29,578	50.25	1,814	1,828	0.77
Netherlands	8,161	7,071	-13.36	98,092	123,261	25.66	1,839	2,214	20.39
Sweden	5,136	3,624	-29.44	62,227	70,800	13.78	1,672	2,442	46.05
Switzerland	8,021	6,995	-12.79	14,746	19,604	32.94	842	1,015	20.55
U.K.	41,431	35,234	-14.96	90,082	106,691	18.44	1,385	1,675	20.94
U.S.	107,703	73,538	-31.72	7,881	11,997	52.23	2,330	3,643	56.35

^a The total banking assets are calculated as the sum of the banking and trust assets of domestically chartered banks and foreign banks, and excludes the assets of credit cooperatives and other financial intermediaries.

^b Does not include the agencies or representative offices of foreign banks. The numbers inclusive of these offices are 864 in 1996 and 828 in 1997.

^c For 1995. Source: De Bandt (1999).

Sources: **Number of credit institutions and branches:** Bank for International Settlements, *Statistics on the Payments Systems in the Group of Ten Countries*. **Market share of the five largest institutions:** For Germany, Portugal, and the U.K., De Bandt (1999); for the remainder, Bank for International Settlements, *International Banking and Financial Market Developments*, August 1999. **Branches and subsidiaries of foreign banks:** Sources: For Europe excluding Switzerland, ECB (1999); for Switzerland, Bank for International Settlements, *Statistics on the Payments Systems in the Group of Ten Countries*, 1995 and 1998; for Japan, Bank of Japan, *Economic Statistics Monthly*, October 1997 and March 1999 issues; for the U.S., the Board of Governors of the Federal Reserve System, *Structure and Share Data for U.S. Offices of Foreign Banks*.

Table A1.2 Credit Markets in France, 1998

	Institutions	Share (%)		Total assets in billions of FFr	Share (%)
Banks	359	29.67		9,952.0	48.58
Domestic	172	14.21		n.a.	n.a.
Majority foreign-owned banks	98	8.10		n.a.	n.a.
Branches of foreign banks	89	7.36		n.a.	n.a.
Mutual and cooperative banks	124	10.25		3,240.0	15.82
Savings and provincial institutions	34	2.81		3,988.5	19.47
Financial companies	646	53.39		1,996.4	9.75
Specialized financial institutions	26	2.15		1,172.9	5.73
Municipal credit banks	21	1.74		n.a.	n.a.
Total	1,210	100.00		20,484.1	100.00

Source: Banque de France, *Annual Report* (Annual Report to the President of the Republic and Parliament by Governor Jean-Claude Trichet), 1996 and 1998; and Banque de France, *Bulletin de la Banque de France, Supplément Statistiques*, 2^e trimestre 1997 and 4^e trimestre 1998. Note: n.a. indicates not available.

Table A1.3 Credit Markets in Germany, 1998

Banking group	Number	Branch offices	Foreign Branches	Foreign subsidiaries	Total assets (billion DM)	Share of business volume, 1997 (%) ^c
Commercial banks	325	6,833	197	229	3,337	24.8
Large banks	4	4,353	148	183	1,729 ^a	9.8
Regional banks and others	187	2,179	49	46	1,355	12.7
Branches of foreign banks	84	75	n.a.	n.a.	196	1.7
Private banks	50	226	n.a.	n.a.	n.a.	0.6
Savings banks	594	18,327	3	1	1,780	18.6
Regional giro institutions	13	443	43	45	1,838	18.3
Cooperatives	2,249	16,139	9	2	1,017	10.7
Cooperative central institutions	4	26	9	16	394	3.8
Special purpose credit institutions	221	18,175	n.a.	n.a.	n.a.	9.4
Memo:						
Majority foreign-owned banks ^b	69	630	n.a.	n.a.	441	2.7

^a Total assets were available only for the "Big Three."

^b Majority foreign-owned banks that are classified in the categories "regional banks and other commercial banks," "private banker," and "mortgage banks."

^c Business volume is the sum of balance sheet total plus endorsement liabilities arising from rediscounted bills and bills sent for collection from the banks' portfolio prior to maturity.

Sources: Data provided by Juergen Weigand, Indiana University and supplemented with data from Deutsche Bundesbank, *Statistisches Beiheft zum Monatsbericht 1, Bankenstatistik*, September 1999; Bauer and Domanski, (1999).

Note: n.a. indicates not available.

A1.4 Credit Markets in Italy, 1997

	Number of Banks	Number of Branches	
		in Italy	Abroad
Limited company banks accepting short-term funds	190	18,026	93
Limited company banks accepting medium and long-term funds	32	98	--
Cooperative banks	69	4,357	9
Mutual banks	586	2,659	--
Central credit and refinancing institutions	6	28	--
Branches of foreign banks	55	82	--
Total	935	25,250	102

Source: Bank of Italy. *Annual Report for 1997*.

Table A1.5 Credit Markets in Japan, March 1998

	Institutions	Branches	Total assets (billions of yen)	Market share (%)
Domestically licensed banks ^a	174	16,380	886,619.0	66.67
City banks	10	3,348	457,340.8	34.39
Regional banks	64	7,902	200,288.9	15.06
Second Tier Regional banks	64	4,675	69,867.1	5.25
Trust banks	33	385	73,113.6	5.50
Long-term credit banks	3	70	85,962.8	6.46
Foreign banks	93	144	60,285.5	4.53
Financial institutions for small businesses ^b	752	12,301	188,931.5	14.21
Financial institutions for Agriculture, Forestry, and Fishery ^c	2,796	16,172	194,082.0	14.59
Government Financial Institutions	2	211	n.a.	n.a.
Post office	1	24,638	n.a.	n.a.
Total	3,992	86,226	1,329,918.0	100.00

^a Assets in the banking accounts only, including the assets of overseas branches of domestic banks.

^b Includes Shinkin banks, the Zenshinren Bank, the Shoko Chukin Bank, credit cooperatives, the Shinkumi Federation Bank, Labor Credit Associations, and the National Federation of Labor Credit Associations.

^c Includes the Norinchukin Bank, agricultural cooperatives, Credit Federations of Agricultural Cooperatives, fishery cooperatives, Credit Federations of Fishery Cooperatives, and Mutual Insurance Federations of Agricultural Cooperatives.

Source: Bank of Japan, *Economic Statistics Monthly* March 1999 No. 624. Note: n.a. indicates not available.

Table A1.6 Credit Markets in Spain, 1996

	Number of institutions	Number of branches	Total assets (millions of pesetas)	Market share (%)
Commercial banks	107	17,863	42,306	57.11
Savings banks	50	15,863	27,837	37.58
Credit cooperatives	97	3,289	2,560	3.46
Foreign banks	56	134	1,377	1.86
Total	310	36,809	74,080	100.00

Source: Data provided by Ana Lozano-Vivas, Universidad de Malaga, Spain.

Table A1.7A Credit Markets in the U.K.

	Number of banks, 1997
UK incorporated	212
Incorporated outside the UK	342
Total	554
Representative offices(2)	215
Foreign banks in UK [(1)+(2)]	557

Table A1.7B Share of banking assets by bank type, 1996

UK Banks		Foreign banks	
Retail	37.9	USA	8.2
Investment	2.2	Japan	9.7
Other	3.4	Other	38.6
Total UK banks	43.5	Total Foreign banks	56.5

Source: Bowen, Hoggarth, and Pain (1999).

Table A1.8 Credit Markets in the U.S., 1998

	Number of institutions			Total Domestic Assets (billions of USD)		
	Domestically Owned	Foreign Owned	Total ^a	Domestically Owned	Foreign Owned	Total ^a
Insured commercial banks ^b	35,002	384	71.11	26,486	2,052	88.82
Savings and loans and insured savings banks ^b	3,112	11	6.28	2,959	51	9.37
Federally insured credit unions	11,023	0	22.15	395	0	1.23
Other banks ^c	227	1	0.46	188	0	0.59
Total	49,364	396	100.00	30,028	2,103	100.00

^a Sum of domestically and foreign-owned.

^b At the end of 1998, insured commercial banks had 132,688 branches and savings institutions had 14,138 branches.

^c Cooperative banks, industrial banks, and nonbank banks.

Source: Federal Reserve System, National Information Center.

Table A1.9 Commercial banks in France, 1991-1997

	Domestic banks	Foreign banks				
		Total	U.S.	Japanese	European	All other
Number of banks	198	67	10	2	41	14
Number of observations	982	352	43	9	212	88
Total assets (in billions of 1982 dollars)	5.37	1.01##	1.39##	0.16##	1.24##	0.35##
As a percentage of total assets						
Gross loans	51.11	41.38##	24.81##	18.17##	46.12##	40.44##
Net loans	51.04	41.19##	24.79##	18.17##	46.00##	39.97##
Securities	42.09	53.15**	65.19**	76.18**	48.69**	55.64**
Equity Securities	1.91	1.08##	2.16	0.03##	1.17##	0.43##
Cash	0.60	0.49	0.09##	0.00##	0.32##	1.15##
Fixed assets	0.98	1.32**	1.07	0.87	1.41**	1.27
Other assets	5.31	3.85##	8.86	4.77	3.58##	1.97##
Total deposits	76.34	78.01	63.33##	57.65#	82.09**	77.43
Demand deposits	16.53	10.09##	3.07##	0.00##	12.23##	9.38##
Time deposits	6.84	2.14##	0.07##	0.00##	2.78##	1.82##
Savings deposits	26.08	25.54	20.72	0.13##	29.68**	20.51##
Other deposits	26.89	40.25**	39.48**	57.52**	37.41**	45.72**
Other debt	13.82	10.95##	16.89	18.89	10.01##	9.47##
Loan loss reserves	0.12	0.50**	0.04##	0.00##	0.24	1.41**
Equity capital	9.68	10.54	19.72**	23.46*	7.66##	11.69**
Net interest income	3.03	2.75#	3.27	1.69#	2.23##	3.86**
Net commission income	1.38	0.71##	1.33	0.94	0.74##	0.31##
Operating profits before provisions	1.38	0.94##	2.06*	0.57#	0.43##	1.68
Loan loss provisions	1.08	1.52*	0.27##	-0.00##	1.75*	1.75*
Operating profits	0.30	-0.58##	1.78**	0.57	-1.32##	-0.07
Salary expense	1.82	1.58##	1.25##	1.07##	1.76	1.59##
ROA	0.22	-0.03##	1.27**	0.06	-0.38##	0.18
<i>Memo:</i>						
ROE (%)	-3.47	-5.64	7.67**	1.56*	-11.85##	2.08**

“***” and “**” (or “##” and “#”) indicate significantly higher (lower) values for foreign banks than domestic banks at the 5% and 10% levels.

The numerator for ROA and ROE is after-tax net income, which equals operating profits plus net special income minus taxes.

Source: FitchIBCA's Bankscope database, February 1999.

Table A1.10 Commercial Banks in Germany, 1991-1997

	Domestic banks	Foreign banks				
		Total	U.S.	Japanese	European	All other
Number of banks	116	84	14	19	30	21
Number of observations	322	308	44	72	124	68
Total assets (in billions of 1982 dollars)	4.84	1.52#	3.53	0.73##	1.84#	0.46##
As a percentage of total assets						
Gross loans	52.50	31.32##	29.63##	17.44##	42.45##	26.80##
Securities	43.86	64.90**	61.92**	81.08**	53.65**	70.21**
Equity Securities	1.24	0.44##	0.38##	0.88	0.32##	0.25##
Cash	1.82	1.34##	0.58##	0.22##	2.16	1.53
Fixed assets	0.92	0.69##	0.63	0.42##	0.67##	1.04
Other assets	0.90	1.76**	7.24**	0.84	1.07	0.43##
Total deposits	80.58	79.76	78.35	65.09##	85.98**	84.88**
Demand deposits	10.31	8.37##	9.35	2.24##	12.45	6.80##
Time deposits	10.37	1.49##	0.79##	0.00##	2.55##	1.57##
Savings deposits	23.41	15.98##	19.38	7.64##	18.94##	17.20##
Other deposits	36.49	53.92**	48.82**	55.20**	52.04**	59.30**
Other debt	3.55	1.07##	0.76##	1.09##	1.24##	0.94##
Equity capital	11.81	15.12**	9.83	31.88**	8.42##	13.00
Net interest income	2.58	2.10##	2.14	2.22	2.05##	2.02##
Net commission income	0.66	1.32**	1.26	1.68**	1.36**	0.89**
Operating profits before provisions	0.77	0.76	0.63	0.88	0.59	1.05
Loan loss provisions	0.46	0.30#	0.46	-0.09##	0.48	0.28
Operating profits	0.31	0.46	0.17	0.96**	0.11	0.77**
Salary expense	1.41	1.71**	1.96	1.63	1.95**	1.20##
ROA	0.20	0.17	0.08##	0.32*	0.07##	0.27
<i>Memo:</i>						
ROE (%)	1.91	1.17##	1.01##	1.12##	0.82##	1.98

“***” and “**” (or “##” and “#”) indicate significantly higher (lower) values for foreign banks than domestic banks at the 5% and 10% levels.

The numerator for ROA and ROE is after-tax net income, which equals operating profits plus net special income minus taxes.

Source: FitchIBCA's Bankscope database, February 1999.

Table A1.11 Commercial banks in Spain, 1991-1997

	Domestic banks	Foreign Banks		
		Total ^a	U.S.	European
Number of banks	66	18	3	14
Number of observations	402	92	13	72
Total assets (in billions of 1982 dollars)	4.13	1.28##	1.30##	0.96##
As a percentage of total assets				
Gross loans	40.39	50.69**	57.16**	50.45**
Net loans	39.99	50.44**	57.01**	50.18**
Securities	50.76	42.49##	32.67##	43.32##
Equity Securities	2.85	0.68##	1.25##	0.55##
Cash	3.56	2.24##	1.40##	2.32#
Fixed assets	2.74	2.25##	2.79	2.14##
Other assets	2.95	2.58	6.13**	2.04##
Total deposits	76.24	88.09**	83.17**	88.75**
Demand deposits	8.66	8.34	4.35	9.19
Time deposits	15.41	15.06	4.69##	16.40
Savings deposits	2.13	0.43##	0.09##	0.49##
Other deposits	50.04	64.27**	74.04**	62.67**
Other debt	4.33	3.62#	6.86*	3.05##
Loan loss reserves	0.40	0.25##	0.15##	0.27
Equity capital	18.06	7.42##	8.67##	7.40##
Net interest income	3.81	2.67##	2.26##	2.77##
Net commission income	0.83	0.83	1.19	0.76
Operating profits before provisions	1.90	0.78##	0.46##	0.82##
Loan loss provisions	0.42	0.34	0.25	0.34
Operating profits	1.48	0.44##	0.21##	0.48##
Salary expense	1.63	1.70	1.89	1.66
ROA	1.14	0.37##	0.28	0.37##
<i>Memo:</i>				
ROE (%)	8.65	2.24##	-0.96##	2.15##

^a The total number of banks includes the American and European banks in the last two columns of the table plus one Arab bank.

“***” and “**” (or “##” and “#”) indicate significantly higher (lower) values for foreign banks than domestic banks at the 5% and 10% levels.

The numerator for ROA and ROE is after-tax net income, which equals operating profits plus net special income minus taxes.

Source: FitchIBCA's Bankscope database, February 1999.

Table A1.12 Commercial banks in Great Britain, 1991-1997

	Domestic banks	Foreign Banks				
		Total	U.S.	Japanese	European	All other
Number of banks	34	36	6	7	4	19
Number of observations	140	153	24	19	30	80
Total assets (in billions of 1982 dollars)	8.21	3.12##	12.73	1.50##	0.20##	0.90##
As a percentage of total assets						
Gross loans	44.15	27.47##	30.57##	9.90##	28.61##	30.29##
Net loans	42.81	26.51##	30.12##	9.75##	27.39##	29.07##
Securities	53.18	61.84**	51.16	66.52**	61.07**	64.21**
Equity Securities	0.99	1.89	3.83	3.28	4.01	0.17##
Cash	2.56	2.54	1.99	1.09	1.66	3.37
Fixed assets	0.82	0.85	0.51#	0.22##	0.81	1.12
Other assets	3.29	8.27**	16.21**	22.42**	9.07**	2.23##
Total deposits	79.37	66.98##	54.77##	45.16##	71.29#	74.21##
Demand deposits	22.73	6.44##	2.19##	1.70##	7.04##	8.63##
Other deposits	24.81	37.09**	47.06**	39.97**	30.38	35.93**
Other debt	11.46	22.52**	44.32**	63.67**	16.37	8.52##
Loan loss reserves	0.22	0.02	0.00	0.00	0.00	0.03
Equity capital	12.47	15.57**	7.58##	9.05##	14.82	19.80**
Net interest income	2.26	1.33##	0.82##	0.54##	1.33##	1.66##
Net commission income	0.80	0.41##	0.84	0.02##	0.56#	0.33##
Operating profits before provisions	1.00	0.59##	0.73	0.08##	0.75	0.61##
Loan loss provisions	0.44	0.14##	0.01##	0.01##	0.14##	0.20#
Operating profits	1.39	0.71##	0.80##	-0.23##	0.99	0.82##
Salary expense	0.82	0.87	0.78	0.24##	1.46	0.82
ROA	1.09	0.56##	0.60##	-0.16##	0.68#	0.67##
<i>Memo:</i>						
ROE (%)	12.83	5.32##	10.17	-1.32##	5.39##	5.41##

“**” and “*” (or “##” and “#”) indicate significantly higher (lower) values for foreign banks than domestic banks at the 5% and 10% levels.

The numerator for ROA and ROE is after-tax net income, which equals operating profits plus net special income minus taxes.

Source: FitchIBCA's Bankscope database, February 1999.

Table A1.13 Large Commercial banks in the U.S., 1993-1998

	Domestic banks	Foreign banks			
		Total	Japanese	European	All other
Number of banks	1,940	43	14	9	20
Number of observations	11,640	258	84	54	120
Mean of gross total assets (in billions of 1982 dollars)	0.79	2.77**	2.54**	7.66**	0.73
As a percentage of total assets					
Gross loans	58.66	56.35##	56.83	50.48##	58.64
Net loans	57.74	55.20##	55.41	49.46##	57.64
Securities	27.27	26.20	24.08#	29.97	25.98
Equity Securities	0.16	0.15	0.14	0.30	0.09##
Cash	4.83	9.09**	13.02**	9.75**	6.05**
Fixed assets	1.69	1.54	0.53##	0.81##	2.59**
Other assets	7.40	6.68	5.40#	8.69	6.66
Total deposits	83.49	74.20##	57.57##	74.51##	85.70**
Demand deposits (domestic only)	24.62	19.82##	13.71##	17.06##	25.34
Time and Savings deposits	52.89	36.66##	20.48##	37.81##	47.47##
Other deposits	5.97	17.72**	23.38**	19.64**	12.89**
Other debt	6.29	14.20**	26.06**	17.07**	4.61##
Loan loss reserves	0.92	1.14**	1.42**	1.02	1.00*
Equity capital	9.29	10.46**	14.94**	7.40##	8.69##
Net interest income	4.07	3.14##	2.44##	2.90##	3.73##
Other fee income	0.34	0.34	0.34	0.31	0.36
Operating profits before provisions	2.00	1.56##	1.72##	1.54##	1.45##
Loan loss provisions	0.24	0.33*	0.21	0.22	0.45**
Operating profits	1.76	1.23##	1.51#	1.32##	1.00##
Salary expense	1.54	1.43##	1.22##	1.19##	1.68**
ROA	1.23	0.79##	0.90##	0.93##	0.64##
<i>Memo:</i>					
ROE (%)	13.57	8.86##	6.33##	13.01	8.77##

“**” and “*” (or “##” and “#”) indicate significantly higher (lower) values for foreign banks than domestic banks at the 5% and 10% levels.

The numerator for ROA and ROE is after-tax net income, which equals operating profits plus net special income minus taxes. Large is defined as over \$100 million in gross total assets (real 1998 dollars) in each of the six years.

Source: U.S. Call Reports and National Information Center (NIC).

Endnotes

¹ These graphs were constructed from Securities Data Company's database on Worldwide Mergers and Acquisitions, which records all public and private corporate transactions valued at \$1 million or more that involved at least 5% of the ownership of a company. These figures will not exactly match those reported in other sources. For example, small banks are seldom publicly traded, most securities firms are partnerships, and many insurance firms are mutually owned by policyholders. While this is an incomplete reckoning of all M&As, it does capture the majority of total M&A value.

² About three-quarters of the value of the intra-EU acquisitions shown in Figure 2.2 was generated by 'truly' domestic M&As (i.e., both target firm and acquiring firm were from the same EU member nation), indicative of domestic market consolidation similar to, but occurring later than, the domestic consolidation in the U.S. However, the truly domestic M&As have declined as a fraction of total EU merger activity since the mid-1990s.

³ It is also sometimes argued that scale efficiency gains from consolidation will be most prevalent when the combining institutions have substantial local market overlap, allowing for the closing of retail branch offices and consolidation of back-office operations. However, studies of the scale efficiency effects of bank in-market M&As and research on branch office scale efficiency suggested little or no gain from this source (Berger and Humphrey 1992b, Rhoades 1993, Akhavein, Berger, and Humphrey 1997, Berger, Leusner, and Mingo 1997, Berger 1998).

⁴ Unlike conventional private placements 144A private placements can be traded and underwritten on a firm commitment basis. A "bought deal" occurs when an investment bank commits in a firm commitment underwriting before syndicating the risk.

⁵ Of course, some combinations of financial institutions can worsen risk-expected return tradeoffs. For example, a commercial bank may be more likely to fail and/or have higher bankruptcy costs in the event of failure if it is combined with another type of financial institution with lower expected return or higher variance of returns that are highly correlated with those of the bank.

⁶ Consistent with this, Sullivan and Spong (1998) found evidence that owner/managers of small banks that have a substantial portion of their wealth invested in their banks tend to pursue safer strategies,

⁷ Institutions may also achieve risk diversification through cross-border lending or investments, or through a secondary market in financial instruments. They may buy loans, (non-asset backed or original or primary) securities or asset-backed securities issued in other countries, or engage in derivative contracts with foreign institutions.

⁸ M&As that diversify the institution may also improve X-efficiency in the long term through expanding the skill set of managers (Milbourn, Boot, and Thakor 1999).

⁹ Some efficiency analyses using linear programming techniques such as data envelopment analysis do not use prices and so do not calculate costs or profits. Instead of using cost or profit X-efficiency, they focus on minimizing inputs for given outputs or maximizing outputs for given inputs, but the concepts are similar.

¹⁰ Consistent with this conclusion, one study found a positive external effect of consolidation following interstate banking deregulation. Out-of-state entry was associated with increased cost X-efficiency in the long term (DeYoung, Hasan, Kirchhoff 1998).

¹¹ Regarding restrictions on nationwide interstate banking, the Riegle-Neal Act caps the total bank and thrift deposits that any organization may reach by M&A to 30% in a single state and 10% nationally.

¹² The effects of monetary union on financial institutions and capital markets has been examined extensively elsewhere (e.g., Dermine 1998, 1999a-c, De Bandt 1998, De Bandt and Davis 1998, Morgan Stanley Dean Witter 1998, McCauley and White 1998, White 1998, Dermine and Hillion 1999, ECB 1999, Hurst and Wagenvoort 1999, Merrill Lynch & Co., Inc. 1999).

¹³ Research evidence supports the notion that banks use relationships to garner information about small businesses and that small businesses benefit from these relationships. Although some of the evidence suggests exceptions, small businesses with stronger banking relationships have generally been found to receive loans with lower rates and fewer collateral requirements, be less dependent on trade credit, enjoy greater credit availability, and have more protection against the interest rate cycle than other small businesses (e.g., Lang and Nakamura 1989, Hoshi, Kashyap, and Sharfstein 1990, Petersen and Rajan 1994, 1995, Berger and Udell 1995, Blackwell and Winters 1997, Angelini, Di Salvo, and Ferri 1998, Berlin and Mester 1998, Cole 1998, Elsas and Krahnen 1998, Harhoff and Körting 1998, Hubbard, Kuttner, and Palia 1999, Ongena and Smith 1999). The data also suggest that banks gather valuable private information from depositors and in some cases use this information in credit decisions (Allen, Saunders, and Udell 1991, Nakamura 1993, Frieder and Sherrill 1997, Mester, Nakamura, and Renault 1998). For a detailed review of the relationship literature, see Berger and Udell (1998).

¹⁴ Tables 4.1 and 4.2 give only a rough indication of this tradeoff. Specifically, in Table 2.1 the size of the stock market itself is not as important as the ownership of stock. In addition, it does not account for double counting such as in Germany and Japan where banks own a significant fraction of stocks. The ideal would be a breakdown of external finance (both private and public debt and equity) in terms of whether they were passively owned or actively owned. This would take into account the strong individual ownership of equity in the U.S. and the proxy ownership of equity in Germany by banks. Data limitations, however, prevented such an analysis. The closest to this type of breakdown was a study that estimated this for just the equity side (Prowse 1995). That study also showed that the U.K. was similar to the U.S. in terms of being skewed toward individually-owned and passively-owned equity.

¹⁵ Note that systemic risk and safety net consequences of cross-border consolidation, which may have important macroeconomic consequences, are covered earlier in subsection 4.3.1.

¹⁶ See Kashyap and Stein (1997a) for a more detailed summary of the bank lending view and a survey of the empirical literature.

¹⁷ Under an alternative credit channel mechanism, the "balance sheet channel" or "financial accelerator," the tightening of monetary policy works in part because the associated higher interest rates impair collateral values or otherwise reduce the net worth of certain borrowers, diminishing their ability to obtain funds. This channel differs from the bank lending channel in that it implies a reduction in the demand for credit, rather than a reduction in the supply of credit in response to monetary policy tightening (Bernanke and Gertler 1995, Bernanke, Gertler, and Gilchrist 1996).

¹⁸ Alternative profit efficiency generally yields similar findings to standard profit efficiency, which specifies output prices rather than quantities in the profit function (Berger and Mester 1997). Standard profit efficiency is more problematic to estimate because output prices have to be approximated by balance sheet and income statement ratios. In addition, by controlling for output prices, standard profit efficiency may not account as well for advantages that cross-regional organizations may have in terms of risk diversification and enhanced service quality/variety.

¹⁹ Our findings for the U.S. differ notably from prior efficiency studies of foreign banks in the U.S. banks. As reviewed in Section 3 above, a number of studies using 1980s data found relatively low cost efficiency and/or relatively low profit efficiency for foreign banks operating in the U.S. Our results suggest that foreign-owned banks in the U.S. have improved their cost efficiency over the past decade, but that their profit efficiency has continued to lag, possibly due in part to turnover of these institutions. Since the 1980s, foreign banks from some countries (e.g., Japan) have reduced their U.S. presence, while foreign banks from other countries (e.g., the Netherlands) have increased their U.S. presence. Thus, while domestic U.S. banks appear to continue to be more efficient than foreign-owned banks, the underlying characteristics of this difference may have changed.

²⁰ This result may be stronger than it at first appears, because the extra operational costs of a multibank holding company (a required organizational structure for interstate banks during most of our sample period) biases against finding cross-regional efficiency.

²¹ Other studies provide more detailed descriptions of credit markets in these and other countries. Berger, Kashyap, and Scalise (1995) discussed the U.S. market. The French market was discussed by Beduc, Ducruezet, and Stephanopoli (1992), de Boissieu (1990), Matherat and Cayssials (1999), and Pfister and Grunspan (1999). Bauer and Domanski (1999) and Pozdena and Alexander (1992) covered the German system. The Italian system was discussed in Bruni (1990), Fazio (1999a and 1999b), and Szego and Szego (1992). The Japanese market was covered by Cargill and Royama (1992), Genay (1998), Hoshi and Kashyap (1999), and Toyama (1999). The Spanish market was discussed by Caminal, Gual, and Vives (1990), Pastor (1993), and Fuentes and Sastre (1999). Birchler and Rich (1992) and Braun, Egli, Fischer, Rime and Walter (1999) discussed the Swiss market. The U.K. market was discussed in Bowen, Hoggarth, and Pain (1999) and Llewellyn (1992).

²² In some countries, such as France and Italy, the restructuring has also involved significant decreases in the role of the state in the banking industry. For instance, in France, the number of public institutions has declined from 92 in 1984 to 23 in 1997 (Matherat and Cayssials, 1999). In Italy, the share of total banking assets held by banks in which the state has a majority control has declined from 68% in 1992 to 20% in 1998 (Fazio, 1999b).

²³ Another notable development in the U.K. markets has been the demutualization of building societies and the conversion of these societies into banks. Also, while the number of domestic institutions declined over 1990-1997, there was a significant increase in the number of foreign banks operating in the U.K. (Bowen, Hoggarth, and Pain, 1999).

²⁴ The samples used to construct tables A1.9 through A1.13 differ from the samples used in our analysis in the paper. Although the data were obtained from the same raw data bases, the samples used in tables A1.9-A1.13 were filtered in the following fashion. To remove the impact of mergers, bank-year observations for which the annual growth in inflation-adjusted assets was more than 50% in absolute value were excluded. We also excluded banks which reported negative values of book-value capital, and banks in the lower and higher 1% of the distributions of ROA and ROE to remove the influence of these outliers on the mean values.

²⁵ The large size of foreign banks relative domestic banks in the U.S. may be due to our sampling methodology. Our definition of large banks in the U.S. (assets greater than \$100 million) is small by international standards.

To What Extent Will the Banking Industry be Globalized?
A Study of Bank Nationality and Reach in 20 European Nations

Allen N. Berger
Board of Governors of the Federal Reserve System
Washington, DC 20551 U.S.A.
Wharton Financial Institutions Center
Philadelphia, PA 19104 U.S.A.
aberger@frb.gov

Qinglei Dai
Norwegian School of Management BI
Sandvika, Norway
qinglei.dai@bi.no

Steven Ongena
Tilburg University
Tilburg, The Netherlands
steven.ongena@kub.nl

David C. Smith
Board of Governors of the Federal Reserve System
Washington, DC 20551 U.S.A.
dsmith@frb.gov

May 2002

The opinions expressed here do not necessarily reflect those of the Federal Reserve Board or its staff. For helpful suggestions, the authors thank Bob Avery, Mark Carey, Gayle DeLong, Bob DeYoung, Ralf Elsas, Charles Freedman, Ron Giammarino, Charles Goodhart, Leora Klapper, Myron Kwast, Loretta Mester, Dave Nickerson, Stephen Poloz, Alberto Pozzolo, John Rogers, Giorgio Szegö, Greg Udell, Wanda Wallace, Frank Warnock, Barry Williams, Craig Wright, and seminar participants at the Australasian Conference in Finance and Banking, the Conference on Framing Financial Structure in an Information Environment at Queen's University, the University of Lausanne Conference on the Regulation of Banking and Financial Markets, and the College of William and Mary, Federal Reserve Board, Indiana University, University of Frankfurt, University of Ghent, University of Mannheim, WHU Koblenz, and York University. Ongena thanks the Netherlands Organization for Scientific Research (NWO) for research support. David Birks made available the GlobalCash-Europe96 data and Nate Miller provided outstanding research assistance.

Please address correspondence to Allen N. Berger, Mail Stop 153, Federal Reserve Board, 20th and C Streets. NW, Washington, DC 20551, call 202-452-2903, fax 202-452-5295, or email aberger@frb.gov.

To What Extent Will the Banking Industry be Globalized?
A Study of Bank Nationality and Reach in 20 European Nations

Abstract

We model two dimensions of bank globalization – *bank nationality* (a bank from the firm's host nation, its home nation, or a third nation) and *bank reach* (a global, regional, or local bank) using a two-stage nested multinomial logit model. Our data set includes over 2,000 foreign affiliates of multinational corporations operating in 20 European nations. We find that these firms frequently use host nation banks for cash management services, and that bank reach may be strongly influenced by this choice of bank nationality. Our results suggest limits to the degree of future bank globalization.

JEL Classification Numbers: G21, G15, G28, G34

Keywords: Bank, Globalization, Europe, Mergers

To What Extent Will the Banking Industry be Globalized?

A Study of Bank Nationality and Reach in 20 European Nations

1. Introduction

Recent years have seen a drastic reduction in global barriers to competition in the financial services industry. Deregulation around the world has permitted consolidation across more distant and different types of financial institutions. Improvements in information processing, telecommunications, and financial technologies have facilitated greater geographic reach by allowing institutions to manage larger information flows from more locations and to evaluate and manage risks at lower cost without being geographically close to the customer. Moreover, growth in cross-border activities of nonfinancial companies has spurred greater demands for institutions that can provide financial services across borders.

Despite these forces, the financial services industry in general, and the commercial banking industry in particular, currently remain far from globalized. While there has been considerable bank consolidation within individual industrialized nations in recent years, cross-border bank mergers and acquisitions among these nations have generally been much less frequent (Group of Ten 2001). In most other nations as well, market shares of foreign-owned banks are generally below 10% (Levine 1996).

We argue here that the banking industry may never become fully globalized, even after adjusting to the full effects of deregulation, technological progress, and increased cross-border nonfinancial activity. Some banking services – such as relationship lending to informationally opaque small businesses – may always be provided primarily by small, local institutions headquartered in the nation in which the services are demanded. Other services, such as syndicated loans to large borrowers, are more likely to be provided by large, global institutions for which the home nations of these institutions are of much less consequence to the demanders of the services. In our view, the better question is not when or if the banking industry will be globalized, but rather *the extent to which* it will be globalized.

To address this question, we examine how more than 2,000 foreign affiliates of large multinational corporations choose a bank for cash management services in each of 20 European nations. The term *cash management* covers a variety of core banking services, with an emphasis on services that require frequent turnover, including liquidity management, short-term lending, foreign exchange transactions, and assistance with hedging. In effect, cash management refers to virtually all short-term banking needs, and likely requires a physical presence in the nation in which the services are provided.

The provision of cash management services to foreign affiliates of large multinational corporations

represents a crucial “middle ground” of financial services that could be provided by 1) small banks headquartered in the host nation, 2) global banks headquartered in a few financial centers, but with offices in many nations around the world, or 3) institutions between these two extremes. Moreover, because cash management services to foreign affiliates of large multinational corporations represent a significant portion of the potential market for global banks, they should be influential in determining the extent to which the banking industry will become globalized. To our knowledge, there is no prior research available on the choice of bank for cash management services by these firms.

Europe provides an excellent laboratory for studying the globalization of the banking industry. It has many developed nations that are geographically proximate, virtually no formal regulatory restrictions on cross-border bank entry within the EU, and many large banks. Moreover, substantial variation exists in banking sector size and financial development across European nations. Our sample includes information from nations with large banking sectors and relatively well-developed financial systems (e.g., the U.K. and Germany), nations with smaller banking sectors, but well-developed financial systems (e.g., Austria and Norway), countries with small banking sectors and less-developed financial systems (e.g., Portugal and Greece) and former socialist nations with developing financial systems (e.g., the Czech Republic and Hungary). This variation allows us to test for the effects of banking sector size, financial development, legal structure, and other factors that might influence the extent to which the banking industry becomes globalized.

We identify two distinct dimensions of globalization – bank nationality and bank reach. *Bank nationality* refers to the location of a bank’s headquarters relative to the host nation where the affiliate operates and the affiliate’s corporate home. A *host nation bank* is headquartered in the nation in which the affiliate operates, a *home nation bank* is headquartered in the same nation as the multinational corporation’s headquarters, and a *third nation bank* is headquartered in neither the host nor the home nation. A foreign affiliate of a multinational corporation may prefer a host nation bank for the “concierge” services that it can provide. That is, a host nation bank should best know the local market, culture, language, and regulatory conditions in the host nation, and have superior information about local nonfinancial suppliers and customers. An affiliate may instead prefer a home nation bank that can offer the “home cookin’” advantages of knowing the market, culture, language, and regulatory conditions of the affiliate’s home nation. A home nation bank may also be the bank that serves the headquarters of the corporation and therefore may have an informational advantage in providing services to the

firm and providing relationship benefits to the corporation as a whole. Alternatively, the firm may choose a third nation bank in circumstances in which neither the concierge benefits of a host nation bank nor the home cookin' benefits of a home nation bank is of great consequence.

Bank reach refers to the geographic scope and size of the chosen bank. A *global bank* operates in many nations and is among the world's largest institutions, a *local bank* operates in a single nation, and a *regional bank* lies between these extremes. Some firms operating in a foreign country may prefer a global bank that offers the broadest range of financial services, expertise within many foreign markets, and the ability to facilitate large deals. Global banks may also provide superior stability because of their risk diversification and/or implicit government protections against closure. Other firms may prefer a local bank that may be more focused on establishing a close relationship with the firm or may be better able to offer specific information about doing business in the local market. Still others may find that the tradeoff between services offered by global and local banks leads them to choose the intermediate reach of a regional bank.

We empirically investigate bank nationality and reach using a two-stage nested multinomial logit model. In the model, firms first choose bank nationality – a host nation bank if the concierge benefits dominate, a home nation bank if the home cookin' benefits dominate, and possibly a third nation bank if neither set of benefits is very important. We assume that this choice depends on host nation characteristics, geographic, cultural, and financial differences between the home and host nations, and attributes of the corporation itself. These variables are designed to reflect both the demand of the firms for cash management services from banks of different nationalities and the willingness and ability of these banks to supply the services. Conditional on bank nationality, firms then select bank reach based on preferences for the range of services, financial stability, relationship services, and local knowledge offered by global, regional, and local banks. We model this decision directly as a function of corporate attributes, but note that within the structural model, the choice also depends indirectly on host nation characteristics and home nation-host nation differences through the determination of bank nationality.

We maintain that bank nationality is of primary importance in the choice of banks by firms operating in foreign countries, and that the choice of bank nationality may have a significant influence on the degree of bank reach. The dependence of bank reach on the choice of bank nationality follows from the simple observation that banks can only expand across international borders to the extent that customers are willing to purchase services from foreign-owned banks. For instance, in an extreme case where all customers preferred host nation banks for

all services, banks might not cross any borders, and all services may be provided by local banks.

Our approach to examining the extent of bank globalization makes several contributions. First, to our knowledge, this is the first study to examine bank nationality and bank reach together and view these as joint determinants of bank globalization. Bank reach is usually viewed in isolation as measuring bank globalization, but we argue that bank nationality is also important. Second, we provide a set of stylized facts on the choice of bank for cash management services made by the foreign affiliates of large, multinational corporations. These services provided to these firms constitute a significant portion of the potential market for global banking services and lie in the crucial middle ground of financial services that could be provided by banks of virtually any nationality and reach. Third, we investigate some of the potential determinants of bank nationality and reach, including host nation characteristics, home-host nation differences, and attributes of the corporations themselves.

Our investigation yields a number of interesting findings, three of which we briefly preview here. First, we show that foreign affiliates of multinational companies choose host nation banks for cash management services more often than home nation or third nation banks. This result is consistent with concierge benefits dominating home cookin' benefits and may be surprising given that firms might be expected to prefer their home nation banks. Second, we find that bank reach is strongly associated with bank nationality. For example, if a host nation bank is the choice of nationality, then the firm is much less likely to choose a global bank. Third, we find that bank nationality and bank reach both vary significantly with the degree of legal and financial development. For example, firms appear to be much less likely to choose a host nation bank and more likely to choose a global bank when operating in the former socialist nations of Eastern Europe. Overall, our results suggest that the extent of future bank globalization may be significantly limited as many corporations continue to prefer local or regional banks for at least some of their services.

The rest of the paper proceeds as follows. Section 2 reviews previous research on bank nationality and reach. Sections 3 and 4 describe our data set and methodology, respectively. Section 5 presents the findings from our main empirical model and some robustness checks. Section 6 concludes with some implications of the findings and some important caveats.

2. Related literature on bank nationality and reach

The extant research on bank nationality has been confined primarily to the study of one component of what we term the home cookin' effect. In particular, previous investigations have found that some banking

organizations engage in a “follow-your-customer” strategy of setting up offices in nations where their home nation customers have foreign affiliates (e.g., Goldberg and Saunders 1981, Grosse and Goldberg 1991, Ter Wengel 1995, Brealey and Kaplanis 1996). However, more recent work finds that foreign-owned banks lend mostly to borrowers other than customers from the home nation (Seth, Nolle, and Mohanty 1998) and tend to have high proportions of their assets invested in business loans to domestic borrowers (Stanley, Roger, and McManis 1993). These findings suggest that while some banks do follow their customers abroad, this often may not be the dominant motivation behind cross-border expansion.

Along another dimension, researchers have studied how bank nationality influences the ability to provide services. For example, large, foreign-owned banks appear to have problems supplying credit to informationally opaque small businesses (e.g., Berger, Klapper, and Udell 2001, Clarke, Cull, and Martinez Peria 2001). Moreover, foreign-owned banks – that is, home and third nation banks – have sometimes been found to be less efficient on average than host nation banks in developed nations, with the possible exception of U.S. banks operating abroad (e.g., DeYoung and Nolle 1996, Berger, DeYoung, Genay, and Udell 2000).

Much of the prior research on bank reach has focused on cross-border bank consolidation. One general finding is that the reach of banks is not as global as might be expected given the significant reductions in barriers to competition discussed earlier. Cross-border mergers and acquisitions (M&As) in banking are considerably rarer than in other industries (e.g., Focarelli and Pozzolo 2001a) and, for much of the 1990s, paled in comparison with bank M&A activity within individual nations, including M&As in individual European nations (e.g., Berger, Demsetz, and Strahan 1999, Group of Ten 2001). Another general result is that cross-border mergers, when they occur, tend to be relatively unprofitable. Cross-border consolidation began to increase in Europe in the late 1990s. However, the combined bidder and target value increases from these mergers have been generally zero or negative, compared with domestic mergers, where combined values have been positive on average (Beitel and Schiereck 2001). A recent study of domestic and cross-border M&As involving U.S. banks found more value created by the cross-border M&As, although the study also found that more concentrated geographic and activity focus had positive effects on value (DeLong 2001).

The low frequency and profitability of cross-border bank consolidation likely reflects some remaining explicit or implicit cross-border barriers. These may include problems in serving informationally opaque small businesses or in operating efficiently abroad, as already discussed. Moreover, recent research on cross-border

bank M&As suggests that banks in highly regulated markets are less likely to be acquired and that information costs, as proxied by distance and cultural differences, tend to deter cross-border M&As (e.g., Buch and DeLong 2001). Finally, a growing body of literature argues that while explicit barriers to cross-border reach within Europe have been removed, consolidation across borders may be deterred by political factors, differences in institutions and cultures, the use of different payment and settlement systems, and differences in capital markets, taxes, and regulations across the nations (e.g., Giddy, Saunders, and Walter 1996, Lannoo and Gros 1998, Boot 1999, Blandon 2000, Goddard, Molyneux, and Wilson 2001).

Recent research has also examined the expansion of bank reach through methods other than consolidation. One dimension examines purchases of equity stakes in foreign banks (e.g., Focarelli and Pozzolo 2001a,b). These studies found that banks take equity positions in foreign banks in nations where expected economic growth rates are high, the banking system is inefficient, banking markets are unconcentrated, and regulations are lax. Banks that take equity stakes in foreign banks tend to be relatively large, profitable, and from nations with more developed banking markets. Another dimension of bank reach is cross-border lending, in which banks lend across borders without necessarily establishing a significant physical presence in the foreign nations.¹ These studies show that cross-border financial asset flows are driven by the same factors as international M&As, and that the distance at which banks lend internationally has not increased over time with deregulation, technological advances, and expansions in cross-border nonfinancial activity (Buch 2001, forthcoming).²

Overall, the literature on bank nationality is not very definitive as to the advantages and disadvantages of host nation banks, home nation banks, and third nation banks, and the evidence on bank reach suggests that banks have expanded less than might be expected based on the declines in explicit barriers to competition. Importantly, the prior literature does not provide specific evidence on the nationality and reach of banks that provide cash management services to the foreign affiliates of large, multinational corporations, which is studied here. As described above, the provision of these services to these firms lies in the crucial middle ground of financial services that could be provided either by local host nation banks, global banks headquartered in a few financial

¹ Cross-border bank lending can be quite large. For example, international syndicated bank lending to firms in developed countries averaged 11% of total GDP in the 1990s, roughly equivalent to the level of corporate bond issuances, and over five times the amount of equity issued during the same period (Davies and Smith 2001).

² This latter result contrasts with research showing that the average distance from U.S. banks to small business loan customers within the U.S. has been increasing over time (Cyrnak and Hannan 2000, Petersen and Rajan 2002).

centers, but with offices in many nations, or by institutions between these extremes.

3. Data description

Our source of information for connecting foreign affiliates of multinational corporations with their banks is GlobalCash-Europe96, a survey of cash management and electronic banking practices conducted in 1996 across 20 European nations by The Bank Relationship Consultancy and the School of Management at the University of Bath. The survey consists of a twelve-page questionnaire containing 60 questions, made available in ten different languages. The questionnaire was mailed to cash managers in 5,800 companies and completed by 1,129, for a response rate of 19.5%. For verification purposes, all responses were followed up with phone interviews.³

The term *cash management*, as it is applied here, may be a misnomer. The services covered in the survey relate to all short-term banking services including lending, deposit-taking, liquidity management, foreign exchange management, and other financial services. According to survey respondents, one of the most important cash management services provided by banks is short-term financing. For example, in response to the question, “What operations come under the heading of cash management in the company in which you are working?,” 90.2% of the sample firms listed at least one of three “lending-related” activities – short-term lending, trade finance, and creditor management – as part of their cash management operations. These choices as a group are second only to the group “liquidity-related” activities. Because short-term credit is the predominant form of bank financing in Europe (Rajan and Zingales 1995), it is likely that cash management banks are often the firms’ primary lending banks. Importantly, many of the cash management services require a physical presence of the bank. As a result, these services can only be performed by a host nation bank or a physical office of a home nation or third nation bank. Thus, the lending across borders without establishing a significant physical presence in the foreign nations discussed above does not apply to these banks chosen for cash management services.

The survey asks corporations to identify the banks used by their foreign affiliates for cash management within each of the 20 nations. For expositional ease, we refer to these foreign affiliates as the “firms” in our sample. Our sample starts with the operations of 2,118 firms associated with the 1,129 respondents, or about two affiliates per responding corporation on average. Although we only track the operations of these corporations within the 20 survey nations, their headquarters may be anywhere. Most of these corporations are headquartered in other European nations, although many are headquartered in the U.S., Japan, and Canada.

³ See Ongena and Smith (2000) for a detailed description of the survey.

A respondent can identify up to two banks – a “primary” and “secondary” bank – that it uses for cash management services in a given country. Correctly classifying the nationality and reach of the sample banks requires that we link banks that share a common parent corporation or holding company. To do this, we first collect ownership information from the Fitch IBCA database on all banks listed by survey respondents. Next, we identify all ownership positions in which one bank (the “parent”) owns at least 51% of equity of another bank (the “subsidiary”) and assume that such subsidiaries are effectively controlled by the parent bank. In other words, subsidiaries that are majority-owned by their parent bank take on the nationality and reach of the parent. Under these criteria, 255 different banks provide cash management services for the 2,118 sample firms. To avoid biases associated with double counting, we report all sample statistics using only the firm’s primary bank choice (although we explore robustness using an alternative definition that may include the secondary bank).

For each firm-bank observation, we identify bank nationality based on the location of the headquarters of a bank relative to the firm it serves. A *host nation bank* is headquartered in the country in which the firm operates, a *home nation bank* is headquartered in the same country as the firm’s multinational corporate headquarters, and a *third nation bank* is headquartered outside of the home and host countries.

We define a bank’s reach in terms of its geographic scope and size. Banks with the widest reach, *global banks*, provide services to sample firms in at least nine of the 20 European nations and have at least \$100 billion in consolidated assets as of year-end 1995 (assets taken from the *American Banker*). These criteria imply that eight of the 255 sample banks are global. *Local banks* are defined to have limited reach. These banks only provide services to sample firms in the European nation of their headquarters and have assets of less than \$100 billion. By definition, all local banks serve only as host nation banks and never as home nation banks or third nation banks, which require a cross-border presence. There are 174 local banks in our sample. A *regional bank* lies between these extremes, operating in more nations or being larger than a local bank, and operating in too few nations or being too small to be a global bank. Regional banks are either mid-sized European institutions or non-European banks that have fairly limited European reach. There are 73 regional banks in our sample.

We acknowledge that our definitions of global, regional, and local banks are somewhat arbitrary and Eurocentric. We may classify some banks as global that may not be truly global, but have broad European presence. However, our definitions should be fairly representative for two reasons. First, the eight banks are generally recognizable as true global banks in terms of size and world coverage. As shown in Table 1, five of the

global banks are based in Europe and the other three are from the U.S. Seven are ranked among *American Banker's* 50 largest banks in the world in 1995, and five operate in at least 18 of the 20 nations in our sample. Second, our findings are materially unchanged when we alter the dividing lines between global and regional banks, and between regional and local banks by adjusting the number of nations or asset size requirements.

The top row of Table 2 shows the distribution of choices of bank nationality and reach across all 2,118 firms. With respect to bank nationality, a surprising finding is that nearly two-thirds of all firms (65.5%) choose a bank headquartered in the host nation, while the remaining firms split evenly between using a home nation bank (17.7%) or third nation bank (16.9%). This pattern suggests that the concierge effect is strong and tends to dominate the home cookin' effect. This finding also goes against the common perception from the "follow your customer" literature that firms will favor their home nation bank for all their banking services when operating in foreign countries. With respect to bank reach, firms choose global banks 35.1% of the time, regional banks 52.8% of the time, and local banks 12.0% of the time. These data suggest that while the vast majority of the foreign affiliates of multinational corporations prefer banks that span multiple nations (i.e., global or regional banks), only about one-third choose global banks.

The remainder of Table 2 shows the distribution of bank nationality and reach choices within each of the 20 host nations, sorted by the total size of the nation's banking sector, and grouped into one of three categories: large banking sector, small banking sector, or former socialist nation.⁴ We separate the banking systems of the former socialist nations because they tend to have legal and financial systems that are underdeveloped relative to the Western European nations. The data show that choices of bank nationality can differ greatly across host nations. For example, only 26.2% of the firms operating in the former socialist countries use a host bank and 42.6% of these firms select a bank from a third nation. Variation across countries is especially apparent among the small banking sector countries. For instance, only 15.0% of the firms operating in Luxembourg use a host bank, compared with 85.3% in Sweden. The data on bank reach also show considerable variation across host nations. Interestingly, global banks are more frequently chosen for large banking sector nations (42.5%) and for former socialist nations (45.4%) than for small banking sector nations (21.9%). This observed pattern seems to indicate that global banks prosper best in markets open to bank competition (large banking sector nations) and in markets

⁴ The size of a nation's banking sector is measured by its 1995 total domestic bank assets and is taken from the data set accompanying Barth, Caprio, and Levine (2001).

that lack an established banking system (former socialist nations). We explore this possibility later in the paper. There is also notable variation in reach among the large banking sector nations. For example, more than two-thirds of sample firms operating in France use a global bank, most of the firms operating in Switzerland and the UK use regional banks, while more than two-thirds of the firms operating in Italy use local banks. In our econometric model, we test for the effects of the variation across European nations in banking sector size, financial development, legal structure, and other factors on the extent of bank globalization.

Table 3 reports the distribution of bank nationality and reach sorted by the home nation of the firm, including home nations other than the 20 European nations. Foreign affiliates with corporate headquarters in both large and small banking sector European nations select a host nation bank 70% of the time and opt for their home nation only about 11% of the time. This result holds despite the close proximity of European nations. Of course, these averages mask significant variation across nations. The four foreign affiliates headquartered in the former socialist nations all choose host nation banks, perhaps reflecting a lack of domestic bank development within the nations, although this is a very small sample. In contrast, firms that are headquartered in the U.S. choose home nation banks more than 40% of the time, much more often more than firms from other nations. This finding may reflect the relatively high efficiency of U.S.-owned banks when operating in other nations already discussed, greater desires for control of foreign affiliates by U.S. corporations or their home nation banks, or other explanations. Finally, it is notable that many firms from other developed nations rarely choose home nation banks. Firms headquartered in Canada, Japan, and a few of the small-banking-sector European nations *never* select home nation banks, although these samples are small. However, the large number of firms headquartered in Germany, the UK, and Switzerland, which have large banks at home, also very seldom choose home nation banks.⁵

4. Methodology

Given the stylized facts, we next set up our empirical model of firm choice of bank nationality and reach. We first motivate the model with a two-stage decision tree, and then introduce the nested multinomial logit procedure and define the explanatory variables employed in the regressions.

⁵ A possible explanation for some of the variation in the data is that corporations that tend to have exclusive banking relationships in their home nation may also be more likely to choose a home nation bank for affiliates operating abroad. However, Table 3 does not appear to support this argument. Corporations in Norway and Sweden typically maintain one domestic bank relationship (Ongena and Smith 2001), but choose to use host nation banks outside of their country more often than firms in Italy and Portugal, where it is common for firms to maintain many domestic banking relationships.

4.1 Two-stage decision tree

In the model, we maintain that bank nationality is of primary importance in the choice of bank by foreign affiliates of large, multinational corporations, and that this choice of bank nationality may have an important influence on bank reach. As shown in the two-stage decision tree in Figure 1, firms first decide on the nationality of their bank (the top “branches”) and then conditional on that choice, choose bank reach (the bottom “branches”). By definition, a local bank arises as a choice only when a firm first chooses a host nation bank, as a local bank does not have a cross-border presence in our data set. Therefore, conditional on choosing a home nation or third nation bank, a firm can only select a bank that is either global or regional.

Although our discussion is couched almost entirely in terms of the decisions firms make in selecting banks, we recognize that the observed outcomes also reflect the willingness and ability of banks to supply these services. For example, a foreign affiliate of a multinational corporation operating in Hungary might prefer the services of a host nation bank with global reach, but find that no bank provides this combination of bank nationality and reach, perhaps because the size of the host nation banking market is too small, the legal structure is too undeveloped, or the barriers to cross-border banking are too high. To the extent possible, we will try to control for such supply factors in our empirical model below by including explanatory variables that reflect the banking environment in the host nation.

At the nodes of the top branches of the tree in Figure 1, we report the sample frequencies of choosing a host nation, home nation, and third nation bank, while at the bottom branch nodes, we report the sample frequencies of choosing a global, regional, and local bank, conditional on the choice of nationality. As documented above, most firms choose host nation banks over home and third nation banks, consistent with a strong concierge effect. The new information in Figure 1 consists of the conditional reach frequencies. Firms’ preferences for bank reach differ greatly depending on the choice of bank nationality. Conditional on choosing a host bank, firms select a global bank only 20.5% of the time. By comparison, when firms first choose a home bank, they have a 66.8% chance of selecting a global bank, and when they choose a third bank, they select a global bank 63.6% of the time. In other words, firms rely heavily on banks with a global reach whenever they choose a home or third nation bank, but prefer a regional or local bank when choosing a host nation bank.

One artifact of the data that could be driving the conditional reach probability patterns in Figure 1 is that only three host nations – France, Germany, and The Netherlands – have a global bank headquartered within their

borders. That is, firms choosing a host nation bank in any of the other 17 nations in our sample cannot also select a global bank. This could simply reflect an equilibrium outcome, i.e., the demand for global services within these countries are not great enough to induce a host nation bank to expand its reach globally or to induce an existing global bank to move its headquarters to one of these countries. As discussed above, this outcome may reflect supply conditions in the host nation, and we try to control for these conditions in our logit regressions.

To gain some insight into how the distribution of bank choices might differ in a market where all types of banks are available, we focus in Figure 2 on Germany. Germany not only has a host nation bank that is global (Deutsche Bank), it also has a strong system of local and regional commercial banks from which firms may choose, including the nationwide systems of *Landesbanken* (state banks), *Sparkassen* (savings banks) and *Hypothekbanken* (building societies). Like Figure 1, Figure 2 shows that a substantial proportion of foreign affiliates of large multinational corporations operating in Germany choose a host nation (i.e., German) bank for their banking services. More important, conditional on selecting a German bank, firms still prefer a regional or local bank over a global bank by a two-to-one margin, while conditional on selecting a home or third nation bank, most firms prefer the services of a global bank.

The raw-data findings from Figures 1 and 2 provide strong support for the maintained assumptions of our model. The finding that most firms choose host nation banks – even when this precludes the selection of a global bank – supports our maintained assumption that bank nationality is of primary importance and is the choice made first in the decision tree. In addition, the finding that bank reach does vary substantially with the choice of host, home, and third nation supports the assumption that the choice of bank nationality may have a significant influence on the degree of bank reach, and may therefore be modeled as conditional on bank nationality.

4.2 Econometric model

Based on the tree structure of Figure 1, we construct a model of the choice of bank nationality and reach and show how that model can be estimated using the nested multinomial logit (NMNL) methodology proposed by McFadden (1978). In the first stage, we assume that firms pick bank nationality as a function of host nation characteristics, geographic, cultural, and financial differences between the home and host nations, and attributes of the multinational corporations. We hypothesize that firms base their nationality decision on the relative attractiveness of the concierge effect, which tends to push a firm towards a host nation bank, vis-à-vis the home cookin' effect, which tends to push a firm towards a home nation bank. Firms may choose third nation banks

when the concierge and home cookin' effects are both relatively weak. As discussed further below, some of the explanatory variables are included in part to control for factors that affect the willingness and ability of banks to supply services in the relevant nations.

Let Y_i^N be a discrete-valued dependent variable that takes on the value of 0, 1, or 2 depending on whether firm i chooses a host, home, or third nation bank, respectively. We assume that the discrete value Y_i^N is the observed outcome from a continuously-valued, latent variable Y_i^{N*} that reflects the net benefits flowing to a firm from selecting a host, home, or third nation bank. The first stage of our model is:

$$Y_i^{N*} = f(\text{Host Nation Characteristics, Differences between Home and Host Nations, Corporate Attributes}). \quad (1)$$

In the second stage, the firm chooses bank reach conditional on the nationality choice and attributes of the corporation. We hypothesize that firms base their bank reach decisions on the tradeoff between having access at the corporate level to the broad product ranges and expertise associated with banks with extensive reach versus the benefits from relationship-oriented services and country-specific knowledge associated with banks with relatively short reach. We assume the existence of a latent variable $Y_i^{R|N*}$ that reflects the flow of benefits to firm i from choosing a global, regional, or local bank (assigned the values of 0, 1, or 2, respectively), conditional on the nationality chosen in the first stage,

$$Y_i^{R|N*} = h_N(\text{Corporate Attributes}), \quad N = (0, 1, 2). \quad (2)$$

Note that when the nationality choice is a home ($N = 1$) or third nation bank ($N = 2$), then the choice $Y_i^{R|N*}$ is limited to either a global or regional bank because local banks do not have a cross-border presence.

Following McFadden (1978), we assume that Y_i^{N*} and $Y_i^{R|N*}$ are linear in their regressors and that the regressions errors follow a generalized extreme-value distribution. This assumption implies that we can write the joint probability of observing a firm choosing nationality N and reach R as

$$\Pr(N, R) = \frac{\exp(\alpha_1' Z_N^{\text{Host Nation}} + \alpha_2' Z_N^{\text{Differences between Home and Host Nation}} + \beta_N' Z_{N,R}^{\text{Corporate}})}{\sum_{N=0}^2 \sum_{R=0}^2 \exp(\alpha_1' Z_N^{\text{Host Nation}} + \alpha_2' Z_N^{\text{Differences between Home and Host Nation}} + \beta_N' Z_{N,R}^{\text{Corporate}})}, \quad (3)$$

the conditional probability of choosing R given N as

$$\Pr(R | N) = \frac{\exp(\beta_N' Z_{N,R}^{\text{Corporate}})}{\sum_{R=0}^2 \exp(\beta_N' Z_{N,R}^{\text{Corporate}})}, \quad (4)$$

and the unconditional probability of choosing N as

$$\Pr(N) = \frac{\exp(\alpha_1' Z_N^{\text{Host Nation}} + \alpha_2' Z_N^{\text{Differences between Home and Host Nation}}) \sum_{R=0}^2 \exp(\beta_N' Z_{N,R}^{\text{Corporate}})}{\sum_{N=0}^2 \exp(\alpha_1' Z_N^{\text{Host Nation}} + \alpha_2' Z_N^{\text{Differences between Home and Host Nation}}) \sum_{R=0}^2 \exp(\beta_N' Z_{N,R}^{\text{Corporate}})}. \quad (5)$$

Define what McFadden (1978) terms to be the “inclusive value”

$$I_N = \ln\left(\sum_{R=0}^2 \exp(\beta_N' Z_{N,R}^{\text{Corporate}})\right), \quad (6)$$

then equation (6) can be expressed as:

$$\Pr(N) = \frac{\exp(\alpha_1' Z_N^{\text{Host Nation}} + \alpha_2' Z_N^{\text{Differences between Home and Host Nation}} + \rho I_N)}{\sum_{N=0}^2 \exp(\alpha_1' Z_N^{\text{Host Nation}} + \alpha_2' Z_N^{\text{Differences between Home and Host Nation}} + \rho I_N)}. \quad (7)$$

Again, when N = 1 or 2 (home or third nation bank), then R can be only 0 or 1 (global or regional bank).

The parameters α , β_N , and ρ are estimated by working backwards on the Figure 1 decision tree, applying multinomial logit at each stage. First, the β_N are estimated at each nationality node (N = home, host, and third) by regressing the conditional bank reach observations $Y_i^{R|N}$ on corporate characteristics. Then, estimated values of β_N are used to construct inclusive values for each nationality node using equation (4). These inclusive values summarize the impact of corporate characteristics on the reach decision, conditional on a given choice of nationality. In the second step, α and ρ are estimated by regressing the bank nationality observations Y_i^N on host nation characteristics, differences between home and host nation characteristics, and the inclusive values.

4.3 Explanatory variables

The explanatory variables include characteristics of the host nation, geographic, cultural, and financial differences between the home and host nations, and attributes of the multinational corporation of which the foreign affiliate is a part. Table 4 lists these variables and their summary statistics. The continuous variables, such as dollar amounts and distance, are included in the regressions as the natural logs of the variables (denoted by \ln), although we show the summary statistics for both the levels and logs.

As discussed above, firms choose bank nationality in our model based primarily on whether the concierge

benefits of a host nation bank versus the home cookin' benefits of a home nation bank dominate. Firms may select a third nation bank if neither set of benefits is very important. We also control for some supply-related factors.

The host nation characteristics proxy for both the demand for concierge benefits from host nation banks and the willingness and ability of banks to supply these services within a host nation. There may be more need for concierge services in host nations with less well developed financial and legal systems, but it may also be more difficult for host nation banks to supply these services when the infrastructure of the nation is less developed. As one proxy for both financial and legal development, we include the dummy variable *Former Socialist Nation* that equals one when the host nation is the Czech Republic, Hungary, or Poland. Recent transitions to market economies imply that the financial systems of former socialist countries are likely to be significantly underdeveloped relative to other European countries. We also include two continuous measures of financial development, *Bank Assets/GDP* and *Market Capitalization/GDP*. *Bank Assets/GDP* measures the importance of the host nation's banking sector in terms of the nation's aggregate domestic bank assets relative to GDP. Similarly, *Market Capitalization/GDP* measures the importance of the host nation's capital markets by summing the value of private sector debt and market capitalization of stock market equity and dividing the sum by GDP. *Exports/GDP* is value of the nation's total exports divided by GDP. It measures the degree of reliance firms within a nation have on cross-border product markets and is a measure of potential demand for cross-border banking services. *Bank Assets/GDP*, *Market Capitalization/GDP*, and *Exports/GDP* are all measured at year-end 1995 and are taken from Barth, Caprio, and Levine (2000). As a legal development variable, we specify *Creditor Protection*, a dummy that takes the value one when a country has both strong creditor protection laws and a good tradition of legal enforcement. This variable is calculated using the creditor rights and legal enforcement indexes created by LaPorta, Lopez-de-Silanes, Shleifer, and Vishny (1997).⁶

The geographic, cultural, and financial differences between the home and host nations also proxy for some demand and supply effects. Demand for concierge services should be greater when the home and host

⁶ The creditor rights index summarizes a country's laws regarding creditor restrictions on other stakeholders (such as minimum dividends or consent to file for reorganization), automatic stays, guarantees of priority, and who obtains control during bankruptcy. The index ranges between zero and four with a four corresponding to the strongest laws favoring creditor rights. The enforcement index measures the law and order tradition in a country. It runs on a scale between zero and ten, with higher values corresponding to a stronger enforcement tradition. *Creditor Protection* equals one if the creditor rights index is higher than two and the enforcement index is higher than six.

nations are very different. Moreover, the ability for a home nation bank to supply home cookin' benefits may become more difficult, the more different is the home nation from the host nation. Both effects predict that when the differences between home and host characteristics are greater, a host nation bank is more likely to be chosen and a home nation bank is less likely to be chosen. We construct a variety of variables so that a higher number indicates a greater difference between the home and host nation, taking absolute values of differences where necessary. The variable $\ln(\text{Distance})$ measures the natural log of the distance in miles between the host and home nation's financial capitals. *Language Difference* equals one when the host and home nations do not share any common official languages, and takes the value zero if any of the official languages of the home nation match any of the official languages of the host nation. The variables $\Delta \ln(\text{Bank Assets}/\text{GDP})$, defined as the absolute value of the log difference $|\ln(\text{Bank Assets}/\text{GDP}_{\text{Home}}) - \ln(\text{Bank Assets}/\text{GDP}_{\text{Host}})|$, and $\Delta \ln(\text{Market Capitalization}/\text{GDP})$, defined similarly to be $|\ln(\text{Market Capitalization}/\text{GDP}_{\text{Home}}) - \ln(\text{Market Capitalization}/\text{GDP}_{\text{Host}})|$, measure the magnitude of the differences in financial development between the home and host nations.

Finally, attributes of the multinational corporation of which the foreign affiliate is a part could influence the choices of bank nationality and bank reach and are included in both sets of equations. Relatively large corporations with product reach that extends across many nations could have developed enough in-house expertise so that neither concierge nor home cookin' benefits have much value. Such corporations may rely more on third nation banks than corporations where one of the two effects is important. Large companies and companies with extended product reach may also prefer global banks because of the range of products they offer, while small companies and companies that value relationship-based financing should prefer banks that emphasize their local reach. $\ln \text{Sales}$, the log of the corporation's 1995 consolidated sales, acts as a proxy for the size of the corporation.⁷ *Number of Nations Doing Business* is the number of European nations in which the corporation reports doing business. *Relationship Importance* is an assessment made by the survey respondent as to the perceived importance of their relationship with a given bank, among a set of nine other specified criteria, in allocating business between existing banks. We assign a one to the variable if company managers answered that a relationship was "important" or "very important," and a zero otherwise. We posit that foreign affiliates of

⁷ Corporations do not actually report exact sales figures. Instead, they categorize their total sales into one of eight intervals, beginning with "less than \$100 million" and ending with "greater than \$10 billion". To obtain a value for sales that is economically meaningful, we convert each categorical response to the midpoint dollar value in that category. A corporation that selects the category "less than \$100 million" gets coded as having sales of \$50 million. For companies reporting sales "greater than \$10 billion," we select the value \$20 billion.

companies that rank relationship importance high will be more likely to choose a local or regional bank that can offer stronger relationship services than a global bank. Finally, we include dummy variables to control for industry-specific effects. Specifically, we group companies into one of four broad industry categories: *Farming and Mining*, *Manufacturing*, *Services and Trade*, or other industry, with the other industry category excluded from the specification as the base case.

5. Results

Tables 5-7 contain the results of the two-stage NMNL model. For each of the tables, we compute and report estimated partial derivatives that measure the impact of small changes in each of the explanatory variables on the probability of observing a given bank choice, holding the other variables constant, evaluated at the sample mean of the explanatory variables. We write this as $\partial \Pr(N) / \partial Z_{\bar{z}}$ when evaluating bank nationality and $\partial \Pr(R) / \partial Z_{\bar{z}}$ when evaluating bank reach. The sums of the estimated derivatives equal zero across a given set of choices of bank nationality (host nation, home nation, or third nation) or bank reach (global, regional, or local) because the sums of the probabilities must equal one.

We also report all results using two different definitions of bank nationality and reach. The first definition – used in the summary statistics and shown in the earlier figures and tables – is based on the firm’s primary bank and ignores the firm’s secondary bank. The second definition maximizes the measured reach of the bank by replacing the primary bank with the secondary bank in cases in which the secondary bank has greater reach. That is, for the second definition, the secondary bank’s nationality is used if the primary bank is a local bank and the secondary bank is regional or global, or if the primary bank is regional and the secondary bank is global. Because the results are similar across the two definitions, we focus on the findings using the first definition.

5.1 Bank Nationality Regressions

Table 5 contains the estimated partial derivatives from the regression of bank nationality choice on host nation characteristics, geographic, cultural, and financial differences between the home and host nations. The table also reports the impact of the corporate attributes on nationality, imputed from the inclusive value estimates obtained from the reach regressions shown below. Several interesting patterns emerge from the table.

First, holding the other variables constant, firms operating in socialist nations are less likely, by 37.3 percentage points, to choose a host nation, all else equal, and are instead more likely to choose a home nation bank (by 24.4 percentage points) or third nation bank (by 12.9 percentage points). This effect of being in a former

socialist nation explains most, but not nearly all of the observed difference in means shown in Table 2 above, in which the frequencies for former socialist nations choosing host nation banks (26.2%) were on average more than 40 percentage points below the large banking sector nations (69.1%) and small banking sector nations (67.0%). This finding is consistent with the hypothesis that financial systems within former socialist countries may be too new and underdeveloped in some cases to create banks with sufficient concierge services, so that many foreign affiliates of multinational corporations may rely instead on banks from other nations. Most of the other host nation characteristics do not have a statistically significant effect on the choice of bank nationality, except that greater exports are associated with a greater probability of choosing a third nation bank and a lesser probability of choosing a home nation bank.

Second, the estimates on the variables that measure differences between the home and host nations generally do not support the hypothesis that relatively large geographic, cultural, and financial differences between the two nations make it more likely that a firm will use a host nation bank for cash management services. In fact, the relation between all of these variables and the likelihood of choosing a host nation bank are negative or zero. For instance, firms become significantly less likely to use a host nation bank and more likely to use a home nation bank or third nation bank as the geographical distance between the home and host increases. The partial derivative estimates imply that a 10% increase in distance from the mean of $\ln(Distance)$ is predicted to increase the likelihood of choosing a home nation bank by about 0.49 percentage points ($0.052 * \ln(1.10)$) and a third nation bank by roughly 0.12 percentage points ($0.013 * \ln(1.10)$). Firms are significantly more likely to choose a third nation bank when the home and host do not share a common language and when the difference in size of the two nations' banking sectors is large. The *Language Difference* estimate implies that lack of a common language between the home and host nations leads to 7.1 percentage point increase in the likelihood of choosing a third nation bank. The estimate on $\Delta \ln(Bank Assets)$ suggests that an increase of 10% in the mean value of the absolute difference between the logged size of the two nations' banking sectors implies a 0.36 percentage point increase in the likelihood of selecting a third nation bank.

The results on the variables that measure differences between the home and host nations could be driven in part by U.S. multinational corporations, which come from a home nation that is located relatively far from the host nations and has relatively large capital markets, yet has firms that rely heavily on home nation banks (see Table 3). As discussed earlier, this may reflect in part the relatively high efficiency of U.S. banks in other nations,

or preferences for control by the U.S. corporations or home nation banks. To test the extent to which the behavior of these firms may explain the anomalous results for the differences between home and host nations, we try removing the foreign affiliates of U.S. corporations from the sample (not shown in tables). The estimate on $\ln(\text{Distance})$ switches signs to become positive and significant and the estimate on *Language Difference* becomes positive but not significant, while all other estimates remain the same sign and of similar magnitude. Thus, without the U.S. firms, the signs on $\ln(\text{Distance})$ and *Language Difference* are consistent with our hypothesis that coming from a more distant home nation or one that does not share a language with the host nation improves the value of concierge benefits and makes firms more likely to rely on a host nation bank.

The imputed corporate attribute estimates suggest that as corporations become larger and operate in more European nations, they become significantly less likely to use a host nation bank and more likely to use a home nation bank. This result could reflect that larger and more far-flung corporations have less demand for concierge services in each individual foreign nation. Alternatively, it may suggest that some banking organizations engage in “follow-your-customer” strategies that target their home customers as they grow and expand.

5.2 Conditional Bank Reach Regressions

Table 6 reports the results from the regressions of bank reach on corporate attributes, conditioned first on the nationality of the bank. Three sets of estimates are given, depending on the bank nationality chosen in the first stage of the decision tree. Conditional on choosing a host nation bank, firm may choose a bank with global, regional, or local reach. Conditional on choosing a home nation or third nation bank, firms can only choose between a global and regional bank. Comparing the estimates for the different nationality choices gives a sense for how nationality choice influences the reach decision.

Conditional on choosing a host nation bank, firms appear to become more likely to select a regional bank rather than a local bank as they become larger in terms of $\ln(\text{Sales})$. Interestingly, size does not appear to influence the likelihood of selecting a global bank. However, firms become *less* likely to choose a global bank as the number of countries in which their corporation does business increases. In contrast, firms that have chosen a home nation bank appear to be more likely to select a global bank as they become bigger and as the number of countries in which they do business increases. Finally, conditional on choosing a third nation bank, little variation in the reach choice is explained by our variables.

At first blush, the effect of $\ln(\text{Number of Nations Doing Business})$ on choice of bank reach for firms that

choose host nation banks may seem counterintuitive. It might be expected that firms that use host nation banks would rely more on global banks as they do business in more nations, as we find that firms do when they use home nation banks. However, this result is consistent with the hypothesis that as these corporations expand internationally, they may prefer the mix of services from regional banks that have better expertise about the foreign nations in which they operate, and still provide a reasonably wide variety of international services.

Table 7 shows imputed partial derivative estimates of the unconditional impact of the explanatory variables on bank reach. The unconditional probability of choosing a bank of a given reach, $P(R)$, can be expressed as:

$$P(R) = \sum_{N=0}^2 P(R|N) \cdot P(N). \quad (8)$$

Partial derivatives can then be computed using the chain rule:

$$\frac{\partial P(R)}{\partial Z} = \sum_{N=0}^2 \left[\frac{\partial P(R|N)}{\partial Z} \cdot P(N) + P(R|N) \cdot \frac{\partial P(N)}{\partial Z} \right]. \quad (9)$$

We obtain estimates in Table 7 by replacing the right hand side of equation (9) with the estimates of $\frac{\partial P(N)}{\partial Z}$ and $\frac{\partial P(R|N)}{\partial Z}$ from Tables 5 and 6, respectively, and fitted values of $P(N)$ and $P(R|N)$. Standard errors for the imputed estimates are calculated in a similar fashion. Note that equation (9) reflects the effects of all three sets of explanatory variables on bank reach through their effects on the choice of bank nationality, as well as the direct effects of the corporate attributes.

Most of the signs of the derivatives on host nation characteristics shown in Table 7 are consistent with expectations, although there is not much statistical significance. The findings suggest that firms operating in former socialist nations are more likely to choose a global bank and less likely to choose a local bank, consistent with expectations that these firms more often need the wide range of services and expertise of a global bank, rather than a local bank headquartered in a former socialist nation. Firms also become more likely to use a global bank as the distance between the host and home nations increases, although this may be driven in part by the presence of U.S. firms. Finally, the data also suggest that larger firms are more likely to choose greater bank reach, consistent with expectations.

6. Conclusion

In this paper, we examine bank globalization along two dimensions – bank nationality and bank reach – using data on cash management services provided to foreign affiliates of large multinational corporations. These firms represent a significant portion of the potential market for global banks and should therefore be influential in determining the extent to which the banking industry will become globalized. The provision of cash management services to such firms represents a crucial “middle ground” of financial services that could be provided by a range of different institutions – from a small bank headquartered in the host nation to a large global bank headquartered in a distant financial center.

We investigate bank nationality and reach using a two-stage nested multinomial logit model in which bank nationality is chosen first and may influence bank reach. Explanatory variables in the model include 1) host nation characteristics, 2) geographic, cultural, and financial differences between the home and host nations, and 3) attributes of the multinational corporations. The first two sets of variables are designed to reflect both the demand of the foreign affiliates of the multinational corporations for cash management services from banks of different nationalities and the willingness and ability of these banks to supply the services. The attributes of the corporations are assumed to affect both bank nationality and reach through the demand side alone.

We find that nearly two-thirds of our sample firms choose a bank headquartered in the host nation and less than 20% select a bank from their home nation. This is consistent with a strong “concierge” effect that dominates a “home cookin’” effect. That is, affiliates of multinational corporations often use banks that know the local market, culture, language, and regulatory conditions rather than banks that are more familiar with the conditions in the corporation’s home market, or that have direct ties to the corporation in the home nation.

The data also suggest that bank reach is strongly associated with bank nationality. Firms that use host nation banks for cash management services are less likely to use a global bank and more likely to use a local or regional bank. Moreover, corporations that use host nation banks also tend to use regional banks as they expand internationally, whereas those that use home nation banks tend to rely on global banks as they expand. These findings together suggest that local and regional banks may be better at delivering concierge services than global banks, and large, multinational corporations need more concierge services as they expand further from their home nation. Overall, the finding that multinational corporations rely on host nation banks with limited reach suggests the extent of globalization may remain limited.

Our bank nationality and bank reach regressions yield some additional interesting results about the likely

determinants of bank globalization. For example, we find that the very low levels of financial development in the former socialist nations appear to have strong effects on both bank nationality and bank reach. Firms operating in the former socialist nations of Eastern Europe are more likely to use home nation or third nation banks rather than host nation banks, and are also more likely to choose banks with a global reach rather than local reach.

We caution that the inferences we draw are subject to several caveats. First, we acknowledge that the financial structure of the banking industry reflects some supply and demand factors that are not modeled here. For instance, implicit barriers to competition might limit the supply of cash management services in some nations and therefore reduce the choice set available to our sample firms. Second, because our sample is simply a “snapshot” of the European market in 1996, our data do not necessarily reflect the long-run, steady-state equilibrium. For instance, the introduction of the Euro in 1999 – and its subsequent adoption as a physical currency in 2002 – may have reduced the costs of offering financial services across the borders of European Monetary Union (EMU) nations, making it easier for home and third nation banks to compete with host nation banks.⁸ Third, our measurement of bank reach is somewhat arbitrary and Eurocentric – we may classify some banks as global that only have substantial reach within Europe.

⁸ However, a recent study that used an extensive panel of micro-level price data across Europe found that most of the benefits of European integration in terms of convergence in goods prices occurred in the early 1990s. Prices have been found to continue to converge after the introduction of the Euro, but at a slower rate than in the early 1990s (Rogers 2001).

References

- Barth, J.R., G. Caprio, and R. Levine. 2001. "The Regulation and Supervision of Banks Around the World: A New Database," World Bank working paper.
- Beitel, P., and D. Schiereck. 2001. "Value Creation at the Ongoing Consolidation of the European Banking Market," Institute for Mergers and Acquisitions working paper.
- Berger, A.N., R. DeYoung, H. Genay, and G.F. Udell. 2000. "Globalization of Financial Institutions: Evidence from Cross-Border Banking Performance." *Brookings-Wharton Papers on Financial Services* 3: 23-158.
- Berger, A.N., Klapper, L.F., Udell, G.F. 2001. "The Ability of Banks to Lend to Informationally Opaque Small Businesses," *Journal of Banking and Finance* 25: 2127-2167.
- Berger, A.N., R. Demsetz, and P. Strahan. 1999. "The Consolidation of the Financial Services Industry: Causes, Consequences, and Implications for the Future," *Journal of Banking and Finance* 23: 135-194.
- Blandon, J.G. 2000. "Cross-Border Banking in Europe: An Empirical Investigation," Universitat Pompeu Fabra working paper.
- Boot, A.W.A. 1999. "European Lessons on Consolidation in Banking," *Journal of Banking and Finance* 23: 609-613.
- Brealey, R.A., and Kaplanis, E.C. 1996. "The Determination of Foreign Banking Location," *Journal of International Money and Finance* 15: 577-597.
- Buch, C.M. 2001. "Distance and International Banking," Kiel Institute of World Economics working paper No. 1043, Kiel, Germany.
- Buch, C.M. forthcoming. "Information or Regulation: What is Driving the International Activities of Commercial Banks?" *Journal of Money, Credit, and Banking*.
- Buch, C.M., and DeLong, G.L. 2001. "Cross-border Bank Mergers: What Lures the Rare Animal?" Kiel Institute of World Economics working paper No. 1070, Kiel, Germany.
- Clarke, G., Cull, R., Martinez Peria, M.S. 2001. "Does Foreign Bank Penetration Reduce Access to Credit in Developing Countries? Evidence from Asking Borrowers," World Bank working paper.
- Cyrnak, A., and T.H. Hannan. 2000. "Non-Local Lending to Small Businesses," Federal Reserve Board working paper.
- Davies, S., and D. C. Smith. 2001. "Trends in External Corporate Financing," Federal Reserve Board working paper.
- DeLong, G. L. 2001. "Stockholder Gains from Focusing versus Diversifying Mergers," *Journal of Financial Economics* 59: 221-252.
- DeYoung, R. and D.E. Nolle. 1996. "Foreign-Owned Banks in the U.S.: Earning Market Share or Buying It?" *Journal of Money, Credit, and Banking* 28(4): 622-636.
- Focarelli, D., Pozzolo A.F. 2001a. "The Patterns of Cross-border Bank Mergers and Shareholdings in OECD

Countries,” *Journal of Banking and Finance* 25: 2305-2337.

Focarelli, D., Pozzolo A.F. 2001b. “Where Do Banks Expand Abroad? An Empirical Analysis,” Bank of Italy working paper.

Giddy, Ian, Anthony Saunders, and Ingo Walter. 1996. “Alternative Models for Clearance and Settlement: The Case of the Single European Capital Market,” *Journal of Money, Credit and Banking* 28(4): 986-1000.

Goddard, J., Molyneux, P., and Wilson, J.O.S. 2001. *European banking: Efficiency, Technology, and Growth*. (Chichester, UK: John Wiley and Sons).

Goldberg, Lawrence G. and Anthony Saunders. 1981. “The Determinants of Foreign Banking Activity in the United States.” *Journal of Banking and Finance* 5: 17-32.

Grosse, R., Goldberg, L.G. 1991. “Foreign Bank Activity in the United States: An Analysis by Country of Origin,” *Journal of Banking and Finance* 15: 1093-1112.

Group of Ten, 2001, *Report on Consolidation in the Financial Sector*, <http://www.bis.org/publ/gten05.htm>.

Lannoo, Karel and Daniel Gros. 1998. “Capital Markets and EMU: Report of a CEPS Working Party,” Centre for European Policy Studies.

LaPorta, R., Lopez-de-Silanes, F., Shleifer, A., and Vishny, R.W. 1997. “Legal Determinants of External Finance,” *Journal of Finance* 22: 1131-1150.

Levine, R. 1996. “Foreign Banks, Financial Development, and Economic Growth,” in Claude E. Barfield, ed., *International Financial Markets: Harmonization Versus Competition*, Washington DC: The AEI Press.

McFadden, D. 1978. “Modelling the Choice of Residential Location,” In A. Karlquist et al. (eds.), *Spatial Interaction Theory and Residential Location*, pp. 75-96. Amsterdam: North-Holland.

Ongena, S. and D.C. Smith. 2000. “What Determines the Number of Relationships? Cross Country Evidence,” *Journal of Financial Intermediation* 9: 26-56.

Petersen, M.A. and R.G. Rajan. 2002. “The Information Revolution and Small Business Lending: Does Distance Still Matter?” *Journal of Finance*, forthcoming.

Rajan, R.G. and L. Zingales. 1995. “What Do We Know about Capital Structure? Some Evidence from International Data,” *Journal of Finance* 50: 1421-1460.

Rogers, J.H. 2001. “Price Level Convergence, Relative Prices, and Inflation in Europe,” Federal Reserve Board working paper, IFDP #699.

Seth, R., Nolle, D.E. and Mohanty, S.K. 1998. “Do Banks Follow their Customers Abroad?,” *Financial Markets, Institutions, and Instruments* 7: 1-25.

Stanley, T.O., Roger, C., McManis, B. 1993. “The Effects of Foreign Ownership of U.S. Banks on the Availability of Loanable Funds to Small Business,” *Journal of Small Business Management* 31: 51-66.

Ter Wengel, J. 1995. “International Trade in Banking Services,” *Journal of International Money and Finance* 14: 47-64.

Figure 1: Firm Choice of Bank Nationality and Reach — Firms Across All Host Nations

This figure depicts the sample distribution of choices of bank nationality and bank reach in terms of a two-stage decision tree. The sample firms are foreign affiliates of large multinational companies operating in 20 European nations. The sample banks provide cash management services to these firms in these nations. A *host nation bank* is headquartered in the nation in which the affiliate operates, a *home nation bank* is headquartered in the same nation as the multinational corporation's headquarters, and a *third nation bank* is headquartered in neither the host nor the home nation. A *global bank* provides services to sample firms in at least nine of the 20 European nations and had at least \$100 billion in worldwide assets as of year-end 1995, a *local bank* provides services to sample firms only in the European nation of the bank's headquarters and had assets of less than \$100 billion, and a *regional bank* is neither global (too few nations or too small) nor local (too many nations or too large).

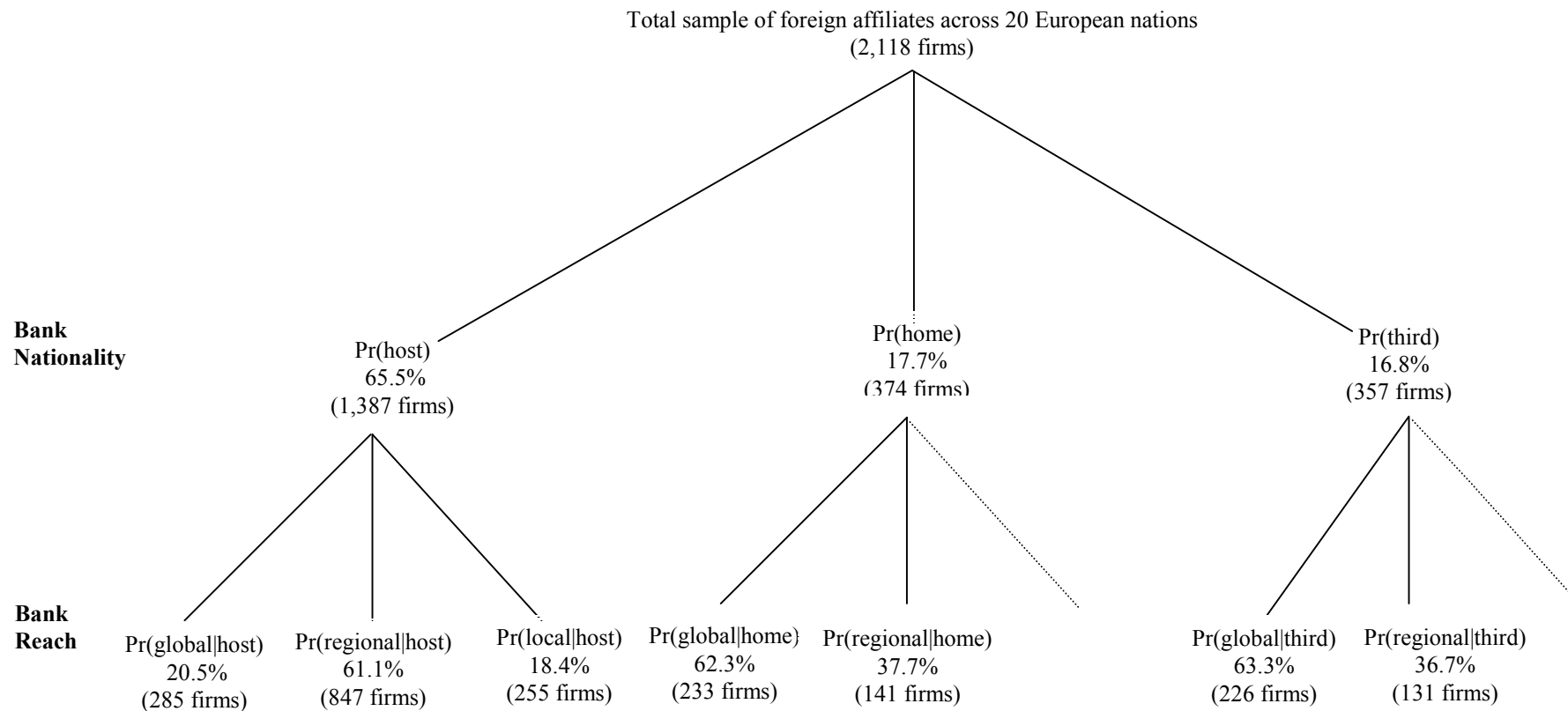


Figure 2: Firm Choice of Bank Nationality and Reach — Firms Operating in Germany

This figure depicts the sample distribution of choices of bank nationality and bank reach in Germany in terms of a two-stage decision tree. The sample firms are foreign affiliates of large multinational companies operating in Germany, and the sample banks provide cash management services to these firms. A *host nation bank* is headquartered in the nation in which the affiliate operates, a *home nation bank* is headquartered in the same nation as the multinational corporation's headquarters, and a *third nation bank* is headquartered in neither the host nor the home nation. A *global bank* provides services to sample firms in at least nine of the 20 European nations and had at least \$100 billion in worldwide assets as of year-end 1995, a *local bank* in this figure is a German bank that provides services to sample firms only in Germany and had assets of less than \$100 billion, and a *regional bank* is neither global (too few nations or too small) nor local (too many nations or too large).

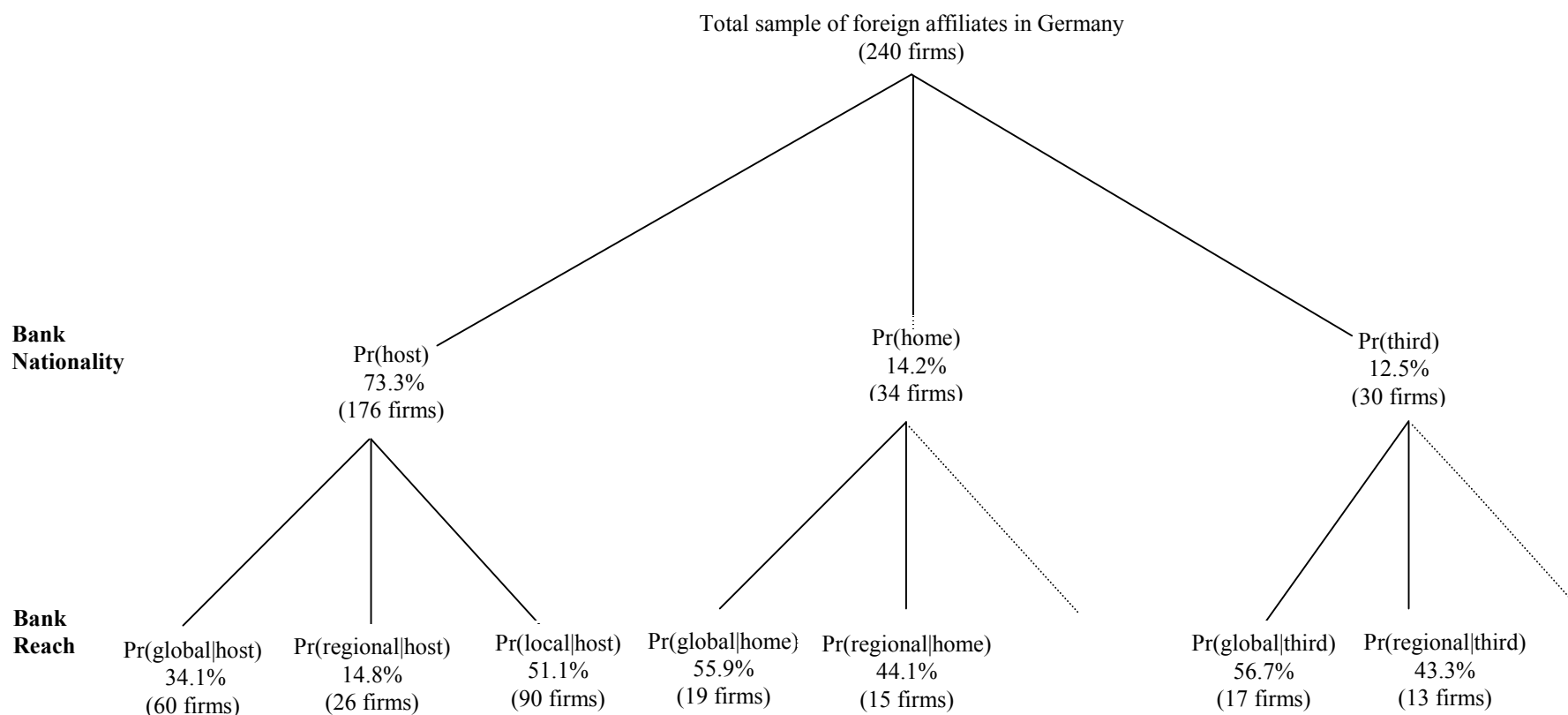


Table 1: The Global Banks in the Sample

This table lists the eight *global banks* in our sample, in order of descending size. These banks provide cash management services to sample firms in at least nine of the 20 European nations and had at least \$100 billion in worldwide assets as of year-end 1995.

Bank Name	Headquarters Nation	Number of survey nations in which the bank operates	1995 worldwide assets (\$billions)	<i>American Banker</i> rank, by 1995 worldwide assets
Deutsche Bank	Germany	10	502.3	1
ABN Amro	Netherlands	19	339.4	12
Crédit Lyonnais	France	9	337.6	13
Société Générale	France	19	324.8	17
Banque Nationale de Paris	France	12	323.5	18
Citibank	US	20	255.3	28
Bank of America	US	18	230.2	34
Chase Manhattan Bank	US	19	120.5	62

Table 2: Distribution of Firm Choice of Bank Nationality and Reach, by Host Nation

This table reports the sample distribution of bank nationality and bank reach across the 20 European nations hosting the sample firms. Sample firms are foreign affiliates of large multinational companies, and sample banks are those identified by the firms as providing cash management services within each nation. A *host nation bank* is headquartered in the nation in which the affiliate operates, a *home nation bank* is headquartered in the same nation as the multinational corporation's headquarters, and a *third nation bank* is headquartered in neither the host nor the home nation. A *global bank* provides services to sample firms in at least nine of the 20 European nations and had at least \$100 billion in worldwide assets as of year-end 1995, a *local bank* provides services to sample firms only in the European nation of the bank's headquarters and had assets of less than \$100 billion, and a *regional bank* is neither global (too few nations or too small) nor local (too many nations or too large).

Nation	Number of Firms	1995 Total Bank Assets (billions \$)	Bank Nationality (%)			Bank Reach (%)		
			Host	Home	Third	Global	Regional	Local
ALL FIRMS	2,118		65.5	17.7	16.9	35.1	52.8	12.0
Large banking-sector nations								
Germany	240	3,041	73.3	14.2	12.5	40.0	49.2	10.8
France	223	1,527	76.7	12.1	11.2	66.8	17.0	16.1
UK	224	1,278	52.2	29.0	18.8	25.9	71.9	2.2
Italy	119	831	70.6	17.6	11.8	27.7	43.7	28.6
Switzerland	103	557	76.7	15.5	7.8	13.6	78.6	7.8
Spain	126	552	57.9	26.2	15.9	26.2	54.8	19.0
Netherlands	166	457	78.3	11.4	10.2	76.5	21.1	2.4
Total	1,201	8,241	69.1	17.9	13.0	42.5	46.1	11.4
Small banking-sector nations								
Belgium	150	389	59.3	21.3	19.3	35.3	64.0	0.7
Austria	79	297	79.7	8.9	11.4	20.3	72.2	7.6
Sweden	109	106	85.3	9.2	5.5	11.0	79.8	9.2
Norway	83	95	74.7	15.7	9.6	10.8	80.7	8.4
Portugal	54	89	51.9	20.4	27.8	27.8	29.6	42.6
Finland	48	88	77.1	12.5	10.4	16.7	68.8	14.6
Denmark	100	75	85.0	7.0	8.0	12.0	79.0	9.0
Greece	40	47	40.0	20.0	40.0	45.0	32.5	22.5
Ireland	73	26	56.2	19.2	24.7	21.9	74.0	4.1
Luxembourg	40	13	15.0	17.5	67.5	27.5	57.5	15.0
Total	776	1,224	67.0	14.8	18.2	21.9	67.7	10.4
Former socialist nations								
Czech Republic	49	43	28.6	28.6	42.9	42.9	28.6	28.6
Poland	60	36	28.3	26.7	45.0	50.0	21.7	28.3
Hungary	32	16	18.8	43.8	37.5	40.6	40.6	18.8
Total	141	96	26.2	31.2	42.6	45.4	28.4	26.2

Table 3: Distribution of Firm Choice of Bank Nationality and Reach, by Home Nation

This table reports the sample distribution of bank nationality and bank reach according to the nation of the firm's corporate headquarters. Sample firms are foreign affiliates of large multinational companies, while sample banks are those identified by the firms as providing cash management services within each nation. A *host nation bank* is headquartered in the nation in which the affiliate operates, a *home nation bank* is headquartered in the same nation as the multinational corporation's headquarters, and a *third nation bank* is headquartered in neither the host nor the home nation. A *global bank* provides services to sample firms in at least nine of the 20 European nations and had at least \$100 billion in worldwide assets as of year-end 1995, a *local bank* provides services to sample firms only in the European nation of the bank's headquarters and had assets of less than \$100 billion, and a *regional bank* is neither global (too few nations or too small) nor local (too many nations or too large).

Nation	Number of Firms	1995 Total Bank Assets (billions \$)	Bank Nationality (%)			Bank Reach (%)		
			Host	Home	Third	Global	Regional	Local
ALL FIRMS	2,118		65.5	17.7	16.9	35.1	52.8	12.0
Large banking-sector nations								
Germany	177	3,041	76.8	7.9	15.3	31.6	55.4	13.0
France	50	1,527	60.0	26.0	14.0	32.0	54.0	14.0
UK	364	1,278	79.1	6.3	14.6	30.5	57.1	12.4
Italy	84	831	54.8	9.5	35.7	36.9	51.2	11.9
Switzerland	84	557	63.1	3.6	33.3	48.8	40.5	10.7
Spain	12	552	66.7	25.0	8.3	41.7	25.0	33.3
Netherlands	121	457	47.1	26.4	26.4	48.8	45.5	5.8
Total	892	8,241	69.3	10.8	20.0	35.8	52.5	11.8
Small banking-sector nations								
Belgium	4	389	100.0	0.0	0.0	0.0	100.0	0.0
Austria	39	297	64.1	28.2	7.7	17.9	51.3	30.8
Sweden	164	106	73.8	12.8	13.4	21.3	67.7	11.0
Norway	65	95	63.1	7.7	29.2	23.1	63.1	13.8
Portugal	12	89	25.0	25.0	50.0	58.3	33.3	8.3
Finland	177	88	83.1	4.5	12.4	21.5	63.8	14.7
Denmark	134	75	70.1	17.9	11.9	17.2	62.7	20.1
Greece	5	47	40.0	20.0	40.0	80.0	20.0	0.0
Ireland	100	26	58.0	9.0	33.0	43.0	47.0	10.0
Luxembourg	16	13	81.3	0.0	18.8	18.8	62.5	18.8
Total	716	1,224	70.9	11.5	17.6	24.4	60.8	14.8
Former socialist nations								
Czech Republic	2	43	100.0	0.0	0.0	0.0	50.0	50.0
Poland	2	36	100.0	0.0	0.0	50.0	0.0	50.0
Hungary	0	16	n.a.	n.a.	n.a.			
Total	4	80	100.0	0.0	0.0	25.0	25.0	50.0
Other Nations								
Japan	9	6,746	77.8	0.0	22.2	33.3	44.4	22.2
US	470	5,012	49.1	41.7	9.1	51.1	41.7	7.2
Canada	22	408	72.7	0.0	27.3	18.2	59.1	22.7
Other	5	422	60.0	0.0	40.0	40.0	40.0	20.0

Table 4: Summary Statistics for the Explanatory Variables

The table reports summary statistics on host nation characteristics, geographic, cultural, and financial differences between the home and host nations, and attributes of the corporation used as regressors in the two-stage NMNL model of bank nationality and reach decisions. The continuous explanatory variables are specified as the natural logarithm of the variable, denoted by the operator \ln . The operator Δ denotes the absolute value of the difference in values between the home and host nations. We show summary statistics with and without the logs, but only the logs are included in the regressions. *Former Socialist Nation* is a dummy variable equal to one if the host nation is the Czech Republic, Hungary, or Poland, and zero otherwise. *Bank Assets/GDP* is the aggregate value of a nation's domestic bank assets divided by gross domestic product (GDP). *Market Capitalization/GDP* is the value of a nation's private sector debt securities and stock market capitalization, divided by GDP. *Exports/GDP* is the total value of a nation's exports divided by GDP. *Bank Assets/GDP*, *Market Capitalization/GDP*, and *Exports/GDP* are all measured at the end of 1995. *Creditor Protection* is a dummy variable equal to one when a nation provides strong protection of creditor rights and has a history of strong legal enforcement, and zero otherwise. *Distance* is the distance, in miles, between the financial centers of the home and host nations. *Language Difference* is a dummy variable equal to one when a home and host nation do not share an official language, and zero otherwise. $\Delta \text{Bank Assets/GDP}$ is $|\text{Bank Assets/GDP}_{\text{Home}} - \text{Bank Assets/GDP}_{\text{Host}}|$ and $\Delta \text{Market Capitalization/GDP}$ is $|\text{Market Capitalization/GDP}_{\text{Home}} - \text{Market Capitalization/GDP}_{\text{Host}}|$. Similarly, $\Delta \ln(\text{Bank Assets/GDP})$ is $|\ln(\text{Bank Assets/GDP}_{\text{Home}}) - \ln(\text{Bank Assets/GDP}_{\text{Host}})|$ and $\Delta \ln(\text{Market Capitalization/GDP})$ is $|\ln(\text{Market Capitalization/GDP}_{\text{Home}}) - \ln(\text{Market Capitalization/GDP}_{\text{Host}})|$. *Sales* is a corporation's 1995 consolidated sales, based on reported categories in the survey. *Number of Nations Doing Business* is the number of European nations in which the corporation reports doing business. *Relationship Importance* is a dummy variable based on the corporation's perceived importance of its banking relationships, equal to one if the response was "important" or "very important," and zero otherwise. *Farm and Mining*, *Manufacturing*, and *Services & Trade* are dummy variables indicating the broad industry of the corporation, with all other industries excluded from the regressions as the base case. The number of observations is 2,043.

Explanatory Variables	Mean	Median	Minimum	Maximum	Std. Dev.
Host Nation Characteristics					
Former Socialist Nation	0.067	0	0	1	0.251
Bank Assets/GDP	0.971	0.994	0.287	1.810	0.379
$\ln(\text{Bank Assets/GDP})$	-0.123	-0.005	-1.245	0.593	0.464
Market Capitalization/GDP	1.251	1.101	0.207	1.931	0.493
$\ln(\text{Market Capitalization/GDP})$	0.119	0.097	-1.574	0.658	0.506
Exports/GDP	0.383	0.308	0.133	1.004	0.174
$\ln(\text{Exports/GDP})$	-1.044	-1.177	-2.011	0.004	0.403
Creditor Protection	0.302	0	0	1	0.459
Differences between Home and Host Nations					
Distance Between Financial Centers	1,278	894	103	10,080	894
$\ln(\text{Distance Between Financial Centers})$	6.750	6.796	4.650	9.218	0.947
Language Difference	0.863	1	0	1	0.342
$\Delta \text{Bank Assets/GDP}$	0.429	0.389	0.006	1.522	0.301
$\Delta \ln(\text{Bank Assets/GDP})$	0.530	0.457	0.006	20.513	1.600
$\Delta \text{Market Capitalization/GDP}$	0.692	0.632	0.007	2.107	0.460
$\Delta \ln(\text{Market Capitalization/GDP})$	0.578	0.472	0.011	20.226	0.758
Corporate Attributes					
Sales (billions of \$)	8.964	3.501	0.050	40.000	11.036
$\ln(\text{Sales, \$})$	8.307	8.161	3.931	10.596	1.395
Number of Nations Doing Business	13	13	1	18	5
$\ln(\text{Number of Nations Doing Business})$	2.483	2.639	0.693	2.917	0.566
Relationship Importance	0.580	1	0	1	0.493
Farming and Mining	0.109	0	0	1	0.311
Manufacturing	0.469	0	0	1	0.499
Services & Trade	0.120	0	0	1	0.325

Table 5: Regression of Bank Nationality on Host Nation Characteristics, Differences between Home and Host Nations, and Imputed Corporate Attributes

This table reports estimated partial derivatives from the two-stage nested multinomial logit (NMNL) regression of bank nationality choice on host nation characteristics, geographic, cultural, and financial differences between the home and host nations, and attributes of the corporation. Each estimated partial derivative measures the change in the probability of observing a given bank nationality choice given a small change in the regressor, holding the other variables constant, evaluated at the sample mean of the explanatory variables, i.e., $(\partial \Pr(N) / \partial Z)_{\bar{Z}}$. A *host nation bank* is headquartered in the nation in which the affiliate operates, a *home nation bank* is headquartered in the same nation as the multinational corporation's headquarters, and a *third nation bank* is headquartered in neither the host nor the home nation. The continuous explanatory variables are specified as the natural logarithm of the variable, denoted by the operator \ln . The operator Δ denotes the absolute value of the difference in \ln values between home and host nations. *Former Socialist Nation* is a dummy variable equal to one if the host nation is the Czech Republic, Hungary, or Poland, and zero otherwise. *Bank Assets/GDP* is the aggregate value of a nation's domestic bank assets divided by gross domestic product (GDP). *Market Capitalization/GDP* is the value of a nation's private sector debt securities and stock market capitalization, divided by GDP. *Exports/GDP* is the total value of a nation's exports divided by GDP. *Bank Assets/GDP*, *Market Capitalization/GDP*, and *Exports/GDP* are all measured at the end of 1995. *Creditor Protection* is a dummy variable equal to one when a nation provides strong protection of creditor rights and has a history of strong legal enforcement, and zero otherwise. *Distance* is the distance, in miles, between the financial centers of the home and host nations. *Language Difference* is a dummy variable equal to one when a home and host nation do not share an official language, and zero otherwise. $\Delta \ln(\text{Bank Assets/GDP})$ is $|\ln(\text{Bank Assets/GDP}_{\text{Home}}) - \ln(\text{Bank Assets/GDP}_{\text{Host}})|$ and $\Delta \ln(\text{Market Capitalization/GDP})$ is $|\ln(\text{Market Capitalization/GDP}_{\text{Home}}) - \ln(\text{Market Capitalization/GDP}_{\text{Host}})|$. *Sales* is a corporation's 1995 consolidated sales, based on reported categories in the survey. *Number of Nations Doing Business* is the number of European nations in which the corporation reports doing business. *Relationship Importance* is a dummy variable based on the corporation's perceived importance of its banking relationships, equal to one if the response was "important" or "very important," and zero otherwise. *Farm and Mining*, *Manufacturing*, and *Services & Trade* are dummy variables indicating the broad industry of the corporation, with all other industries excluded from the regressions as the base case. The number of observations used in the regressions is 2,043. Standard errors are in parentheses. *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5

	Estimates of $\partial \Pr(N) / \partial Z_z$.			Estimates of $\partial \Pr(N) / \partial Z_z$.		
	Dependent variable based on primary bank only			Dependent variable based on bank with widest reach		
	Host	Home	Third	Host	Home	Third
Host Nation Characteristics						
Former Socialist Nation	-0.373*** (0.087)	0.244*** (0.030)	0.129*** (0.033)	-0.366*** (0.083)	0.233*** (0.064)	0.133*** (0.033)
Ln(Bank Assets/GDP)	-0.007 (0.035)	0.031 (0.028)	-0.024* (0.013)	-0.007 (0.033)	0.032 (0.025)	-0.025* (0.013)
ln(Market Capitalization/GDP)	-0.059 (0.046)	0.039 (0.037)	0.020 (0.018)	-0.055 (0.044)	0.035 (0.035)	0.020 (0.019)
ln(Exports/GDP)	0.072* (0.038)	-0.052* (0.029)	-0.020 (0.014)	0.072** (0.036)	-0.051* (0.028)	-0.020 (0.014)
Creditor Protection	-0.016 (0.034)	-0.001 (0.027)	0.015 (0.013)	-0.010 (0.032)	-0.006 (0.025)	0.016 (0.014)
Differences between Home and Host Nations						
ln(Distance)	-0.065*** (0.008)	0.052*** (0.007)	0.013*** (0.003)	-0.060*** (0.008)	0.047*** (0.006)	0.013*** (0.003)
Language Difference	-0.036 (0.042)	-0.035 (0.031)	0.071*** (0.018)	-0.034 (0.040)	-0.043 (0.030)	0.077*** (0.019)
Δ ln(Bank Assets/GDP)	-0.047 (0.033)	0.011 (0.026)	0.036*** (0.013)	-0.032 (0.032)	-0.001 (0.025)	0.033*** (0.012)
Δ ln(Market Capitalization/GDP)	0.027 (0.035)	-0.001 (0.028)	-0.026* (0.013)	0.022 (0.033)	0.004 (0.027)	-0.026** (0.013)
Corporate Attributes						
ln(Sales)	-0.103*** (0.041)	0.113*** (0.018)	-0.010 (0.022)	-0.105** (0.043)	0.106*** (0.018)	-0.001 (0.024)
ln(Number of Nations Doing Business)	-0.228* (0.127)	0.276*** (0.054)	-0.048 (0.072)	-0.227* (0.134)	0.289*** (0.053)	-0.063 (0.080)
Relationship Importance	-0.004 (0.124)	0.016 (0.053)	-0.012 (0.071)	-0.008 (0.131)	0.018 (0.053)	-0.010 (0.077)
Farming and Mining	-0.025 (0.232)	0.000 (0.081)	0.025 (0.150)	-0.061 (0.250)	-0.016 (0.080)	0.077 (0.169)
Manufacturing	-0.129 (0.146)	0.106* (0.055)	0.023 (0.090)	-0.132 (0.154)	0.104* (0.057)	0.028 (0.096)
Services & Trade	-0.157 (0.256)	0.070 (0.073)	0.087 (0.181)	-0.158 (0.271)	0.058 (0.073)	0.100 (0.197)

Table 6: Regressions of Bank Reach on Corporate Attributes

This table reports estimated partial derivatives from multinomial logit regressions of bank reach on corporate attributes, conditioning first on the choice of bank nationality. Each estimated partial derivative measures the change in probability of observing a given conditional bank reach choice given a small change in a regressor, holding the other variables constant, evaluated at the sample mean of the explanatory variables, i.e., $(\partial \Pr(R | N) / \partial Z)_{\bar{Z}}$. A *host nation bank* is headquartered in the nation in which the affiliate operates, a *home nation bank* is headquartered in the same nation as the multinational corporation's headquarters, and a *third nation bank* is headquartered in neither the host nor the home nation. A *global bank* provides services to sample firms in at least nine of the 20 European nations and had at least \$100 billion in worldwide assets as of year-end 1995, a *local bank* provides services to sample firms only in the European nation of the bank's headquarters and had assets of less than \$100 billion, and a *regional bank* is neither global (too few nations or too small) nor local (too many nations or too large). The continuous explanatory variables are specified as the natural logarithm of the variable and denoted by the operator *ln*. *Sales* is a corporation's 1995 consolidated sales, based on reported categories in the survey. *Number of Nations Doing Business* is the number of European nations in which the corporation reports doing business. *Relationship Importance* is a dummy variable based on the corporation's perceived importance of its banking relationships, equal to one if the response was "important" or "very important," and zero otherwise. *Farm and Mining*, *Manufacturing*, and *Services & Trade* are dummy variables indicating the broad industry of the corporation, with all other industries excluded from the regressions as the base case. The number of observations used in the regressions is 2,043. Standard errors are in parentheses. *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6

		Estimates of $\partial \Pr(R | N) / \partial Z_{\bar{z}}$			Estimates of $\partial \Pr(R | N) / \partial Z_{\bar{z}}$		
First-Stage = Host Nation Bank		Dependent variable based on primary bank only			Dependent variable based on bank with widest reach		
(1350 observations)		Global	Regional	Local	Global	Regional	Local
	ln(Sales)	-0.001 (0.008)	0.023** (0.010)	-0.022*** (0.008)	-0.000 (0.009)	0.009 (0.010)	-0.009 (0.007)
	ln(Number of Nations Doing Business)	-0.070*** (0.019)	0.070*** (0.025)	0.000 (0.020)	-0.056** (0.022)	0.078*** (0.025)	-0.022 (0.016)
	Relationship Importance	0.020 (0.023)	0.008 (0.028)	-0.028 (0.022)	0.016 (0.025)	0.014 (0.028)	-0.030 (0.019)
	Farming and Mining	-0.005 (0.039)	0.016 (0.048)	-0.011 (0.038)	0.066 (0.042)	-0.061 (0.048)	-0.005 (0.031)
	Manufacturing	0.008 (0.025)	0.009 (0.031)	-0.018 (0.024)	0.044 (0.028)	-0.003 (0.031)	-0.041** (0.020)
	Services & Trade	0.024 (0.036)	-0.037 (0.045)	0.012 (0.035)	0.017 (0.042)	0.000 (0.046)	-0.017 (0.030)
First-Stage = Home Nation Bank							
(347 observations)		Global	Regional		Global	Regional	
	ln(Sales)	0.140*** (0.025)	-0.140*** (0.025)		0.125*** (0.024)	-0.125*** (0.024)	
	ln(Number of Nations Doing Business)	0.335*** (0.073)	-0.335*** (0.073)		0.328*** (0.070)	-0.328*** (0.070)	
	Relationship Importance	0.017 (0.071)	-0.017 (0.071)		0.018 (0.068)	-0.018 (0.068)	
	Farming and Mining	0.005 (0.110)	-0.005 (0.110)		-0.001 (0.104)	0.001 (0.104)	
	Manufacturing	0.138* (0.075)	-0.138* (0.075)		0.130* (0.073)	-0.130* (0.073)	
	Services & Trade	0.108 (0.102)	-0.108 (0.102)		0.090 (0.097)	-0.090 (0.097)	
First-Stage = Third Nation Bank							
(346 observations)		Global	Regional		Global	Regional	
	ln(Sales)	-0.002 (0.021)	0.002 (0.021)		0.015 (0.021)	-0.015 (0.021)	
	ln(Number of Nations Doing Business)	-0.054 (0.049)	0.054 (0.049)		-0.069 (0.048)	0.069 (0.048)	
	Relationship Importance	-0.022 (0.054)	0.022 (0.054)		-0.016 (0.052)	0.016 (0.052)	
	Farming and Mining	0.052 (0.092)	-0.052 (0.092)		0.140 (0.093)	-0.140 (0.093)	
	Industry	0.068 (0.063)	-0.068 (0.063)		0.068 (0.061)	-0.068 (0.061)	
	Services & Trade	0.196** (0.098)	-0.196** (0.098)		0.195** (0.097)	-0.195** (0.097)	

Table 7: Imputed Effects on Unconditional Bank Reach of Host Nation Characteristics, Differences between Home and Host Nations, and Corporate Attributes

This table reports imputed partial derivative estimates from the two-stage nested multinomial logit (NMNL) model of host nation characteristics, geographic, cultural, and financial differences between the home and host nations, and attributes of the corporation on bank reach. Each estimated partial derivative measures the change in probability of observing a given bank reach choice given a small change in a regressor, holding the other variables constant, evaluated at the sample mean of the explanatory variables, i.e., $(\partial \Pr(R) / \partial Z)_{\bar{Z}}$. A *global bank* provides services to sample firms in at least nine of the 20 European nations and had at least \$100 billion in worldwide assets as of year-end 1995, a *local bank* provides services to sample firms only in the European nation of the bank's headquarters and had assets of less than \$100 billion, and a *regional bank* is neither global (too few nations or too small) nor local (too many nations or too large). The continuous explanatory variables are specified as the natural logarithm of the variable, denoted by the operator *ln*. The operator Δ denotes the absolute value of the difference in *ln* values between home and host nations. *Former Socialist Nation* is a dummy variable equal to one if the host nation is the Czech Republic, Hungary, or Poland, and zero otherwise. *Bank Assets/GDP* is the aggregate value of a nation's domestic bank assets divided by gross domestic product (GDP). *Market Capitalization/GDP* is the value of a nation's private sector debt securities and stock market capitalization, divided by GDP. *Exports/GDP* is the total value of a nation's exports divided by GDP. *Bank Assets/GDP*, *Market Capitalization/GDP*, and *Exports/GDP* are all measured at the end of 1995. *Creditor Protection* is a dummy variable equal to one when a nation provides strong protection of creditor rights and has a history of strong legal enforcement, and zero otherwise. *Distance* is the distance, in miles, between the financial centers of the home and host nations. *Language Difference* is a dummy variable equal to one when a home and host nation do not share an official language, and zero otherwise. $\Delta \ln(\text{Bank Assets/GDP})$ is $|\ln(\text{Bank Assets/GDP}_{\text{Home}}) - \ln(\text{Bank Assets/GDP}_{\text{Host}})|$ and $\Delta \ln(\text{Market Capitalization/GDP})$ is $|\ln(\text{Market Capitalization/GDP}_{\text{Home}}) - \ln(\text{Market Capitalization/GDP}_{\text{Host}})|$. *Sales* is a corporation's 1995 consolidated sales, based on reported categories in the survey. *Number of Nations Doing Business* is the number of European nations in which the corporation reports doing business. *Relationship Importance* is a dummy variable based on the corporation's perceived importance of its banking relationships, equal to one if the response was "important" or "very important," and zero otherwise. *Farm and Mining*, *Manufacturing*, and *Services & Trade* are dummy variables indicating the broad industry of the corporation, with all other industries excluded from the regressions as the base case. The number of observations used in the regressions is 2,043. Standard errors are in parentheses. *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 7

	Estimates of $\partial \Pr(R) / \partial Z_z$			Estimates of $\partial \Pr(R) / \partial Z_z$		
	Dependent variable based on primary bank only			Dependent variable based on bank with widest reach		
	Global	Regional	Local	Global	Regional	Local
Host Nation Characteristics						
Former Socialist Nation	0.161** (0.073)	-0.093 (0.087)	-0.068*** (0.016)	0.146* (0.078)	-0.099 (0.080)	-0.047*** (0.011)
ln(Bank Assets/GDP)	0.003 (0.031)	-0.002 (0.037)	-0.001 (0.007)	0.003 (0.033)	-0.002 (0.034)	-0.001 (0.005)
ln(Market Capitalization/GDP)	0.025 (0.041)	-0.015 (0.048)	-0.012 (0.009)	0.022 (0.044)	-0.015 (0.045)	-0.007 (0.006)
ln(Exports/GDP)	-0.031 (0.032)	0.018 (0.039)	0.013* (0.007)	-0.029 (0.035)	0.020 (0.036)	0.009* (0.005)
Creditor Protection	0.007 (0.030)	-0.004 (0.036)	-0.003 (0.007)	0.004 (0.032)	-0.003 (0.033)	-0.001 (0.004)
Differences between Home and Host Nations						
ln(Distance)	0.028*** (0.007)	-0.016** (0.008)	-0.012*** (0.002)	0.024*** (0.008)	-0.016** (0.008)	-0.008*** (0.001)
Language Difference	0.015 (0.037)	-0.009 (0.044)	-0.006 (0.008)	0.014 (0.040)	-0.009 (0.041)	-0.005 (0.006)
$\Delta \ln(\text{Bank Assets/GDP})$	0.020 (0.029)	-0.012 (0.035)	-0.008 (0.006)	0.013 (0.031)	-0.009 (0.032)	-0.004 (0.004)
$\Delta \ln(\text{Market Capitalization/GDP})$	-0.012 (0.031)	0.007 (0.036)	0.005 (0.007)	-0.009 (0.033)	0.006 (0.034)	0.003 (0.005)
Corporate Attributes						
ln(Sales)	0.067* (0.035)	-0.031 (0.054)	-0.035*** (0.014)	0.065 (0.041)	-0.045 (0.054)	-0.020* (0.011)
ln(Number of Nations Doing Business)	0.098 (0.104)	-0.057 (0.161)	-0.041 (0.038)	0.101 (0.125)	-0.055 (0.161)	-0.046 (0.029)
Relationship Importance	0.019 (0.105)	0.003 (0.160)	-0.022 (0.039)	0.017 (0.125)	0.006 (0.161)	-0.024 (0.031)
Farming and Mining	0.011 (0.198)	0.002 (0.291)	-0.013 (0.071)	0.085 (0.239)	-0.073 (0.297)	-0.012 (0.056)
Manufacturing	0.090 (0.124)	-0.053 (0.185)	-0.037 (0.045)	0.114 (0.147)	-0.065 (0.186)	-0.048 (0.036)
Services & Trade	0.118 (0.216)	-0.099 (0.312)	-0.019 (0.074)	0.106 (0.259)	-0.072 (0.315)	-0.033 (0.058)



WHAT DO FOREIGNERS WANT? EVIDENCE FROM TARGETS IN BANK CROSS- BORDER M&As

STEFANO CAIAZZA
Università di Roma "Tor Vergata"

ANDREW CLARE
Cass Business School, London

ALBERTO F. POZZOLO
Università degli Studi del Molise
MoFiR

MoFiR working paper n° 45

November 2010

What do foreigners want? Evidence from targets in bank cross-border M&As

Stefano Caiazza
Università di Roma “Tor Vergata”,

Andrew Clare
Cass Business School, London

and

Alberto Franco Pozzolo*
Università degli Studi del Molise.

Abstract

Given the recent traumatic events in the world's banking industry it is important to understand what drives bankers to create larger and larger, often multinational, banking groups. In this paper we investigate whether the targets in cross-border bank M&As are materially different from those banks targeted in domestic M&A deals. To address this question we use a sample of over 24,000 banks from more than 100 countries. We begin by estimating the probability that a bank will be a M&A target; this probability is based upon both bank specific and country specific characteristics. The sample also naturally includes banks that were not involved in any M&A deal, this set of banks acts as a control sample for the study. We then estimate a multinomial model that distinguishes between (i) targets in domestic operations, (ii) targets in cross-border operations and (iii) non-targets. The main message of the paper is that, with few exceptions, domestic and foreign investors target similar banks. In particular, contrary to what one might expect, bank size does not affect differently the probability of being a domestic or a cross-border target, but it has a positive and highly significant effect in both cases. What differs between national and international M&As are the characteristics of the countries where banks operate. On average, banking systems characterized by lower leverage, higher cost inefficiency and lower liquidity are more likely to be targets of cross-border acquisitions, while none of this characteristics affects the likelihood of being acquired domestically.

JEL classification: G15, G21, G34

Keywords: M&As, bank, bank internationalisation.

*

Address for correspondence: Alberto Franco Pozzolo, Dipartimento di Scienze Economiche, Gestionali e Sociali, Università degli Studi del Molise, via de Sanctis, 86100, Campobasso, Italia. E-mails: caiazza@economia.uniroma2.it; a.clare@city.ac.uk; pozzolo@unimol.it. We would like to thank seminar participants at the Università Politecnica delle Marche and at the XVI International “Tor Vergata” Conference on Banking and Finance, Roma, December 2008. We gratefully acknowledge financial support from the Italian Ministry for Education (Prin project no. 2006134152).

1. Introduction

The events in the global banking industry since the summer of 2007, that have included widespread bank bailouts and both full and part nationalisation of many banks, should cause us to question the banking industry's desire over the past three decades to create larger and larger institutions, often multinationals. Their desire to merge with and to acquire other banks has arguably led to the creation of an increasing number of large banking groups that are clearly too big to fail. However, it is possible that this creation of "*too big to fail*" entities is just a by-product of a competitive environment for corporate control rather than a deliberate policy on behalf of bank executives, and normally one would deem such competition as being essential for the well being of any corporate sector. But given recent events it is perhaps more important than ever to try to understand what drives Mergers and Acquisitions (M&A) activity in this crucial sector of the global economy.

The pre-credit crunch academic literature on bank M&A activity has already analysed many different aspects of this market, ranging from the determinants of a merger or acquisition, the effects that such deals might have on the restructured company and its markets, the role that advisers play and the different means by which funding is obtained for these transactions. M&A activity increased substantially over the last three decades leading up to the start of the credit crisis in 2007. This increase in corporate deals in this sector began in the US in the early 1980s, but only took off in Europe around ten years later after the EU's directive on financial market integration (Amel *et al* 2004, DeYoung *et al* 2009, Pozzolo 2009). Prior to the impact of the global credit crunch the consensus was that this consolidation in the banking sector had been driven by a combination of technological and financial innovation and the pre-credit crunch trend towards financial deregulation (for example, see Berger *et al* 1999).

Although the majority of M&A activity in the banking sector has been domestic in nature, cross-border deals were twice as common in the years immediately preceding the credit crunch as they were in the early 1990s. As the credit bubble inflated them it seems that more and more banks were looking overseas for partners and targets (Figure 1). Various aspects of this internationalisation in the banking sector have been studied in recent research. Researchers have analysed the nature of the expansion of cross-border banking deals, the characteristics of the bidding banks and the impact that these deals have had upon the subsequent performance of the new corporate entity.¹ However, perhaps surprisingly, with the exception of Correa (2009) there has been very little research that has focused on the characteristics of the target banks in these

¹ See for example Berger *et al* (2000), Focarelli and Pozzolo (2001), Vander Venet (2002).

cross-border M&As. In this paper, our main aim is to focus on this particular aspect of M&A activity by investigating whether the targets in cross-border bank M&As are materially different from those banks targeted in domestic M&A deals.² Are the sorts of banks targeted in a domestic deal different from those targeted in a cross-border deal? As such, our research contributes to the wider understanding of the pre-credit crunch drive for consolidation in the banking industry.

To answer these and related questions we use a sample of over 24,000 banks from more than 100 countries between 1992 and 2006. We begin by estimating the probability that a bank will be a M&A target; this probability is based upon both bank specific and country specific characteristics. The sample also naturally includes banks that were not involved in any M&A deal, this set of banks acts as a control sample for the study. We then estimate a multinomial model that distinguishes between (i) targets in domestic operations, (ii) targets in cross-border operations and (iii) non-targets.

Our results show that banks incorporated in countries that are larger and that are supervised by a larger number of regulatory authorities are significantly less likely to be targets in cross-border operations. In addition to these two variables, there are a number of other differences between the characteristics of domestic and cross-border takeover targets, but none of them turns out to be statistically significant. The size of the banking sector, for example, has a negative effect on the probability that a bank is a M&A target, but such effect is statistically significant only in the case of domestic operations. Similarly, bank specific characteristics such as profitability, specialization and cost-efficiency have in general very similar effects in the case of domestic and cross-border deals.

The rest of the paper is organised as follows: in Section 2 we briefly review the empirical literature on bank mergers and acquisitions that is relevant for work here; in Section 3 we describe the data set, while in Section 4 we present the empirical specification of the model used in our estimation, in Section 5 we present our results, and we conclude the paper in Section 6 with final thoughts and suggestions for future research in this area.

2. Relevant literature

The empirical literature that has focused on the characteristics of banks that have been involved in M&A activity has come to the general conclusion that more ‘efficient’ banks tend to buy smaller, less efficient ones (DeYoung *et al* 2009). These less efficient targets tend to have poor capital ratios (Wheelcok and Wilson 2000), lower levels of profitability (Akhibe *et al* 2004) and a lower

² There is a related literature on the characteristics of targets in the manufacturing sector; for example see Palepu (1986) and Shleifer and Vishny (2003).

level of efficiency (Pasiouras *et al* 2007).³ As a result, the pre-2007 empirical evidence appeared to suggest that this M&A activity tended to improve the efficiency of target banks, and therefore also tended to have a positive effect on shareholder value overall, although this is more evident in European-based M&A deals.⁴

With regard to cross-border M&A activity the available empirical evidence reveals a number of stylised facts. First, banks are more likely to target overseas banks where the links between the relevant countries are stronger, both in economic, cultural and institutional terms (see for example, Buch and DeLong 2004, Claessens and Van Horen 2007, or Focarelli and Pozzolo 2008). Second, the targets in these cross-border deals are more likely to be located in countries with higher expected growth (see Focarelli and Pozzolo 2005). And finally, the presence of specific regulations and the degree of concentration in the banking sector have significant but unclear effects on the pattern of these cross-border expansions (see for example, Hernando *et al.* 2008, Correa 2009, Pasiouras *et al* 2007, Focarelli and Pozzolo 2005, or Hannan and Pilloff 2006). Correa (2009), which represents the only study to our knowledge that compares domestic and cross-border targets in bank M&A operations, finds that banks that are acquired by foreign investors tend to be larger and have poorer performance than those acquired by domestic institutions. However, the empirical analysis might be compromised because the control sample used in the study only includes banks that were either domestic or cross-border M&A target over the sample period.

More broadly, our work is related to the role of economic borders on cross-border banking activities. On the one hand, as suggested by Carbò Valverde *et al* (2009), the informational asymmetries that make it more difficult to organize cross-border M&As may be one of the reasons at the root of the policy pursued by many European banks, in many cases encouraged by national authorities, of creating large “national champions”. This can be seen as a defensive policy, since large domestic banks might be less likely to be targets in cross-border M&As. However, as suggested by Degryse *et al* (2009), once domestic banks increase their size and focus on larger and more transparent borrowers, they might become more transparent and therefore be more easy targets also in cross-border M&As, as some recent experiences such as the acquisition of the German HVB by the Italian Unicredit or of the UK Abbey National by the Spanish Santander have shown.

³ For research relating to the characteristics of these targets see Focarelli *et al.* (2003), Hernando *et al.* (2008), Correa (2009), Lanine and Vander Vennet (2007).

⁴ See for example Cybo-Ottone and Murgia (2000) and Campa and Hernando (2006).

3. Data and summary statistics

In this paper we attempt to identify whether banks targeted by other domestic banks are materially different from those that are targeted by overseas banks. To this end we make use of a substantial data set. The initial sample of data includes all those bank mergers and acquisitions that were announced and completed between 1988 and 2006 and that have a record in the *Platinum Worldwide Mergers and Acquisition Database*, which is a commercial database provided by Security Data Corporation (SDC). Each record includes information about the name, main sector of operation and country of residence of the bidder and of the target, several identification codes (such as ISIN and SEDOL), the announced and effective dates of the deal, and details about the deal status. In our sample, we only include completed M&As and we take as our reference the effective date of realisation. We define domestic M&As as those where the nationalities of the bidder and of the target banks are identical; we define cross-border M&As as those where they differ.⁵ Our initial data set comprises over 19,000 deals. We obtained bank balance sheet data from Bankscope, which is a commercial database provided by Bureau van Dijk. We then merged the M&A data set from SDC with the balance sheet information from Bankscope using company SEDOL code, which is the only identifier common to the two databases. Having done this our data set comprised 185,962 observations on 24,325 banks between 1992 and 2006, which involved in 1,474 M&A deals, of which 1,176 were domestic and 298 cross-border. The incidence of domestic deals is nearly four times that of operations involving banks from different countries, confirming once again that national borders matter. We gathered data on GDP and the ratio of private credit to GDP for each country from the IMF World Economic Outlook database and from the World Bank database, respectively. Further, following the literature on the determinants of M&As, we include in our analysis two key indices of the institutional characteristics of a country: the extent of disclosure of corporate decisions and the strength of legal rights, which measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending.⁶ Both indices are produced within the Doing Business Project by the International Finance Corporation, a corporation part of the World Bank.⁷ Finally, data on the number of bank supervisors is from Barth *et al* (2001), updated to 2008.

Table 1 shows a full summary of the deals that comprise our database by country. Domestic deals are widespread over our sample. The highest number of domestic operations over this sample

⁵ As is typical for research in this area, we do not distinguish between mergers and acquisitions.

⁶ The extent of disclosure is one of the three components of the index of investor protection used by Rossi and Volpin (2004); in unreported analyses available upon request we verified that this component is the only one with a robust and significant effect in our framework.

⁷ See <http://www.doingbusiness.org/Downloads/>.

period were seen in USA, where 337 deals were completed representing 29% of the domestic deal sample (shown in column 3 of Table 1). There were also a large number of deals in Italy and Japan, 138 and 123 respectively. In total, targets located in G10 countries accounted for nearly 70% of all the domestic deals in our sample.⁸ German targets represented a significant proportion of our sample of cross-border deals, 17 in total representing 6% of the total of cross-border deals. Banks from Italy (14), Brazil (13) and France (13) were also frequent targets in cross-border M&A transactions. In total, targets located across G10 countries accounted for nearly one quarter of all cross-border deals. The relative higher incidence of domestic as opposed to cross-border M&As signals that banks in larger countries are, all else equal, less likely to be acquired by foreign investors.

Figure 1 plots the number of both domestic and cross-border bank M&A deals on an annual basis from 1992 to 2006. Clearly, domestic operations are much more frequent than cross-border deals, a fact well known in the empirical literature (see, e.g., Focarelli and Pozzolo, 2001). Both domestic and cross-border deals are evenly distributed across our sample period with slightly more than half of the deals being completed before 2000, both for domestic and cross-border operations. Both types of deal peaked before the collapse in the stock market in 2001, before recovering again as the equity markets recovered too.⁹

In Table 2 we present some descriptive statistics for the data used in the empirical analysis. The average value of total GDP is \$236 billion, expressed in purchasing power parity terms. The smallest value in our sample is for Albania (\$4.18 billion) and the largest, naturally, for the USA (\$10,235 billion). Private sector credit expressed as a proportion of GDP is very high for a number of countries including many of those that have since suffered severely from the effects of the credit crunch. The average of this variable for the G10 countries is just above unity. The data on bank concentration were calculated by summing the market share of the five largest banks in each country. The average level of concentration, according to this measure, is 67%; Sweden is highly concentrated, with an index of 95% while Luxemburg (23%) and USA have the lowest concentration (25%). The average value for the G10 countries is 56%. The number of authorities responsible for bank supervision does not change with the development of the financial markets. More than one authority is present in less developed countries (e.g., Malaysia) as well as among the G10s (USA). The Extent of disclosure index, that measures investor protection considering the degree of disclosure of corporate decisions to third parties, ranges from 0 in countries such as Laos

⁸ G10 countries are Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, Switzerland, United Kingdom, United States. Our sample does not include operations with Canadian target banks.

⁹ Pozzolo (2009) analyses more in detail the patterns of bank M&As providing some explanations of the drop registered at the beginning of the decade.

and Sudan, to 10 in France and UK, but also in Malaysia and Thailand. It is 7 in USA. Finally, the Strength of legal rights index, that measures the degree to which laws protect the rights of borrowers and lenders, ranges from 1 in countries such as Bolivia and Syria, to 10 in Malaysia and Singapore. It is 9 in UK and 8 in USA.

Table 3 reports summary statistics for the individual banks in our sample. Panel A provides average values for the indicators for those banks that were not involved in M&As, while Panels B and C provide the same information for those involved in domestic and cross-border M&As respectively. Summary statistics are calculated for the sample of banks in each category in the year before the M&A event took place. In other words, each bank contributes to the average value of total assets of domestic targets with its asset value in the year before it has merged or has been acquired. Bank summary statistics are calculated by excluding values larger than the 99th or smaller than the 1st percentile.

Perhaps surprisingly, targets in cross-border and domestic M&As are larger on average than those banks that have not been involved in any M&A deal. The average and median total assets of targets not involved in M&A activity are \$1,920 million and \$260 million respectively (panel A); for those banks involved in domestic M&As they are, respectively, \$5,207 million and \$942 million (panel B); and for cross-border deals the numbers are respectively \$4,193 million and \$1,143 million (panel C). The findings of Akhige *et al.* (2003) that targets are less profitable than average is also confirmed in the case of cross-border M&As. The return on assets is higher for the set of cross-border target banks than for the domestic banks and very similar to the return on assets achieved by those banks not involved in M&A activity over this period. Also interest margin is higher for cross-border targets (4.3%), and it is lower for non targets (3.8%) and domestic targets (3.6%). On average cross-border and non targets have the same share of revenues coming from non traditional banking activities (13%), as opposed to 12% for domestic targets. Banks that have not been targets have higher capitalization (11.3%) than those of domestic operations (9.8%); while cross-border targets have an intermediate level (10.9%). Both domestic and cross-border targets are on average less cost efficient: the cost to income ratio of target banks is respectively 71.6% and 68.6% for those involved in domestic and cross-border deals, higher than for those not involved in M&A over this period (67.3%). Finally, the ratio of liquid to total assets is higher for target banks, more so for those involved in cross-border (23.9%) than domestic deals (20.2%).

4. The Empirical model

In Section 3 we presented descriptive statistics that showed that there appeared to be differences in the characteristics of banks that have not been involved in any M&A deal, and those that have

been involved in either a domestic or a cross-border deal. Further, some differences emerged between domestic and cross-border targets. We now approach this issue in a more formal context by specifying a model to test the null hypothesis that the two sets of targets have the same characteristics. We conduct this analysis in two stages. We begin by using a binomial model to estimate the probability that a bank is an M&A target. The binomial model specification that we estimate is shown as follows:

$$\Pr(Y_{ijt} = 1) = F(X_{ijt-1}, C_{jt-1}, TD_t) \quad (1)$$

where Y_{ijt} takes the value of one if bank i from country j at time t is involved in an M&A and zero otherwise; X_{it-1} is a set of bank specific characteristics at time $t-1$, expressed as differences from year and country averages;¹⁰ C_{jt} represents a set of country specific characteristics; and TD_t are a set of time dummies. Since some of the explanatory variables only vary at the country level, our estimates might be affected by the aggregate regressor problem, i.e. by possible within-class disturbance correlation (Moulton, 1990). For this reason, the standard errors are clustered at the country level.

We then estimate a multinomial model that distinguishes between (i) targets in domestic operations, (ii) targets in cross-border operations and (iii) non-targets. Employing the same set of explanatory variables used to estimate expression (1), we therefore estimate:

$$\Pr(Y_{ijt} = k) = F(X_{it-1}, C_{jt-1}, TD_t) \quad k = 0, 1, 2 \quad (2)$$

where $Y_{ijt} = 0$ if bank i of country j at time t is not a target; $Y_{ijt} = 1$ if it is a target in a domestic M&A; and $Y_{ijt} = 2$ if it is a bidder in a cross-border M&A.

While the binomial specification could be estimated either using logit or probit, multinomial choice models estimated using a logistic specification impose the independence of irrelevant alternative hypothesis, that is rejected in our sample. For this reason we estimate both models using a probit specification.

¹⁰ We chose this specification since we did not want to include country fixed effects because this would have made impossible to estimate the between-countries effects of country characteristics and, at the same time, we wanted to account separately for the effect of average characteristics of banks in each country and for the impact of bank individual characteristics. Besides, in most cases, maximization of the likelihood function for multinomial probit estimates including country fixed effects did not reach converge.

5. Empirical results

Baseline specification

Table 4 presents the results of the estimates of the baseline specification. The columns headed (1) and (2) in Table 4 respectively report the coefficients and the marginal effects (multiplied by 10,000) evaluated at the sample median of the binomial specification of the model in expression (1). The columns headed (3) to (6) report instead the coefficients and the marginal effects of the multinomial specification of the model in expression (2). Column (7) shows the statistical significance of the test for the difference in the coefficients for domestic and cross-border M&As in the multinomial specification. As already mentioned above, in all specifications, individual bank-specific characteristics are expressed as differences from year and country means. In each column, Panel A reports the results for general country-specific characteristics, Panel B shows the results for year and country averages of bank characteristics, and Panel C for the individual bank levels, expressed as differences from year and country averages.

Binomial choice model

Column (1) of Panel A shows that banks operating in countries with more developed credit markets (a higher credit to GDP ratio), higher bank concentration, a larger number of supervisors of banking activities, represented by the dummy variable “multiple sup”, and where collateral and bankruptcy laws provide a stronger protection of the rights of borrowers and lenders (Strength of legal rights) are less likely to be M&A targets. The coefficients on the size of the economy (total GDP) and the transparency of related-party transactions, a key measure of investor protection, are instead statistically insignificant.

Next, in Panel B of Table 4, we consider the effect of year and country averages of bank-specific characteristics. Column (1) shows that banks are more likely to be M&A targets in countries where the average size of credit institutions is larger and where cost efficiency is lower. None of the other characteristics is statistically significant.

Finally, in Panel C of Column (1) we report the coefficients of the bank specific characteristics. M&A targets are larger than non-targets, as confirmed by the positive and highly significant coefficient on Total assets. Recall that we calculated all bank specific variables as differences with respect to year and country means, and these results show therefore that targets are on average larger than their country peers. Furthermore, they are less profitable and less innovative, as shown by the negative and significant coefficients on Returns on assets and on the share of Other operative income over total income (a standard measure of the incidence of more non-traditional banking activities). And finally, they are less cost efficient, as shown by the positive coefficient of

the Cost to income ratio. By contrast, net interest margins and capitalization seem to have little impact on the likelihood of being a target or not. Overall, these results provide additional support for the results of previous research on bank M&As (see, e.g., Akhigbe et al., 2003) and on bank internationalisation based on country level characteristics (see, for example, Focarelli and Pozzolo 2005), showing that target banks are typically more traditional and less profitable and efficient than average.

Column (2) presents the marginal effects of each explanatory variable, evaluated at the sample median and multiplied by 10,000. The two variables with the largest influence are the individual bank share of other operative income over total income and the number of authorities involved in supervision. The marginal effects of size and profitability are smaller than that of specialisation, and that of cost efficiency is negligible.

Multinomial choice model

As argued above, cross-border deals are far less frequent than domestic deals, suggesting that investors may see them as different types of operations, organized possibly for very different purposes.¹¹ It is therefore not obvious why domestic and foreign investors would choose to buy or merge with the same types of banks. To test this hypothesis we have then estimated the multinomial choice model of expression (2). The results are presented in Columns (3) to (6). The most noticeable finding is that only four coefficients are significantly different between domestic and cross-border targets; and three of them represent country level characteristics. Specifically, banks incorporated in countries that are smaller are significantly less likely to be targets in cross-border operations, while the size of the country has no significant effect in the case of domestic operations. The presence of multiple bank supervisors has a negative effect on the probability that a bank is a target in both domestic and cross-border deals, but such effect is much larger in the latter case. Banks operating on countries with a higher average share of revenues coming from non-traditional banking activities are also significantly less likely to be targets in cross-border M&As. But although the sign of the coefficient of other operative income over total income is positive in the case of domestic deals and negative in the case of international operations, none of them is statistically significant per se. Finally, less profitable banks are more likely to be targets in domestic operations, but this is not the case for cross-border operations. In other words, investors at home buy banks that are relatively less profitable on average, while this result is not robust for investors from abroad.

¹¹ Barba *et al* (2010), for example, show that multinational banks can use more efficiently their internal capital markets than domestic banks to smooth the correlation between deposits and loans, and Gulamhussen *et al* (2010) show that bank international diversification augments corporate value.

In addition to the previous four characteristics, some additional features differ between targets of domestic and cross-border takeovers, although they do not turn out to be statistically significant. The index for Strength of legal rights in protecting borrowers and lenders has a negative and statistically significant effect in the case of domestic M&As, but not for cross-border deals. Countries in which banks are on average more capitalized and less liquid are more likely to host cross-border M&A targets, but these country characteristics have no statistically significant impact on the likelihood of domestic operations. Among bank specific variables, in addition to the different effect of profitability, we find that bank specialisation towards less traditional activities, proxied by the share of other operative income over total income, has a negative effect on the probability that it is a target in a domestic M&A, but no statistically significant impact in the case of cross-border deals, although the sign and the magnitude of the coefficients are comparable. Finally, and most remarkably, it is confirmed that larger and less cost efficient banks are more likely to be targets in both domestic and cross-border M&As.

In synthesis, these results show that domestic and foreign investors target similar banks, and what differs mostly between national and international M&As are the characteristics of the countries where banks operate, and the average country characteristics of each banking system. Most interestingly, and contrary to what one might expect, size has a positive and highly significant effect on the probability that a bank is a domestic as well as a cross-border target, shedding some doubts on the hypothesis that the “national champions” policy succeeded in limiting foreign entry. In the following, we will verify if and how the results of the baseline specification change when we consider different samples of banks and countries.

Alternative specifications

Tables 5 to 9 have the same structure of Table 4, but present the results obtained using different specifications with respect to the baseline model. In particular, we focus on larger banks, banks in developed (G10) and less developed countries, and banks in economically integrated areas (EU15 and EMU).¹²

Large banks

Columns (1) and (2) of Table 5 present the coefficients and the marginal effects obtained from the estimates of expression (1), but where the smaller banks (defined as those with total assets below our sample median of slightly more than 25 billions of US\$) have been excluded, thereby reducing the number of observations from 136,183 to 68,335. The overall results are qualitatively unchanged, although some coefficients have different significance. In particular two previously

¹² In unreported regressions we also focused on the subsample of deals that led to the acquisition of 50% or more of the target's equity, obtaining very similar results as those of the baseline specification.

statistically significant coefficients on country specific characteristics (Bank concentration and the dummy for multiple supervisors) and two on individual bank characteristics (Return of assets and Cost to income ratio) become statistically insignificant, and one bank specific coefficient becomes significant (liquid assets over total deposits). They all maintain the same sign and a similar magnitudes. Also the marginal effects (column (2)) show little changes with respect to the baseline specification.

Also the results of the multinomial model, reported in columns (3) to (6), broadly confirm those of the baseline specification. For three of the four variables that had a significantly different effect on domestic and cross-border targets in the baseline specification – GDP, the dummy for multiple supervisors and the average ratio of other operative income to total income – we obtain the same result also in the subsample of larger banks. In addition, in the sample of larger banks also the coefficients for the individual ratio of bank equity over total assets (the inverse of leverage) are significantly different from each other, although only that for cross-border M&As is positive and statistically significant, suggesting that more capitalized banks are less likely to be acquired by foreign investors. On the contrary, the coefficients on individual bank profitability, that significantly differed in the baseline specification, are both statistically insignificant, as well as their difference.

Finally, Column (3) shows that the negative coefficients of Other operative income over total income and of liquidity in the binomial specification are entirely explained by domestic deals, suggesting that bidders are less likely to acquire a foreign bank with the intent to innovate its activities or to inject liquidity.

G10 and non-G10 countries

In Table 6 we present results for the sub-sample of banks in the G10 countries. With respect to the baseline specification, the number of observations slightly drops to 122,215. In the binomial specification the results change in many respects (Column (1)). First, the coefficients of Private credit over GDP and of bank concentration become smaller and statistically insignificant. Second, the coefficient on the index for the Extent of disclosure becomes positive and statistically significant. Third, the coefficient on average bank capitalization in the country (Equity over total assets) becomes negative and statistically significant. And fourth, the coefficient of average Other operative income over total income, our measure of banks specialization, becomes statistically significant, while that at the individual bank level becomes insignificant.

In the multinomial specification (Columns (3) and (4)), the coefficients differ between domestic and cross-border M&As in six cases, and none of them coincides with those of the baseline specification. Among general country characteristics, the indexes of the institutional characteristics

in corporate activities have a statistically significant effect only on the probability that a bank is a target in a domestic deal, and the difference with respect to the effect on cross-border deals is also statistically significant (Panel A). Similarly, the average size and capitalization of the banks in each country only have a significant effect in the case of domestic deals, and the difference with respect to the coefficient for cross-border deals is also statistically significant (Panel B). The effect of individual bank innovativeness, proxied by the share of other income over total income, is significantly different from zero for both domestic and cross-border M&As, but it has a negative impact on domestic operations and a positive impact on international deals, although none of the two coefficients is individually significant (Panel C). Finally, less liquid banks in the G10s have a lower probability of being targets in domestic operations, and a higher probability in the case of foreign acquisitions, suggesting that foreign investors might be interested in acquiring foreign intermediaries to inject them liquidity.

The picture is different when we consider non-G10 countries. The results in column (1) of Table 7 shows that banks are more likely to be M&A targets in countries with lower bank concentration and fewer bank supervisors (Panel A), and where on average credit institutions are larger, are more profitable in the traditional banking activities (i.e., have a higher Net interest margin) and are less liquid (Panel B). Among individual bank characteristics, targets in non G10 countries are typically larger, have a higher profitability from traditional activities and a lower incidence of revenues from innovative activities, and they are less cost efficient. In other words, large, traditional and low efficient banks are more likely to be targets (Panel C).

The multinomial specification (Columns 3 and 4) shows that country size has a significantly different effect on the probability that a bank is a target in a domestic and in a cross-border M&A (Panel A).¹³ The difference between the two coefficients is statistically significant, although none of them is individually so. Moreover, the size of the credit market has a negative effect on the probability that a bank is a target in a cross-border deal, suggesting that foreign investors prefer to enter less financially developed countries, possibly to export their superior skills, consistent with Focarelli and Pozzolo (2005). It has no effects on domestic deals. The results in Panel B show that banks operating in countries where on average Net interest margins are higher are more likely to be domestic targets. Low average cost efficiency has instead a significant impact only on the probability of being a foreign target. At the individual bank level (Panel C), a higher Net interest margin increases the probability of being a domestic target, stronger specialization towards more innovative banking activities increases the probability of being a cross-border target, and cost

¹³ In the multinomial specification it was not possible to include the dummy for multiple supervisors because our sample does not include instances in which the target bank in a cross-border deal is hosted in a non-G10 country where multiple authorities are responsible for bank supervision.

efficiency has a similar impact on the probability of being acquired by either domestic or foreign investors.

EU15 countries

In Tables 8 and 9 we focus on a subset of countries with stronger economic, financial and institutional integration: The European Union before the recent enlargement (EU15) and the European Monetary Union (EMU). In the case of EU15 countries, the results of the binomial specification model, reported in Columns (1) and (2), show that targets are less likely to be located in countries that are large, have more developed banking markets and have a stronger protection of legal rights (Panel A). Among average bank characteristics, only liquidity has a statistically significant effect, reducing the probability that a bank is an M&A target (Panel C). With respect to individual bank characteristics (Panel C), consistent with previous results, we find that targets are larger, less cost efficient and less liquid. Moreover, within the EU15, they are also more capitalized, as shown by the positive sign of the coefficient on Equity over total assets.

The multinomial specification shows a large number of general country characteristics that have a significantly different effect in the case of domestic and cross-border deals (Column (3), (4) and (7)).¹⁴ Banks in larger countries are less likely to be targets in a domestic deal, while the effect is not statistically significant in the case of cross-border deals (Panel A). Moreover, although none of the two coefficients is individually significant, banks in countries with a more developed credit market are more likely to be targets in a domestic deal and less likely in a cross-border deal, and the difference is statistically significant. A higher index of the Extent of disclosure also reduces the likelihood that banks are targets in cross-border deals, although it has no significant effect in the case of domestic operations. On the contrary, the strength of legal rights has a negative effect on the probability of being a target in a domestic deal, but has no effects in the case of cross-border deals.

Average bank characteristics also have significantly different effects (Panel B). Average bank size and average cost efficiency only matter in the case of domestic deals, increasing the probability that a bank is a target. On the contrary, average specialization towards more innovative banking activities only affects the probability that a bank is a target in a cross-border operation, reducing its likelihood. Moreover, average profitability in traditional lending activities (Net interest margin) and average capitalization have an opposite effect on domestic and international operations. Banks in countries with higher average profitability in traditional activities and lower a equity to capital

¹⁴ As in the case of the G10s, it was not possible to include in the multinomial specification the dummy for multiple supervisors.

ratio are significantly more likely to be domestic targets, and significantly less likely to be cross-border targets.

Finally, apart from size, that affects equally domestic and cross-border deals, all the other individual bank characteristics only impact on the probability that a bank is a target in a domestic deal, although only in the case of cost efficiency the coefficients are significantly different in the two cases (Panel C). In particular, more capitalized, less cost efficient and less liquid banks are more likely to be domestic targets.

EMU countries

In Table 9 we consider the case of banks operating in a very integrated area, such as the European Monetary Union. In the binomial specification (Column 1) only four explanatory variables turn out to have a statistically significant effect. In addition to credit market development, that reduces the probability of being an M&A target (Panel A), the other three are all individual bank characteristics – size, equity to total assets and cost to income – with a positive effect on the probability (Panel C).

What is more striking is that in many cases country and bank characteristics have a significantly different effect on the probability that a bank is a target in a domestic or in a cross-border operation (Columns (3), (4) and (7)). General country characteristics are only relevant in the case of cross-border deals, with banks located in larger countries, with less developed credit markets and higher banks concentration being more likely to be targets of foreign investors (Panel A). Not surprisingly, within a strongly integrated area, institutional characteristics such as the extent of disclosure of corporate decisions and the strength of legal rights have no significant effects.

With the exception of the share of income from non-lending activities, that has a negative effect on the probability of being both a domestic and a cross-border a target, all other average bank characteristics only impact on international deals (Panel B). Countries that on average have larger, more cost efficient, more liquid and more profitable banks in the traditional lending activities are significantly less likely to be targets of cross-border M&As. This results are not surprising, since these characteristics describe healthy banking sectors, that are more capable of defending themselves from foreign acquisitions.

Finally, among individual bank characteristics, larger size, higher capitalization, lower specialization in innovative banking activities and lower liquidity increase the probability of being acquired by a domestic investor (Panel C). Larger size and lower cost efficiency increase that of being a cross-border target.

6. Summary

In this paper we have provided more insight into global bank mergers and acquisitions. The probability that a bank is the target of a cross-border M&As is on average much smaller than that it is the target in a domestic operation, which confirms that borders have a relevant impact on corporate activities. However, we find that, with few exceptions, domestic and foreign investors target fairly similar banks. What differs between national and international M&As are the characteristics of the countries where banks operate. Banks incorporated in countries that are smaller and where a fewer number of authorities is in charge of bank supervision are significantly more likely to be targets in cross-border operations. Within the more heterogeneous subset of the non-G10 countries, we also find that foreign investors prefer to acquire banks in countries where the extent of disclosure of corporate operations is higher and where the strength of legal rights, which measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending, is lower.

On average, banking systems characterized by lower leverage, higher cost inefficiency and lower liquidity are more likely to be targets of cross-border acquisitions, while none of this characteristics affects the likelihood of being acquired domestically. However, the picture is different in the case of acquisitions within EU15 and EMU, where countries that are most frequently targets of cross-border deals have also lower Net interest margins and a larger share of income from traditional lending activities.

As for bank specific characteristics, contrary to what one might expect, bank size does not affect differently the probability of being a domestic or a cross-border target, but it has a positive and highly significant effect in both cases.

Overall, these results make perfect sense. First, they are not too dissimilar from those of the manufacturing sector, where country specific characteristics also have a significant effect on the probability that a firm is a target in a domestic or in a cross-border deal.¹⁵ Second, they confirm the trend amongst banks to create larger and larger financial institutions over the last two to three decades. Other things equal, large banks in large countries are those that have been more often targets of cross-border bank deals.

¹⁵ Erel *et al* (2009), for example, find evidence that currency depreciation and stock market returns play an important role in determining the firm's choices, and Rossi and Volpin (2004) show that shareholder protection and the transparency of accounting standards in the host country affect the probability that a firm is a target in a cross-border M&A. In unreported specifications we verified that these variables have no significant effects in the case of bank M&As.

References

- Akhigbe, A., McNulty, J. E., 2003. The profit efficiency of small US commercial banks. *Journal of Banking and Finance* 27, 307-325.
- Amel, D., Banes, C., Panetta, F., Salleo, C., 2004. Consolidation and efficiency in the financial sector: a review of the international evidence. *Journal of Banking and Finance* 28, 2493-2519.
- Barba Navaretti, G., Calzolari, G., Pozzolo, A.F., Levi, M., 2010. Multinational Banking in Europe: Financial Stability and Regulatory Implications Lessons from the Financial Crisis. *Economic Policy*, forthcoming.
- Barth, J.R., Caprio, G.J., Levine, R., 2001. The regulation and supervision of banks around the world: a new database. World Bank Policy Research Working Paper No. 2588, World Bank, Washington, D.C.
- Berger, A. N., DeYoung, R., Genay, H. , Udell, G. F., 2000. The globalization of financial institutions: evidence from a cross-border banking performance. Brookings-Wharton Paper on Financial Service, 23-120.
- Berger, A. N., Demsetz, R.S., Strahan, P.E., 1999. The consolidation of the financial services industry: causes, consequences, and implications for the future. *Journal of Banking and Finance* 23, 135-194.
- Buch, C.M., DeLong, G.L., 2004. Cross-border bank mergers: what lures the rare animal?. *Journal of Banking and Finance* 28, 2077-2102.
- Claessens, S., van Horen, N., 2007. Location decisions of foreign banks and competitive advantage. Available at SSRN: <http://ssrn.com/abstract=904332>.
- Campa, J.M., Hernando, I., 2006. M&As performance in the European financial industry. *Journal of Banking and Finance* 30, 3367-3392.
- Carbó Valverde, S., Humphrey, D., Maudos, J., Molyneux, P., 2009. Cross-country comparisons of competition and pricing power in European banking. *Journal of International Money and Finance* 28, 115-134.
- Correa, R., 2009. Cross-border bank acquisitions: is there a performance effect?. *Journal of Financial Services Research* 36, 169-197.
- Cybo-Ottone A., Murgia M., 2000. Mergers and shareholder wealth in European banking. *Journal of Banking and Finance* 24, 831-859.
- Degryse, H., Ongena, S., Tümer-Alkan, G., 2009. Lending technology, bank organization and competition. *Journal of Financial Transformation* 26, 24-30.
- DeYoung, R., Douglas E., Molyneux P., 2009. Mergers and acquisitions of financial institutions: a review of the literature. *Journal of Financial Services Research* 36, 87-110.
- Djankov, S., La Porta, R., Lopez-de-Silanes, F., Shleifer, A., 2008. The law and economics of self-dealing. *Journal of Financial Economics* 88, 430-466.
- Djankov, S., McLiesh, C., Shleifer, A., 2007. Private credit in 129 countries. *Journal of Financial Economics* 84, 299-329.

- Erel, I., Liao, R.C., Weisbach, M.S., 2009. World markets for mergers and acquisitions. NBER Working Paper no. 15132.
- Focarelli, D., Panetta, F., 2003. Are mergers beneficial to consumers? Evidence from the market for bank deposits. *American Economic Review* 93, 1152-1172.
- Focarelli, D., Pozzolo, A.F., 2008. Cross-border M&As in the financial sector: is banking different from Insurance?. *Journal of Banking and Finance* 32, 15-29.
- Focarelli, D., Pozzolo, A.F., 2005. Where do banks expand abroad? An empirical analysis. *Journal of Business* 78, 2035-2065.
- Focarelli, D., Pozzolo, A.F., 2001. The patterns of cross-border bank mergers and shareholdings in OECD countries. *Journal of Banking and Finance* 25, 2305-2337.
- Gulamhussen, M.A., Pinheiro, C., Pozzolo, A.F., 2010. Do multinational banks create or destroy economic value?. Mo.Fi.R. Working Papers 36, 2004, Money and Finance Research group (Mo.Fi.R.).
- Hannan, T.H., Pilloff, S.J., 2006. Acquisition targets and motives in the banking industry. Federal Reserve Board Finance and Economics Discussion Series 2006-40.
- Hernando, I., Nieto, I., Wall, L.D., 2009. Determinants of domestic and cross-border bank acquisitions in the European Union. *Journal of Banking and Finance* 33, 1022-1032.
- Lanine, G., Vander Venet, R., 2007. Microeconomic determinants of acquisitions of Eastern European banks by Western European banks. *Economics of Transition* 15, 285-308.
- Moulton, B., 1990. Illustration of a pitfall in estimating the effects of aggregate variables on micro units. *The Review of Economics and Statistics* 72, 334-338.
- Palepu, K.G., 1986. Predicting takeover targets. A methodological and empirical analysis. *Journal of Accounting and Economics* 8, 3-35.
- Pasiouras F., Tanna S., Gaganis C., 2007. What drives acquisitions in the EU industry? The role of bank regulation and supervision framework, bank specific and market specific factors. Coventry University Working Paper Series, 3/2007.
- Pozzolo, A.F., 2009, *Bank cross-border mergers and acquisitions (causes, consequences and recent trends)*, in: Alessandrini, P., Fratianni, M., Zazzaro, A., (Eds.), *The Changing Geography of Banking and Finance*, Norwell, Springer.
- Rossi, F., Volpin, P.F., 2004. Cross-country determinants of mergers and acquisitions. *Journal of Financial Economics* 74, 277-304.
- Shleifer, A., Vishny, R.W., 2003. Stock market driven acquisitions. *Journal of Financial Economics* 70, 295-311.
- Vander Venet, R., 2002. *Cross-border mergers in european banking and bank efficiency*, in: Herrmann, H., Lipsey, R. (Eds.), *Foreign direct investment in the real and financial sector of industrial countries*. Springer, Heidelberg and New York.
- Wheelock, D., Wilson, P., 2000. Why do banks disappear: the determinants of US bank failures and acquisitions. *Review of Economics and Statistics* 82, 127-138.

Figure 1

Domestic an cross border deals par years

This graph reports the number of domestic and cross borders deals per year in our sample. Data are from the Platinum Worldwide Mergers and Acquisition Database of the Security Data Corporation (SDC).

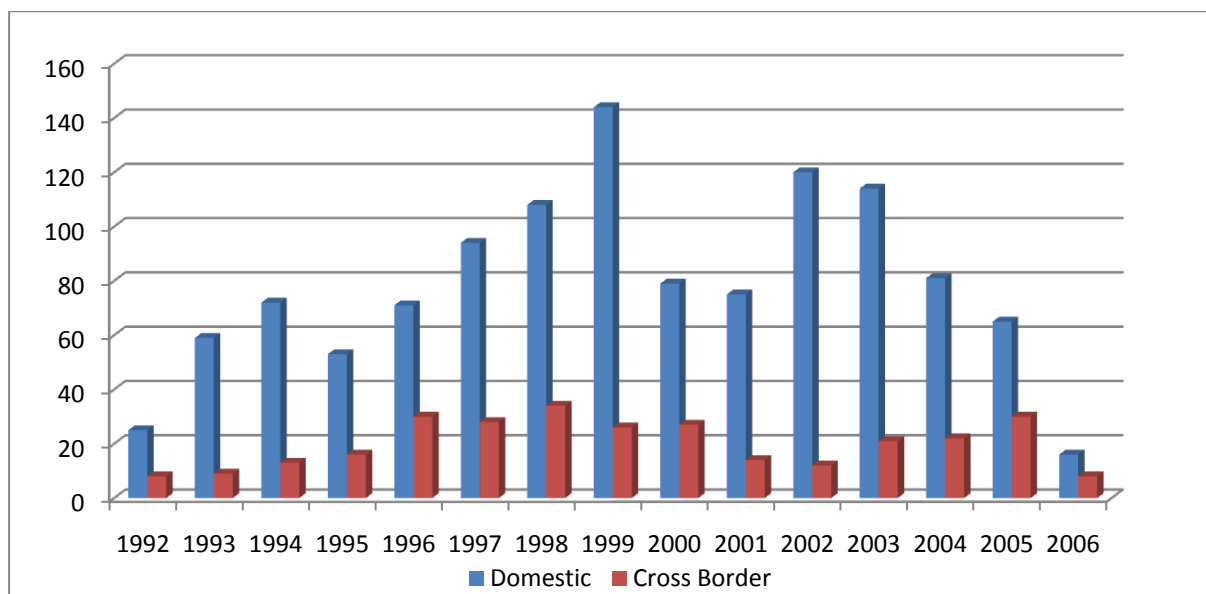


Table 1

Number of Domestic and Cross border M&As by country

This table presents the number of domestic and cross border deals for each country from 1991-2006. Data are from Platinum Worldwide Mergers and Acquisition Database of the Security Data Corporation (SDC).

	<i>Domestic</i>	<i>Cross border</i>	<i>Total</i>
Albania	1	3	4
Argentina	23	12	35
Armenia	0	2	2
Australia	20	5	25
Austria	13	4	17
Bahrain	1	1	2
Belarus	0	1	1
Belgium	12	8	20
Bermuda	2	0	2
Bhutan	1	0	1
Bolivia	0	3	3
Botswana	1	0	1
Brazil	26	13	39
Bulgaria	3	8	11
Cameroon	0	2	2
Chile	10	5	15
Colombia	8	6	14
Croatia	1	7	8
Czech Republic	2	4	6
Denmark	10	1	11
Ecuador	3	0	3
Egypt	1	5	6
El Salvador	0	3	3
Estonia	4	2	6
Fiji	0	1	1
Finland	0	3	3
France	50	13	63
Germany	88	17	105
Greece	10	3	13
Guatemala	1	0	1
Honduras	1	0	1
Hong Kong	5	6	11
Hungary	7	10	17
Iceland	2	0	2
India	12	5	17
Indonesia	3	8	11
Iraq	0	1	1
Israel	1	0	1
Italy	138	14	152
Japan	123	0	123
Jordan	1	1	2
Kazakhstan	1	1	2
Kenya	1	2	3
Kuwait	1	0	1
Kyrgyzstan	0	1	1
Latvia	2	4	6
Lebanon	7	1	8
Lithuania	2	1	3
Luxembourg	6	6	12
Malawi	1	0	1
Malaysia	6	0	6
Mali	1	0	1
Malta	0	2	2
Mexico	7	2	9
Morocco	4	5	9
Mozambique	0	3	3
Namibia	1	1	2
Netherlands	2	2	4
New Zealand	2	0	2

Table 1 (continued)

	<i>Domestic</i>	<i>Cross border</i>	<i>Total</i>
Nicaragua	2	0	2
Nigeria	2	0	2
Norway	5	4	9
Oman	3	1	4
Pakistan	0	3	3
Panama	4	1	5
Paraguay	0	1	1
Peru	5	4	9
Philippines	12	5	17
Poland	19	9	28
Portugal	16	7	23
Romania	1	4	5
Saudi Arabia	2	0	2
Singapore	5	1	6
Slovenia	6	3	9
South Africa	1	0	1
Spain	40	9	49
Sri Lanka	4	0	4
Sudan	1	0	1
Sweden	4	0	4
Switzerland	33	7	40
Tanzania	1	0	1
Thailand	7	6	13
Tunisia	1	1	2
Turkey	9	1	10
Uganda	1	2	3
Ukraine	1	6	7
United Kingdom	13	5	18
Uruguay	4	0	4
USA	337	4	341
Venezuela	5	4	9
Vietnam	4	2	6
	1,176	298	1,474

Table 2

Summary Statistics for Country-specific Variables

This table presents the mean value of country-variables entered in the regressions. GDP is the Gross Domestic Product based on purchasing-power parity (PPP) expressed in billions of dollars. *Private Credit to GDP* is the ratio between the total amount of credits supplied and GDP. *Concentration* is the market share of the five largest banks. *Multiple supervisory authority* is a dummy that takes the value of one if more than one authority is responsible for bank supervision. *Extent of disclosure index* measures investor protection measured considering disclosure to third party. The index ranges from 0 to 10, with larger values indicating greater information. *Strength of legal rights index* measures the degree to which laws protect the rights of borrowers and lenders. The index ranges from 0 to 10, with higher scores indicating better protection. Data on GDP and Private Credits are from the World Bank database. Bank concentration, measured as the market share of the five largest banks (C5), is based on our elaboration from Bankscope. Multiple supervisory authority is from Barth et al (2001), updated to 2008. The Extent of disclosure index is from Djankov et al. (2008). The Strength of legal rights is from Djankov et al. (2007).

Country	GDP	Private credit to GDP	Concentration	Multiple superv. authority	Extent disclosure index	Strength of legal right
Albania	4.18	0.08	0.80	.	8	9
Algeria	59.02	0.08	0.86	0	6	3
Argentina	263.93	0.18	0.37	0	6	4
Armenia	2.62	0.07	0.79	0	5	6
Australia	368.57	0.79	0.67	0	8	9
Austria	189.38	1.02	0.68	0	3	7
Azerbaijan	6.67	.	0.85	.	7	8
Bahamas	5.41	.	.	.	2	9
Bahrain	7.98	0.44	0.83	0	8	4
Bangladesh	48.90	0.26	0.53	0	6	7
Barbados	2.34	0.52	0.99	.	.	.
Belarus	11.14	.	0.80	0	5	2
Belgium	219.13	0.74	0.74	0	8	7
Bermuda	.	.	0.95	.	.	.
Bhutan	0.49	0.11	.	0	5	2
Bolivia	8.04	0.48	0.53	0	1	1
Botswana	5.68	0.16	0.90	0	7	7
Brazil	638.12	0.32	0.43	0	6	3
Bulgaria	13.96	0.25	0.67	0	10	8
Cameroon	4.20	0.07	0.67	.	5	8
Chile	72.26	0.55	0.48	0	7	4
Colombia	95.21	0.29	0.39	0	8	5
Costa Rica	16.31	0.24	0.65	0	2	5
Croatia	21.81	0.40	0.61	0	1	6
Cyprus	9.23	1.45	0.87	0	4	9
Czech Republic	57.46	0.50	0.69	0	2	6
Denmark	151.76	0.87	0.77	0	7	9
Ecuador	16.85	0.29	0.76	.	1	3
Egypt	91.82	.	.	0	8	3
El Salvador	13.09	0.40	0.79	0	5	5
Estonia	5.80	0.31	0.89	0	8	6
Fiji	1.54	0.33	.	0	3	7
Finland	117.88	0.63	0.94	0	6	7
France	1269.05	0.87	0.50	0	10	7
Gabon	5.30	0.09	0.98	0	6	3
Germany	1,838.42	1.09	0.61	0	5	7
Ghana	5.23	0.10	0.86	0	7	7
Greece	123.73	0.40	0.87	0	1	3
Grenada	0.37	0.67	.	0	4	8
Guatemala	16.73	0.20	0.36	0	3	8
Guyana	0.69	0.43	1.00	0	5	4
Haiti	3.72	0.13	0.98	.	2	3
Honduras	7.46	0.34	0.43	0	0	6
Hong Kong	161.37	.	.	0	10	10
Hungary	47.82	0.31	0.64	0	2	7
Iceland	9.25	1.26	1.00	0	5	7
India	448.97	0.27	0.36	0	7	8
Indonesia	169.90	0.36	0.50	0	10	3
Iran	108.49	.	.	.	5	4
Iraq	.	.	.	.	4	3
Israel	108.83	0.71	0.76	0	7	9
Italy	1,080.36	0.69	0.54	0	7	3

Table 2 (continued)

Country	GDP	Private credit to GDP	Concentration	Multiple superv. authority	Extent disclosure index	Strength of legal right
Ivory Coast	10.04	.	.	.	6	3
Jamaica	9.18	0.20	0.82	0	4	8
Japan	4,691.42	1.49	0.36	0	7	7
Jordan	8.56	0.68	0.88	0	5	4
Kazakhstan	23.79	0.17	0.66	0	7	5
Kenya	12.71	0.23	0.57	0	3	10
Kuwait	39.81	0.42	0.68	0	7	4
Kyrgyzstan	1.47	0.05	0.83	0	8	10
Laos	1.96	0.07	0.96	.	0	4
Latvia	8.68	0.27	0.53	0	5	9
Lebanon	16.21	.	0.35	0	9	3
Lesotho	0.78	0.13	1.00	0	2	7
Lithuania	12.87	0.19	0.80	0	5	5
Luxembourg	18.32	1.02	0.23	0	6	7
Madagascar	3.90	0.09	0.79	.	5	2
Malawi	1.68	0.05	0.89	0	4	8
Malaysia	92.69	1.21	0.43	1	10	10
Mali	3.00	0.14	0.81	0	6	3
Malta	4.02	0.99	0.82	0	.	.
Mauritania	1.16	0.21	0.82	.	3	5
Mauritius	4.48	0.56	0.81	0	6	5
Mexico	586.99	0.19	0.63	0	8	4
Morocco	39.36	0.40	0.63	0	6	3
Mozambique	4.89	0.11	0.81	0	5	2
Namibia	3.94	.	0.87	.	5	8
Nepal	6.13	0.27	0.61	.	6	5
Netherlands	365.51	1.24	0.72	1	4	6
New Zealand	54.16	1.07	0.91	0	10	9
Nicaragua	3.68	.	0.56	0	4	3
Nigeria	52.68	0.12	0.46	1	5	8
Norway	169.44	0.69	0.91	0	7	7
Oman	18.88	0.34	0.71	0	8	4
Pakistan	75.64	0.23	0.58	0	6	6
Panama	11.07	0.76	0.35	0	1	6
Paraguay	7.19	0.25	0.42	.	6	3
Peru	51.84	0.19	0.67	0	8	7
Philippines	74.59	0.35	0.76	0	2	3
Poland	158.29	0.23	0.59	0	7	9
Portugal	104.32	1.00	0.67	0	6	3
Qatar	17.70	0.29	0.92	.	5	3
Romania	42.60	0.11	0.70	0	9	8
Rwanda	1.82	0.09	0.85	.	7	8
Saudi Arabia	184.89	0.25	0.56	1	9	4
Senegal	4.89	0.18	0.70	0	6	3
Singapore	76.83	0.97	0.82	0	10	10
Slovenia	19.10	0.32	0.64	0	3	6
South Africa	129.79	0.62	0.87	0	8	9
Spain	554.77	0.90	0.74	0	5	6
Sri Lanka	16.13	0.25	0.70	0	4	4
Sudan	13.72	0.04	0.67	.	0	5
Swaziland	1.56	0.15	0.84	.	0	6
Sweden	254.51	0.83	0.95	0	6	5
Switzerland	245.55	1.59	0.84	0	0	8
Syria	21.84	0.11	0.97	0	6	1
Tanzania	11.05	0.05	0.60	0	3	8
Thailand	126.97	1.11	0.49	0	10	4
Togo	1.26	0.16	0.95	0	6	3
Tonga	0.18	0.54	.	.	.	.
Tunisia	19.10	0.54	0.48	.	5	3
Turkey	246.81	0.15	0.66	.	9	4
Uganda	6.44	0.05	0.64	0	2	7
Ukraine	39.50	.	0.55	.	5	9

Table 2 continued

Country	GDP	Private credit to GDP	Concentration	Multiple superv. authority	Extent disclosure index	Strength of legal right
United Kingdom	1,441.73	1.25	0.64	0	10	9
Uruguay	21.47	0.46	0.51	0	3	5
USA	10,235.14	0.52	0.25	1	7	8
Uzbekistan	15.43	.	0.89	.	4	2
Vanuatu	0.23	0.39	.	0	5	9
Venezuela	119.84	.	.	0	3	2
Vietnam	34.02	0.40	0.83	.	6	8
Zambia	3.54	0.06	0.67	.	3	9
Zimbabwe	5.69	.	0.74	1	8	7
Total Average	236.41	0.46	0.67	0.05	5.40	5.73

Summary Statistics for Bank-specific Variables

This table presents summary statistics of bank-specific variables entered in the regressions. Panel A reports statistics for banks not involved in any deals. Panel B reports statistics for banks involved in domestic deals (the years before the deal). Panel C reports statistics for banks involved in cross border deals ((the years before the deal). *Total Asset* is the total amount of bank's asset expressed in million of dollars. *Return on Asset* is the ratio between return and Asset. *Net Interest Margin* is the net interest income to earning assets. *Other Operative Income to Total Income* is the ratio between the sum of the non-traditional activity /net fees and commission, net trading income, net other income) and total operative income. *Equity to Tot. Asset* is the ratio between equity and total Asset. *Cost to income* is the ratio between total costs and total income. *Liquid Assets to Deposit* is the ratio between Liquidity and Deposits. Data are from Bankscope.

Variable	Obs	Mean	Median	SD	Minimum	Maximum
A. Banks not involved in M&As						
Total Asset	180,825	1,919.97	259.85	6,183.37	8.38	73,600.00
Return on Asset	178,790	0.94	0.83	1.29	-5.72	10.25
Net Interest Margin	175,899	3.75	3.65	1.91	0.01	16.44
Other Op. Inc to Tot. Income	155,770	0.13	0.10	0.13	0.00	0.88
Equity to Asset	180,680	11.25	8.75	10.69	1.28	88.61
Cost to Income	174,737	67.31	66.04	19.62	15.46	205.30
Liquid Asset to Deposits	164,386	19.11	11.90	20.07	0.42	125.86
B. Banks involved in Domestic M&As						
Total Asset	1,141	5,207.48	941.63	11,400.00	9.42	73,300.00
Return on Asset	1,133	0.61	0.59	1.35	-5.48	8.19
Net Interest Margin	1,127	3.57	3.27	2.07	0.01	16.31
Other Op. Inc to Tot. Income	963	0.12	0.08	0.12	0.00	0.85
Equity to Asset	1,134	9.75	7.97	9.11	1.37	86.20
Cost to Income	1,116	71.56	69.00	22.96	16.52	205.10
Liquid Asset to Deposits	1,009	20.22	15.56	17.95	0.44	112.18
C. Banks involved in Cross border M&As						
Total Asset	285	4,192.79	1,142.62	9,425.94	14.04	72,200.00
Return on Asset	289	0.98	0.87	1.55	-5.69	6.21
Net Interest Margin	281	4.30	3.71	2.93	0.09	16.29
Other Op. Inc to Tot. Income	231	0.13	0.07	0.16	0.00	0.87
Equity to Asset	293	10.86	9.01	8.48	1.58	66.11
Cost to Income	278	68.60	65.87	25.74	17.57	202.12
Liquid Asset to Deposits	233	23.92	19.53	19.19	0.72	97.10

Bank M&A targets: baseline specification

The dependent variable takes the value of one if the bank is a target in an M&A, zero otherwise. The model is estimated using a probit specification. All independent variables are lagged one period. For variable definitions see the notes to Tables 1-3. Robust standard errors adjusted for in clustering at the bank level are reported in parentheses. The symbol *** indicates a significance level of 1 per cent or less; ** between 1 and 5 per cent; * between 5 and 10 per cent. Marginal effects are the partial change in the probability with respect to the change of each independent variables, evaluated at median. Values are multiplied by 10,000.

	Binomial specification		Multinomial specification				
	Coefficients	Marginal effects	Coefficients		Marginal effects		Difference
			Domestic	Corss-border	Domestic	Corss-border	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel A - Country characteristics</i>							
GDP (log)	-0.0219 (0.0323)	-3.5240	0.0201 (0.0518)	-0.1267** (0.0527)	2.3610	-0.1620	**
Private Credit /GDP	-0.2873*** (0.0782)	-46.1380	-0.3257** (0.1291)	-0.6405*** (0.1948)	-37.7640	-0.7660	
Bank Concentration	-0.32066** (0.1482)	-51.4890	-0.394* (0.2345)	-0.1088 (0.3049)	-45.7710	-0.0888	
Multiple sup. (dum.)	-0.29812* (0.1799)	-70.2750	-0.3399 (0.3038)	-1.3272*** (0.3578)	-52.4130	-13.6440	**
Extent of disclosure	0.0063 (0.0176)	1.0160	0.0143 (0.0287)	0.0049 (0.0275)	1.6710	0.0044	
Strength of legal rights	-0.0391* (0.0232)	-6.2850	-0.0707* (0.0387)	-0.0213 (0.0243)	-8.2110	-0.0183	
<i>Panel B - Country averages</i>							
Roa	-0.0074 (0.0710)	-1.1910	0.0162 (0.1218)	-0.1049 (0.1153)	1.8980	-0.1340	
Total assets (log)	0.2090*** (0.0379)	33.5690	0.3044*** (0.0513)	0.1671** (0.0714)	35.3490	0.1730	
Net interest margin	0.0362 (0.0336)	5.8090	0.0647 (0.0542)	-0.012 (0.0483)	7.5280	-0.0230	
Equity / tot. Assets	0.0126 (0.0089)	2.0190	0.0104 (0.0147)	0.0256* (0.0142)	1.2090	0.0309	
Other op. / tot. Income	0.1120 (0.5337)	17.9770	0.4573 (0.8973)	-0.8418 (0.6238)	53.2420	-1.1150	*
Cost / income	0.0133*** (0.0049)	2.1480	0.0184** (0.0079)	0.0121* (0.0064)	2.1410	0.0131	
Liquid ass. / deposits	-0.0037 (0.0027)	-0.5970	-0.0029 (0.0045)	-0.0106*** (0.0039)	-0.3460	-0.0131	
<i>Panel C - Bank characteristics</i>							
Roa	-0.0514* (0.0303)	-8.2670	-0.1019** (0.0473)	0.0108 (0.0505)	-11.8460	0.0260	*
Total assets (log)	0.1238*** (0.0194)	19.8880	0.1681*** (0.0286)	0.1829*** (0.0393)	19.5150	0.2100	
Net interest margin	0.0133 (0.0166)	2.1510	0.0229 (0.02686)	0.0199 (0.0239)	2.6650	0.0223	
Equity / tot. assets	0.0043 (0.0039)	0.7050	0.0036 (0.0065)	0.01049* (0.0062)	0.4220	0.0128	
Other op. / tot. income	-0.6315** (0.2979)	-101.4150	-0.811* (0.4782)	-0.7219 (0.574)	-94.1390	-0.8090	
Cost / income	0.0039*** (0.0009)	0.6310	0.0052*** (0.0013)	0.0042* (0.0022)	0.6120	0.0047	
Liquid ass. / deposits	-0.0010 (0.0010)	-0.1720	-0.0024 (0.0017)	0.0018 (0.0028)	-0.2800	0.0026	
Observations	136,183		136,183	136,183			
Predicted probabilit� (x 1,000)	5.63		5.77	0.04			

Table 5

Bank M&A targets: large banks

The dependent variable takes the value of one if the bank is a target in an M&A, zero otherwise. The model is estimated using a probit specification. All independent variables are lagged one period. For variable definitions see the notes to Tables 1-3. Robust standard errors adjusted for in clustering at the bank level are reported parentheses. The symbol *** indicates a significance level of 1 per cent or less; ** between 1 and 5 per cent; * between 5 and 10 per cent. Marginal effects are the partial change in the probability with respect to the change of each independent variables, evaluated at median. Values are multiplied by 10,000.

	Binomial specification		Multinomial specification				
	Coefficients	Marginal effects	Coefficients		Marginal effects		Difference
			Domestic	Corss-border	Domestic	Corss-border	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel A - Country characteristics</i>							
GDP (log)	-0.0209 (0.0359)	-3.3520	0.0583 (0.0634)	-0.1343** (0.0545)	4.662	-0.0157	***
Private Credit /GDP	-0.2869** (0.1146)	-45.9410	-0.325 (0.2046)	-0.5773** (0.2471)	-25.939	-0.0606	
Bank Concentration	-0.1630 (0.1808)	-26.0940	0.0123 (0.2954)	-0.0427 (0.3269)	0.9830	-0.0049	
Multiple sup. (dum.)	-0.3722 (0.2664)	-96.3320	-0.5931 (0.4656)	-1.4209*** (0.2925)	-83.8120	-2.2020	*
Extent of disclosure	0.0187 (0.0204)	3.0080	0.0192 (0.0335)	0.0285 (0.0369)	1.5350	0.0030	
Strength of legal rights	-0.0602** (0.0276)	-9.6500	-0.0997** (0.0466)	-0.0535 (0.0321)	-7.9580	-0.0048	
<i>Panel B - Country averages</i>							
Roa	-0.0254 (0.0833)	-4.0700	0.0555 (0.1668)	-0.1942* (0.115)	4.4340	-0.0223	
Total assets (log)	0.1344** (0.056)	21.5240	0.1866** (0.076)	0.0648 (0.0813)	14.8950	0.0051	
Net interest margin	0.0238 (0.0437)	3.8130	0.0337 (0.0751)	-0.01 (0.0573)	2.6930	-0.0015	
Equity / tot. Assets	0.0097 (0.0112)	1.5640	-0.0014 (0.019)	0.0255 (0.017)	-0.0120	0.0029	
Other op. / tot. Income	0.3709 (0.6731)	59.3900	0.8941 (1.0936)	-0.7235 (0.8628)	71.3690	-0.0911	*
Cost / income	0.0128** (0.0058)	2.0510	0.0175* (0.0095)	0.0119 (0.0078)	1.3980	0.0011	
Liquid ass. / deposits	-0.0057 (0.0035)	-0.9190	-0.0056 (0.0061)	-0.0135*** (0.0048)	-0.4510	-0.0014	
	-0.0247 (0.0387)	-3.9650	-0.0675 (0.0591)	0.005 (0.066)	-5.3930	0.0013	
<i>Panel C - Bank characteristics</i>							
Roa	-0.0247 (0.0387)	-3.9650	-0.0675 (0.0591)	0.005 (0.066)	-5.3930	0.0013	
Total assets (log)	0.1415*** (0.0202)	22.6650	0.1876*** (0.0334)	0.1398** (0.0565)	14.9750	0.0134	
Net interest margin	-0.0070 (0.0243)	-1.1310	-0.016 (0.039)	0.0062 (0.0336)	-1.2840	0.0009	
Equity / tot. assets	0.0015 (0.0052)	0.2550	-0.0079 (0.0079)	0.0169** (0.0074)	-0.6320	0.0020	***
Other op. / tot. income	-0.6929*** (0.2599)	-110.9280	-1.0042*** (0.3749)	-0.2334 (0.6361)	-80.1480	-0.0144	
Cost / income	0.0012 (0.0014)	0.2080	0.0008 (0.0026)	0.0021 (0.0032)	0.0654	0.0002	
Liquid ass. / deposits	-0.0022*** (0.0008)	-0.3540	-0.0044*** (0.0015)	0.0001 (0.0043)	-0.3520	0.0001	
Observations	68,335		68,335	68,335			
Predicted probability (x 1,000)	5.61		3.79	0.003			

Bank M&A targets: G10 countries

The dependent variable takes the value of one if the bank is a target in an domestic M&A, two if target in a cross border M&A, zero otherwise. The model is estimated using a multinomial probit specification. All independent variables are lagged one period. For variable definitions see the notes to Tables 1-3. Robust standard errors adjusted for clustering at the country level are reported in parenthesis. The symbol *** indicates a significance level of 1 per cent or less; ** between 1 and 5 per cent; * between 5 and 10 per cent. Marginal effects are the partial change in the probability with respect to the change of each independent variables, evaluated at median. Values are multiplied by 10,0000.

	Binomial specification		Multinomial specification				
	Coefficients	Marginal effects	Coefficients		Marginal effects		Difference
			Domestic	Corss-border	Domestic	Corss-border	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel A - Country characteristics</i>							
GDP (log)	-0.0348 (0.2092)	-5.5050	-0.084 (0.3038)	-0.3954 (0.3072)	-5.2810	-0.6030	
Private Credit /GDP	-0.0804 (0.1444)	-12.7270	-0.1541 (0.2165)	-0.2212 (0.3132)	-9.7330	-0.3260	
Bank Concentration	0.1784 (0.5277)	28.2230	-0.0811 (0.787)	0.3071 (1.0987)	-5.1710	0.4850	
Multiple sup. (dum.)	0.7478* (0.3956)	50.2690	0.7332 (0.6801)	-0.2628 (0.37395)	23.9970	-0.6980	
Extent of disclosure	0.1734** (0.0857)	27.4360	0.2444** (0.1155)	-0.0814 (0.1087)	15.4830	-0.1520	*
Strength of legal rights	-0.2422*** (0.0376)	-38.3150	-0.3115*** (0.0426)	-0.0202 (0.1074)	-19.7220	0.0022	**
<i>Panel B - Country averages</i>							
Roa	0.2069 (0.333)	32.7280	0.1911 (0.456)	0.4016 (0.446)	12.0590	0.6010	
Total assets (log)	0.1245*** (0.0377)	19.7070	0.1918*** (0.0473)	-0.1085 (0.1569)	12.1590	-0.1890	**
Net interest margin	-0.1593 (0.1177)	-25.2010	-0.0219 (0.1717)	-0.2531 (0.3719)	-1.3630	-0.3900	
Equity / tot. Assets	-0.1464*** (0.0561)	-23.1630	-0.2302*** (0.0846)	-0.026 (0.0433)	-14.5710	-0.0156	**
Other op. / tot. Income	3.5709* (1.9122)	564.7970	6.1452** (2.9755)	-0.3137 (3.8963)	389.0780	-1.1470	
Cost / income	0.026*** (0.0084)	4.1130	0.0342*** (0.012)	0.0125 (0.0213)	2.1650	0.0158	
Liquid ass. / deposits	0.0134 (0.0111)	2.0640	0.0197 (0.0146)	0.0187* (0.011)	1.2500	0.0270	
<i>Panel C - Bank characteristics</i>							
Roa	-0.1094** (0.0538)	-17.3060	-0.1683** (0.0714)	-0.1287 (0.1341)	-10.6450	-0.1810	
Total assets (log)	0.1092*** (0.0225)	17.2860	0.1494*** (0.0491)	0.1966*** (0.0587)	9.4380	0.2880	
Net interest margin	0.0013 (0.0376)	0.2070	-0.034 (0.0425)	0.0402 (0.0377)	-2.1600	0.0659	
Equity / tot. assets	0.0008 (0.008)	0.1350	-0.0023 (0.0101)	0.0183 (0.0117)	-0.1500	0.0287	
Other op. / tot. income	-0.5819 (0.4594)	-92.0440	-1.0268 (0.7217)	0.4202 (0.5157)	-65.0520	0.7610	*
Cost / income	0.0027* (0.0014)	0.4280	0.0037** (0.0018)	0.0001 (0.0037)	0.2400	-0.0005	
Liquid ass. / deposits	-0.0009 (0.0014)	-0.1500	-0.0035* (0.0018)	0.0045* (0.0027)	-0.2240	0.0074	***
Observations	122,215		122,215	122,215			
Predicted probabilità (x 1,000)	5.53		2.93	0.05			

Bank M&A targets: non-G10 countries

The dependent variable takes the value of one if the bank is a target in an domestic M&A, two if target in a cross border M&A, zero otherwise. The model is estimated using a multinomial probit specification. All independent variables are lagged one period. For variable definitions see the notes to Tables 1-3. Robust standard errors adjusted for clustering at the country level are reported in parenthesis. The symbol *** indicates a significance level of 1 per cent or less; ** between 1 and 5 per cent; * between 5 and 10 per cent. Marginal effects are the partial change in the probability with respect to the change of each independent variables, evaluated at median. Values are multiplied by 10,000.

	Binomial specification		Multinomial specification				
	Coefficients	Marginal effects	Coefficients		Marginal effects		Difference
			Domestic	Corss-border	Domestic	Corss-border	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel A - Country characteristics</i>							
GDP (log)	-0.0055 (0.0431)	-2.1940	0.0447 (0.0674)	-0.0831 (0.0543)	10.3410	-8.4840	*
Private Credit /GDP	-0.1353 (0.1227)	-53.7630	-0.0843 (0.1889)	-0.6389*** (0.2363)	-13.7460	-62.0770	*
Bank Concentration	-0.4035* (0.2116)	-160.3400	-0.4265 (0.3258)	-0.4401 (0.2766)	-89.6000	-40.1160	
Multiple sup. (dum.)	-0.4108** (0.1694)	-106.0960					
Extent of disclosure	-0.0158 (0.0198)	-6.2860	-0.0423 (0.0306)	0.0076 (0.0293)	-9.2720	1.0570	
Strength of legal rights	0.0122 (0.0214)	4.8660	0.0274 (0.0340)	-0.0033 (0.0286)	5.9880	-0.5240	
<i>Panel B - Country averages</i>							
Roa	-0.0594 (0.0648)	-23.8430	-0.0721 (0.103)	-0.1252 (0.1134)	-14.7890	-11.7740	
Total assets (log)	0.1991*** (0.0621)	79.1230	0.2784*** (0.1059)	0.1519 (0.0995)	59.4640	12.9090	
Net interest margin	0.0594* (0.0338)	23.6030	0.0904* (0.047)	-0.0086 (0.0568)	19.7300	-1.4970	*
Equity / tot. Assets	0.0145 (0.0097)	5.7750	0.01467 (0.0141)	0.0216 (0.0143)	3.0360	2.0220	
Other op. / tot. Income	0.1443 (0.4471)	57.3390	0.2462 (0.6355)	-1.0587* (0.6487)	61.1690	-105.6420	**
Cost / income	0.0062 (0.0043)	2.4890	0.0058 (0.005)	0.01505** (0.0066)	1.1580	1.4350	
Liquid ass. / deposits	-0.0088*** (0.0029)	-3.5130	-0.0128*** (0.0046)	-0.0142*** (0.0045)	-2.6820	-1.3030	
<i>Panel C - Bank characteristics</i>							
Roa	0.0025 (0.0249)	1.0280	-0.0362 (0.0380)	0.0519 (0.052)	-8.2620	5.3570	
Total assets (log)	0.1181*** (0.0301)	46.9340	0.1581*** (0.0530)	0.1769*** (0.0413)	33.1290	16.2240	
Net interest margin	0.0399** (0.0166)	15.8690	0.0675*** (0.0254)	0.0094 (0.0276)	14.6180	0.4460	**
Equity / tot. assets	0.0016 (0.0037)	0.6540	0.0029 (0.0064)	0.0032 (0.0079)	0.6170	0.2960	
Other op. / tot. income	-0.416** (0.1978)	-165.2870	-0.0421 (0.3160)	1.554** (0.6527)	2.0000	-152.1610	*
Cost / income	0.0042** (0.0016)	1.6820	0.005** (0.0024)	0.0056* (0.003)	1.0680	0.5160	
Liquid ass. / deposits	-0.0004 (0.0019)	-0.1810	0.0004 (0.0027)	-0.0039 (0.0037)	0.1360	-0.3940	
Observations	13,968		14,525	14,525			
Predicted probabilità (x 1,000)	15.86		11.61	4.62			

Bank M&A targets: EU15 countries

The dependent variable takes the value of one if the bank is a target in an domestic M&A, two if target in a cross border M&A, zero otherwise. The model is estimated using a multinomial probit specification. All independent variables are lagged one period. For variable definitions see the notes to Tables 1-3. Robust standard errors adjusted for clustering at the country level are reported in parenthesis. The symbol *** indicates a significance level of 1 per cent or less; ** between 1 and 5 per cent; * between 5 and 10 per cent. Marginal effects are the partial change in the probability with respect to the change of each independent variables, evaluated at median. Values are multiplied by 10,0000.

	Binomial specification		Multinomial specification				
	Coefficients	Marginal effects	Coefficients		Marginal effects		Difference
			Domestic	Corss-border	Domestic	Corss-border	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel A - Country characteristics</i>							
GDP (log)	-0.0858*** (0.0293)	-1.1140	-0.1811*** (0.0499)	0.5257 (0.0751)	-2.9920	1.2290	***
Private Credit /GDP	-0.3581* (0.2099)	-4.6490	1.4465 (0.1535)	-0.7582 (0.4031)	3.6380	-11.8460	***
Bank Concentration	0.3601 (0.2954)	4.6750	0.9354 (0.3673)	4.7708 (0.5230)	2.0080	10.6380	
Multiple sup. (dum.)	0.3150 (0.2143)	7.1540					
Extent of disclosure	0.0359 (0.0254)	0.4660	0.4736 (0.0396)	-0.0964** (0.0342)	1.1470	-1.5180	***
Strength of legal rights	-0.089*** (0.0222)	-1.1560	-0.1960*** (0.0291)	-0.0414 (0.0438)	-3.2020	-0.5860	***
<i>Panel B - Country averages</i>							
Roa	-0.1938 (0.1846)	-2.5160	1.8306 (0.1976)	-0.4740 (0.4539)	4.4620	-7.4440	
Total assets (log)	0.0578 (0.0492)	0.7510	0.1917* (0.0785)	0.3056 (0.0906)	3.1310	0.6270	**
Net interest margin	0.0829 (0.0685)	1.0770	0.2655* (0.1154)	-0.3405** (0.1276)	4.4540	-5.3700	***
Equity / tot. Assets	-0.0016 (0.0297)	-0.0213	-0.0796** (0.0275)	0.0973* (0.0430)	-1.3340	1.5350	***
Other op. / tot. Income	-0.3341 (1.2447)	-4.3380	-0.1345 -18735.0000	-3.7309* -15369.0000	-1.1140	-57.9470	*
Cost / income	0.0068 (0.0053)	0.0895	0.0271** (0.0104)	-0.0070 (0.0136)	0.4470	-0.1170	**
Liquid ass. / deposits	-0.0042* (0.0022)	-0.0557	-0.0078 (0.0047)	-0.0032 (0.0053)	-0.1260	-0.0471	
<i>Panel C - Bank characteristics</i>							
Roa	-0.0137 (0.0322)	-0.1780	-0.0461 (0.0301)	-0.0361 (0.1055)	-0.7460	-0.5480	
Total assets (log)	0.1562*** (0.013)	2.0290	0.2577*** (0.0292)	0.2056*** (0.0549)	4.1660	3.1210	
Net interest margin	0.0067 (0.0377)	0.0871	0.2431 (0.0722)	0.1236 (0.0401)	0.5690	0.2670	
Equity / tot. assets	0.0112*** (0.0041)	0.1460	0.0165** (0.0050)	0.1201 (0.0111)	0.2650	0.2650	
Other op. / tot. income	-0.3945 (0.338)	-5.1220	-0.8156 (0.5880)	-0.2903 (0.5954)	-13.2880	-4.2730	
Cost / income	0.0053*** (0.0012)	0.0693	0.0074*** (0.0017)	0.0038 (0.0023)	0.1200	0.0563	*
Liquid ass. / deposits	-0.0032*** (0.0009)	-0.0418	-0.0053* (0.0021)	0.0008 (0.0028)	-0.0869	0.0140	
Observations	35,676		35,676	35,676			
Predicted probabilit� (x 1,000)	1.83		0.66	0.62			

Bank M&A targets: EMU countries

The dependent variable takes the value of one if the bank is a target in an domestic M&A, two if target in a cross border M&A, zero otherwise. The model is estimated using a multinomial probit specification. All independent variables are lagged one period. For variable definitions see the notes to Tables 1-3. Robust standard errors adjusted for clustering at the country level are reported in parenthesis. The symbol *** indicates a significance level of 1 per cent or less; ** between 1 and 5 per cent; * between 5 and 10 per cent. Marginal effects are the partial change in the probability with respect to the change of each independent variables, evaluated at median. Values are multiplied by 10,0000.

	Binomial specification		Multinomial specification				
	Coefficients	Marginal effects	Coefficients		Marginal effects		Difference
			Domestic	Corss-border	Domestic	Corss-border	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel A - Country characteristics</i>							
GDP (log)	0.1820 (0.1180)	15.0320	0.7069 (0.1584)	0.5731** (0.2011)	3.6870	42.1630	**
Private Credit /GDP	-1.6380** (0.5605)	-135.2660	-0.5168 (0.7733)	-4.7054*** (0.9980)	-15.2810	-346.7790	***
Bank Concentration	0.1570 (0.4539)	12.9610	-0.7269 (0.8259)	2.6729*** (0.4094)	-39.2480	198.9340	***
Multiple sup. (dum.)							
Extent of disclosure	-0.0425 (0.0371)	-3.5060	0.2896 (0.0282)	-0.0209 (0.0782)	1.9970	-1.6230	
Strength of legal rights	-0.0622 (0.0437)	-5.1350	0.1090 (0.1306)	-0.1760 (0.1039)	1.0730	-13.0360	
<i>Panel B - Country averages</i>							
Roa	-0.1678 (0.3330)	-13.855	4.5563 (0.5077)	-0.5831 (0.3562)	31.9300	-44.3500	*
Total assets (log)	-0.0732 (0.1682)	-6.0430	-0.1715 (0.3889)	-1.2554*** (0.2860)	-5.6560	-92.4580	**
Net interest margin	-0.4107 (0.3006)	-33.9130	-0.0364 (0.3158)	-2.0636*** (0.4694)	2.2340	-152.4480	***
Equity / tot. Assets	0.0219 (0.0383)	1.8080	-0.0121 (0.0354)	-0.0347 (0.0658)	-0.5020	-2.5430	
Other op. / tot. Income	-3.5357 (2.2299)	-291.9890	-9.8521** -34927.0000	-14.3562** -54281.0000	-435.3050	-1042.2120	
Cost / income	-0.0071 (0.0156)	-0.5870	0.1090 (0.0229)	-0.1250*** (0.0265)	0.9750	-9.2700	***
Liquid ass. / deposits	0.0029 (0.0016)	0.2390	0.0096** (0.0036)	-0.0135* (0.0069)	0.4740	-1.0120	***
<i>Panel C - Bank characteristics</i>							
Roa	-0.0029 (0.0466)	-0.2410	-0.0559 (0.0547)	-0.0002 (0.1445)	-2.6270	0.0942	
Total assets (log)	0.1564*** (0.0220)	12.9200	0.2728*** (0.0385)	0.2683*** (0.0608)	12.3020	19.3070	
Net interest margin	0.0188 (0.0366)	1.5490	0.1076 (0.0677)	-0.0028 (0.0611)	0.7320	-0.2360	
Equity / tot. assets	0.0133* (0.0056)	1.0980	0.0201* (0.0079)	0.1528 (0.0136)	0.9000	1.5880	
Other op. / tot. income	-0.8007 (0.5347)	-66.1240	-1.5303* (0.6352)	-0.0264 (0.8806)	-71.8280	0.9720	***
Cost / income	0.0053** (0.0019)	0.4390	0.0060 (0.0037)	0.0056* (0.0028)	0.2700	0.4030	
Liquid ass. / deposits	-0.0024 (0.0014)	-0.1980	-0.0051** (0.0019)	0.0002 (0.0042)	-0.2400	0.0212	*
Observations	21,269		21,412	21,412			
Predicted probability	2.68		2.07	3.44			



DO DOMESTIC AND CROSS-BORDER M&As DIFFER? CROSS-COUNTRY EVIDENCE FROM THE BANKING SECTOR

STEFANO CAIAZZA

Università di Roma "Tor Vergata"

ALBERTO FRANCO POZZOLO

Università degli Studi del Molise

Centro Studi Luca d'Agliano

MoFiR

GIOVANNI TROVATO

Università di Roma "Tor Vergata"

MoFiR working paper n° 52

June 2011

Do domestic and cross-border M&As differ?

Cross-country evidence from the banking sector

Stefano Caiazza
(Università di Roma “Tor Vergata”)

Alberto Franco Pozzolo
(Università degli Studi del Molise, CASMEF, Centro d’Aglano and MoFiR)

Giovanni Trovato
(Università di Roma “Tor Vergata”)

Abstract

Are the drivers of domestic and cross-border M&As in the banking sector different? Despite the intense research on bank M&As in the last decade, the attention paid to this issue is surprisingly limited. We fill this gap studying the ex-ante determinants of national and international acquisitions in the banking sector in an unbalanced panel of nearly 1,000 banks from 50 world countries, from 1992 to 2007. Our results show that size and profitability have a stronger impact on the probability that a bank is a bidder in a cross-border deal than in a domestic deal. Consistent with the findings of the literature on the determinants of the internationalization of manufacturing firms, international expansion in the banking sector is therefore easier for countries with a number of large “national champions”, that are more capable to overcome the fixed costs of internationalization and have a stronger incentive to diversify the idiosyncratic risks of their domestic activities.

JEL classification: G15, G21, G34

Keywords: M&As, bank, bank internationalization.

* Address for correspondence: Alberto Franco Pozzolo, Dipartimento di Scienze Economiche, Gestionali e Sociali, Università degli Studi del Molise, via de Sanctis, 86100, Campobasso, Italia. E-mails: caiazza@economia.uniroma2.it; pozzolo@unimol.it; giovanni.trovato@uniroma2.it. We would like to thank Michele Bagella, Iftekar Hasan and Giancarlo Spagnolo for comments and suggestions and seminar participants at the XV International “Tor Vergata” Conference on Banking and Finance, Rome, 5-7 December 2007. The standard disclaimers apply. We gratefully acknowledge financial support from the Italian Ministry for Education (Prin project no. 2006134152).

1. Introduction

Since the early 1990s, deregulation and increased competition have determined a substantial increase in the number of mergers and acquisitions (M&As) in the banking sector, from an average of 211 a year in the 1980s to 561 in the period from 1990 to 2006. While the scope of the consolidation process has been larger within domestic markets (Focarelli and Pozzolo, 2001), the number of cross-border operations has also increased considerably (Pozzolo, 2009), leading to radical changes in the shape of financial markets worldwide.

The intense activity in the takeover market for financial institutions has fostered the growth of an empirical literature analysing the determinants and consequences of these operations (see, e.g., the surveys by Amel et al., 2004, and DeYoung et al., 2010). The most typical operation has been found to be the acquisition of small and less efficient intermediaries by parts of relatively more profitable and efficient banks. While it is unclear whether or not this creates value for shareholders (as shown, e.g., by the influential but somewhat contrasting views in DeLong, 2001 and Houston et al., 2001), the evidence tends to point to the positive effects of takeovers in relation to indicators of corporate performance, such as profitability and efficiency (see, e.g., Focarelli et al., 2002; Focarelli and Panetta, 2003). But despite the progressive internationalization of the market for corporate control, the research attention paid to the differences between domestic and cross-border M&As is surprisingly limited. The objective of this paper is to fill this gap by investigating whether the ex-ante determinants of cross-border M&As in the banking sector differ from those related to domestic operations.

In broad terms, our work contributes to the understanding of the mechanisms driving contestability of corporate control. The competition of alternative teams in the takeover market for the right to manage corporate resources promotes better resource utilization (Jensen and Ruback, 1983; Andrade et al., 2001) and, in a world without friction, reallocation of control over companies would channel assets towards their best possible use (Rossi and Volpin, 2004). But in reality many frictions

limit this process (Erel et al., 2009), possibly leading to inefficient equilibria. It is therefore important to understand what are the drivers of corporate operations, especially for financial companies, where the overwhelming presence of information asymmetries can severely limit contestability over corporate control.

More specifically, our research is linked to the literature studying the patterns and effects of domestics and cross-border bank expansion (Focarelli and Pozzolo, 2001 and 2008; Buch and DeLong, 2004; Berger et al., 2004; Gulamhussen et al., 2010). Indeed, although this literature has provided ample evidence that the domestic and cross-border M&As are different – due, for example, to linguistic and cultural barriers, normative and institutional differences, less efficient information transmission, and higher fixed costs for the organization of transactions – to the best of our knowledge, a cross-country investigation of these issues based on individual data is still lacking.¹ We therefore build our analysis on an unbalanced panel of nearly 1,000 banks from 50 world countries, for the period from 1992 to 2007. Most important, we include in our sample both intermediaries that acquired participation in a domestic or foreign bank, as well as a control group of intermediaries that have not participated in bidding in a M&A. Our rich data set has a two crucial characteristics that put us in a better position with respect to the previous analyses. First, with individual information on a large number of banks from many different developed and developing countries we can analyze the role of both bank specific characteristics such as size, profitability and specialization, and country specific characteristics, including institutional features. Second, the inclusion in the sample of a large number of banks that did not bid in an M&A provides a control group that is a reliable benchmark with respect to which it is possible to compare the characteristics of the banks that are involved in corporate operations.²

¹ A recent exception is Correa (2009), who compares the characteristics of targets in domestic and cross-border deals.

² In theory, one might also be interested in studying simultaneously the characteristics of the targets of these M&A operations, but this poses insurmountable problems of dimensionality. If we were to analyze the characteristics of each specific deal from the point of view of the bidders and of the targets, the correct control group would be the set of all possible M&As, i.e., the product of all potential bidders with all potential targets. Clearly, the total set is far too wide and

Our results confirm the previous evidence that banks more active in M&As are larger and more profitable than their country peers. Moreover, they strengthen the previous indirect evidence on bank internationalization, showing that banks that bid cross-border are even larger than those that bid domestically, and they are relatively more liquid and better capitalized.

The rest of the paper is organized as follows. Section 2 briefly reviews the relevant empirical literature on bank M&As and internationalization. Section 3 describes the data set; Sections 4 and 5 present the empirical model used for the estimations, and the results of the baseline specification and robustness checks. Section 6 concludes.

2. Relevant literature

In broad terms, the literature on bank M&As can be classified into two groups that study, respectively, the ex-ante characteristics of bidders in M&As and the ex-post effects. Further distinctions that are relevant for our analysis are between papers that focus on domestic and cross-border M&As, and between analyses based on aggregate and on individual level data.

The literature on the determinants of bank M&As, mostly based on bank specific information, is overwhelming.³ The generally agreed result is that the typical pattern is of larger and more efficient banks buying smaller and less efficient institutions. The reasons are straightforward: the acquirers, by sharing their superior management skills, create value by improving the profitability and efficiency of the acquired organization (Focarelli et al., 2002; Hannan and Pilloff, 2006). As for the ex-post effects, the evidence of improved bank efficiency is quite pervasive. Worthigton (2001), for example, shows that greater managerial ability, higher earnings, larger size, and the possibility of loan portfolio diversification are all features that increase the probability of a bank becoming a bidder in a M&A operation. In the case of the results of mergers in the US, Kwan and Wilcox (2002) find evidence of

the incidence of M&As far too small to allow sensible inference. Caiazza et al. (2010) analyze the characteristics of targets in a large sample of banks from over 100 countries, using as a control sample all potential targets.

³Recent surveys include Amel et al. (2004) and DeYoung et al. (2009).

significant cost reductions, and Cornett et al. (2006) demonstrate increased revenue efficiency, especially in the case of operations that are activity and geographically focused. Huizinga et al. (2001) and Campa and Hernando (2006) provide evidence of cost efficiency improvements in the case of European mergers, and Altunbas and Marques-Ibáñez (2008) show that deals involving similar banks show better ex-post performance.

However, efficiency gains are not a guarantee that a bank merger will create value for shareholders, as shown by the results obtained for different countries, the specific characteristics of the merger (e.g., domestic versus cross-border or focusing versus diversifying), and the relative positions of the companies involved. Houston and Ryngaert (1994), for example, show that the stock market's response to large bank mergers is not value enhancing.⁴ De Long (2001) suggests that US geographic and activity focused mergers create value, while diversifying operations do not, a result that is also confirmed by Cornett et al. (2003). Goergen and Renneboog (2004) confirm these results showing that mergers are significantly value enhancing for targets, but much less so for bidders.

International M&As are different from domestic operations. Research based on the aggregate number of cross-border operations between country pairs shows that banks are more likely to expand to countries with stronger economic, cultural, legal, and institutional linkages to their countries of origin, which are likely to reduce the impact of entry barriers (Buch and Delong, 2004; Berger et al., 2003 and 2004, Claessens and van Horen, 2007). Similar conclusions are drawn from analyses of bank cross-border reach based on individual level data (Focarelli and Pozzolo, 2005; Magri et al., 2005). Moreover, Focarelli and Pozzolo (2001) show that internationalization is less common in banking than in other sectors of economic activity, arguing that this is due to the more pervasive role of explicit and implicit barriers to foreign entry of credit institutions, than manufacturing firms (and even insurance companies; Focarelli and Pozzolo, 2008).

⁴ The results of Campa and Hernando (2004) suggest that this is partly related to heavy regulation in the banking sector.

As to the ex-post effects, consistent with the negative stock price reaction of geographically diversifying M&As, Amihud et al. (2002) show that the bidders' returns on the announcement of a cross-border bank merger are negative. According to DeYoung et al. (2009), an explanation for these contrasting results might be that profit maximization is not the only motivation for a M&A in the banking sector. As confirmed by many episodes in the recent financial crisis, motives such as power building by managers (Hughes et al., 2003) and the research of a size that guarantees of being too-big-to-fail (Mishkin, 2006) may provide even more important incentives for bank M&As than profit maximization.

Taken together, all these findings suggest that the implicit and explicit fixed costs for the acquirer will be much higher in the case of foreign expansions than for domestic deals. This would suggest that, along certain individual and country specific dimension, the characteristics of bidders in cross-border M&As will be different from those of bidders in domestic operations. In what follows, we will examine this hypothesis in detail.

3. Data and summary statistics

To study the characteristics of bidders in domestic and cross-border M&A deals, we need information on the banks involved in the mergers and data on the control group of institutions not involved in M&A activity. Therefore, we consider initially an unbalanced panel of potential bidders from nearly 1,000 banks from 71 countries, whose total assets in 2006 were in excess of US\$25 billion, obtained from the Bankscope database provided by Bureau van Dijk. We concentrate on the larger banks in order that comparison between domestic and cross-border operations is not biased by the incidence of fixed costs, which will be disproportionately high for smaller banks involved in international deals.

Within this sample, we identify banks involved in M&As using the information provided by Security Data Corporation (SDC) in their Platinum Worldwide Mergers and Acquisition Database,

which includes the names, industry sectors, countries of residence, and several identification codes (e.g. ISIN and SEDOL) for the bidders and targets involved in M&As, together with the announced and effective dates of these deals, and their status. We consider all bank M&As effectively completed between 1988 and 2007. We define domestic M&As as those where bidder and target bank nationalities are the same, and cross-border M&As as those where nationalities differ. Our initial sample of M&As includes nearly 12,000 deals. To merge the balance sheet and the M&A datasets we use the SEDOL code, the identifier common to both databases, and then compare bank name and nationality text strings to cover the cases in which the SEDOL code is missing. We manually checked the string matches to remove improper attributions. Our final sample includes 7,434 observations for 923 banks from 50 countries between 1992 and 2007; 103 banks are involved in 456 domestic and 207 cross-border M&As (clearly, many banks are involved in more than one operation).

Table 1 shows that our sample is biased towards the US.⁵ In fact, domestic mergers involving an American bank account for 79 per cent of total domestic deals; those involving a bank from a G10 country account for 91 per cent of all domestic deals.⁶ Germany is host country to the largest number of bidders in cross-border operations (21 per cent); the G10 countries host 55 per cent. Banks from Austria, Canada, France, Greece and Hungary are also very active in cross-border operations, while international deals with a US bank bidder are just 3 per cent of the total.

Figure 1 shows that domestic deals are evenly distributed across our sample period, with 56 per cent of the total number occurring before 2000. On the contrary, cross-border deals have been much less frequent before 2000 (21 per cent). This difference in the time distribution can be explained by two factors. First, at the start of the financial sector consolidation process that took place at the beginning of the 1990s, bidders probably watched for potential domestic targets, only later widening their focus to

⁵ Additional analyses, available from the authors upon request, confirm that our results are broadly unchanged also excluding US banks.

⁶ The official definition of G10 includes 11 countries: Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, UK and US. In our analysis, we exclude Sweden for reasons of data availability.

foreign markets. Second, the regulatory and supervisory authorities may have become more favorable to the idea of foreign competitors (Carletti et al., 2006).

Tables 2 and 3 present some descriptive statistics for the data used in the empirical analysis.⁷ Data on GDP are from the International Monetary Fund's World Economic Outlook published in October 2009. Total GDP, expressed in PPP US\$ billions in 2000, ranges from 0.43 for Tonga to 9,545 billion for the US; on average it is 817.89 US\$ billions.

Stock market capitalization, private bank credit and total deposits are from the updated version of Beck et al. (2000), concentration is calculated from individual data. We consider three aggregate characteristics of the banking and financial markets. Concentration is measured as the ratio of the assets of a country's five largest banks to its total bank assets. The banking market is highly concentrated, with an average sample value of 91 per cent, although for many countries it is 100 per cent, implying that the top five banks represent entire coverage of the nation's banking system in our sample. Perhaps in part because of better market coverage, the US has the lowest concentration index (26 per cent), followed by Japan (49). Average concentration in the G10 countries is 75 per cent. Financial market specialization is measured as the ratio of stock market capitalization to private credit, and has an average value of 1.06. As it is customary in the literature, banking sector development is measured by the ratio of private credit to GDP; the average value is in this case is 0.79, but it hides significant cross-country differences. Stock markets are particularly large with respect to credit in South Africa (where the ratio is 2.87), Hong-Kong (2.68), US (2.44), and also the Russian Federation (2.19) and Turkey (1.71). Apart from Syria and Tonga, they are less developed in Austria (0.23), Cyprus (0.24), Portugal (0.31) and Germany (0.37), where bank intermediation is more important, as shown by the higher ratios

⁷ We include in our descriptive statistics, as well as in our econometric analysis, also countries that had no domestic or cross-border M&As during our sample period, as additional controls. Additional analyses available upon request confirm our results also excluding these countries.

of private credit to GDP (ranging from 1.38 of Cyprus to 1.03 of Portugal, as opposed, for example, to 0.50 in the US).

Table 3 reports summary statistics for the individual bank indicators calculated for the sample of banks in each category in the year before the event occurred. For example, a domestic bidder in a domestic M&A contributes its asset value in the year before a bid to the average value of the total assets of domestic bidders in domestic M&As. Panel A reports the characteristics of the banking sector in each country, obtained aggregating our individual bank data from Bankscope. Average bank size, measured by total assets, is US\$112 billion. The largest banks are located in the Netherlands (US\$451bn), Switzerland (US\$311bn), France (US\$234bn) and Japan (US\$203bn). Cyprus and United Arab Emirates have the smallest banks. Bank returns on assets, a standard measure of profitability, is 0.76 per cent on average. The countries hosting the most profitable banks during our sample period are Hungary (2.46) and Iceland (2.25). French, German and UK banks have values below 0.5 per cent; similarly, the profitability of the G10 countries' banks is well below the sample average (0.52). The average share of other operative income to total income, often used as a proxy for the relative importance of traditional banking activities, is 0.51, with a range of 0.05 in Israel to 1.02 in Australia (0.75 in the US); the average value for the G10 countries is 0.41. The ratio of equity to total assets (the inverse of leverage), is 6.16 per cent on average, ranging from 12.99 in the Russian Federation to 1.29 in Syria (2.93 in Germany); in the G10s it is 4.81, lower than in the US (7.77). The ratio of liquid assets to deposits, a standard measure of the level of liquidity of the banking system is 19.92 per cent on average; in the G10 countries it is slightly lower (15.95); India and Turkey show the highest values (40.94 and 37.19, respectively), Saudi Arabia and Norway the lowest values (4.32 and 2.66). The cost to income ratio – a raw proxy for efficiency (Focarelli and Pozzolo, 2001; Vander Venet, 2003) – is

59.26 per cent on average, ranging from 75.64 in Iran to 16.64 in Syria.⁸ Among the G10 countries, the highest value is for Italy (67.93), the lowest for Germany (52.54).

Panel B, C and D of table 3 report statistics for individual bank indicators related, respectively, to non-bidders, domestic bidders and cross-border bidders. Consistent with the literature on banking internationalization, in our sample we find that the bidders in cross-border M&As are the largest banks: the average bidder in a cross-border M&A has a total assets value of US\$427 billions. The average bidder in a domestic M&A has a significantly smaller value (US\$116bn), still larger than the value of non bidders (US\$102bn). Interestingly, bidders in domestic deals have on average higher returns on assets than bidders in cross-border operations (respectively, 1.21 and 0.84 per cent). The differences are even starker if we consider the medians. Cross-border bidders have a larger share of the revenues from traditional banking activities, with a share of other operative income to total income of only 30 per cent, as opposed to 39 per cent for domestic bidders. Non-bidder banks exhibit the largest ratio of income from non-traditional activity over total income (0.53). The average ratio of equity to total assets is lower for banks bidding in cross-border deals (i.e., these banks have higher leverage) than for those bidding in domestic deals (respectively, 5.15 and 7.86 per cent); the other banks are between these two values (6.08). The ratio of liquid assets to deposits is lower for banks involved domestic operations (9.92 per cent) compared to cross-border deals (11.08). The average value for other banks is 20.92 per cent. Finally, the cost to income ratio of bidding banks (61.64 and 60.44 for cross-border and domestic operations respectively) is higher than that of non-bidders (59.10).

Overall, these figures confirm most of the previous findings of the empirical literature on the determinants of M&As, and support the indirect evidence on the characteristics of international banks, that are typically larger and more profitable than their peers. In the remaining of the paper, we will

⁸ Costs are defined as the sum of net interests paid and operational costs; income is defined as total bank revenues.

verify if the broad patterns emerging from these descriptive statistics are confirmed by a more rigorous econometric analysis.

4. The empirical model

To study the characteristics of bank M&A bidders, we adopt a multinomial choice model in which we distinguish between non-bidders, bidders in domestic operations, and bidders in cross-border operations. In practice, we estimate the following specification:⁹

$$\Pr(Y_{ijt} = k) = F(X_{it-1}, B_{jt-1}, TD_t), \quad k = 0, 1, 2 \quad (1)$$

where: $Y_{ijt} = 0$ if bank i in country j at time t is not a bidder in any M&A, $Y_{ijt} = 1$ if it is a bidder in a domestic M&A, and $Y_{ijt} = 2$ if it is a bidder in a cross-border M&A; X_{it} are characteristics of bank i at time t ; B_{jt} are characteristics of country j at time t ; and TD_t are time dummies.

As bank specific characteristics we include the difference between the bank's individual value and the same variable's country and year average, therefore removing from the estimated coefficient of bank specific characteristics both time and country specific effects. In other words, the estimated coefficients measure the effect of the difference between a bank's characteristics and those of its average peer in the same country and in the same year. We choose this specification to disentangle the effects of cross-country and time heterogeneity, even in the absence of the country specific fixed effects. However, we verified that our results are qualitatively unchanged using a specification that includes country fixed effects. However, in some cases this led to the non-convergence of the maximization procedure for the likelihood function, and the comparison was therefore impossible.

⁹ For the sake of comparison, we also estimate and present the results of a binomial choice model of the probability that a bank is an M&A bidder, without distinguishing between domestic and cross-border operations.

Since it is well known that multinomial choice models estimated using a logistic specification impose the hypothesis of independence of irrelevant alternatives, and we verified that the Hausman tests rejects this hypothesis in our sample, we use a multinomial probit specification. All standard errors are robust and clustered at country level.

5. Empirical results

5.1 Baseline specification

The choice of explanatory variables to include in our empirical model is mainly driven by the findings of the literature on bank M&As, and include measures of size, profitability, specialization and efficiency.

We have argued above that there are many reasons why cross-border M&As are more complex than domestic operations, and therefore it is very likely that the determinants of bank domestic and cross-border M&As will differ, and that the average effects obtained from pooling both types of deals will hide some interesting additional economic content. Thus, in Table 4 we report the results from estimating the multinomial choice model of equation (1). For the sake of comparison, Panels 1 and 2 present the coefficients and the marginal effects of a binomial choice model of the probability that a bank is an M&A bidder, respectively. Panels 3 to 6 present instead the results of the estimation of our baseline multinomial specification, distinguishing domestic and cross-border M&As. Panels 3 and 4 report the coefficients and Panels 5 and 6 the marginal effects. Panel 7 shows the significance of the test for the differences between the parameters for the estimated probabilities of domestic and cross-border operations.

The results clearly confirm our main hypothesis that domestic and cross-border M&As have partly different drivers. Panel 7 shows that in five cases the coefficient of the model for the probability that a bank is a bidder in a domestic M&A is significantly different from that of the model for cross-border activity.

Country characteristics. A first group of variables included in the analyses are country characteristics. Within this set, only economic development has a different effect on the probability that a bank bids in a domestic or in a cross-border deal. Higher GDP has a positive and significant effect on the probability that a bank is a bidder in a domestic deal, the same result as from the binomial model, but it has no effects on the probability that it bids internationally. The difference between the two coefficients is statistically significant at the 10% level. In other words, larger economies have more competitive takeover markets, but this does not impact on the ability of their national banks to merge with or acquire foreign financial intermediaries.

No other country characteristics have a significantly different effect on the probability that banks bid in domestic or cross-border merger deals. Consistent with the hypothesis that regulators hinder consolidation when it can negatively influence competition, banking sector concentration has a much stronger effect on the probability that a bank bids internationally, as confirmed by the larger marginal effect than in the case of domestic operations, but both coefficients are estimated with large standard errors and none of them is statistically significant. The coefficient of the country's financial market orientation is negative and statistically significant in both cases of domestic and cross-border M&As, showing that the consolidation wave of the last decade was stronger in countries more orientated towards bank intermediation. In the case of cross-border deals, this result is also consistent with the findings of the literature on bank internationalization, showing that international bank are more likely to come from bank oriented countries (e.g., Focarelli and Pozzolo, 2001 and 2005). Finally, the sheer size of the banking market relative to total GDP has no significant effects on the probability that banks will be M&A bidders, in both the binomial and the multinomial specifications.

Bank specific characteristics. The second group of variables included in our regression refers to bank specific characteristics, expressed as differences with respect to country and year averages. Consistent with our expectations, the results show that banks are more likely to bid in an M&A if they

are: a) larger; b) more profitable; c) less liquid; d) more oriented towards traditional banking activities; and e) have a higher cost to income ratio. Although the signs of these effects is the same on the probability of domestic and cross-border deals, the magnitudes are significantly different in three out of six cases.

As we argued above, it is a standard finding in the empirical literature that larger and more profitable banks are more likely to acquire or merge with other institutions (Focarelli et al., 2002). However, the effect of size is significantly stronger in the case of cross-border operations, confirming also for the banking industry the general result that only large corporations have the incentives and the means to overcome the high fixed costs that are necessary to expand internationally (Helpman et al., 2004). On the contrary, profitability seems to be more relevant in the case of domestic deals, as shown by the larger marginal effect, although the difference with respect to the likelihood of bidding in cross-border operations is small and statistically insignificant. Liquidity has a negative impact in the case of both domestic and international deals, but only in the first case the coefficient is statistically significant. The results are consistent with the hypothesis that banks try to reduce the risk of liquidity shocks through mergers (Focarelli et al., 2002), but it suggests that this strategy is not a major driver in the case of cross-border participations, most likely because the limitations to the international transfer of liquidity that are imposed by regulators also within subsidiaries of the same banking group limit its viability.

The negative and significant effect of the incidence of non traditional banking activities is partly in contrast with the finding that innovative banks are typically more active in the Italian takeover market (Focarelli et al., 2002). On the contrary, it shows that large and profitable banks specialized in traditional activities enter more innovative markets precisely through the acquisition of more specialized intermediaries, an interpretation that is indeed consistent with the findings of Caiazza et al. (2010), who show that domestic M&A targets have a larger share of the revenues from non-traditional

banking activities. Our results also show that this effect is smaller in the case of cross-border deals. Interestingly, banks with a higher cost to income ratio are more likely to bid in both domestic and cross-border M&As. While the marginal effect is much smaller than for the other bank specific characteristics, this result suggests that our rough measure of cost efficiency is not a relevant characteristic in the domestic and international markets for corporate control, and it may indeed capture instead higher average labor costs, that are typically associated with a more specialized labor force.¹⁰ Finally, a lower level of equity of total assets (a higher leverage) has a negative effect on the probability that a bank bids domestically and a positive effect that it bids internationally. However, although the two coefficients are significantly different from each other at the 5 per cent level, none of them turns out being significantly different from zero.

Average bank characteristics. Finally, a third set of variables included in the regression refers to the year and country averages of bank specific characteristics that were subtracted from individual bank data to obtain our previous set of regressors. Interestingly, the effects of year and country averages go in the same direction as those of bank specific characteristics, with the only important exception of that of average size.¹¹

Banks are more likely to bid in an M&A when they operate in countries where average liquidity is lower – confirming that liquidity search is a relevant motivation for bank mergers – and where average profitability is higher. However, the effects are not significantly different on the probability that of domestic and cross-border bids. More surprisingly, average bank size has a negative and statistically significant effect on the probability that banks take an active part in an M&A operation, both domestically and internationally. In the case of domestic deals, this results may be explained by the fact that it is easier for banks to bid in an M&A in countries where banks are on average smaller,

¹⁰ Indeed, in a companion paper (Caiazza et al., 2009) in which we model technical efficiency more rigorously, using parametric and semi-parametric techniques, we find that more efficient banks are more likely to bid in cross-border operations.

¹¹ We checked that this results is not driven by the number of bank operating in each country.

since there is a larger number of potentially affordable targets. In the case of cross-border deals, the negative effect is less sizeable, as confirmed by the smaller marginal effect, but its explanation seems more puzzling.

We find no statistically significant evidence that average specialization, measured by the ratio of other operative income over total income, and average cost to income, our raw proxy for efficiency, affect the probability that a bank is active in an M&A deal. Finally, the average ratio of equity to total assets (the inverse of leverage) has no statistically significant effect on the probability that a bank is an M&A bidder in a domestic operation, but it has a significant negative effect on the probability that it bids internationally, and the difference between the two coefficients is statistically significant at the 10 per cent level.

The comparison of the average marginal effects over the estimation sample provide additional information about the relevance of the explanatory variables included in the regression. The variables with a stronger statistically significant effect on the probability that a bank is a bidder in a domestic M&A are the country's financial specialization, its total GDP and its average bank profitability. Among individual bank characteristics, the strongest impact are those of the incidence of traditional banking activities and of profitability. In the case of cross-border M&As, the strongest impact comes from the country's financial specialization and from average bank profitability and, at the individual bank level, from size.

5.2 *G10 countries*

Since the determinants of M&As might be different in richer countries, that have more developed financial markets and better institutional environments, than in poorer countries, in Table 5 we present the results obtained estimating the model of equation (1) on the sub-sample of banks based in G10 countries. Although they broadly confirm the findings obtained from the full sample, they still show some interesting differences. The structure of Table 5 replicates that of Table 4. As in the previous

case, Panel 7 clearly confirms the existence of significant differences between the determinants of domestic and cross-border M&As: in six cases the coefficient of the model for the probability that a bank is a bidder in a domestic M&A is significantly different from that of the model for cross-border activity. However, only in three cases the differences are between those same coefficients that differed in the estimates from the entire sample.

The estimates of the effects of country characteristics obtained from the smaller sample of the countries of the G10 group are obviously much less reliable than those from the entire sample, but they nonetheless broadly confirm the previous. Economic development has a positive and significant effect on the probability that a bank is a bidder in a domestic deal and an insignificant effect in the case of cross-border operations, as in the case of the estimates on the entire sample. However, due to the smaller number of countries, the difference between the two coefficients is not statistically significant. Banking sector concentration has no statistically significant effect on the probability that a bank bids in an M&A, although the coefficient is surprisingly positive in the case of domestic deals and negative in that of cross-border operations, and the difference between the two is statistically significant at the 10 per cent level. The effect of the country's financial market orientation is negative and statistically significant in both cases of domestic and cross-border M&As, but in the case of domestic deals the effect is much stronger, and the difference between the two coefficients is also statistically significant, at the 5 per cent level.

The results on the effects of bank specific characteristics are statistically more reliable, since also in the case of the smaller sample of G10 countries are based on a set of over 4,000 observations. Overall, they confirm the findings of the estimates from the entire sample. Banks that are larger, more profitable, less liquid, more oriented towards traditional banking activities and have a higher cost to income ratio are indeed more likely to bid in an M&A. As expected, also in the estimates within the G10s the coefficient of size is significantly larger in the case of cross-border deals, although the

marginal effects are in this case comparable. Interestingly, the results of the opposite effects of leverage for domestic and cross-border deals is also confirmed but, as in the case of the estimates on the entire sample, none of the two individual coefficients is statistically significant.

Finally, also the results for year and country averages of bank specific characteristics are similar to those from the baseline specification. However, within the G10s, in addition to the ratio of equity to total assets (the inverse of leverage), also the liquidity ratio has a significantly different effect on the probability that a bank bids domestically or internationally.

Interestingly, the size of the marginal effects and their internal ranking are also quite different from those obtained from the entire sample. In particular, within the G10s, by far the strongest impact on the probability that a bank bids in an M&A deal comes from average liquidity.

6. Conclusions

The economic literature provides extensive analyses of why banks bid in an M&A. However, the differences between domestic and cross-border deals have not been studied in depth so far. This paper analyzes the characteristics of banks (and the countries in which they operate) that make it more likely that they will be bidders in domestic or in cross-border M&As.

The results of our econometric analysis show that banks more active in M&As are larger, more profitable, more oriented towards traditional banking activities, less liquid, and are located in countries with higher GDP and with financial markets more oriented to banking intermediation than stock market transactions. Further, when we distinguish between domestic and cross-border operations, we obtain additional interesting information, showing that individual bank size is significantly more important for cross-border deals than for domestic M&As. This confirms that size is essential for cross-border expansion, consistent with the findings of the literature on the determinants of the internationalization of manufacturing firms. From a policy perspective, bank internationalization has been and will be easier for countries with a presence of a number of large “national champions”.

References

- Altunbas, Y., Marques-Ibáñez, D., 2008. Mergers and acquisitions and bank performance in Europe: The role of strategic similarities. *Journal of Economics and Business* 60, 204-222.
- Amel, D., Banes, C., Panetta, F., Salleo, C., 2004. Consolidation and efficiency in the financial sector: A review of the international evidence. *Journal of Banking and Finance* 28, 2493-2519.
- Amihud, Y., DeLong, G.L., Saunders, A., 2002. The Effects of Cross-Border Bank Mergers on Bank Risk and Value. *Journal of International Money and Finance* 21, 857-877.
- Andrade, G., Mitchell, M., Stafford, E., 2001. New evidence and perspectives in mergers. *Journal of Economic Perspectives* 15, 103-120.
- Beck, T., Demirgüç-Kunt, A., Levine, R., 2000. A new database on financial development and structure. *World Bank Economic Review* 14, 597-605, revised in 2006.
- Berger, A.N., Hunter, W.C., Timme, S.G., 2003. The efficiency of financial institutions: a review and preview of research past, present, and future. *Journal of Banking and Finance* 17, 221-49.
- Berger, A.N., Buch, C.M., DeLong, G.L., DeYoung R., 2004. Exporting financial institutions management via foreign direct investment mergers and acquisitions. *Journal of International Money and Finance* 22, 333-366.
- Buch, C.M., DeLong, G.L., 2004. Cross-border bank mergers: what lures the rare animal?. *Journal of Banking and Finance* 28, 2077-2102.
- Caiazza, S., Pozzolo, A.F., Trovato, G., 2009. Bank efficiency measure, M&A decision and heterogeneity: a semi-parametric application. *mimeo*.
- Caiazza, S., Clare, A.D., Pozzolo, A.F., 2010. What Do Foreigners Want? Evidence from Targets in Bank Cross-Border M&As. Available at SSRN: <http://ssrn.com/abstract=1703524>.
- Campa, J.M., Hernando, I., 2004. Shareholder Value Creation in European M&As. *European Financial Management* 10, 47-81.
- Campa, J.M., Hernando, I., 2006. M&As performance in the European financial industry. *Journal of Banking and Finance* 30, 3367-3392.
- Carletti, E., P. Hartmann and S. Ongena (2006), "Cross-border banking and competition policy, *European Central Bank Research Bulletin*, 4, 7-10.
- Claessens, S., van Horen, N., 2007. Location decisions of foreign banks and competitive advantage. Available at SSRN: <http://ssrn.com/abstract=904332>.
- Cornett, M.M., Hovakimian, G., Palia, D., Tehranian, H., 2003. The impact of the manager-shareholder conflict on acquiring bank returns. *Journal of Banking and Finance* 27, 103-131.
- Cornett, M.M., McNutt, J.J., Tehranian, H., 2006. Performance changes around bank mergers: Revenue enhancements versus cost reductions. *Journal of Money, Credit, and Banking* 38, 1013-1050.

- Correa, R., 2009. Cross-border Bank Acquisitions: Is there a Performance Effect?. *Journal of Financial Services Research* 36, 169-197.
- DeLong G.L., 2001, Stockholder gains from focusing versus diversifying bank mergers, *Journal of Financial Economics* 59, 221-252.
- DeYoung, R., Douglas, E., Molyneux, P., 2009. Mergers and Acquisitions of Financial Institutions: A Review of the Literature. *Journal of Financial Services Research* 36, 87-110.
- DeYoung, R., Hunter, W.C., Udell, G.F., 2004. The past, present, and probable future for community banks. *Journal of Financial Services Research* 25, 85– 133.
- Erel, I., Liao, R.C., Weisbach, M.S., 2009. World markets for mergers and acquisitions. NBER WP no. 15132.
- Focarelli, D., Panetta, F., Carmelo, S., 2002. Why do banks merge?. *Journal of Money Credit and Banking* 34, 1047-66.
- Focarelli, D., Panetta, F., 2003. Are mergers beneficial to consumers? Evidence from the market for bank deposits. *American Economic Review* 93, 1152-1172.
- Focarelli, D., Pozzolo, A.F., 2001. The patterns of cross-border bank mergers and shareholdings in OECD countries. *Journal of Banking and Finance* 25, 2305- 2337.
- Focarelli, D., Pozzolo, A.F., 2005. Where do banks expand abroad? An empirical analysis. *Journal of Business* 78, 2035–2065.
- Focarelli, D., Pozzolo, A.F., 2008. Cross-border M&As in the financial sector: Is banking different from Insurance?. *Journal of Banking and Finance* 32, 15-29.
- Goergen, M., Renneboog, L., 2004. Shareholder Wealth Effects of European Domestic and Cross-border Takeover Bids. *European Financial Management* 10, 9-45
- Gulamhussen, M.A, Pinheiro, Pozzolo, A.F., 2010, Do multinational banks create or destroy economic value?. Mo.Fi.R. Working Papers 36, 2010.
- Hannan, T.H., Pilloff, S.J., 2006. Acquisition targets and motives in the banking industry. Federal Reserve Board Finance and Economics Discussion Series 2006-40.
- Helpman, E., M.J. Melitz, S.R. Yeaple. (2004). Export versus FDI with heterogeneous firms. *American Economic Review* 94, 300-16.
- Houston, J., James, C.M., Ryngaert, M., 2001. Where do merger gains come from? Bank mergers from the perspective of insiders and outsiders. *Journal of Financial Economics* 60, 285-331.
- Houston, J., Ryngaert, M., 1994. The overall gains from large bank mergers. *Journal of Banking and Finance* 18, 1155-1176.
- Hughes, J., Lang ,W., Mester, L., Moon, C.G., Pagano, M., 2003. Do bankers sacrifice value to build empires? Managerial incentives, industry consolidation, and financial performance. *Journal of Banking and Finance* 27, 417-447.

- Huizinga, H.P., Nelissen, J.H.M., Vander Venet, R., 2001. Efficiency effects of bank mergers and acquisitions in Europe. Ghent University Working Paper No 106.
- Jensen, M.C., Ruback, L.S., 1983. The Market For Corporate Control: The Scientific Evidence. *Journal of Financial Economics* 11, 5-50.
- Kwan, S., Wilcox, J., 2002. Hidden cost reduction in bank mergers: Accounting for more productive banks. *Research in Finance* 19, 109-124.
- Magri, S., Mori, A., Rossi, P., 2005. The entry and the activity level of foreign banks in Italy: An analysis the determinants. *Journal of Banking and Finance* 29,1295–1310.
- Mishkin, F.S. , 2006. How big a problem is too big to fail?. *Journal of Economic Literature* 44, 988-1004.
- Pozzolo, A.F., 2009, Bank cross-border mergers and acquisitions (causes, consequences and recent trends), in: Alessandrini, P., Fratianni, M., Zazzaro, A., (Eds.), *The Changing Geography of Banking and Finance*, Norwell, Springer.
- Rhoades ,S. A., 1994. A Summary of Merger Performance Studies in Banking, 1980-93, and an Assessment of the 'Operating Performance' and 'Event Study' Methodologies. Federal Reserve Board, *Staff Study* 167.
- Rossi, F., Volpin, P.F., 2004. Cross-country determinants of mergers and acquisitions. *Journal of Financial Economics* 74, 277-304.
- Vander Venet, R., 2003. Cross-border mergers in european banking and bank efficiency, in: Herrmann, H., Lipsey, R. (Eds.), *Foreign Direct Investment in the Real and Financial Sector of Industrial Countries*. Springer, Heidelberg and New York.
- Worthington, A.C., 2001. Efficiency in pre-merger and post-merger non-bank financial institutions. *Managerial and Decision Economics* 22, 439-452.

Table 1

Number of domestic and cross-border M&As by country

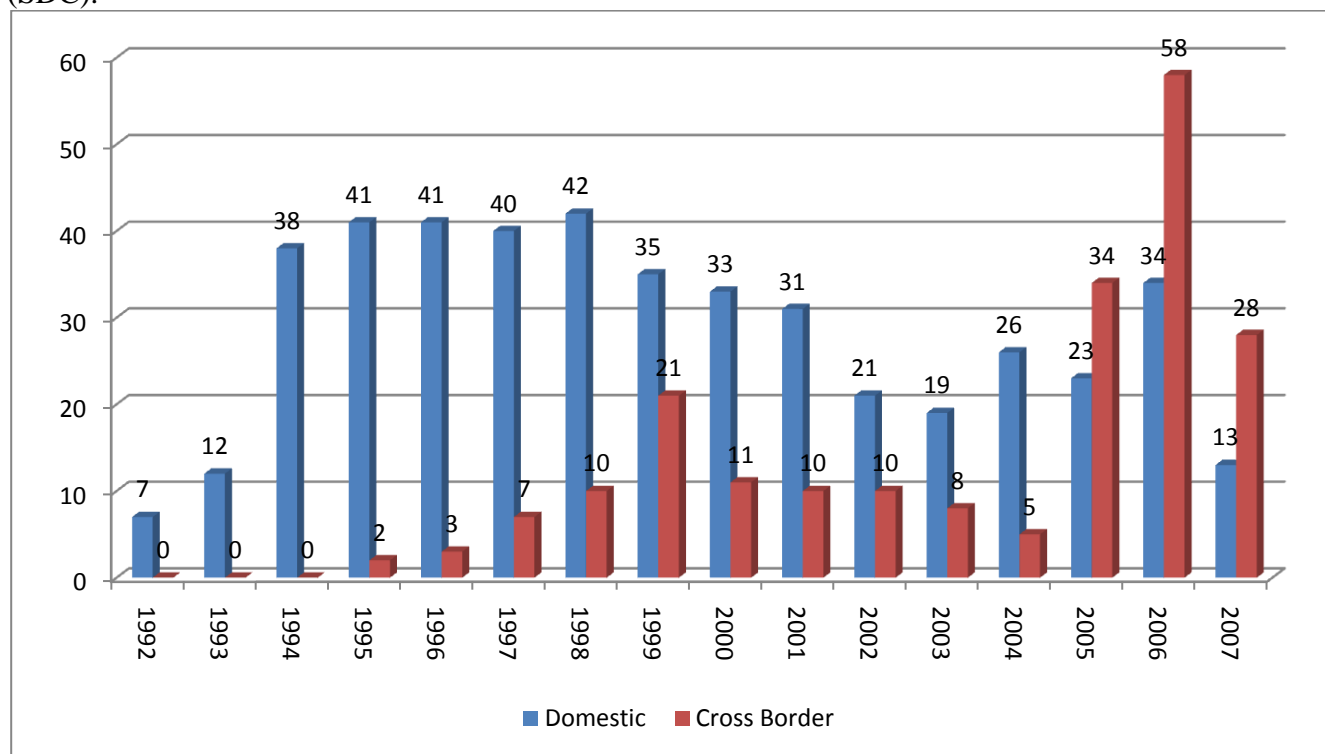
Number of domestic and cross-border mergers and acquisitions that took place between 1992 and 2007 as registered in the Platinum Worldwide Mergers and Acquisition Database produced by Security Data Corporation (SDC).

	<i>Domestic</i>	<i>Cross-border</i>	<i>Total</i>
Australia	0	6	6
Austria	6	27	33
Belgium	1	0	1
Brazil	10	1	11
Canada	11	31	42
China	0	1	1
Czech Republic	1	0	1
Denmark	0	3	3
Finland	0	2	2
France	1	21	22
Germany	17	44	61
Greece	0	17	17
Hungary	1	10	11
Iceland	0	3	3
India	3	3	6
Israel	4	1	5
Italy	9	5	14
Japan	16	1	17
Korea, Rep.	1	2	3
Malaysia	2	2	4
Netherlands	1	6	7
Norway	0	1	1
Poland	0	1	1
Portugal	1	1	2
Russian Fed	1	2	3
Singapore	0	2	2
South Africa	1	0	1
Spain	1	4	5
Taiwan	8	0	8
Thailand	1	0	1
United Kingdom	1	4	5
United States	358	6	364
Total	456	207	663

Figure 1

Number of domestic and cross-border M&As by year

Number of domestic and cross-border mergers and acquisitions between 1992 and 2007, filed in the Platinum Worldwide Mergers and Acquisition Database produced by Security Data Corporation (SDC).



Summary statistics for country-specific variables

GDP is the gross domestic product based on purchasing-power parity (PPP) in 2000, expressed in billions of US dollars. *Concentration* is the market share of the five largest banks measured by total assets. *Stock market capitalization / total credit* is the ratio between the stock market capitalization and total credit to the private sector. *Private credit / GDP* is the ratio between total credit to the private sector and GDP. Data on GDP is from the IMF; stock market capitalization and private credit are from Beck et al.(2000), revised in 2006. Concentration is obtained as country average of bank individual data from Bankscope. Statistics are obtained trimming the first and last percentiles of the sample distribution of each variable.

Country	GDP	Concentration	Stock market capitalization / Private credit	Private credit / GDP
Australia	652.22	0.94	1.18	0.99
Austria	244.54	0.84	0.23	1.03
Belgium	259.92	0.94	0.73	0.71
Brazil	1,305.89	0.80	1.18	0.31
Canada	887.58	0.89	0.97	0.97
Cayman Islands	.	.	.	.
China	3,505.68	0.90	.	.
Cyprus	13.38	1.00	0.24	1.38
Czech Republic	155.40	1.00	0.51	0.49
Denmark	149.25	1.00	0.89	0.88
Egypt	229.30	1.00	0.64	0.39
Finland	128.00	1.00	1.21	0.65
France	1,570.76	0.74	0.74	0.88
Germany	2,095.93	0.80	0.37	1.08
Greece	283.07	0.91	0.70	0.71
Hong Kong	234.50	0.91	2.68	1.43
Hungary	141.06	1.00	0.70	0.36
Iceland	10.34	1.00	0.73	1.91
India	2,039.09	0.94	1.29	0.33
Indonesia	598.38	1.00	1.10	0.22
Iran	519.18	1.00	0.77	0.22
Ireland-Rep	128.30	0.91	0.53	1.14
Israel	115.42	1.00	0.71	0.71
Italy	1,379.24	0.70	0.48	0.70
Japan	3,280.67	0.49	0.56	1.48
Jordan	15.55	1.00	1.34	0.67
Korea, Rep.	767.85	0.64	0.65	0.69
Kuwait	70.28	1.00	1.81	0.40
Luxembourg	24.15	0.84	1.33	1.07
Malaysia	221.45	1.00	1.48	1.20
Mexico	1,109.72	1.00	1.56	0.16
Netherlands	571.49	0.92	0.60	1.59
New Zealand	75.63	1.00	0.42	1.05
Norway	181.14	1.00	0.59	0.68
Poland	523.67	1.00	0.99	0.28
Portugal	171.35	1.00	0.31	1.03
Russian Fed	1,363.36	1.00	2.19	0.17
Saudi Arabia	361.25	1.00	1.74	0.25
Singapore	145.19	1.00	2.10	0.93
South Africa	358.93	0.79	2.87	0.65
Spain	1,003.33	0.83	0.58	1.12
Switzerland	226.77	1.00	1.27	1.59
Syria	52.91	1.00	.	0.09
Taiwan	.	.	.	.
Thailand	289.35	.	0.27	1.43
Tonga	0.43	1.00	.	0.50
Turkey	597.74	0.89	1.71	0.15
United Kingdom	1,572.82	0.76	1.05	1.30
United States	9,544.78	0.26	2.44	0.50
Utd Arab Em	82.54	1.00	.	.

Table 3

Summary statistics for bank-specific variables

Panel A reports the statistics for the entire sample, trimming the first and last percentiles of the sample distribution of each variable. Panel B reports the statistics for banks not involved in any deal. Panels C and D report the statistics for banks involved in domestic deals and cross-border deals, respectively. Summary statistics are calculated for the sample of banks in each category in the year before the event has taken place. *Total assets* is the total amount of bank's asset expressed in billions of US dollars. Return on (average) asset is the ratio between bank returns and total asset, expressed in percentage. *Other income over total income* is the ratio between the sum of income from non-traditional activities (eg net fees and commission and net trading income) and total income. *Equity / assets*, the inverse of leverage, is the percentage ratio between equity and total asset. *Liquid assets to deposits* is the ratio between liquid assets and total deposits, expressed in percentage. *Cost / income* is the percentage ratio between total costs and total income. Data are from Bankscope.

Variable	Obs.	Mean	Median	St. dev.	Minimum	Maximum
A. Banks with total assets of more than \$25 Billion						
Total Assets	7,434	112.00	39.10	216.00	0.00	1,960.00
Return on Asset	7,033	0.76	0.67	0.72	-1.95	3.82
Other Inc. / Total Income	6,420	0.51	0.23	0.92	-0.77	8.57
Equity / Assets	7,281	6.16	5.70	3.50	0.34	25.73
Liquid Assets / Deposits	6,863	19.92	12.03	22.19	0.05	112.47
Cost / Income	7,078	59.26	59.31	23.32	0.00	729.15
B. Banks not involved in M&As						
Total Assets	6,771	102.00	38.00	198.00	0.00	1,960.00
Return on Asset	6,376	0.72	0.62	0.73	-1.95	3.82
Other Inc. / Total Income	5,776	0.53	0.22	0.96	-0.77	8.57
Equity / Assets	6,618	6.08	5.53	3.57	0.34	25.73
Liquid Assets / Deposits	6,217	20.92	12.84	22.88	0.05	112.47
Cost / Income	6,419	59.10	59.94	24.30	0.00	729.15
C. Banks involved in domestic M&As						
Total Assets	456	116.00	39.10	228.00	1.16	1730.00
Return on Asset	453	1.21	1.25	0.51	-0.49	3.68
Other Inc. / Total Income	446	0.39	0.27	0.50	-0.26	5.27
Equity / Assets	456	7.86	7.93	2.21	2.35	18.53
Liquid Assets / Deposits	442	9.92	7.37	9.20	0.56	79.16
Cost / Income	455	60.44	60.57	8.86	22.40	93.90
D. Banks involved in cross-border M&As						
Total Assets	207	427.00	251.00	430.00	8.21	1,660.00
Return on Asset	204	0.84	0.68	0.69	-0.49	3.45
Other Inc. / Total Income	198	0.30	0.22	0.31	-0.46	1.82
Equity / Assets	207	5.15	4.73	2.18	2.62	11.86
Liquid Assets / Deposits	204	11.08	10.27	10.01	0.08	71.90
Cost / Income	204	61.64	61.59	10.65	30.44	90.74

Characteristics of bank M&A bidders

In the binomial specification, the dependent variable takes the value of one if the bank is a bidder in any M&A and zero otherwise. In the multinomial specification, the dependent variable takes the value of two if the bank is a bidder in a cross-border M&A, one if it is a bidder in a domestic M&A and zero otherwise. Both models are estimated using a (binomial or multinomial) probit specification. All independent variables are lagged one period. For variable definitions see the notes to Tables 1-3. Robust standard errors adjusted for clustering at the country level are reported in parenthesis. Panel 7 reports the significance of the test of the difference between the coefficients of domestic deals (Panel 3) and of cross-border deals (Panel 4). The symbol *** indicates a significance level of 1 per cent or less; ** between 1 and 5 per cent; * between 5 and 10 per cent. Marginal effects are the partial change in the probability with respect to the change of each independent variables, evaluated at the sample means, multiplied by 10,000.

	Binomial specification		Multinomial specification				
	Coefficients	Marginal effects	Coefficients		Marginal effects		Difference
			Domestic	Cross-border	Domestic	Cross-border	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel A - Country characteristics</i>							
GDP (log)	0.2535* (0.1483)	388.527	0.4843** (0.1947)	-0.0623 (0.2439)	348.621	5.089	*
Bank Concentration	0.4319 (0.8135)	661.854	0.1494 (0.9683)	1.1659 (1.2508)	72.090	371.046	
St.mkt cap. / Pr. Cr.	-0.6345*** (0.2222)	-972.355	-0.873*** (0.2894)	-0.8708** (0.3989)	-605.553	-253.539	
Private Credit /GDP	-0.3938 (0.3414)	-603.467	-0.7171 (0.5127)	-0.8207 (0.5137)	-495.505	-242.190	
<i>Panel B – Individual bank characteristics (net of country and year averages)</i>							
Total Assets (log)	0.3373** (0.1389)	516.887	0.3054** (0.1488)	1.0123*** (0.1579)	189.723	316.719	***
Return on Assets	0.3676*** (0.0584)	56.340	0.4185*** (0.1086)	0.4927*** (0.1615)	287.643	145.788	
Liq. Asset / Deposits	-0.0181*** (0.0054)	-27.575	-0.0294*** (0.0075)	-0.0018 (0.0062)	-21.250	0.302	***
Oth. Inc. /Tot.	-0.4676*** (0.1818)	-716.668	-0.5958** (0.6046)	-0.4966*** (0.1713)	-415.821	-141.583	
Equity / Assets	-0.0258 (0.0287)	-39.574	-0.0411 (0.0406)	0.0568 (0.0458)	-31.531	19.593	**
Cost / Income	0.0008** (0.0035)	13.079	0.0111** (0.0054)	0.0135** (0.0064)	7.623	4.017	
<i>Panel C – Average bank characteristics (by year and country)</i>							
Total Asset (log)	0.0152 (0.2372)	23.342	-0.4045** (0.1600)	-0.3146* (0.1821)	-283.040	-88.837	
Return on Assets	1.1862*** (0.3227)	1817.813	0.7180* (0.3683)	1.4824*** (0.5697)	477.376	455.410	
Liq. Asset / Deposits	-0.0247** (0.0120)	-37.866	-0.0344** (0.0172)	-0.0385** (0.0166)	-23.719	-11.340	
Oth. Inc. /Tot.	-0.3422 (0.2134)	-524.518	-0.3528 (0.2839)	-0.0238 (0.3103)	-254.638	3.237	
Equity / Assets	-0.1167 (0.0758)	-178.906	-0.0321 (0.0957)	-0.2523* (0.1370)	-15.431	-80.320	*
Cost / Income	0.0156 (0.0123)	24.021	0.0203 (0.0187)	0.0175 (0.0164)	14.187	5.013	
Observations	4,803		5,301	5,301			

Characteristics of bank M&A bidders – G10 countries

In the binomial specification, the dependent variable takes the value of one if the bank is a bidder in any M&A and zero otherwise. In the multinomial specification, the dependent variable takes the value of two if the bank is a bidder in a cross-border M&A, one if it is a bidder in a domestic M&A and zero otherwise. Both models are estimated using a (binomial or multinomial) probit specification. All independent variables are lagged one period. For variable definitions see the notes to Tables 1-3. Robust standard errors adjusted for clustering at the country level are reported in parenthesis. Panel 7 reports the significance of the test of the difference between the coefficients of domestic deals (Panel 3) and of cross-border deals (Panel 4). The symbol *** indicates a significance level of 1 per cent or less; ** between 1 and 5 per cent; * between 5 and 10 per cent. Marginal effects are the partial change in the probability with respect to the change of each independent variables, evaluated at the sample means, multiplied by 10,000.

	Binomial specification		Multinomial specification				
	Coefficients	Marginal effects	Coefficients		Marginal effects		Difference
			Domestic	Cross-border	Domestic	Cross-border	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel A - Country characteristics</i>							
GDP (log)	1.2883*** (0.3779)	2018.045	0.6587** (0.2959)	0.0678 (0.2679)	533.887	-5.704	
Bank Concentration	1.5257 (1.0351)	2389.885	0.9110 (0.9284)	-2.4113 (1.9248)	806.095	-454.266	*
St.mkt cap. / Pr. Cr.	-1.2950*** (0.1368)	-2028.417	-1.1021*** (0.3110)	-2.7360*** (0.6445)	-822.430	-457.717	**
Private Credit /GDP	-0.5685* (0.3436)	-890.608	-0.1442 (0.4576)	-0.6527 (0.6101)	-99.692	-112.399	
<i>Panel B – Individual bank characteristics (net of country and year averages)</i>							
Total Assets (log)	0.3203* (0.1703)	501.694	0.2976** (0.1331)	1.1800*** (0.1678)	210.195	202.216	***
Return on Assets	0.3117*** (0.0499)	488.375	0.4193* (0.2267)	0.4121 (0.2896)	329.936	62.106	
Liq. Asset / Deposits	-0.0281*** (0.0108)	-44.103	-0.0364** (0.0153)	-0.0203 (0.0158)	-29.072	-2.649	
Oth. Inc /Tot. Income	-0.4203** (0.2148)	-658.355	-0.5896** (0.2983)	-0.7040*** (0.2716)	-460.501	-109.511	
Equity / Assets	-0.0411 (0.0340)	-64.445	-0.0580 (0.0530)	0.0891 (0.0916)	-49.623	17.459	*
Cost / Income	0.0117** (0.0052)	18.418	0.0125 (0.0086)	0.0208*** (0.0071)	9.656	3.384	
<i>Panel C – Average bank characteristics (by year and country)</i>							
Total Asset (log)	0.5392*** (0.1965)	844.575	-0.5981*** (0.1735)	-0.3105* (0.1704)	-478.095	-39.164	
Return on Assets	-0.0845*** (0.0189)	-133.393	-0.0608*** (0.0193)	-0.0591** (0.0287)	-47.890	-8.893	
Liq. Asset / Deposits	2.5068*** (0.4526)	3926.489	1.6534*** (0.5496)	7.0612*** (1.5158)	1153.943	1213.481	***
Oth. Inc /Tot. Income	-0.7106* (0.3641)	-1113.055	-0.1947 (0.3924)	0.2481 (0.5373)	-165.079	49.472	
Equity / Assets	-0.2732*** (0.0736)	-428.035	-0.0759 (0.2294)	-1.0541*** (0.2510)	-33.258	-185.770	***
Cost / Income	0.0459 (0.0320)	71.929	0.0266 (0.0220)	0.0505* (0.0295)	20.316	8.286	
Observations	3,381		4,025	4,025			

Banking Globalization and Monetary Transmission

Nicola Cetorelli and Linda S. Goldberg^{*}
Forthcoming **Journal of Finance**

Abstract

Globalization of banking raises questions about banks' liquidity management, their response to liquidity shocks, and the potential for international shock propagation. We conjecture that global banks manage liquidity on a global scale, actively using cross-border internal funding in response to local shocks. Having global operations insulates banks from changes in monetary policy, while banks without global operations are more affected by monetary policy than previously found. We provide direct evidence that internal capital markets are active in global banks and contribute to the international propagation of shocks. This feature was at play during the financial crisis of 2007 to 2009.

Keywords: international transmission, monetary policy, bank, global, liquidity, lending channel, internal capital markets

JEL Classification: E44, F36, G32

^{*} Federal Reserve Bank of New York. The views expressed in this paper are those of the individual authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System. We are very grateful to Campbell Harvey, the Editor, and an anonymous referee for very extensive and insightful remarks. We also appreciate valuable comments from Anil Kashyap, Jeremy Stein, Phil Strahan, and Adam Ashcraft, as well as from seminar and conference participants at the London School of Economics/London Business School/University College of London Trio Seminar, the Bundesbank, CEPR, International Monetary Fund, European Central Bank, Bank for International Settlements, NBER, Bank of England, and University of Alabama. We also thank Leslie Shen, Sarita Subramanian, Nikki Candelore, and Victoria Baranov for research assistance. Address correspondences to Nicola Cetorelli or Linda S. Goldberg, Federal Reserve Bank of NY, Research Department, 33 Liberty St, New York, N.Y. 10045. email: Nicola.Cetorelli@ny.frb.org, or Linda.Goldberg@ny.frb.org.

As financial markets have become increasingly globalized, banks have expanded their global operations, developing growing networks of physical branches and subsidiaries in foreign countries. We refer to such entities as “global” banks.

This changing orientation in banking activity raises important questions about how banks manage their liquidity, how they react to liquidity shocks and how these shocks may be transmitted across borders. We conjecture that global banks can respond to a domestic liquidity shock by activating a cross-border, internal capital market between the head office and its foreign offices, thus reallocating funds on the basis of relative needs. Because of this potential access to internal capital markets with foreign offices, lending by global banks is likely to be more insulated from domestic liquidity shocks. However, this does not mean necessarily that a domestic liquidity shock has a diminished impact in the presence of global banks: if global banks respond through an internal reallocation of funds, their foreign lending may be affected. Hence, banks managing liquidity globally may increase the *international* propagation of domestic liquidity shocks.

We test our conjectures by analyzing the response of U.S. banks to changes in monetary policy. Using more than twenty years of quarterly data we find evidence that corroborates our conjectures regarding liquidity management in global banks. Global operations and global liquidity management are traits that can make loan supply effectively insulated from domestic monetary policy. The activation of internal funding within the bank and across international locations is key to such insulation, and it is also a main channel of transmission of domestic shocks into foreign lending markets. This channel is symmetrically used in response to positive and negative liquidity disturbances.

This study makes direct contributions to the literature on the lending channel for monetary policy effectiveness.¹ By emphasizing the changing orientation of banking activity we propose a substantial re-examination of the mechanics of the lending channel. A liquidity shock no longer starts and ends on the balance sheet of a given bank: it now extends and links together balance sheets of the same organization across borders. In fact, we empirically show that once we take into account this modification in the lending channel mechanism, the overall effectiveness of liquidity shocks triggered by monetary policy is much larger, both in size and scope. Indeed, we find that broader segments of the population of U.S. banks are affected by

monetary policy than previously assessed. And once we factor in the effects on lending by the foreign offices of global banks, the effectiveness of the lending channel proves to be even stronger. Evidence focusing only on effects on domestic soil is bound to produce systematic underestimation of the lending channel.

Our evidence thus advances our understanding of the effectiveness of monetary policy, but its relevance is much broader. Indeed, our arguments apply to any liquidity shocks banks may experience, as underscored by activity during the financial crisis of 2007 to 2009. As we document, the onset of the crisis, determined by severe funding shortages, did in fact trigger sizeable and widespread inflows of internal funding in support of the head offices' balance sheet. We also document a subsequent related contraction in (external) lending by the foreign offices that provided funds, corroborating the international propagation mechanism. Previous evidence on an international transmission channel through banking is associated with the work, for example, of Peek and Rosengren (1997, 2000). However, and to the best of our knowledge, we are the first to document a systematic relationship between bank globalization and monetary policy effectiveness.

The paper also makes contributions to the literature on internal capital markets in financial firms. That banks – as other business organizations – have active internal capital markets is not new, and evidence has been reported, among others, in Houston, James and Marcus (1997), Campello (2002), Ashcraft (2006, 2008), and Ashcraft and Campello (2007). Importantly, we are the first to provide *direct* evidence of cross-border internal capital markets: we use data that U.S. banks are required to file quarterly, reporting the value of the net liabilities (or claims) between the head office and its foreign offices. These data thus provide an unusual opportunity for a direct test of the existence of an internal capital market, since data on borrowing and lending *within* an organization, between its different components, is hardly ever available.² Accordingly, we directly test whether cross-border, internal flows of funds within a banking organization are systematically associated with changes in U.S. monetary policy and we confirm that this is the case.

Overall, the mechanisms we identify have broad consequences. The themes we emphasize are directly relevant in the current policy debate regarding the reshaping of bank regulation and the role for international coordination of regulatory activity. Liquidity

management of global banks is at the forefront of the current policy debate in the aftermath of the financial crisis. Possible restrictions to the ability of financial firms to manage liquidity at a global level (arguments for “ring fencing”, “local liquidity pools”) are within the core of bank reform proposals from many national regulatory authorities (see, e.g. BIS Committee on the Global Financial System, (2010a, 2010b)). While global banking has strong benefits (Goldberg (2009)), banks are nonetheless operating in a potentially deeply integrated international environment, with exposures to markets that are sometimes beyond the direct purview of regulators. These interlinkages are important for the supervision and risk assessments of globally active banks. The crisis period also demonstrates that these issues may have bearing on the division of lender of last resort responsibilities across national borders.

On the macroeconomic level, the operations of global or multinational banks can serve as a stabilizing mechanism, especially in emerging markets, in response to local shocks.³ Cetorelli and Goldberg (2011) show transmission of the financial crisis through the lending channel by a cross section of industrialized countries to a broad panel of emerging markets. Micro-economic data exercises documenting shock transmission to emerging markets are provided by Khwaja and Mian (2008) for Pakistan and by Schnabl (forthcoming) for Peru. For industrialized countries, there is a well established literature on international shock transmission and business cycle comovement. While cross-border correlations are well documented, for example as in Frankel et al. (2004), Obstfeld et al. (2005) and Neumeyer and Perri (2005), the direct evidence on the actual mechanisms for international transmission of shocks and policy is more limited. Thus our analysis serves to identify one such mechanism that arises through global bank funding practices.

In the next section we outline our empirical identification approach. We then provide information on the data and follow with the presentation of the results. After making our case focusing on monetary policy as a funding shock, we conclude with a case study of the mechanism at work during the 2007 to 2009 financial crisis.

I. Identification strategies

We test our conjectures on the importance of global banks and internal capital markets with a set of alternative and complementary empirical strategies. We begin by re-examining the existing evidence on the bank lending channel, introducing a distinction among banks based on the global

orientation of their balance sheets. We then proceed by directly looking for evidence on the existence of the internal capital market channel. Next, we follow with specific evidence of the propagation of the shocks to the balance sheet of the foreign offices of global banks. We conclude by documenting evidence specific to the events of the 2007 to 2009 financial crisis. Since the funding shock that jump started the crisis was not directly related to monetary policy, we analyze the latter crisis events as a separate case study.

A. Revisiting the Lending Channel

The basic description of the bank lending channel is the following: banks experience a funding shock. If they cannot substitute liabilities with other external funding sources, such as by issuing certificates of deposit or attracting money market funds, the shock is transmitted to the asset side of their balance sheets.⁴ Absent a sufficiently large buffer of liquid assets, the original shock is then absorbed by lending activity, thus completing the transmission of the shock to the real economy.

Our argument instead suggests that the head office of a global bank can accommodate the original shock by effectively involving the balance sheets of its foreign affiliates, activating an internal funding transfer (an increase in *internal* liabilities by the head office and a corresponding increase in *internal* assets by its' foreign offices). The head office asset side is insulated, but the asset side of the foreign offices may now be affected and their *external* lending may have to adjust in response to the change in internal lending.

This argument speaks to previous empirical contributions that incorporate the main insights on the existence and economic importance of the lending channel. The influential work by Kashyap and Stein (2000) has shown that, in practice, the lending channel works only through the balance sheet of small banks. By contrast, large banks have unencumbered access to external capital markets so that any funding shock is absorbed with a liability substitution. Campello (2002) goes further and shows that, in fact, even among small banks the ones that are most affected are stand-alone entities: the benefits of insulation from shocks achieved by the large banks are extended to those small banks that are affiliated with such large banks as parts of the same bank holding company.

The natural starting point for us is to build on these results to provide the first batch of evidence on the consequences of global banking. We begin by observing that global banks are likely to be large banks, as the establishment of foreign offices presumably requires a pre-existing large scale of operation. If all that matters is size, large banks should be insulated from monetary policy shocks irrespective of whether they have global operations or not. Hence, our empirical analysis begins by re-examining the bank lending channel for large banks, but now sorting these banks according to whether they had or did not have global operations.⁵

In order to test our conjecture and isolate the role of globalness, we take the exact same two-step empirical methodology adopted in Kashyap and Stein (2000) and Campello (2002), the only innovation being that we break down the population of banks along the global versus domestic dimensions.⁶ The first step of this empirical strategy entails running separate cross-sectional regressions for each data quarter for banks indexed by i and within each of the two subsets of banks: the large global banks and the large, non-global, banks. The general stage 1 specification is:

$$\Delta \log(Y_{i,t}) = \sum_{j=1}^4 a_{ij} \Delta \log(Y_{i,t-j}) + \beta_t X_{i,t-1} + \text{Controls} + \varepsilon_{i,t} \quad (1)$$

where $Y_{i,t}$ is either total lending or commercial and industrialized (C&I) lending.⁷ $X_{i,t-1}$ is a measure of a bank's overall balance sheet liquidity and is defined as the logarithm of the ratio of a bank's liquid assets to total assets. A bank's capitalization ratio, its asset size, and the value of its nonperforming loans are included as bank-specific controls. These balance sheet measures are lagged one quarter to avoid econometric issues arising due to simultaneity. The vector of controls also includes indicator variables for the state where the bank's headquarters is located and whether or not the bank's headquarters is in a metropolitan statistical area (MSA). The inclusion of the state and MSA indicator variables allows for different macroeconomic conditions in each period for each geographical area and is intended to capture unobserved variability of loan demand.

The key variable of interest in (1) is the estimated coefficient on $X_{i,t-1}$, denoted by β_t . Each regression is run for each quarter, thus generating a separate time series of estimated β_t coefficients for each class of banks under consideration. The second step of this empirical

strategy uses each of the β_t series estimated in the first step as dependent variables in order to determine how lending sensitivity to bank balance sheet liquidity varies with monetary policy:

$$\beta_t = \eta + \sum_{j=1}^n \phi_j MP_{t-j} + \delta \text{Controls} + \mu_t \quad (2)$$

where MP_{t-j} is an indicator of monetary policy. In our analysis we use three alternative indicators of monetary policy: the Bernanke-Mihov indicator of liquidity conditions, the nominal Federal Funds rate, and the real Federal Funds rate.⁸ These indicators of monetary policy are defined in our analysis so that they increase in times of liquidity tightening and decrease in times of looser liquidity conditions. As in Campello (2002), the number of policy lags n , in the summation term is equal to eight, to capture what could be a relatively slow adjustment of lending aggregates to changes in liquidity conditions. The basic control vector in each specification (2) includes a time trend, three quarterly indicator variables to capture seasonality, and the growth rate in real GDP and its lags to capture business cycle effects. Also following Campello and given the time series nature of specification (2), we correct standard errors using the Newey-West variance estimator to consider possible autocorrelations of up to an 8 quarters lag.

If lending by banks is affected by monetary policy, the testing approach maintains that bank lending becomes more dependent on balance sheet liquidity in times of policy tightening and less dependent in times of monetary policy loosening. Hence, the sum of the coefficients of the monetary policy indicators ϕ_j in the second-step regression would be positive and significant for the bank lending channel for either the global bank or the domestic bank specifications.

In implementing the specification based on equations (1)-(2), a concern is that the Kashyap and Stein identification strategy may be exposed to possible issues of endogeneity bias among the right hand side variables, since banks may change their liquidity holdings in response to macroeconomic conditions. Moreover, since global banks may be systematically different from non-global large banks, it is possible that whatever bias arises may apply differently across the two subgroups. We address directly the potential endogeneity of the measure of liquidity in stage (1) by running the stage-1 regressions with the liquidity-to-asset ratio instrumented by the residual of a regression of the liquidity-to-asset ratio on the ratio of C&I lending to total lending

and the ratio of non-performing loans to total loans, where both regressors should capture a cyclical component in the measure of liquidity.⁹

B. Direct Tests of Internal Funding Activity

Our argument presupposes that global banks activate an internal capital market, moving resources between parent and foreign offices in response to domestic monetary policy changes. Conceptually, the literature justifying internal capital market transfers within an organization rationalizes such flows as leading to a more efficient allocation of resources (see, e.g., Stein (1997), Gertner, Scharfstein, and Stein (1994), Stein (2002)), or as a managerial tool to mediate agency frictions existing within a firm, across separate divisions, (e.g., Rajan, Servaes, and Zingales (2000), Scharfstein and Stein (2000)).¹⁰ We do not take a stance on alternative theoretical justifications in international banking. Our documentation that global banks have very active internal capital markets is consistent with both theoretical perspectives, and most importantly, it is instrumental to our main objective of redefining the scope of the lending channel mechanism and understanding international transmission of disturbances.

We test this *directly* by analyzing whether cross-border, internal flows of funds within a banking organization are systematically associated with changes in U.S. monetary policy.¹¹ Normally, data on internal transactions within an organization are unavailable in any systematic format. However, U.S. banks are required to report quarterly the aggregate value of internal transactions between the head office and foreign offices (“Net Due To or From Own Related Offices in Other Countries”).¹² We construct bank-specific quarterly changes of net internal positions for each bank. A positive value means the head office has increased its debtor position with its foreign offices, hence indicating an inflow of funds, and vice versa. It is important to recognize that this entry truly reflects internal funds reallocation within the banking organization, and it is totally distinct from reporting of other balance sheet activity, such as bank investments in foreign or local assets.

If global banks are insulated from domestic liquidity shocks just because of their size, and therefore for their innate ability to access external sources of funds, we should not expect to observe any abnormal behavior in the patterns of cross-border, internal capital markets between

parent banks and their foreign offices around times of changes in monetary policy. We test this conjecture using the time-series panel specification (3) over the full group of global banks:

$$\Delta Net Due_{i,t} = \alpha + \sum_{j=1}^4 \varphi_j \Delta Net Due_{i,t-j} + \sum_{j=0}^4 \theta_j \Delta MP_{t-j} + \sum_{j=0}^4 \gamma_j \Delta GDP_{t-j} + \mu_{i,t} \quad (3)$$

where $\Delta Net Due_{i,t}$, the quarterly change in real Net Due funds for bank i at time t , is regressed on its own four lags, on the change in the indicator of monetary policy and its four lags. Real Net Due is constructed by deflating nominal Net Due by the CPI, with 2005 as the CPI base year taking a value of 1. The regression includes the growth rates in real GDP and its four lags to control for general economic conditions. Some specifications also introduce controls for foreign monetary policy changes.

If the internal capital market is in operation within a global banking organization and is used to offset the local effects of domestic monetary policy shocks, this would appear as an increase in the inflow of funds to the domestic bank from (or a decline in outflows of funds to) its foreign operations in times of domestic monetary policy tightening, and the other way around when policy is looser. Evidence of the internal capital markets response between the parent and foreign affiliates would be reflected in a positive and significant sum of coefficients θ_j on the monetary policy variables.

C. Tests of International Transmission

Next, we focus on the methodologies for testing the last piece of our conjecture, that the internal funding activity of global banks is a direct channel for international propagation of liquidity shocks. First, and continuing in the spirit of analyses by Kashyap and Stein (2000) and Campello (2002), we test whether lending of the foreign offices is more or less dependent on the balance sheet strength of the head office as monetary policy conditions vary. In times of U.S. monetary policy contraction, for instance, lending by *foreign* offices would be expected to rely less on the overall balance sheet strength of the head office. For this test we again rely on the two-step procedure described in equations (1) and (2). In this case, however, the dependent variable in the first step is a measure of the lending activity of the foreign offices of bank i at

time t . The lending measures used are, alternatively, the growth in total lending of the foreign offices or the growth in C&I lending of the foreign offices. The main regressor of interest is the sum of coefficients ϕ_j from the second stage regressions liquidity measure of the reporting parent bank.

The final set of tests of international transmission look for a direct, empirical relationship between changes in internal funding flows and changes in lending by foreign offices of U.S. banks. Foreign offices may provide internal lending to the parent organization in times of domestic monetary policy contraction, but it is still not necessarily the case that the external lending of the foreign offices should be negatively affected by Net Due transfers: there may be margins of adjustments in the balance sheet that could potentially insulate the foreign offices' lending books. The crux of the conjecture is that substitution among uses of funds (external loans versus "internal" loans to the head office), and therefore effective international propagation, is most likely to occur if the bank has a constrained balance sheet. Hence, we test the relationship between changes in foreign office lending and changes in Net Due flows for those banks with low levels of liquid assets – which is a potential cushion that could mitigate the need for changes in loan supply – in times of contractionary or expansionary U.S. monetary policy. The model specification is the following

$$\Delta Y_{i,t} = \alpha + \sum_{j=1}^4 \Delta NetDue_{i,t-j} \cdot \left(\beta_j + \gamma_j \cdot \Delta MP_{t-j} + \delta_j \cdot LowLiquidity_{i,t-j} \right) + \eta_j \cdot \Delta MP_{t-j} \cdot LowLiquidity_{i,t-j} + Controls + \varepsilon_{i,t} \quad (4)$$

where $Y_{i,t}$ is a measure of total loans or C&I loans of the foreign offices of bank i at time t . The coefficients $\beta_j, \gamma_j, \delta_j$, and η_j capture the effect of a change in internal lending, and the δ 's and η 's capture the partial effect of Net Due on liquidity constrained banks. $LowLiquidity_{i,t}$ is a dummy variable equal to one if bank i at time t has a liquid asset ratio below the median of global banks at date t , and is zero otherwise. The vector of *Controls* in this specification includes *all* partial terms of interactions (with the same lag structure) and individual variables (and lags), as well as GDP growth (and lags) and the foreign monetary policy variable in some specifications (and its lags).

II. Bank Characteristics and Balance Sheets

The core of our analysis utilizes data on bank balance sheets that is available quarterly for every chartered U.S. bank and is collected as part of bank supervision conducted in the United States.¹³ Our sample of “Call Report” data consists of nearly 1.2 million bank-quarters over the period from 1980Q1 through 2005Q4. In section IV we discuss additional data used in analysis of the later financial crisis period.

Two broad distinctions prove useful for our empirical methods: between large versus small banks, and between domestic versus global banks. As in Kashyap and Stein (2000) and Campello (2002), we define a *large* bank as any bank that is in the 95th percentile or higher of banks sorted by asset size, with this categorization of banks performed in every quarter of the sample period. As in Campello (2002), a small bank is defined as any bank that is in the 90th percentile of size or lower: leaving out the intermediate group of banks between the 90th and 95th percentile is justified in order to achieve a clean separation between small and large banks.

We define a bank as *global* in each period if it has foreign assets greater than zero.¹⁴ As said earlier, this definition identifies banks that have actual offices in foreign countries. The implication is that a bank that exclusively accesses foreign market customers through cross-border lending or borrowing is not considered a global bank for our purposes.

Table I provides balance sheet details for all banks in the United States and for some subsets of banks: large domestic banks, large global banks, small banks affiliated with a large global bank via common ownership under the same bank holding company (BHC) organization, and small banks in BHCs that contain large but non-global banks. The table rows present the numbers of bank-quarter observations in the sample, and the median values for bank size, loan to asset ratios, commercial & industrialized (C&I) lending as a share of assets, bank liquidity, capitalization, and nonperforming loan shares. Data is shown for three reference dates (1985, 1995, and 2005), providing snapshots of characteristics of banks in the respective decades covered by our dataset.

[Table I about here]

In part the result of banking sector consolidation, median bank size has grown substantially over time, with the most pronounced growth for banks that have global operations.

While there are only about a third as many global banks than domestic banks in the large bank category, the global bank share in total banking system assets rose from 56 percent in 1985 and 1995 to 68 percent in 2005. There are broad distributions of size across both the large domestic and large global bank categories, although many comparably sized banks are in the categories of large domestic and large global banks. Small banks affiliated with large banks account for less than 1 percent of banking system assets by 2005. The median sizes of these banks are similar regardless of whether they are affiliated with large domestic or large global banks through a BHC.

All categories of banks have a broadly similar focus on lending, as reflected in the share of total loans to assets. Differences across banks appear in the composition of loans extended and in financing. Among the large banks, the global banks focus substantially more on C&I lending.¹⁵ Non-performing loan shares for the median banks are similar. The global banks tend to have less liquid assets and lower capitalization. Both categories of affiliated small banks are similar to the large domestic banks in the composition of lending. Smaller banks tend to have higher capitalization ratios compared with larger banks.¹⁶

For global banks, regulatory data also includes information on “foreign loans,”¹⁷ which are loans extended directly by offices in the countries where the offices are physically located. Table II provides descriptive statistics on these loans at the three reference dates. Most global banks (more than 85 % by count) had foreign loans under 10 % of total bank assets. For the remaining global banks, the foreign loan share generally was under 30 % of the size of total bank assets. The largest global banks account for the majority of total foreign loans extended (not shown). These foreign loans are one of two main categories of lending to foreign counterparties: the second category is cross-border lending, which is done by the parent bank in the United States. As shown in Figure 1, global banks engage both in cross-border lending and foreign lending. While domestic banks conduct some cross-border lending, this activity is small in aggregate.

[Figure 1 about here]

For global banks we also capture data for the international internal funding transfers. These data are reported as “Net Due with foreign offices”¹⁸ and reflect *direct* flows between a parent with its branches and subsidiaries abroad. Positive values (“net due to”) mean the head

office has borrowed funds from its foreign offices, while negative values (“net due from”) mean the head office has sent funds to affiliates outside of the United States. As shown in Table II, at each date the Net Due observations for global banks show some banks with “net due to” flows and others with “net due from” flows: the pattern of international transfers of dollars across individual banking organizations is not uni-directional. In 1995, for example, 103 of 170 global banks reported “net due to” observations, while the remaining 67 banks reported “net due from” observations.

[Table II about here]

When we argue that increases in net internal transfers to the U.S. parent within a banking organization can occur when liquidity conditions tighten in the United States, it is important to recognize that this can be achieved either through an increase in direct flows to the United States from affiliates, or via reduced support that U.S. parents provide to affiliates abroad.

III. Empirical Findings

For the empirical analysis, the data for bank observations are passed through standard screens to eliminate outliers.¹⁹ While we present most results for total loans by banks, all tests were likewise performed on C&I loans. We present the results of the instrumental variables specifications, but all results were also generated using OLS specifications. All findings are robust to loan types and OLS versus IV specifications.

A. Evidence from Revisiting the Lending Channel

If we take the Kashyap and Stein (2000) methodology and divide the sample of large banks based on whether they have global operations, will their results hold? If globalness is irrelevant, banks in both groups, by virtue of size, should display similar insensitivity to monetary policy.

[Table III about here]

Table III presents results for estimated $\sum_{j=1}^n \phi_j$ from equation (2) regressions relating monetary policy variables and total loans. Recall that the dependent variable is the time series of estimated coefficients on the liquidity-to-asset ratio in quarterly, cross-sectional, instrumental

variable regressions based on equation (1) specifications. Each specification is run with or without GDP growth controls in the second stage, as indicated by column headings in the table. Results highlighted in bold are statistically significant at least at the 10 % level and indicate the existence of an active lending channel for monetary policy. All specifications are also run for C&I lending as dependent variables, with fully consistent empirical results (not reported).

The table shows that the pattern of statistical significance of the lending channel is different for the two subgroups of large banks. Large and global banks maintain the property of bank lending insulation from monetary policy that Kashyap and Stein (2000) had highlighted. The sums of coefficients for the regressions based on this category of banks are never significant at standard significance levels. The results for global banks are robust to whether or not specifications introduce controls for domestic GDP growth (column 1 and 3 compared with column 2 and 4). The results are consistent across all three metrics of U.S. monetary policy shown in the rows of the table. For global banks we also introduce a specification that contains, within stage 2 controls, a weighted average of foreign interest rates, with weights represented by U.S. global banks' exposures in different countries.²⁰ This variable may be important for internal capital market allocations of the global banks since it provides perspective on the relative opportunity cost of allocating resources internally or abroad. Presumably, if interest rates abroad move in correspondence with U.S. monetary conditions, the incentive of U.S. parent banks to reallocate funds between parents and foreign affiliates might be mitigated. The addition of this control, with the results provided in column 5, does not change the outcome of the regressions.

The results indicate that large, non-global banks are less insulated than expected based on the Kashyap and Stein (2000) findings. In five out of the six regressions in columns 1 and 2 the sums of coefficients are statistically significant and positive. While the basic result highlighted in Kashyap and Stein (2000) was that large U.S. banks were effectively insulated from monetary policy, our tests indicate that separating the cluster of large banks along the global dimension makes a difference. The assumed ability of large banks to substitute external market liabilities may in fact be less than perfect. Lacking the ability to activate cross-border internal funding, a liquidity shock is transmitted to the asset side of the large bank balance sheet.

How large are these effects? As in Kashyap and Stein (2000), we take the hypothetical case of a 100 basis points change in the Federal Funds rate and apply this to the median large,

non-global bank to gauge the overall economic impact. For instance, in the specification with GDP growth controls and total lending as dependent variable (column 2, first row) the estimated coefficient is 0.0008. To calculate the impact on lending growth, we evaluate the effect at the median point in the liquidity-to-asset ratio distribution across domestic large banks, which is equal to 0.2 (in logs equal to -1.6). Hence, the median bank loss in total lending growth is equal to 0.13 percentage points (0.0008×-1.6) quarterly.²¹ Thus, the 100 basis point change in monetary policy reduces the slope of the path of lending growth for large, domestic banks, leading to 0.13 percentage points less growth each quarter.²²

These results provide indirect evidence that globalness may in fact be a factor in providing bank lending with insulation from monetary policy. This evidence is only suggestive at best, and for a number of reasons. First, global banks are significantly larger on average than non-global banks, even within the same top-five percentile cluster of the full population of banks, with the global banks over-populating the top 1 percentile. Yet, the original findings by Kashyap and Stein (2000) showed large bank lending insulation even in a sample excluding the top 1 percentile of banks. In any case, we perform robustness tests to further take into account the issue of bank size. Accordingly, in one additional set of regressions we curtail the dataset to banks within the 95th and the 99th percentile. This refinement, with results in the lower panel of Table III, columns 6 through 9, continues to show that large global banks (now excluding the very largest), have lending patterns that are insulated from monetary policy, while large, non-global banks within the same sub cluster continue to display a certain degree of lending sensitivity. In another robustness check, we ran weighted least squares regressions for global banks in the first stage, using as weights the size distribution of the large, non-global banks. This approach in essence statistically penalizes the largest of the global banks and over-emphasizes the contribution of the smallest global banks to the results. The results, in column 10, confirm the insensitivity of global banks, and are an additional piece of evidence that size per se does not appear to be the leading factor explaining the difference in results across the domestic and global large banks.

Another possible explanation of our results is that perhaps it is not globalness driving the differences across domestic and global banks, but rather some differences in the customer bases of these banks. Certainly, global banks cater to more internationally-oriented businesses, which

may have different loan demand responsiveness to changes in domestic macroeconomic conditions. In order to capture the impact of globalness on banks which are more likely to face a homogeneous demand schedule, we capitalize on the Campello (2002) findings that insulation of lending to monetary policy achieved in external capital markets by large institutions extends to their small bank affiliates within the United States. Small banks operate in similar lending markets, and face a more homogenous population of borrowers. If globalness of the large bank affiliates of the small banks is an irrelevant factor, we should expect to replicate Campello (2002)'s results for small banks affiliated with large banks, with results across these banks similar irrespective of whether the small banks are affiliated with large banks that are global or non-global. However, if globalness matters, those small banks affiliated with large, global banks should exhibit a higher degree of lending insulation than those affiliated with large but domestically-oriented banks.

The empirical specification used by Campello (2002) follows (1)-(2), but with a slightly different set of regressors. The main bank balance sheet variable of interest in this specification, $X_{i,t-1}$, is the ratio of income from operation to total loans. In the first stage, controls include the ratio of non-performing loans to total loans, the equity to asset ratio, the log of bank total assets, the log change in bank liquid assets, and state and MSA dummies. We add as additional control variables the total log of assets of the entire BHC to which the small bank belongs and its squared value. As in Campello (2002), the log change in liquid assets is instrumented by its lag.²³

[Table IV about here]

The first set of columns in Table IV refer to estimated coefficients from the regressions run on the subset of small banks affiliated with large, domestic banks, while the second set of columns refer to regressions run on the subset of small banks affiliated with large, global banks. The second set of columns shows that small banks affiliated with large, global banks appear to have lending that is insulated from liquidity shocks: in all specifications, regardless of the indicator of monetary policy, the choice of total lending or C&I lending, and including or excluding GDP controls, the estimated $\sum_{j=1}^n \phi_j$ are never positive and significant. In fact, they are actually negative and significant in three of the regressions that have total loans as the first stage dependent variable.

The results for small banks affiliated with large, domestic banks are markedly different. In eleven of the twelve alternative specifications the sums of coefficients from the second stage regressions are positive and statistically significant, indicating that these small banks need to rely more on their own balance sheets in times of liquidity shortage. The implication is that the small banks affiliated with domestic-only BHCs appear to remain exposed to changes in U.S. liquidity conditions. This result is an indication that the large banks in their organizations may not be sufficiently shielded to be able to activate a meaningful reallocation of resources to their small affiliates through the organization's internal capital market.²⁴

The combined results of Tables III and IV indirectly suggest that the global dimension of banks matters for the transmission mechanism of monetary policy. However, the results are more broadly relevant. They highlight a form of more complex dynamics in banks' response to liquidity shocks. Additionally, they indicate that the domestic scope of the lending channel is bigger than previously thought since large, non-global banks are not as insulated from policy and, by extension, small banks affiliated with them are also less insulated.

B. Internal Capital Markets of Global Banks

The next set of tests, using specification (3), examines directly whether the conjectured internal capital market channel between head offices and foreign offices is active and used to respond to changes in U.S. monetary policy. In all regressions the dependent variable is the change in Net Due flows between a bank's domestic headquarters and its foreign offices, with the Net Due flows expressed in constant 2005q4 dollars. By construction, an *increase* in Net Due means that the domestic offices are receiving more funds from their foreign offices or sending fewer resources abroad to their affiliates. Specifications differ based on which monetary variable is used and on whether a foreign interest rate control is included.

[Table V about here]

The results summarized in the first column, upper panel of Table V, show a pattern of funds flow internal to the banking organization which is both statistically significant and consistent with the expected direction of results. Column 1 shows that Net Due flows from foreign affiliates to the head office in the United States increase significantly (or outflows

decline significantly) when liquidity conditions tighten in the United States, and vice versa. This finding is robust across all three indicators of U.S. liquidity and monetary policy.

How important are these effects? From Table V, the response by a median global bank to an increase of the Federal Funds rate by 100 basis points would have been an increase in internal borrowing by \$74.3 million (in 2005q4 dollars) over four quarters. This number per se is not small, considering that over the same period the median change – up or down – over four consecutive quarters would have been \$179.5 million (median = $\$44.9 \times 4$ quarters). What matters, however, is an assessment of the hypothetical Net Due response magnitude in relation to the potential balance sheet impact on the median bank of the original liquidity shock. In the absence of this cross-border, internal capital market, our argument is that global banks would have exhibited lending growth sensitivity to monetary policy presumably similar to that of large, domestic banks. Hence, we run a counterfactual exercise, calculating the potential loss in loan growth for large, domestic banks, and then applying that loss to the global banks. We then assess whether the estimated increase in internal lending is comparable to the fictional loss that otherwise would have occurred from the liquidity shock. If the orders of magnitude of these terms are comparable, we take this as an indication that the internal capital market channel is a significant component of global banks' overall balance sheet management.

The counterfactual uses the same 100 basis point change in federal funds rate and then looks for the strongest estimated impact on large, domestic banks. This approach embeds a type of worst-case scenario and the most adverse to test our conjecture. From the bottom panel of Table III, the largest estimated coefficient is obtained from the specification with GDP controls and excluding the largest, top 1 percentile domestic banks. This coefficient is 0.0016. To calculate the impact on lending growth, we evaluate the effect at the median point in the liquidity-to-asset ratio distribution, which is equal to 0.2 (in logs equal to -1.6). Hence, the median loss in total lending growth would be equal to 0.25 percentage points (0.0016×-1.6) quarterly. Thus, the 100 basis point change in monetary policy reduces the slope of the path in lending growth for large, domestic banks, leading to 0.25 percentage points less growth each quarter.²⁵ We now apply this estimate of the loss in potential lending growth to the global banks, and see if the internal inflow of funds from affiliates is sufficiently large to “fill the gap”.

Over the whole sample period, at the average bank/quarter point, a global bank had loans for approximately \$8.3 billion (in 2005q4 dollars). Because the response in internal funding is expected over four consecutive quarters, we calculate the hypothetical loss in lending growth from this average point over four consecutive quarters as: $\$8.3 \text{ billion} \times 0.0025 \times 4$, which is approximately equal to \$83 million. Hence, the estimated inflow of funds over the same time period for the median global bank observation seems to be quite exactly able to fill the funding gap and therefore maintain the balance sheet insulation of the global banks.

For robustness, we add to the basic specification the composite foreign interest rate with the same lag structure as the monetary policy variables and observe in column 2 that the inclusion of this control does not alter the basic result. Additional robustness checks in columns 3 and 4 include tests for asymmetry in the internal capital market response to U.S. liquidity condition tightening or loosening. The transmission of U.S. liquidity conditions onto Net Due flows occurs in response to both directions of liquidity change. Funds flow into the parent bank at a faster pace (or flow out from the parent at a slower pace) when domestic monetary policy is tighter (column 3), and funds flow out to the affiliates (or into the parent from the affiliate at a slower pace) when domestic monetary policy is more expansionary (column 4). Tests performed for equality across the asymmetric coefficients (not reported) show that none of the specifications yield a statistically significant difference between estimated size of Net Due response to tightening versus loosening of credit conditions. The empirics reject the notion that the response of internal capital markets between U.S. banks and their foreign affiliates is active only in one direction.

A potential critique of the internal capital market conjecture is that the movement of funds picked up by the regressions on Net Due flows may not reflect internal funding needs, but may instead be the result of chasing higher relative return opportunities across markets. If this were the case, however, foreign offices would simply increase their own positions in domestic assets on their balance sheet (e.g., through purchases of U.S. government securities). In other words, international portfolio reallocations could be done directly without the affiliate engaging in internal transactions with the head office. Nonetheless, we test the validity of this objection by running an alternative model specification. We test for a differential response in Net Due flows between banks with high versus low capitalization ratios. If the Net Due flows are just the result

of portfolio considerations and not due to internal funding needs, we would expect to see no difference in response between banks with higher and lower capital to asset ratio. On the contrary, under the presumption that, all-else-equal, banks with lower capitalization may have more difficulty accessing traditional external markets, we would expect to see a higher internal flow response exactly from this subgroup of banks. To implement this set of robustness checks, we construct for each quarter a dummy variable equal to one if a global bank has a lower than median capital-to-asset ratio relative to other global banks. We then run specification (3) separately for banks with lower or higher capital-to-asset ratios. The results, in Table V columns 5 and 6, corroborate the prior that global banks with lower capitalization ratios use the Net Dues channel more aggressively in response to liquidity conditions. We also run the specification for banks that are above or below median size each period. Columns 7 and 8 show that, as would be expected, the magnitude of the Net Due response scales up significantly for the larger global banks.

C. International Transmission through Global Banks

The fact that global banks activate internal capital markets with their foreign offices in response to changes in domestic liquidity conditions has direct implication for a potential international propagation mechanism. We provide two types of evidence on the consequences for the foreign offices. First, and as described in section II, we test whether foreign lending is more or less dependent on the strength of the balance sheet of the parent office as conditions of U.S. monetary policy vary.

[Table VI about here]

The regression specifications reported in Table VI cover growth in total lending of foreign offices, shown in the first set of columns, and growth in C&I lending of foreign offices, shown in the second set of columns. As in Table III, the reported results are the summed effects across quarters of a change in U.S. monetary variables, with the cells of the table drawn from regression specifications that are inclusive or exclusive of controls for real GDP growth and with the instrumented liquidity-to-asset ratio. The results are highly consistent across specifications. The estimated sums of coefficients are always negative and are significant in ten out of twelve regressions. The implication is that foreign lending activity of U.S. bank affiliates abroad relies

less on the overall strength of the home office in times of tighter monetary conditions in the United States, and relies more on the U.S. parent balance sheet in times of looser U.S. liquidity.

Second, we present direct evidence on the possible substitution between internal and external lending by foreign offices of global banks. This evidence more cleanly indicates the existence of an effective international propagation of domestic liquidity shocks via the internal capital market channel we have conjectured. Substitution between internal and external lending is expected to be stronger for those banks with a constrained balance sheet.

[Table VII about here]

We estimated equation specification (4), reporting in Table VII the sum of coefficients only for those terms needed to evaluate the total impact on foreign lending by low liquidity banks. Each column of Table VII reflects results of specifications utilizing different monetary policy variables.

Changes in Net Due *per se* have a small impact on lending by foreign offices. Indeed, changes in Net Due in times of U.S. monetary policy tightening are actually associated with a positive impact on foreign lending. This effect is likely capturing an increase in foreign investment that occurs during the periods when domestic macroeconomic conditions generate the need for policy tightening. A global bank with a relatively unconstrained balance sheet can receive support from its foreign operations while simultaneously increasing foreign office lending activity. However, the table also shows that liquidity-constrained banks instead substitute foreign external lending with cross-border internal lending, which is a direct indication that the internal capital market of global banks with their foreign offices represents an effective and potent channel of international propagation of domestic bank shocks to foreign markets. This substitution is observed in lower liquidity banks, but not those with higher liquidity.

To calculate the size of the international propagation channel, we use the results from Table VII to gauge the direct relationship between changes in internal lending and corresponding changes in external foreign lending. Take again the experiment of a 100 basis points change in the Federal Funds rate. The total effect of a change in internal lending due to such change in monetary policy for liquidity constrained banks is equal to a coefficient of -0.065 . To assess the economic impact, we turn this number into an elasticity, evaluating the effect at the mean of the distribution. The mean quarterly change in total foreign lending, up or down, for liquidity-

constrained global banks over the sample period was about \$75 million. The corresponding mean quarterly change in Net Due was about \$332 million. Hence the corresponding elasticity of foreign lending to Net Due in response to a 100 basis points change in the Federal Funds rate is equal approximately to 29 percent ($0.065 \times (332/75)$). For each dollar of extra internal lending that a liquidity-constrained global bank receives from its foreign offices, foreign external lending declines by 29 cents. Hence, even the magnitude of the international propagation channel seems very significant.²⁶

IV. The Crisis Period

Our analysis has covered the period through the end of 2005 to purposefully maintain a separation from the events associated with the global financial crisis of 2007 to 2009. An in-depth analysis of the crisis is beyond the scope of this paper; however this more recent period still represents an opportunity to verify, in a very different scenario, the importance of the internal market funding channel that we have established.

As is well known, this period of time is characterized by a sequence of market events and an unprecedented battery of policy actions, by number and intensity.²⁷ For this reason, the end-of-quarter balance sheet data used in the previous part of the analysis may be unsuitable for capturing internal funding dynamics of banks. Given the high frequency of events and policy responses, for this specific exercise we utilize a different data source, the weekly series on aggregate Assets and Liabilities of Commercial Banks in the United States (the H.8 Statistical Release), published by the Board of Governors. The H.8 releases offer an important trade off: the data is aggregated over reporting banks, so we lose the bank-level dimension of Call Report data. On the other hand, the weekly frequency has the significant advantage that we are able to pin point a number of key event dates, corresponding to which we can conjecture and verify subsequent changes in the direction of the internal funding flows.

Another advantage of this data is that Net Due balances are presented not only for U.S. chartered banks (the population we have followed so far) but also for branches of foreign banks operating on U.S. soil (that are not required to file the standard Call Report form). Since the events of 2007 to 2009 did not just affect U.S. banks but also banks in other countries – especially those from developed Europe – this specific data offers ideal circumstances to contrast

internal capital market transfers across types of banks in light of U.S. versus foreign market pressures and responses.

The onset of the crisis is characterized by a severe funding shock to bank balance sheets. Banks, especially those in developed countries, had been accumulating substantial dollar denominated assets, mainly long-term securities derived from real estate activity, and they had funded such positions mainly through short-term dollar liabilities. Events in the summer of 2007 contributed to a substantial deterioration in quality of such asset portfolios, thus triggering a global shortage in short-term dollar supply right after the BNP Paribas announcement, on August 9th, of its inability to value assets in some of its investment funds. The response by the Federal Reserve was to facilitate access to the discount window. However, this form of borrowing remained very limited. As stresses mounted, in late December, the Federal Reserve introduced auction-based funding allocation with the institution of the bi-weekly Term Auction Facility (TAF) and dollar swap lines with the European Central Bank and the Swiss National Bank.²⁸ Through the swap lines, the U.S. central bank could effectively provide some limited quantities of dollar liquidity to European banks through European central banks. During the first half of 2008, Bear Stern exited via its acquisition by JP Morgan Chase, first announced on March 17. While this event contributed in the subsequent weeks to increased market turmoil, the apex of the crisis was not reached until the bankruptcy filing of Lehman Brothers, on September 15. The following weeks were ones of extreme financial market stress, dollar funding shortages, and a range of policy measures. The first part of 2009 is characterized by still elevated uncertainty over banks' health (banks "stress tests" in the U.S. were announced and conducted between February and May) and a steep contraction in global demand. Signs of normalization in dollar funding markets are seen in mid 2009, after which and the Federal Reserve began the winding down of the emergency facilities.

We analyze separately the internal funding dynamics of U.S.-chartered banks and of U.S.-based branches of foreign banks in the upper and lower panels of Figure 2.

[Figure 2 about here]

Pre-crisis, the aggregate Net Due To balances for U.S.-chartered banks were roughly around \$350 billion. As the figure shows, Net Due balances started increasing (more funds flowing in) *right after* the August 9th BNP announcement. The pace of increase was fairly steady

and reached a first peak of \$500 billion in the third week of January. By then, the TAF had conducted the first three auctions, allocating increasing but still limited amounts of dollars to eligible banks. As U.S. head offices consolidated the direct funding support from TAF, we should observe less demand for internal funding inflows. Indeed, Net Due balances decrease in the subsequent weeks. After the Bear Stern event, internal funding of U.S. banks by foreign offices picks up again before reaching a trough of \$415 billion just around the Lehman event (data point of September 24, 2008). The largest changes are observed in the subsequent weeks, with a new peak of \$600 billion by January 2009. Balances return to pre-Lehman levels only by March 2009. Despite continued volatility, the trend is decreasing throughout the first half of 2010, where it reaches levels similar to those recorded in pre-crisis weeks. The internal funding dynamics for U.S. banks during the crisis period thus seem to fit quite closely with our conjectures about their responses to liquidity conditions in U.S. markets.

The internal funding dynamics for the branches of foreign banks located in the U.S. provide perspective on how the foreign head offices managed liquidity internally given the conditions outside of the United States. Our conjectures suggest a different time line in their internal funding dynamics: the initial funding shock was in fact a shock that affected the head offices in foreign countries. In the time between mid August 2007 and mid December 2007, while the foreign banks' head offices may have been actively engaged in "repatriating" funds internally from *a range of* foreign offices, it is not obvious one would observe a significant contribution coming from their U.S. offices, especially given the impaired liquidity conditions observed in U.S. financial markets overall. However, with the introduction of the TAF, the U.S. offices of foreign banks gained direct access to a low cost source of dollar funding. Hence, for this set of bank entities, our conjectures would imply observing a spike in their internal *lending* out to their own organizations only in the weeks *after* the start of TAF auctions.

The Net Due series in the lower panel of Figure 2 show the relatively flat dynamics between mid August and mid December, with outstanding balances averaging about \$380 billion. A substantial upward trend occurs right after the start of the TAF auctions and continues throughout the first half of 2008. The trend stops right before the Lehman event, with a peak at September 9 of \$600 billion in outstanding balances vis-à-vis their own foreign organizations (hence an increase of almost 60 percent over just nine months). Post-Lehman, the chart shows a

sudden drop in internal transfers abroad for these foreign entities. While taken in isolation this pattern would seem puzzling, in September 2008 foreign draws on the central bank dollar swap facilities accelerated. The uncapping of available dollars through this facility broadened the central bank dollar swap lines balances from about \$100 billion to about \$600 billion over the subsequent period, a similar order of magnitude change as the drop in internal bank transfers. The direct dollar funding provision by the Federal Reserve to foreign central banks essentially allowed direct funding support by foreign central banks to the head offices of their own affected banking organizations. Hence, once their own central banks were able to provide significant dollar funding through their own auction-based system, the need for internal borrowing from their U.S.-based offices subsided. The pattern throughout the rest of 2009 is similar to that observed for U.S. chartered banks. In particular, both sets of banks denote a pattern of decreasing net due balances going back to pre-crisis level.

Regarding the impact on foreign lending, the crisis embeds an additional challenge, due to the fact that investment demand slows down on a global scale. Hence, it is hard to highlight changes in lending *supply* by the foreign offices of U.S. banks in a period of concomitant important changes in lending demand as well. Suggestive evidence on the effects of internal capital market transfers comes from examination of bank-level changes in foreign lending from average levels before the middle of 2007 and afterwards.²⁹ We perform an exercise (not reported) similar in spirit to the exercise reported in Table VII, wherein we expect more severe lending contractions for banks with ex ante pre-crisis ratios of liquid assets to total assets below median, with this difference-in-difference approach being one method of controlling for simultaneous changes in loan demand across banks.

[Figure 3 about here]

The data, although limited in power by the relatively limited number of observations, show that there was a negative relationship for low liquidity banks (an increase in net dues, i.e. more internal lending, corresponds to lower external lending) and a non-existent or opposite relationship for high liquidity banks.

V. Conclusions

The results provided in this paper support the conjecture that globalization of banking has a deep and pervasive impact on the consequences of domestic and international liquidity shocks. First, we find that having global operations insulates banks from changes in monetary policy while banks without global operations are more affected by monetary policy than previously suggested in the literature. Second, using data on actual internal funding between banks' head offices and their foreign offices, we provide direct evidence for the conjectured internal capital market activity of global banks. Third, we show that these internal capital market flows of global banks directly contribute to the international propagation of domestic liquidity shocks into the lending done by their foreign affiliates. These internal capital market transfers in global banks were also an important feature of bank liquidity management during the financial crisis of 2007 through 2009.

The consequences are statistically and economically significant. The mechanisms we identify imply that, under increasing banking globalization, the impact of monetary policy on domestic bank lending and on the U.S. economy as a whole is more attenuated, while at the same time the domestic shock is transmitted more broadly to foreign markets through affiliated banks. A continuing process of increasing banking globalization suggests that the lending channel within the United States could be declining in strength, with international transmission rising for policy and shocks originating in the United States.³⁰

As the period of the financial crisis demonstrated, understanding the dynamics of international, intra-bank funding is important for effective policy making. With financial globalization and the broader international propagations of shocks, the international community responded with an unprecedented degree of policy coordination and cooperation. Looking forward, there could be enhanced efforts to understand the funding models of banks and the forms of interlinkages in global organizations that support the efficient allocation of liquidity internationally.

In conclusion, geographic national boundaries are increasingly losing importance in evaluating the effects of domestic shocks, and the rise of global banking is an effective vehicle of transmission across borders. Central bankers and regulators in general are then confronted with a diminishing effectiveness of their standard policy tools and with a renewed and expanded need for broader international coordination.

References:

Armantier, Olivier, Sandra Krieger, and James McAndrews, 2008, The Federal Reserve's term auction facility, *Current Issues in Economics and Finance* 14, 1-11.

Ashcraft, Adam, 2008, Are bank holding companies a source of strength to their banking subsidiaries?, *Journal of Money, Credit, and Banking* 40, 273-294.

Ashcraft, Adam, 2006, New evidence on the lending channel, *Journal of Money, Credit, and Banking* 38, 751-776.

Ashcraft, Adam, and Murillo Campello, 2007, Firm balance sheets and monetary policy transmission, *Journal of Monetary Economics* 54, 1515-1528.

Barba Navaretti, Giorgio, Giacomo Calzolari, Alberto Franco Pozzolo, and Micol Levi, 2010, Multinational banking in Europe: Financial stability and regulatory implications. Lessons from the financial crisis, *Economic Policy*, 64, 703–753.

Bank for International Settlement, Committee on the Global Financial System, 2010a, Funding patterns and liquidity management of internationally active banks, No. 39, May.

Bank for International Settlement, Committee on Global Financial Stability, 2010b, Long term issues in international banking, No. 40, July.

Berger, Allen, Nathan H. Miller, Mitchell A. Petersen, and Raghuram G. Rajan, 2005, Does function follow organizational form? Evidence from the lending practices of large and small banks, *Journal of Financial Economics* 76, 237-69.

Bernanke, Ben, and Alan Blinder, 1988, Credit, money, and aggregate demand, *American Economic Review, Papers and Proceedings* 78, 435-439.

Bernanke, Ben, and Mark Gertler, 1995, Inside the black box: The credit channel of monetary transmission, *Journal of Economic Perspectives* 9, 27-48.

Bernanke, Ben, and Ilian Mihov, 1998, Measuring monetary policy, *Quarterly Journal of Economics* 113, 869-902.

Brave, Scott, and Hesna Genay, 2010, Federal Reserve policies and financial market conditions during the crisis, Manuscript, Federal Reserve Bank of Chicago.

Campello, Murillo, 2002, Internal capital markets in financial conglomerates: Evidence from small bank responses to monetary policy, *Journal of Finance* 57, 2773-2805.

Cetorelli, Nicola, and Linda Goldberg, 2011, Global banks and international shock transmission: Evidence from the crisis, *International Monetary Fund Economic Review*.

Cremer, Martijn, Rocco Huang, and Zacharias Sautner, Internal capital markets and corporate politics in a banking group, *Review of Financial Studies*, Forthcoming.

De Haas, Ralph, and Iman Lelyveld, 2010, Internal capital markets and lending by multinational bank subsidiaries, *Journal of Financial Intermediation* 19, 1-25.

Frankel, Jeffrey, Sergio Schmukler, and Luis Servén, 2004, Global transmission of interest rates: Monetary independence and the currency regime, *Journal of International Money and Finance* 23, 701-734.

Gertner, Robert, David Scharfstein, and Jeremy Stein, 1994, Internal versus external capital markets, *Quarterly Journal of Economics* 109, 1211-1230.

Goldberg, Linda, 2009, Understanding banking sector globalization, *International Monetary Fund Staff Papers* 56, 171-197.

Goldberg, Linda, Craig Kennedy, and Jason Miu, 2011, Central bank dollar swap lines and overseas dollar funding costs, *Economic Policy Review*.

Houston, Joel, David Marcus, and Christopher James, 1997, Capital market frictions and the role of internal capital markets in banking?, *Journal of Financial Economics* 46, 135-164.

Kashyap, Anil and Jeremy Stein, 1994, Monetary policy and bank lending, in N. Gregory Mankiw, ed.: *Monetary Policy* (University of Chicago Press).

Kashyap, Anil, and Jeremy Stein, 1995, The impact of monetary policy on bank balance sheets, *Carnegie-Rochester Conference Series on Public Policy* 42, 151-95.

Kashyap, Anil, and Jeremy Stein, 2000, What do a million observations on banks say about the transmission of monetary policy?, *American Economic Review* 90, 407-28.

Khwaja, Asim, and Atif Mian, 2008, Tracing the impact of bank liquidity shocks: evidence from an emerging market, *American Economic Review* 98, 1413-42.

Loutskina, Elena, and Philip Strahan, 2009, Securitization and the declining impact of bank finance on loan supply: Evidence from mortgage acceptance rates, *Journal of Finance* 64, 861-922.

Morgan, Donald, Bertrand Rime and Philip Strahan. 2004. Bank Integration and State Business Cycle, *Quarterly Journal of Economics*, 119, 1555-85.

Neumeyer, Paolo and Fabrizio Perri. 2005. "Business cycles in emerging economies: the role of interest rates" *Journal of Monetary Economics* vol. 52 pp.345-380.

Obstfeld, Maurice, Jay Shambaugh, and Alan Taylor, 2005, The trilemma in history: Tradeoffs among exchange rates, monetary policies, and capital mobility, *Review of Economics and Statistics* 3, 423-438.

Peek, Joe, and Eric Rosengren, 1997, The international transmission of financial shocks: The case of Japan, *American Economic Review* 87, 495-505.

Peek, Joe, and Eric Rosengren, 2000, Collateral damage: Effects of the Japanese bank crisis on real activity in the United States, *The American Economic Review* 90, 30-45.

Rajan, Raghuram, Henri Servaes, and Luigi Zingales, 2000, The cost of diversity: The diversification discount and inefficient investment, *Journal of Finance* 55, 35-80.

Scharfstein, David, and Jeremy Stein, 2000, The dark side of internal capital markets: Divisional rent-seeking and inefficient investment, *Journal of Finance* 55, 2537-2564.

Schnabl, Philipp, Financial globalization and the transmission of bank liquidity shocks: Evidence from an emerging market, *Journal of Finance*, forthcoming.

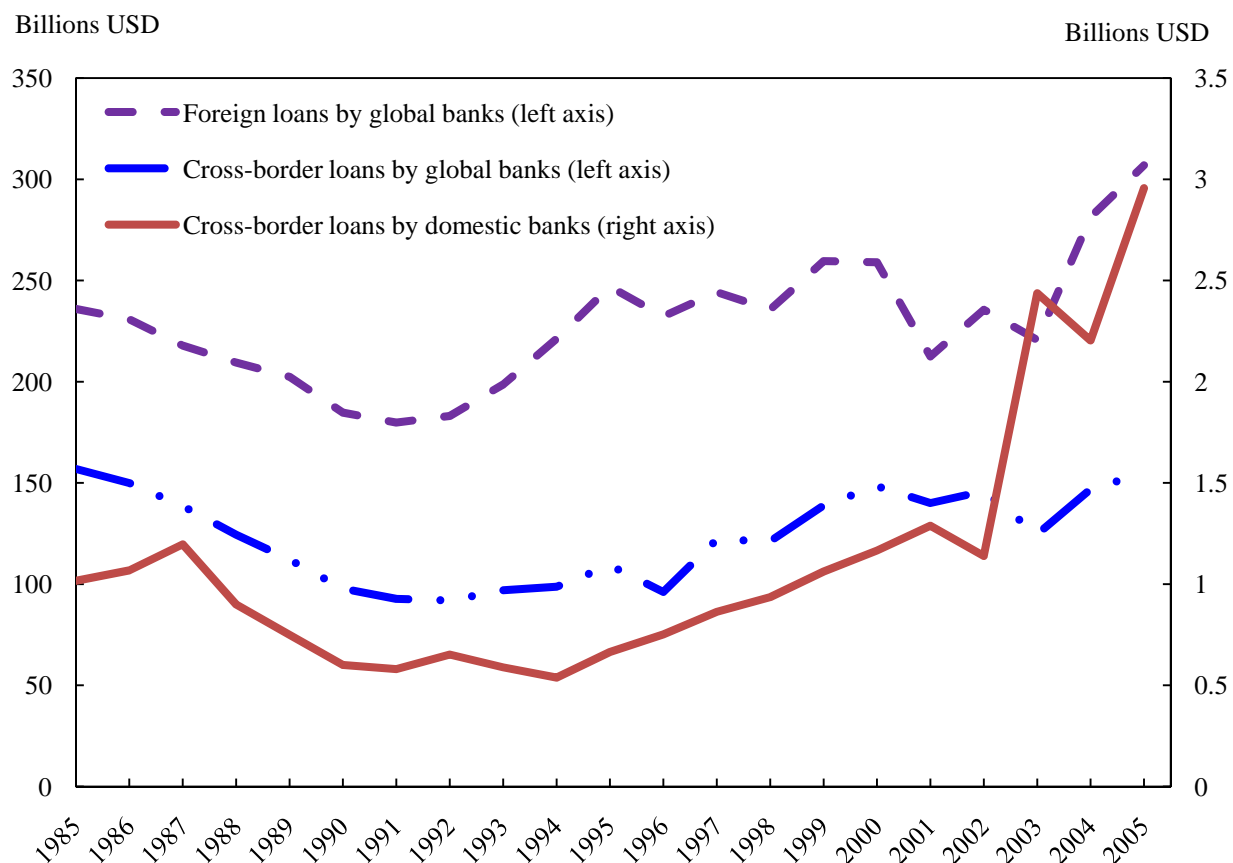
Stein, Jeremy, 1997, Internal capital markets and the competition for corporate resources, *Journal of Finance* 52, 111-133.

Stein, Jeremy, 1998, An adverse-selection model of bank asset and liability management with implications for the transmission of monetary policy, *RAND Journal of Economics* 29, 466-486.

Stein, Jeremy, 2002, Information production and capital allocation: Decentralized vs hierarchical firms, *Journal of Finance* 57, 1891-1921.

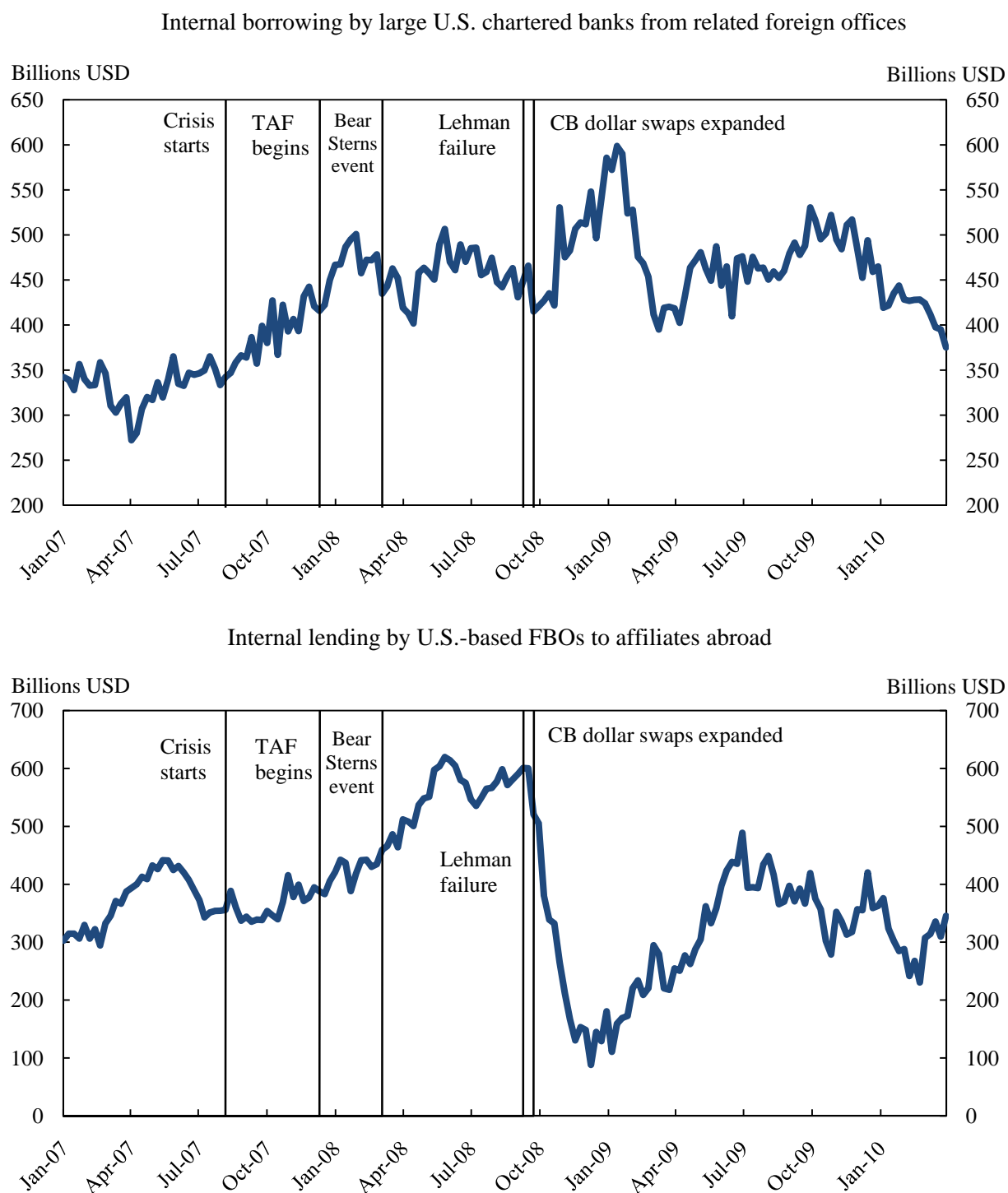
Stein, Jeremy, 2003, Agency, information and corporate investment, in George M. Constantinides, Milton Harris, and René Stulz, eds.: *Handbook of the Economics of Finance*, Vol. 1A (Elsevier B.V.).

Figure 1 International Lending by U.S. Banks



Source: Data on loans are from schedule RC-C of form FFIEC 031 of the Call Reports. Cross-border loans are computed as the sum of consolidated commercial and industrial loans to non-U.S. addressees (RCFD 1764), domestic offices loans to banks in foreign countries (RCON B535), consolidated loans to foreign governments and official institutions (including foreign central banks) (RCFD 2081), and consolidated lease financing receivables to non-U.S. addressees (RCFD 2183), sorted for every quarter and averaged annually. Foreign loans are computed as the difference between total loans and leases of consolidated banks (RCFD 2122) and total loans of their domestic offices (RCON 2122), sorted for every quarter and averaged annually. A bank is defined as global in a quarter if it reports positive foreign assets. A bank is defined as domestic if all its activity comes from offices located domestically.

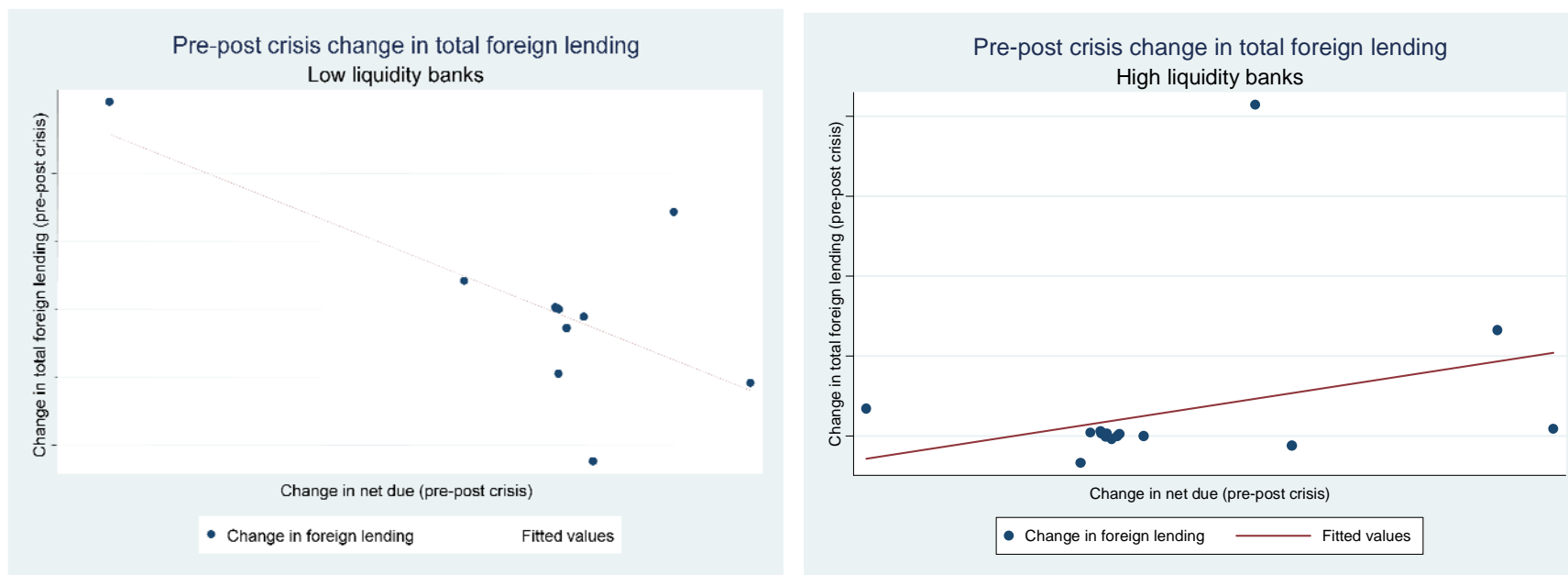
Figure 2 Patterns of Internal Borrowing During the Crisis



Source: Weekly series on aggregate Assets and Liabilities of Commercial Banks in the United States (H.8 report). Data is reported from the perspective of the reporting institution located in the United States. Hence, the series shown are *internal borrowing* by large U.S. chartered commercial banks (net due to related foreign offices), and

internal lending of U.S.-based foreign banking organizations (FBOs) to their foreign affiliates (negative net due to foreign affiliates).

Figure 3 Foreign Lending During the Crisis



The charts display the relationship between change in total foreign lending and change in net due from pre-crisis levels (average levels in quarters up to 2007q2 compared to average levels afterwards), separately for large global banks with pre-crisis liquid asset levels below median (low liquidity banks) and above median (high liquidity banks). Low-liquidity banks display a negative relationship, consistent with the hypothesis that an increase in internal lending is associated with a decrease in external lending for banks with an ex-ante more constrained asset side of the balance sheet. There is no relationship between external and internal lending (if anything a slight positive relationship) for banks with an -ante less constrained balance sheet.

Table I: Basic Balance Sheet Information for U.S. Banks

	All banks	Large domestic banks	Large global banks	Small banks in domestic BHCs	Small banks in global BHCs
Total number of bank observations (1980Q1-2005Q4)	1,162,969	43,921	14,252	41,339	47,640
Median values for bank asset size (millions 2005USD)					
1985	62.3	997	5,123.7	93.9	103
1995	73.9	1,775.9	10,358.6	142.7	134.8
2005	105.2	2,236.5	22,300	213.3	213.2
Share of each bank group in total assets (%)					
1985	100.0	16.6	56.0	1.4	2.2
1995	100.0	22.6	56.1	1.0	0.9
2005	100.0	17.9	67.9	0.4	0.3
Median total loans / assets (%)	55.6	61.1	60.4	57.1	55.5
Median C&I loans / assets (%)	17.3	22.8	35.4	18.4	21.0
Median real estate loans / assets (%)	24.5	26.0	17.5	26.2	22.3
Median bank liquid assets / total assets (%)	24.1	19.8	16.6	27.3	26.3
Median capitalization ratio (%)	8.7	7.2	6.4	8.0	7.6
Value of nonperforming loans/ total loans (%)	1.0	1.0	1.1	1.6	0.8

Data is from quarterly Call Report forms for all banks from 1980Q1 to 2005Q4. A bank is defined as global in a quarter if it reports positive foreign assets. A bank is defined as domestic if it has no foreign assets. Large banks are those with total assets above the 95th percentile of the total asset distribution in each quarter. Small banks are those with total assets below the 90th percentile of the total asset distribution in each quarter. Small banks in domestic BHCs are small banks affiliated in BHCs with at least one large, domestic bank and no global banks. Small banks in global BHCs are small banks affiliated in BHCs with at least one large, global bank.

Table II: Net Due Flows and Foreign Loans
(Millions 2005 USD)

		1985q4	1995q4	2005q4
Number of global banks		247	170	107
Loans of Foreign Offices				
Total loans	Median value across banks	\$19.3	\$0.027	\$0
	Mean value across banks	\$1,599.7	\$1,978	\$3,129.8
	Share of total bank lending	0.15	0.11	0.07
C&I loans	Median value across banks	\$4.8	\$0	\$0
	Mean value across banks	\$866.4	\$942.2	\$1,236.9
	Share of total C&I lending	0.08	0.05	0.03
Net Due flows				
Net Due To	Median	\$62.3	\$299.2	\$657.3
	Mean	\$304.3	\$955.7	\$3,856.1
	Number of observations	60	103	62
Net Due From	Median	\$43.3	\$3.9	\$852
	Mean	\$458.3	\$332.5	\$984
	Number of observations	187	67	45
(Net Due To – Net Due From)				
	Median absolute value	\$47.3	\$141.9	\$74.4
	Mean absolute value	\$420.9	\$710.1	\$2,648.2
	Number of observations	247	170	107

Net due to/from indicate the position of the domestic offices of a bank relative to all of the bank's Edge and Agreement subsidiaries, foreign branches, consolidated foreign subsidiaries, and branches in Puerto Rico and U.S. territories and possessions (schedule RC-H from form FFIEC 031 – Call Report). A positive net due *to* indicates that the head office owes funds to its foreign offices. A positive net due *from* indicates that the head office is owed funds from its foreign offices. Foreign loans are the total loans booked by the foreign offices of U.S. global banks.

Table III: Lending Channel for Large Domestic and Large Globally-Oriented Banks

	Domestic Banks		Global Banks		
	no gdp controls (1)	with gdp controls (2)	no gdp controls (3)	with gdp controls (4)	gdp and foreign rate controls (5)
Federal Funds Rate (nominal)	0.0008 [0.008]	0.0008 [0.006]	-0.0001 [0.915]	-0.0004 [0.659]	0.0007 [0.637]
Federal Funds Rate (real)	0.0004 [0.274]	0.0008 [0.036]	0.0017 [0.109]	0.0011 [0.296]	0.0010 [0.519]
Bernanke-Mihov index (negative*100)	0.0004 [0.038]	0.0003 [0.084]	-0.0001 [0.902]	-0.0001 [0.831]	0.0001 [0.820]
Robustness					
	Domestic Banks		Global Banks		
	No Top 1 %		No Top 1 %		WLS
	no gdp controls (6)	with gdp controls (7)	no gdp controls (8)	with gdp controls (9)	with gdp controls (10)
Federal Funds Rate (nominal)	0.0016 [0.000]	0.0016 [0.000]	-0.0030 [0.444]	-0.0029 [0.509]	0.0026 [0.587]
Federal Funds Rate (real)	0.0010 [0.077]	0.0014 [0.007]	-0.0012 [0.806]	0.0002 [0.963]	0.0057 [0.296]
Bernanke-Mihov index (negative*100)	0.0005 [0.052]	0.0004 [0.130]	-0.0032 [0.264]	-0.0032 [0.334]	-0.0018 [0.589]

This table presents results from equation (2) using IV specifications for total bank loans. The dependent variable is the time series of estimated coefficients of the liquidity to asset ratio from quarterly cross-sectional regressions based on specification (1), where the dependent variable was growth in total bank loans. The reported figures in the columns are from the sum of the estimated coefficients on the eight lags of each respective monetary policy variables. The Bernanke-Mihov index has been modified from the original so that all three monetary policy indicators signal tightening when they increase. Reported in brackets is the probability that the sum of the coefficients is significantly different from zero. All reported specifications instrument the liquidity to asset ratio with the series of the residuals of a regression of such variable on the C&I to total lending ratio and the ratio of non performing to total loans. The first two columns reports results for the group of large, domestic banks, i.e. banks above the 95th percentile in asset size and reporting no foreign assets. The last three columns report results for the group of large, global banks, i.e. large banks with positive foreign assets. Columns 1 and 3 refer to second-stage specifications without GDP controls, while columns 2, 4 and 5 to specifications including GDP controls. Column 5 also includes foreign rate controls. In the lower panel, the first two columns report results for large, domestic banks, excluding banks in the top 1 % in asset size. Column 3 and 4 report equivalent results for large, global banks. The fifth column report results for large, global banks based on a WLS regression, with weights determined using the size distribution of large, domestic banks. Bold indicates statistical significance at least at the 10 % level. Sample period: 1980:Q1-2005:Q4. Standard errors are computed with an 8-lags Newey-West correction for autocorrelation and heteroskedasticity.

Table IV: Results for Small Affiliated with Large Domestic or Globally-Oriented Banks

	Total Bank Lending			
	Small in Domestic Banks		Small in Global Banks	
	no gdp controls (1)	with gdp controls (2)	no gdp controls (3)	with gdp controls (4)
Federal Funds Rate (nominal)	0.2903 [0.047]	0.5203 [0.026]	-1.1976 [0.131]	-0.3404 [0.471]
Fed Funds Rate (real)	0.8440 [0.000]	0.9411 [0.001]	-1.5803 [0.057]	-1.8704 [0.142]
Bernanke-Mihov index (negative*100)	0.1278 [0.122]	0.2495 [0.016]	-0.6966 [0.075]	-0.4937 [0.042]

	Total C&I Lending			
	Small in Domestic Banks		Small in Global Banks	
	no gdp controls (5)	with gdp controls (6)	no gdp controls (7)	with gdp controls (8)
Federal Funds Rate (nominal)	1.4342 [0.029]	1.0752 [0.087]	-0.1390 [0.764]	-0.0207 [0.970]
Fed Funds Rate (real)	2.5029 [0.050]	2.6469 [0.027]	-1.0854 [0.233]	-1.0579 [0.282]
Bernanke-Mihov index (negative*100)	0.7712 [0.035]	0.6619 [0.057]	-0.1084 [0.604]	-0.0145 [0.953]

This table presents results similar to those of Table III, but based on Campello (2002): the object of analysis are small banks (asset size below the 90th percentile) affiliated to either large, domestic banks or large, global banks as part of the same BHC. The dependent variable is the time series of estimated coefficients on the net income to loan ratio in quarterly cross-sectional regressions where the dependent variable was either growth in total bank loans or total C&I loans. The reported figures in the columns are from the sum of the estimated coefficients on the eight lags of each respective monetary policy variables. The Bernanke-Mihov index has been modified from the original so that all three monetary policy indicators signal tightening when they increase. Reported in brackets are the probabilities that the sum of the coefficients is significantly different from zero. The upper panel reports results from estimations where the dependent variable in the first-stage regressions was total lending growth. The lower panel reports results from estimations where the dependent variable in the first-stage regressions was total C&I lending growth. The first two columns reports results for the group of small banks members of BHCs where there is at least one large domestic bank and no global banks. The last two columns report results for the group of small banks members of BHCs where there is at least one large global bank and no other large, domestic bank. Odd columns refer to second-stage specifications without GDP controls, while even columns to specifications including GDP controls. Bold indicates statistical significance at least at the 10 % level. Due to sample size constraint, the sample period is 1980:Q1-1996:Q4. Standard errors are computed with an 8-lags Newey-West correction for autocorrelation and heteroskedasticity.

Table V: Internal Lending Between Parent Banks and Foreign Affiliates

Monetary variable	Baseline (1)	Baseline with foreign rate controls (2)	Baseline with Potential asymmetry of effects when	
			Tighter money (3)	Looser money (4)
Federal Funds Rate (nominal)	74,268 [0.026]	80,162 [0.020]	131,158 [0.043]	82,441 [0.000]
Fed Funds Rate (real)	75,715 [0.044]	104,688 [0.010]	82,266 [0.024]	164,481 [0.020]
Bernanke-Mihov index (negative*100)	14,633 [0.083]	17,918 [0.010]	23,969 [0.230]	24,231 [0.043]

Monetary variable	Capitalization rate		Bank Size	
	Lower (5)	Higher (6)	Below Median (7)	Above Median (8)
Federal Funds Rate (nominal)	157,352 [0.008]	-15,562 [0.489]	1,882 [0.698]	152,704 [0.023]
Fed Funds Rate (real)	163,302 [0.017]	-20,615 [0.288]	-2,025 [0.634]	152,473 [0.043]
Bernanke-Mihov index (negative*100)	28,300 [0.078]	2,598 [0.787]	3,039 [0.362]	30,605 [0.085]

This table presents results from regressions where the dependent variable is the quarterly real change in net due flows from foreign affiliates to the head office. A positive change indicates a net inflow of funds from foreign operations. The dependent variable is in real 2005q4 dollars. The reported figures in the columns are from the sum of the estimated coefficients on the eight lags of each respective monetary policy variables. The Bernanke-Mihov index has been modified from the original so that all three monetary policy indicators signal tightening when they increase. In the upper panel, column 1 reports results from the baseline specification of equation (3). Column 2 reports results of the baseline specification where foreign rate controls were also included. Column 3 and 4 splits the sample in period of monetary tightening and monetary expansion, respectively. Tests of the equality of each pair of estimates from column 3-4 were run but they are not reported. In the lower panel, columns 1 and 2 split the sample between observations with a capital to asset ratio below and above the median, respectively. Column 3 and 4 instead split the sample in observations below and above the median in asset size. Reported in brackets are the probabilities that the sum of the coefficients is significantly different from zero. Bold indicates statistical significance at least at the 10 % level. Sample period: 1980:Q1-2005:Q4. Robust standard errors and clustered by bank id.

Table VI: Monetary Policy and Foreign Lending

Monetary variable	Total Foreign Lending		Total Foreign C&I Lending	
	Without gdp controls (1)	With gdp controls (2)	Without gdp controls (3)	With gdp controls (4)
Federal Funds Rate (nominal)	-0.0104 [0.008]	-0.0118 [0.001]	-0.0159 [0.004]	-0.0146 [0.011]
Fed Funds Rate (real)	-0.0098 [0.049]	-0.0124 [0.002]	-0.0114 [0.021]	-0.0118 [0.025]
Bernanke-Mihov index (negative*100)	-0.0057 [0.045]	-0.0063 [0.016]	-0.0026 [0.469]	-0.0012 [0.768]

This table presents results based on specification similar to those of Table III. Here the focus is on the activity of the foreign offices of global banks. The dependent variable is the time series of estimated coefficients of the liquidity-to-asset ratio from quarterly cross-sectional regressions where the dependent variable was either growth in total loans or total C&I loans of the foreign offices of global banks. The reported figures in the columns are from the sum of the estimated coefficients on the eight lags of each respective monetary policy variables. The Bernanke-Mihov index has been modified from the original so that all three monetary policy indicators signal tightening when they increase. Reported in brackets are the probabilities that the sum of the coefficients is significantly different from zero. The first two columns report results from estimations where the dependent variable in the first-stage regressions was total lending growth of foreign offices. The last two columns report results from estimations where the dependent variable in the first-stage regressions was total C&I lending growth of foreign offices. Odd columns refer to second-stage specifications without GDP controls, while even columns to specifications including GDP controls. All reported specifications instrument the liquidity to asset ratio with the series of the residuals of a regression of such variable on the C&I to total lending ratio and the ratio of non performing to total loans. Bold indicates statistical significance at least at the 10 % level. Sample period: 1980:Q1-2005:Q4. Standard errors are computed with an 8-lags Newey-West correction for autocorrelation and heteroskedasticity.

Table VII: Net Due Effects on Foreign Lending in Response to Monetary Policy

Regression coefficients	Total Foreign Lending		
	Federal Funds Rate (nominal)	Fed Funds Rate (real)	Bernanke-Mihov index (negative*100)
Net Due	-0.0232 [0.168]	0.0058 [0.734]	-0.0533 [0.002]
Net Due x Monetary policy	0.2984 [0.000]	0.2711 [0.000]	0.1243 [0.000]
Net Due x Low Liquidity	-0.0854 [0.001]	-0.1165 [0.000]	-0.0520 [0.044]
Net Due x Mon policy x Low Liquidity	-0.2781 [0.000]	-0.2156 [0.000]	-0.1137 [0.000]

	Total Foreign C&I Lending		
	Federal Funds Rate (nominal)	Fed Funds Rate (real)	Bernanke-Mihov index (negative*100)
Net Due	0.0097 [0.241]	0.0166 [0.047]	-0.0179 [0.037]
Net Due x Monetary policy	0.2161 [0.000]	0.1436 [0.000]	0.0969 [0.000]
Net Due x Low Liquidity	-0.0352 [0.015]	-0.0423 [0.003]	-0.0080 [0.574]
Net Due x Mon policy x Low Liquidity	-0.1866 [0.000]	-0.1022 [0.000]	-0.0734 [0.000]

This table presents results from regressions of equation specification (4). They capture the direct effect on lending of foreign offices of a change in net due in response to a change in monetary policy. We report only a partial list of coefficients, to focus on the effect on low liquidity banks. The dependent variable is either the quarterly change in foreign total lending or foreign C&I lending. Each column is a separate regression for each of the three measures of monetary policy. The reported numbers are from each respective sum of estimated coefficients, as indicated by each row legend. Net Due is in real 2005q4 dollars. Low liquidity is a dummy equal to one if a global bank has a value of liquidity to asset ratio below the median in a quarter. Reported in brackets are the probabilities that the sum of the coefficients is significantly different from zero. Sample period: 1980:Q1-2005:Q4.

¹ For basic references on the lending channel see, e.g., Bernanke and Blinder (1988), Bernanke and Gertler (1995), and Kashyap and Stein (1994, 1995, 2000).

² For this reason, evidence on the existence of internal capital markets is typically derived indirectly by looking at the *performance* of one side of an organization in response to a shock to the other side. De Haas and Lelyveld (2010) and Barba Navaretti, Calzolari, Pozzolo, and Levi (2010) are recent applications using multinational bank data.

³ Goldberg (2009) surveys the range of evidence on foreign bank consequences for lending overall and for lending to small and medium sized enterprises.

⁴ See Stein (1998) for specific modeling of the informational frictions on banks' liability side.

⁵ Note that while it is the case that global banks (again, defined in this paper as banks with actual foreign offices) are large banks, a large bank does not need to be "global" to engage in international lending. Large, but non-global U.S. banks can engage in "cross-border" lending activity, defined as lending by a domestic bank to clients residing abroad.

⁶ For the sake of comparability with the existing results from Kashyap and Stein (2000) and Campello (2002), and in order to maintain a "ceteris paribus" condition, we follow closely their model specification while focusing our attention on the globalness aspect. One consideration raised is the desirability of the two-step procedure, instead of a nested single step procedure. The main advantage of the two-step procedure is in allowing for a more flexible parametric specification. For example, the effects of both local macroeconomic conditions and lags in the dependent variable can be allowed to be time-variant in the two-step procedure. While alternative modeling approaches could be worth investigating, presenting refinements of this kind would be narrow in focus and would take us away from the main goals we want to achieve. We nonetheless run a large battery of robustness tests of the basic model specification, described at length in the results section.

⁷ As mentioned in Kashyap and Stein (2000), C&I lending may offer a more direct insight in the potential impact on real economic activity, but it is also the case that the loan portfolio across banks varies widely, as we show in Table I. For that reason focusing on total lending may be more inclusive and less exposed to potential sample biases.

⁸ Bernanke and Mihov (1998) applied a flexible VAR model which nested specific assumptions about central bank operating procedures, such as whether it is based on federal funds rate or non-borrowed reserves targeting. Ilian Mihov kindly updated and revised this measure in December 2006 using data through the end of 2005. The Kashyap and Stein (2000) study uses a narrative measure of monetary policy, the Boschen-Mills index, the Federal Funds rates, and the Bernanke and Mihov measure. Kashyap and Stein (2000) do not use a real Federal Funds rate.

⁹ A similar approach was also taken by Kashyap and Stein (2000). In addition, we have run equivalent OLS specifications, which yielded qualitatively similar results.

¹⁰ See, e.g., Stein (2003) for a comprehensive survey.

¹¹ A recent paper, Cremer, Huang and Sautner (forthcoming), tests theories of internal capital markets using confidential data on internal funding activity between headquarter and member banks of a single banking group for the 2005 to 2007 period.

¹² Further details on this data are provided in section II.

¹³ The specific details on the FFIEC 031 Consolidated Reports of Condition and Income for a Bank with Domestic and Foreign Offices and FFIEC 041 Consolidated Reports of Condition and Income for a Bank with Domestic Offices Only are available at <http://www.ffiec.gov/forms031.htm> and <http://www.ffiec.gov/forms041.htm>.

¹⁴ The qualitative results presented are supported using larger thresholds for foreign asset shares.

¹⁵ While both categories of large banks increased substantially the share of real estate lending in the decade ending 2005, this type of lending was a larger share of the loan portfolio for the more domestically-oriented large banks (not shown).

¹⁶ Berger et al. (2005) explore differences in portfolios across banks distinguished by size. Bank size is correlated with the bank business model: larger banks tend to lend at a greater distance, interact more at arms-length with their borrowers, and have shorter and less exclusive relationships with these borrowers.

¹⁷ These data are from schedule RC-C of the Call Reports filed by banks: item RCFN 2122 for total loans and RCFN 1763+1764 for C&I loans.

¹⁸ We construct these as the difference between schedule RC-H Net due *to* own foreign offices, Edge and Agreement subsidiaries, and IBFs and Net due *from* own foreign offices, Edge and Agreement subsidiaries, and IBFs (RC-H 2941-2163).

¹⁹ These screens follow closely those of Kashyap and Stein (2000) and Campello (2002). We drop bank quarters in which mergers or changes in "high holder" within a BHC occur. We drop bank quarters where asset growth was above 100 percent and total loan growth was above +50 percent or below -50 percent. In regressions where we focus on C&I lending, we remove similar outliers in the C&I lending growth distribution. Finally, for regressions

analyzing the lending of foreign offices we dropped outliers at the 1st and 99th percentile of either the series of growth in total and C&I lending of foreign offices.

²⁰ Given reliable data availability on such interest rates, we focus on the top 20 countries by exposure, which account anyway for the vast majority of total system exposure.

²¹ This exercise is similar to those in Kashyap and Stein (2000).

²² Their median growth in total lending over the whole period was 2.2 percent, hence the loss would amount to about 5 percent of such median value.

²³ However, the sample size of these sub groups of small banks implies a constraint in this empirical exercise: Because of the underlying process of industry consolidation occurring over the sample period, by the time we are in the mid 1990s the two sub-samples become relatively small. After 1996Q4, for instance, the sub group of small in BHCs with a large, global bank shrinks below 100 observations. Given the number of regressors in the first-stage estimation (balance sheet variables, quarterly dummies and state dummies), we decided to truncate the sample size at 1996Q4 for the analysis on the small banks. Since this exercise only has the specific task of addressing the issue of demand heterogeneity, and not of providing a full fledged analysis on small banks' funding patterns, we feel that this constraint is acceptable. We ran further tests on the sub group of small banks in BHCs with large, domestic-only banks, which has relatively more observations than the other sub group. Truncating their sample at 2000Q4, the quarter after which this sample size goes below 100, the results are consistent with those reported.

²⁴ The same quantitative exercise ran before shows a very large impact on the lending activity of this category of banks: the estimated coefficient of the specification with GDP growth controls and total lending as dependent variable was equal to 0.52 (second column, first row of Table V). The median liquidity to asset ratio for small banks affiliated with large, domestic banks is about 17 percent (in log equal to -1.77). Hence a 100 basis points change in the Federal Funds rate would reduce their total lending by about 0.91 percentage points.

²⁵ Their median growth in total lending was 2.2 percent, hence the loss would amount to about 10 percent of such median value. While it could be argued that this effect is relatively small in economic magnitude, the scale is not surprising: these are still relatively very large banks with better than average access to financial markets external to the banking organization. Despite access to such external markets, insulation of large bank lending to U.S. monetary policy is not complete without international operations.

²⁶ Since banks often follow their large multinational customers abroad, it is possible that when the foreign production is destined for the United States and liquidity tightens in the United States, demand for loans falls regardless of internal capital market transfers by banks. However, our examination of data on the composition of customers of foreign offices does not support this force as a driver of our results. For our population of global banks, the large majority of banks report that most of the C&I lending of their foreign offices is with *non*-U.S. borrowers. The median ratio of foreign offices' C&I lending to *non*-U.S. borrowers to their total C&I lending is never below 93 percent.

²⁷ For a summary of events and corresponding policy responses, see, e.g. Brave and Genay (2010).

²⁸ For in-depth overviews of facilities, see, e.g., Armantier, Krieger, and McAndrews (2008) on the TAF and Goldberg, Kennedy and Miu (2011) on the central bank dollar swap lines.

²⁹ For this part of the event study we felt it would not make much sense to perform finer subdivisions of the sample period as lending dynamics are known to be slow and certainly spanning over multiple quarters.

³⁰ This work is closely related to others that have also suggested a reduced potency for monetary policy as a result of evolution of the banking industry, e.g., Morgan, Rime and Strahan (2004), Ashcraft (2006) and Loutskina and Strahan, (2009).

Distance, Lending Relationships, and Competition

HANS DEGRYSE and STEVEN ONGENA*

ABSTRACT

We study the effect on loan conditions of geographical distance between firms, the lending bank, and all other banks in the vicinity. For our study, we employ detailed contract information from more than 15,000 bank loans to small firms comprising the entire loan portfolio of a large Belgian bank. We report the first comprehensive evidence on the occurrence of spatial price discrimination in bank lending. Loan rates decrease with the distance between the firm and the lending bank and increase with the distance between the firm and competing banks. Transportation costs cause the spatial price discrimination we observe.

BANKS DERIVE MARKET POWER *ex ante* from their relative physical proximity to the borrowing firms or *ex post* from private information they obtain about firms during the course of the lending relationship. Banks located closer to borrowing

*Hans Degryse is from KU Leuven and CentER, Tilburg University. Steven Ongena is from CentER, Tilburg University and CEPR. The authors are especially indebted to an anonymous referee, Robert Hauswald, and Robert Marquez for many insightful comments. We also received valuable comments from Adam Ashcraft, Allen Berger, Clive Bell, Arnoud Boot, Jan Bouckaert, Santiago Carbó Valverde, Elena Carletti, Giovanni Dell'Ariccia, Jurgen Eichberger, Thomas Gehrig, Hans Gersbach, Rick Green (the editor), Larry Goldberg, Reint Gropp, Timothy Hannan, Philipp Hartmann, Roman Inderst, Tulio Jappelli, Abe de Jong, Robert Lensink, Ernst Maug, Phil Molyneux, Theo Nijman, Marco Pagano, Maria Fabiana Penas, Mitch Petersen, Nagpurnanand Prabhala, Joao Santos, Alessandro Sbuelz, Elmer Sterken, Linda Toolsema-Veldman, Greg Udell, Martijn Van Dijck, Frank Verboven, Philip Vermeulen, Jurgen Weigand, and Gunther Wuyts, and participants at the 2003 American (Washington, DC), 2003 European (Glasgow), and 2002 German (Köln) Finance Association Meetings, the 2003 European Central Bank—Center for Financial Studies Network Meeting on Capital Markets and Financial Integration (Helsinki), the 2002 Federal Reserve Bank of Chicago's Annual Conference on Bank Structure and Competition, the 2002 European Meeting of the Econometric Society (Venice), the 2002 SUERF Conference on Geography and Banking and Financial Markets (Helsinki), the 2002 Symposium on Finance, Banking, and Insurance (Karlsruhe), the Bundesbank—Center for Financial Studies—European Central Bank Joint Lunch Seminar, and Seminars at the Central Bank of Sweden, Copenhagen Business School, CSEF-Salerno, Federal Reserve Bank of New York, Free University of Amsterdam, Koblenz Business School, Norwegian School of Management BI, CentER—Tilburg University, Erasmus University Rotterdam, and the Universities of Amsterdam, Antwerp, Groningen, Heidelberg, and Maryland. The authors are grateful to Dirk Rober for providing extraordinary programming assistance, to Jeanne Bovenberg for her critical editorial assistance, and to Ivonne Eltink, Nancy Kanters, and Nicole Segers for their valuable research support. Degryse received financial support from the Fund for Scientific Research—Flanders (FWO) and the TMR-Network on the Industrial Organization of Banking and Financial Markets. Ongena benefited from the financial support of the Netherlands Organization for Scientific Research (NWO).

firms enjoy significantly lower transportation and monitoring costs, to such an extent that “if other banks are relatively far, close banks have considerable market power” (Petersen and Rajan (1995, p. 417)).

We study the effect of geographical distance on bank loan rates, taking into account the distance between both commercial borrowers and their bank branch and commercial borrowers and other competing banks, while controlling for relevant relationship, loan, bank branch, borrower, and regional characteristics. For our study, we employ a unique data set containing detailed loan contract information, including firm and lender identity and location, from more than 15,000 bank loans to (predominantly) small firms.

In line with the predictions emanating from theory modeling spatial price discrimination, we find that loan rates decrease with the distance between the firm and its lending bank, and increase with the distance between the firm and competing lenders. We identify banking competition and pricing strategies in our analysis by including both the number of bank branches (or, alternatively, branch concentration) and the distance between the borrower and competing bank branches in the vicinity. We observe that increasing distance between the borrower and alternative lenders significantly relaxes price competition and results in substantially higher borrowing costs for the firm. From a variety of exercises we infer that transportation costs, not informational asymmetries, are probably the main basis for the spatial price discrimination we observe.

Economists have long analyzed price discrimination and inferred its importance (Phlips (1983), Thisse and Vives (1988), Stole (2001)). Recent empirical work focusing, for example, on race, gender, and social price discrimination in the auto, private mortgage, and business loan markets has rekindled interest (Ayres and Siegelman (1995), Goldberg (1996), Morton, Zettlemeyer, and Silva-Risso (2003), Gary-Bobo and Larribeau (2003), Cavalluzzo, Cavalluzzo, and Wolken (2002)). We contribute to this literature by empirically investigating *spatial* price discrimination and by demonstrating its relevance for the pricing of financial contracts.

Our analysis has two distinct advantages over current empirical work on price discrimination. First, in contrast to race, gender, and many other social variables, measures of distance are continuous and possibly less correlated with important but unobservable characteristics. Second, the estimated coefficients in our analysis capturing the presence of spatial price discrimination can be linked to a well-defined primitive (i.e., the transportation costs resulting from the location of borrowers and bank branches). This linkage makes it possible to benchmark the economic relevance of our estimates. For example, our estimated coefficients suggest that in order to obtain a loan, a new borrower may have to visit the bank branch between two and three times. A repeat customer, on the other hand, is not required to undertake additional visits. Our estimates also indicate that spatial price discrimination targeting borrowers located near the lending bank branch yields average bank rents of around 4% (with a maximum of 9%) of the bank's marginal cost of funding.

Taken at face value, our findings substantiate an important source of rents accruing to financial intermediaries, based on location. Location rents are distinct

from rents derived from customer switching costs (Klemperer (1995)), which in credit markets are often attributed to pervasive informational asymmetries (Fischer (1990), Sharpe (1990), Rajan (1992), von Thadden (2004)). Kim, Kliger, and Vale (2003), for example, provide the first estimates of switching costs faced by bank borrowers. Their findings imply average annualized bank rents of roughly 4% of the banks' marginal cost of funding.¹ In our data set, the increase of the loan rate during the average bank–firm relationship points to annual information rents of less than 2% of the bank's marginal cost of funding.

Sweeping global consolidation of the banking industry (Berger et al. (2000)) and widely observed innovations in information technology (Berger (2003)) may erode both location and inside information as sources of bank rents. Petersen and Rajan (2002), for example, document dramatic increases in distance and substantially changing modes of communication between small firms and their lenders in the United States over the last 25 years. Our study complements their work by entering the distance between the firm and the competing banks in the vicinity into the analysis of the loan rate, by documenting that the distance between the firm and the bank in Belgium did not increase substantially over the period 1975 through 1997, and by arriving at estimates of bank rents generated by spatial price discrimination.

Characteristics of both the Belgian financial landscape and the analyzed bank make our data set ideally suited to investigate spatial price discrimination. Belgium has a continental bank-based financial system, but is otherwise similar to the United States in general economic, financial, and technological (both transportation and communication) development. The aforementioned finding of moderate changes in distance in Belgium greatly facilitates the interpretation of the estimated coefficients and suggests that, in contrast to the United States, small business lending in continental Europe may not yet have been affected much by recent improvements in communication and information technology.

The bank we study operates across the nation and across industries. Most firms in its portfolio are single-person businesses, and many firms obtain only one loan from the bank. Hence, even though distances are typically rather small in Belgium, transportation costs may be important on the margin for the small borrowers in the data set. In addition, formalized interviews with bank managers indicate that loan officers located in the bank's branches enjoyed substantial autonomy when granting and pricing small business loans. The officers' own assessment of the development of the relationship with the firm, the skills and reputation of the firm's management, and the quality of the

¹ The mean loan rate in Kim et al. (2003) equals around 11.8% and the mean T-bill rate is around 9.2%. They calculate that the proportion of the marginal value of a locked-in customer to the marginal increase of the bank's present value that is due to an additional locked-in customer is 0.16 (ranging from 0.01 to 0.33 in various classes). Hence, bank rents as a percentage of the banks' marginal cost of funding equal $(11.8\% \text{ to } 9.2\%) \times 0.16/9.2 = 4.5\%$, assuming that relationships last long (the median duration of bank–firm relationships in Norway reported by Ongena and Smith (2001) is 18 years).

firm's business vision (i.e., "soft" information in Stein (2002)) played key roles in the lending decision. Though loan officers were required to "harden" their assessment internally by supplying key statistics and other relevant written information, much local discretion remained.

To conclude, we consider our empirical setting to be uniquely suited to study spatial pricing and to analyze whether transportation costs resulting from the distance between borrower and lender, and borrower and competing banks, provide sufficient and reasonable grounds for loan officers to price discriminate. In this regard, our work also contributes to a rapidly widening strand of the literature revealing the considerable impact of geographical distance on activities of financial intermediaries, such as spatial loan rationing (Petersen and Rajan (2002)), cross-border bank lending (Buch (2004), Berger et al. (2003)), and domestic and international bank branching (Grosse and Goldberg (1991), Fuentelsaz and Gomez (2001)).²

We organize the rest of the paper as follows. Section I reviews the theoretical predictions regarding distance, lending relationships, and competition. Section II introduces the data and discusses the methodology used in our paper. Section III displays and discusses the empirical results. Section IV concludes.

I. Theoretical Predictions

A. Distance

Recent theoretical papers highlight the importance of distance in explaining the availability and pricing of bank loans. Lending conditions may depend on the distance between the borrower and the lender and the distance between the borrower and the closest competing bank (Table I summarizes the theoretical predictions). In location differentiation models (Hotelling (1929), Salop (1979)), borrowers incur distance-related transportation costs from visiting their bank branches. Banks price uniformly if they cannot observe borrowers' locations or are prevented from charging different prices to different borrowers.

However, if banks observe the borrowers' locations and offer interest rates based on that information, they may engage in spatial price discrimination. Banks are often informed about the borrower's address before even granting or pricing a loan. If borrowers incur their own transportation costs, as is most likely to be the case, a bank charges a higher interest rate to those borrowers that are located closest to its bank branch (Lederer and Hurter (1986)). Closer borrowers face higher total transportation costs when visiting competing banks

² Distance also determines the effectiveness of internal control mechanisms within bank holding companies (Berger and DeYoung (2001, 2002)), the strength of informational contagion between banks (Aharony and Swary (1996)), and the representation of venture capitalists on the boards of U.S. private firms (Lerner (1995)). Physical distance further influences activities in financial and product markets in general. International capital flows seem bound by geographical proximity (Portes and Rey (2001)), but so are the composition and returns on actively managed U.S. mutual funds (Coval and Moskowitz (2001)), the trading profitability of traders on the German electronic exchange Xetra (Hau (2001)), and the portfolio choices of American (Huberman (2001)) and Finnish investors (Grinblatt and Keloharju (2001)).

Table I
Theoretical Models Linking Loan Rates and Distance

The table lists models, categorized by argumentation, hypothesizing the impact of distance for a given number of competitors on the loan rate.

Arguments & Discussed Models	Impact on the Loan Rate of the		
	Distance to the Lender	Distance to the Closest Competitor	Number of Competitors
<i>Transportation Costs (for borrower)</i>			
Uniform pricing	no	no	negative
Discriminatory pricing	negative	positive	negative
<i>Monitoring Costs (for lender)</i>			
Marginal cost pricing	positive	negative	negative
Discriminatory pricing	negative	positive	negative
	Distance to the Relationship Bank	Distance to the Transactional Bank	Number of Competitors
<i>Asymmetric Information</i>			
Dell'Ariccia (2001)	negative	no	negative
Hauswald and Marquez (2003)	negative	positive	positive/negative

(which are located further away than the lending bank), resulting in some market power for the lender. Similarly, a monopolist bank optimally charges a higher loan rate to close borrowers, since these borrowers incur lower total transportation costs. Consequently, discriminatory pricing based on location (and associated transportation costs) implies, for a given number of banks, a negative relationship between the loan rate and the borrower–lender distance and a similar, positive relationship between the loan rate and the distance between the borrower and the closest competing bank.

The cost of monitoring a borrower could also be related to physical distance. Total monitoring costs increase with borrower–lender distance because of extra communication costs or transportation costs incurred by banks visiting the borrowers' premises. Loan rates passing through such costs increase with distance. However, distance-related monitoring costs might also allow for discriminatory pricing. In Sussman and Zeira (1995), banks face monitoring costs known to be increasing in distance. As a result, lenders extract rents from close borrowers because more distant competing banks take into account their own higher monitoring costs in their loan rate offers. Spatial price discrimination based on bank monitoring costs again implies a negative (positive) relationship between the loan rate and the borrower–lender (borrower-closest competing bank) distance (for a given number of banks).

B. Distance and Lender Information

Lenders may initially be unsure about the exact location of the borrower (e.g., if the borrower is an independent salesman or a software consultant and

maintains multiple centers of activity). In that case, the bank can engage in discriminatory pricing only upon becoming informed about the location and transportation costs faced by their borrowers. In Dell'Ariccia (2001), banks become informed about the location of the borrower through first-period lending. In his model, only relationship banks, those lending to the same firm for a second time, can engage in spatial price discrimination, while *de novo* transactional banks have to resort to "mill pricing."

The severity of the asymmetric information problem itself may also increase with distance. Hauswald and Marquez (2003) develop a model in which the precision of the signal about a borrower's quality received by a bank decreases with distance. Because banks receive more precise signals about close borrowers, competing banks face increasing adverse selection problems when approaching borrowers closer to the most informed bank. Hence, the informed relationship bank can charge higher interest rates to closer borrowers, while the uninformed transactional banks charge higher interest rates to borrowers located farther afield (due to the increase in the adverse selection problem). *Ceteris paribus*, Hauswald and Marquez derive a negative (positive) relationship between the loan rate and the distance between the borrower and the relationship (transactional) bank.

C. Number of Banks

In spatial models, the number of banks in the market is typically inversely related to the distance between the lender and the (closest) competing banks. An increase in the number of banks (harsher competition) increases the likelihood of receiving lower loan rate offers. A decrease in the fixed setup costs per bank (e.g., Sussman and Zeira (1995)) increases the number of banks, decreases the distance between any two neighboring banks, and decreases the loan rate for each bank–borrower distance combination.

On the other hand, an increase in the number of banks may aggravate an adverse selection problem by enabling lower-quality borrowers to obtain financing, resulting in moral hazard and credit rationing (Petersen and Rajan (1995)) or a higher interest rate (Broecker (1990)). In Dell'Ariccia (2001), adverse selection generates an endogenous fixed cost, constituting a barrier to entry in the industry by limiting the number of banks competing in the market. Similarly, a decrease in the fixed-cost component of the relationship-building technology in Hauswald and Marquez (2003) not only leads to an increase in the number of banks and more competition, but also results in a retrenchment toward relationship lending.

D. Distance, Borrower Information, and Experience

Casual observation suggests that borrowers do not always frequent the closest bank, as most spatial models presume they should. First, borrowers may not be fully informed about the precise location of all competing banks and the

availability and conditions of the loans offered there. Grossman and Shapiro (1984) and Bester and Petrakis (1995) model such location-*cum*-informational differentiation. In Grossman and Shapiro, consumers buy a product from a particular seller upon becoming informed of its location through advertising. The advertising itself is not localized. The sales price in their model exceeds the full information price, by the magnitude of the transportation cost, as informational differentiation lowers the elasticity of demand. In addition, consumers in their model, as they are unaware of all sellers, do not necessarily patronize the closest one. Bester and Petrakis model the advertising of lower price offers. In the absence of advertising, customers are only informed about local prices. Producers advertise lower prices to attract customers from more distant locations. Hence, more distant informed customers are observed to receive lower prices.

Second, location is just one characteristic of a bank's product that is important for its customers. For example, Elliehausen and Wolken (1990) document that small- and medium-sized firms in the United States are also influenced by other characteristics of the branches (convenience and hours of operation), banks (reputation, quality, and reliability), and relationships (personal or long-term) when choosing a particular bank. Hence, borrowers may not visit the closest bank branch when another bank's loan product exhibits other, more preferred characteristics (e.g., Pinkse, Slade, and Brett (2002)). And once borrowers have experienced a good match and have observed the high quality of the services provided by their current bank, they switch to another bank only when it offers a considerably lower price (Tirole (1988, p. 294)).

To conclude, most theoretical models imply a negative (positive) correspondence between the borrower-lender (competing bank) distance and the loan rate, caused either by transportation costs (for either the borrower or the lender) or asymmetric information. Information availability, experience, and other product characteristics may abate the strength of the distance-loan rate relationship. However, we know of no paper that has yet empirically investigated this association and its causes directly and comprehensively.

II. Data

A. Loan Contracts

The unique data set we analyze consists of 17,776 loans made to independents or single-person businesses, and to small-, medium-, and large-sized firms by an important Belgian bank that operates throughout Belgium. The sample commences with all existing loans at the bank as of August 10, 1997 that were initiated after January 1, 1995.

Characteristics of both the bank and the Belgian financial landscape make this data ideally suited to investigate spatial price discrimination. The bank is one of a handful of truly national and general-purpose banks operating in Belgium in 1997. The bank lends to firms located in most postal zones and is

Table II
Bank and Postal Zone Statistics

The table provides key statistics about the lending bank and the Belgian postal zones/areas.

<i>Total number of banks</i>	145				
<i>Total number of bank branches</i>	7,477				
	Postal Zones	Postal Areas			
Total number with bank branches	837	9			
Total number with borrowers of the bank	921	9			
Total number	1,168	9			
Average surface area, in km ²	26	3,359			
Average population	8,632	1,120,209			
	Mean	Median	Minimum	Maximum	SD
<i>Number of banks per postal zone</i>	6.4	4	0	103	10.4
<i>Number of adjacent postal zones/postal zone with bank branches</i>	5.1	5	0	16	2.0
<i>Number of banks in postal zones adjacent to postal zones with bank branches</i>	53.6	44	2	471	42.4

active in 53 different industries.³ However, around 83% of the firms in its portfolio are single-person businesses and most borrowers obtain just one (relatively small) loan from this bank. Consequently, even though distances are typically rather small in Belgium, transportation costs may be important on the margin for the small borrowers in the data set. In addition, geographical clustering of economic and financial activity in northern and central Belgium results in substantial variation across the country in the average distances traveled.

For each borrower, we calculate the distance both to the lending bank and the branches of all other competing banks located in the same postal zone as the borrower. As of December 31, 1994, we identify 7,477 branches, operated by 145 different banks and located in 837 different postal zones (Table II). Each postal zone carries a postal code between 1,000 and 9,999. The first digit in the code indicates a geographical region, which we call a postal area and which in most cases coincides with one of the 10 provinces in Belgium. A postal zone covers on average 26 km² and contains approximately six bank branches. A postal area covers 3,359 km², on average. Not surprisingly, borrowers are often located in areas more densely occupied by banks, with on average more than 17 bank branches per postal zone, resulting in around 250,000 possible borrower–bank branch pairs.

³ These 549 bank branches lend to firms located in 921 out of 1,168 postal zones. The concentration index of the number of loans (sum of shares squared) is 22 (equal shares would yield an index equal to 9). The industry concentration index across the 53 NACE industries is 1,238 (equal shares would result in an index equal to 204).

We employ both web-based MapBlast.com and PC-based MS Mappoint to track the shortest traveling time (in minutes) by car between the borrower and each bank branch. We choose the shortest traveling time, the default setting in both programs, over a number of other mapping alternatives, since we suspect that for most entrepreneurs in our sample, variable transportation costs consist mainly of traveling time spent. We provide concrete statistics on this issue when we discuss the results, and employ the fastest driving distance (in kilometers) in robustness exercises.

Address recording errors, incomplete map coverage, and changes in street names cut down our sample. We drop 801 contracts that were relocated to another branch or to a new branch after the closure of the original branch. Next, we conservatively remove the outlying 1% of borrowers located farthest from their lending banks, as we discover that a combination of address-recording errors, mapping problems, and nonstandard borrowing motives and business arrangements are responsible for most of these longer distances. Finally, we lay aside 612 contracts located in postal zones without competing banks. We return to this set of contracts later in the paper.

Table III provides summary statistics for the remaining 15,044 contracts.⁴ Table III shows the definition, mean, median, minimum, maximum, and standard deviation of our variables, broken down into nine sets of characteristics: (1) geographical distances, (2) relationship characteristics, (3) competition measures, (4) loan rate and size, (5) loan contract characteristics, (6) loan purpose, (7) firm characteristics, (8) firm location, and (9) interest rate variables.

B. Distance to Lender

The median borrower is located around 4 minutes and 20 seconds from the lender, which (depending on the local road conditions) translates into 2.25 km (1.40 miles) of driving at 31 km/h (20 mph). In contrast, Petersen and Rajan (2002) find that the median distance between lending banks and small U.S. firms covered by the 1993 National Survey of Small Business Finance (NSSBF) is more than double that distance, that is, 4 miles. However, the median firm in the NSSBF employs two to four employees (e.g., Cole and Wolken (1995)), while the median firm in our sample is a single-person business. In addition, costs of driving differ substantially between Belgium and the United States, and Belgian businesses may be limited by the size of the country in their choice of domestically located banks. These arguments may also explain the even larger differences in the other distance statistics reported by Petersen and Rajan (2002). For example, the average (75 percentile) borrower–bank distance in our sample is around 3 (3.5) miles, while the same borrower in Petersen

⁴ The loan rate and type of the 2,732 discarded contracts on average does not significantly differ (at a 1% level) from the 15,044 remaining contracts, though the borrowers are somewhat more transactional (mean *main bank* = 52.5%; mean duration of relationship = 7.2 years) and larger than the firms remaining in the sample (the means of the small-, medium-, and large-firm dummies are 20.6%, 3.4%, and 0.4%, respectively; the mean loan size is BEF 1.09 million).

Table III
Data Description

The table defines the variables employed in the empirical specifications and provides their mean, median, minimum, maximum, and standard deviation. The number of observations is 15,044.

Variables	Definition	Mean	Median	Minimum	Maximum	<i>SD</i>
Geographical Distance						
Distance to lender	Shortest traveling time, in minutes	6.90	4.29	0.00	51.00	7.30
Distance to closest competitors	Shortest traveling time to the closest quartile competitor in the borrower's postal zone, in minutes	3.82	3.27	0.00	24.00	2.33
Relationship Characteristics						
Main bank	= 1 if bank considers itself as main bank, ^a in %	58.82	100	0	100	49.22
Duration of relationship	Length of relationship with current lender, in years	7.93	7.47	0.00	26.39	5.44
Competition Measures						
Number of competitors	Number of branches (minus the lender's) in the borrower's postal zone	17.18	13	1	103	15.49
Herfindahl–Hirschman Index	Summed squares of bank market shares, by number of branches, in each postal zone	0.17	0.15	0.05	1.00	0.11
Loan Rate and Size						
Loan rate	Interest rate on loan until next revision, in basis points	812	782	200	2,200	236
Loan size	Size of loan, in millions of BEF ^c	0.88	0.30	0.005	80	1.83
Loan Contract Characteristics						
Collateral	Including Four Loan Revisability Dummies = 1 if loan is secured via collateral, in %	26.40	0	0	100	44.08
Repayment duration of loan	Repayment duration of loan, in years	2.35	0.55	0.00	20.00	3.26
Loan Purpose						
Mortgage	= 1 if loan is a business mortgage loan	n/a ^b				
Term	= 1 if loan is a business term loan (investment credit)	n/a ^b				
Securitizable term	= 1 if loan is a securitizable business term loan (investment credit)	n/a ^b				
Bridge	= 1 if loan is a bridge loan	n/a ^b				
Prepay taxes	= 1 if loan is credit to prepay taxes	n/a ^b				
Consumer credit	= 1 if loan is a consumer credit loan (capturing installment loans)	n/a ^b				
Other	= 1 if loan is given for another purpose or its purpose is not specified	n/a ^b				
Rollover	= 1 if loan is given to prepay another loan, in %	10.20	0	0	100	30.27

Firm Characteristics	Including 8 Postal Area and 49 Industry Dummies					
Small firm	= 1 if <10 employees and turnover <250 million BEF, ^c in %	15.99	0	0	100	36.64
Medium firm	= 1 if >10 employees or turnover >250 million BEF, ^c in %	0.89	0	0	100	9.40
Large firm	= 1 if turnover >1 billion BEF, ^c in %	0.14	0	0	100	3.73
Limited partnership	= 1 if firm is limited partnership, in %	11.97	0	0	100	32.46
Limited partnership w/ES	= 1 if firm is limited partnership with equal sharing, in %	1.18	0	0	100	10.78
Corporation	= 1 if firm is corporation, in %	3.78	0	0	100	19.07
Temporary arrangement	= 1 if firm is a temporary arrangement, in %	0.85	0	0	100	9.18
Firm Location						
Average real estate price	In the Postal Zone in 1995, in millions of BEF ^c	2.40	2.19	0.35	7.84	0.99
Urban	= 1 if located in agglomeration with >250,000 inhabitants, in %	9.73	0	0	100	29.64
Interest Rate Variables	Including 2-Year Dummies					
Government security	Interest rate on a Belgian government security with equal repayment duration as loan to firm, in basis points	389	350	305	805	87
Term spread	Yield on Belgian government bond of 5 years—yield on Treasury bill with maturity of 3 months, in basis points	179	177	100	268	31

^aThe definition used by the bank to determine whether it is the main bank is: for single-person businesses and small firms, these have a turnover on the current account of at least BEF 100,000 per month and buy at least two products from that bank.

^bFor bank-strategic considerations we cannot reveal the relative importance of the types of loans.

^cForty Belgian Francs (BEF) are approximately equal to US\$1 during the sample period.

and Rajan communicates across 42.5 (14) miles with his or her bank, or across a whopping 252 (255) miles with his or her other financial institutions.

Petersen and Rajan (2002) also report that the distance between U.S. borrowers and banks has increased dramatically over time. For example, the median bank–borrower distance more than doubled between the mid-1970s and the early 1990s (from 2 to 5 miles), while the average distance more than quadrupled (from 16 to 68 miles). In contrast, in our sample the median and average distances between the borrowers and the Belgian bank we study increased by only around 30%, from 4 (6.85) minutes in 1975 to 5.2 (8.86) minutes in 1997.

We calculate the traveling time statistics for each year, which are calculated by subtracting the duration of the relationship between lender and borrower from the initiation year of each loan contract. In effect, we assume that the address of the borrower did not change during the relationship period.⁵ Most of the modest increase of around 25% in traveling time in our sample seems to occur during the early 1990s (Degryse and Ongena (2003) contains a figure). This increase may be partly driven by the small decrease in the number of bank branches caused by regulatory driven despecialization of financial intermediation and resulting consolidation. Branch closures seem to explain most of the observed variation in traveling time.⁶

Possible selection issues may further complicate the assessment of this moderate growth in the distance between bank and borrowers (Petersen and Rajan (2002)). Actually, if we look at the evolution of distance by loan origination date, we find that average distance decreases from 7.7 minutes in 1995 to 6.7 minutes in 1997. We are therefore tempted to conclude that our findings with respect to the evolution over time of the lender–borrower distances broadly match results in Buch (2004) and Corvoisier and Gropp (2001). Both studies suggest that physical proximity continues to play an important role in European bank loan markets. We nevertheless control for possible changes over time in lending technology in robustness exercises.

C. Distance to Closest Competitors

We now turn to our other main variable of interest, *distance to the closest competitors*. The median (average) borrower in our sample is located 2 (2) minutes from the closest competitor or 3 minutes and 15 (50) seconds from the

⁵ Only 179 borrowers report different addresses on loan contracts written in the same year, and an additional 75 borrowers report different addresses across different years. There are 351 contracts with the same address listing a different borrower name.

⁶ We regress the distance to lender on an intercept, the starting year of the relationship, a large firm dummy, and an interaction term between the latter two variables. We want to investigate whether technology affects larger firms in a different way than it affects other firms. Distance grows significantly, but only by around 9 seconds per year, while the growth in distance between large firms and their lenders is indistinguishable from the growth in distance between small firms and their lenders. When we add the (national) number of bank branches to this specification, the growth in distance drops to a significant but small 4 seconds per year. The closure of one branch in each postal zone (implying a decrease in the number of bank branches about equal to the observed drop between 1990 and 1997) increases the traveling time by around 1 minute and 40 seconds.

quartile closest competitor located in the same postal zone. The quartile closest competitor is the bank branch with the 25 percentile traveling time located in the same postal zone as the borrower. We select this second measure to gauge competitor proximity for obvious measurement reasons. Omissions and recording or mapping errors are less likely to influence the 25 percentile statistic than the shortest distance statistic. In addition, bank branches may not be entirely homogeneous in their product offerings. In that case, we also conjecture that our 25% measure is more highly correlated with the distance to the closest, truly competing bank branch than the minimum distance metric. In any case, we also check for the robustness of our results with respect to this a priori choice of proximity metric.

The lending bank is located closer than the quartile (closest) competitor in more than 44% (25%) of the borrower contract cases, making distance a relevant bank (product) characteristic for a sizeable minority of the borrowers in our data set. While distance is important, a majority of the borrowers do not patronize the closest bank branch.⁷ Hence, our statistics suggest that if banks price uniformly, then transportation costs must be negligible for branch choice to be random. On the other hand, if banks do not price uniformly, then information, reputation, and other bank product characteristics in addition to location must play a role in the choice of bank branch and the determination of loan conditions.

D. Relationship Characteristics

Relationship characteristics control for information and experience effects and are therefore central to our analysis. The first characteristic in this category, *main bank*, indicates whether this bank considers itself to be the main bank of that firm or not. The definition used by the bank to determine whether it is the main bank is having a monthly “turnover” on the current account of at least BEF 100,000 (USD 2,500), and buying at least two products from that bank. More than half of all borrowers are classified as *main bank* customers. *Main bank* captures the scope of the relationship. If these sources of information improve the accuracy of the bank’s information or reduce the monitoring costs, then the measure *main bank* should reduce the expected cost of such loans. But *main bank* also proxies for the exclusivity of the relationship and the resulting lack of information a borrower has about alternatives.⁸ In that case, a *main bank* customer pays a higher loan rate.

⁷ In less densely branched areas, proximity may play a more prominent role. For example, regressing distance to lender on distance to closest competitors yields a slope coefficient of 0.57*** and an intercept equaling 4.69***. (As in all tables, *, **, and *** indicate significance at a 10%, 5%, and 1% level, two-tailed.) These estimates suggest a crossover point of around 11 minutes, at which the distance to the lender on average becomes smaller than the distance to the quartile closest competitor. Less than 1% of all borrowers in our sample are located in such areas.

⁸ Large Belgian firms maintain more than 10 bank relationships (Ongena and Smith (2000)). On the other hand, the average small Belgian firm surveyed by de Bodt, Lobe, and Statnik (2001) employs only two banks. The firms in the latter sample are on average more than three times larger and 7 years older than the firms in our sample.

The second relationship variable is the *duration of the relationship* in years with that particular bank at the time the loan rate is decided upon. A relationship starts when a firm buys a product from that bank for the first time. The average duration of the relationship in the sample is about 8 years. Duration proxies for the increased time for a firm to experience using the banks' products and to appreciate the added flexibility the bank has to maintain and fulfill implicit contracts. While the bank gains private information about a firm to tailor its products, the firm may also become locked in. In that case, a long-term bank customer may end up paying a higher loan rate.

E. Competition

We also enlist in our main analysis the *number of competitors*, which is defined as the number of bank branches (minus the lender's) in the borrower's postal zone. In most of the spatial models discussed, the number of competitors corresponds inversely to the sum of the distance to the lender and the closest competitor. This is also the case in our sample, although the correlation coefficient seems small in absolute value, that is, only -0.023^{***} (actual closest) or -0.103^{***} (quartile closest).

An obvious candidate for explaining the small correlation coefficient is the spatial simplification embedded in the theoretical models discussed earlier in the paper. Geographical clustering of business and banking activities across a land surface may weaken any correspondence between distance and the number of bank branches. In addition, there are also the differences in the surface area covered by the different postal zones. Many postal zones are roughly equal in size, except for the postal zones in Brussels (which are small) or the postal zones in the provinces Luxembourg or West-Flanders (which are large). We include eight postal area dummies (that cover around 100 zones each), in addition to the base case to control for these differences in zone size. We also introduce postal zone and bank branch effects in robustness exercises.

F. Other Variables

The rest of the variables are less unique to our analysis (see Degryse and Van Cayseele (2000)), so we limit the discussion here. Consider the *loan contract characteristics*. The first is the dependent variable, the *interest rate* on the loan until the next revision. For fixed interest rate loans, this is the yield to maturity of the loan. For variable interest rate loans, this is the interest rate until the date at which the interest rate will be revised as stipulated in the contract. The average interest rate on a loan in our sample is 8.12% or 812 basis points (we employ basis points throughout the paper). The loan rate varies widely, not only nationally (the standard deviation is 236 basis points), but also at the branch level (the average standard deviation at the branch level is still 217 basis points). Loan fees are not included in our data set. Loan fees are rarely charged to single-person businesses and are set by the bank's national headquarters.

The median loan size is BEF 300,000 (USD 7,500), but varies between BEF 5,000 (USD 125) and BEF 80,000,000 (USD 2,000,000). We assume in our empirical analysis that loan rate and size are determined jointly. The variable *collateral* indicates whether or not the loan is collateralized. Approximately 26% of the loans are collateralized. We assume, as in Berger and Udell (1995) and in Elsas and Krahnen (1998), among others, that collateral and interest rate conditions are determined sequentially, with the collateral decision preceding the interest rate determination. However, we investigate alternative decision sequences with respect to loan size and collateral in various robustness checks.

Another loan contract characteristic is the *repayment duration of the loan*. For all loans to the firms, we know how soon the loans are repaid. This allows us to compute the exact repayment duration of a loan. We include the natural logarithm of (one plus) this variable in the regression analysis in order to proxy for the risk associated with the time until the loan is repaid. Four dummies capture the effect of the revisability of the loan, as some loan contracts allow resetting the loan rate at fixed dates, subject to contractual terms.

We also include dummies capturing the *loan purpose*. We have seven types of loans in our sample. While we cannot discern the relative importance of the types of loans, we include the seven loan purpose dummies in Table III for convenient reference. We further include a separate *rollover* dummy (also listed in the *loan purpose* category), which takes a value of 1 if the loan is given to prepay another loan, and is 0 otherwise.

The *firm characteristics* include proxies both for the size and legal form of the firm. A distinction can be made between single-person businesses (82.98% of the sample), small (15.99%), medium (0.89%), and large (0.14%) firms; and between sole proprietorships (82.22%), limited partnerships (11.97%), limited partnerships with equal sharing (1.18%), corporations (3.78%), and temporary arrangements (0.85%). In the regressions, we exclude the dummies for single-person businesses and sole proprietorships. We include 49 two-digit NACE code dummies to capture industry characteristics.

The *interest rate variables* are incorporated to control for the underlying cost of capital in the economy. The first is the interest rate on a Belgian government security with the same repayment duration as the loan granted to the firm. Second, we include a *term spread*, defined as the difference between the yield on a Belgian government bond with repayment duration of 5 years and the yield on a 3-month Treasury bill. Finally, we incorporate 2-year dummies for 1996 and 1997 (with 1995 as the base case) to control for business cycle effects.

III. Empirical Results

A. Control Variables

We analyze the determinants of the loan rate by regressing the loan interest rate on our distance, relationship, competition, and control variables, which include loan contract characteristics, loan purpose, firm characteristics, and interest rates. We use ordinary least squares estimation. We first analyze and

discuss a specification containing only the relationship and control variables. Afterward, we add our competition and distance variables of interest, discuss and interpret the results, and perform supplementary robustness tests.

First, we regress the loan interest rate (in basis points) on the relationship characteristics and control variables. Most control coefficients remain virtually unaltered throughout the exercises in this paper. We therefore tabulate the estimated coefficients only once in Table IV. The loan contract characteristics include whether the loan is collateralized, its repayment duration, and the loan revisability options. When a loan is collateralized, the loan rate decreases by approximately 51 basis points. This result is in line with the sorting-by-private-information paradigm, which predicts that safer borrowers pledge more collateral (e.g., Besanko and Thakor (1987)). However, our finding that collateral is associated with safer borrowers is inconsistent with the empirical findings of Berger and Udell (1990) and Berger and Udell (1995), and with Elsas and Krahnen (1998) and Machauer and Weber (1998), who report a positive (though economically small) effect of collateralization on loan rates.

The coefficient of $\ln(1 + \text{Repayment Duration of Loan})$ is significantly negative at the 1% level: An increase in duration from say, 5 to 6 years, reduces the loan rate by 14 basis points. However, Crabbe (1991) finds that an increase in duration from 5 to 6 years *increases* bond yield spreads by around 11 basis points. But the 72 corporate bonds in his sample have maturities longer than 7 years, while 88% of our 15,044 sample bank loans have maturities shorter than 7 years (Barclay and Smith (1995)).⁹

We also include four loan revisability dummies (but do not tabulate these coefficients to conserve space). However, we report the rejection (at the 1% significance level) of the hypothesis of the joint equality to zero of the coefficients of the four loan revisability dummies. The coefficient on the rollover dummy indicates that if a loan is given to prepay another loan, the loan rate increases by approximately 21 basis points. Term, bridge, and consumer credit loans carry a significantly lower loan rate (but we do not tabulate these coefficients to conserve space). However, again we report the rejection, at the 1% significance level, of the hypothesis of the joint equality to zero of the coefficients of the six loan purpose dummies.

Table IV also shows that small firms pay a higher interest rate, while medium and large firms pay a significantly lower interest rate than do single-person

⁹ To replicate Crabbe's empirical model, we replace $\ln(1 + \text{Repayment Duration of Loan})$ with a linear and quadratic term in repayment duration, and restrict the coefficient on the government security variable to be equal to 1. Sampling only loans with maturities longer than 7 years, we also find that an increase in duration *increases* bond yield spreads, although the effect is smaller (i.e., only three basis points going from 5 to 6 years). The estimated coefficients on the repayment duration variables for the full sample including all maturities suggest that repayment duration negatively affects spreads for loans with maturities shorter than 8 years. Alternatively, we replace $\ln(1 + \text{Repayment Duration of Loan})$ by 20 repayment duration year dummies. The estimated coefficients from this exercise suggest local minima at 3 and 5 years. Hence, given the predominance of short loan maturities in the sample, we display the results from the *a priori* chosen and most parsimonious empirical model. We note, however, that the main results reported later remain virtually unaffected when any of these replacements and/or restrictions is imposed.

Table IV
Borrowing Costs, Firm, and Loan Characteristics

The table lists the coefficients from a regression with the *loan rate* until the next revision, in basis points, as the dependent variable. *Main bank* equals 1 if the bank considers itself as the main bank and 0 otherwise. *Duration of relationship* is the length of relationship with the current lender, in years. *Collateral* equals 1 if the loan is secured via collateral and 0 otherwise. *Repayment duration of loan* is in years. The *loan purpose* and *firm characteristics* variables are all dummies that equal 1 if the loan or firm has the featured characteristic and zero otherwise. *Government security* is the interest rate on a Belgian government security with equal repayment duration as loan to firm, in basis points. *Term spread* is the yield on a Belgian government bond of 5 years—yield on treasury bill with a maturity of 3 months, in basis points. The number of observations is 15,044. We employ ordinary least squares estimation.

Variable Categories	Independent Variables	
<i>Relationship Variables</i>	<i>Main Bank</i>	-40.7*** (3.7)
	ln(1 + Duration of Relationship)	19.2*** (2.3)
<i>Loan Contract Characteristics</i>	<i>Collateral</i>	-50.9*** (8.3)
	ln(1 + Repayment Duration of Loan)	-92.5*** (9.3)
<i>Loan Purpose</i>	<i>Included Dummies</i>	<i>4 Loan Revisability***</i>
	Rollover	21.3*** (7.3)
<i>Firm Characteristics</i>	<i>Included Dummies</i>	<i>6 Loan Purpose***</i>
	Small Firm	44.0** (19.2)
	Medium Firm	-99.5*** (26.2)
	Large Firm	-170.2*** (51.4)
	Limited Partnership	-30.2 (18.7)
	Limited Partnership w/ES	-46.3* (24.7)
	Corporation	-116.2*** (21.1)
	Temporary arrangements	-35.1 (24.2)
	<i>Included Dummies</i>	<i>8 Postal Area***</i>
		<i>49 Industry***</i>
<i>Interest Rate Variables</i>	Government Security	0.5*** (0.1)
	Term Spread	0.4*** (0.1)
	<i>Included Dummies</i>	<i>2 Years***</i>
	<i>Intercept</i>	589.6*** (122.9)
	Adjusted R^2	0.222

*, **, and *** indicate significance at the 10%, 5%, and 1% level, two-tailed.

businesses (the base case). This nonmonotonicity is due to differences in legal exposure. Almost all single-person businesses are sole proprietors, and owners thus face unlimited liability for their business debts. On the other hand, all small firms are partnerships, corporations, or temporary arrangements; their owners for the most part face only limited liability. Diversification and reputation effects (due to increased firm size) eventually overwhelm the impact of limited liability, however, and lower the loan rate for the average medium and large firms. Corporations and limited partnerships with equal sharing pay a significantly lower interest rate than do sole proprietorships, possibly reflecting both the effects of limited liability and increased firm size. While few individual coefficients on either the eight postal area or the 49 industry dummies are significant, both sets of coefficients are highly significant as a group.

Finally, a significant fraction of the variation in the loan rate is explained by economy-wide factors. The change in the loan rate due to a basis point change in the interest rate on a government security with the same repayment duration equals 0.5. This coefficient suggests sluggishness in loan rate adjustments, possibly due to the implicit interest rate insurance offered by banks (e.g., Berlin and Mester (1998)), credit rationing (e.g., Fried and Howitt (1980), Berger and Udell (1992)), or the downward drift in Belgian interest rates during our sample period. This decrease in interest rates is actually reflected in our sample loan rates, as the (nontabulated) coefficients on the 2-year dummies indicate that the average 1995 (1996) loan rate is a significant 127 (18) basis points above the average 1997 loan rate, *ceteris paribus*. A basis point parallel shift of the term spread implies a positive 0.4 basis point shift in the loan rate. The size of the coefficient on the government security variable found by Petersen and Rajan (1994) is around 0.3***, whereas the coefficient for the term spread is negative and insignificant.¹⁰

B. Relationship Characteristics

The impact of the bank–firm relationship is captured in two complementary ways. Our first indicator of relationship strength, *main bank*, measures the *scope* of the bank–firm relationship. The loan rate decreases with the scope of the relationship. The results show that a firm pays 41 basis points fewer when the scope of a relationship is sufficiently broad (*main bank* = 1).

The second indicator is the duration of the relationship between the lending bank and the borrower. We take the log of (one plus) the duration of the relationship, as we expect the marginal impact on the loan rate to decrease with

¹⁰ We restrict the coefficient on the government security variable to be equal to 1 to estimate the impact of the independent variables on the spread rather than on the loan rate. The main results are unaffected. We further replace both interest rate variables (and the 2-year dummies) by weekly time effects. While the time effects are significant as a group, the coefficients (in all main models we report) are otherwise virtually unaffected. We focus on specifications incorporating the interest rates, as this type of specification is widely used in the literature.

the duration of the financial relationship. Table IV shows that the loan rate increases with the duration of the relationship (see also Degryse and Van Cayseele (2000)). For example, an increase in duration from the median (7.5 years) to the median + standard deviation (13 years) increases the loan rate by 10 basis points.

C. Competition

Table V incorporates our measures of banking competition. In Model I, the coefficient on $\ln(1 + \text{Number of Competitors})$ is not significantly different from zero. Hence, when competition is measured by the number of bank branches present in the same postal zone as the borrower, neither the effects of induced competition nor adverse selection effects seem to dominate. We add the number of bank branches of competitors in adjacent postal zones to this variable. The coefficient on the adjusted variable is not significant either, and we do not report the results.

In Model II, we replace the number of competitors by a more commonly used measure of competition, the Herfindahl—Hirschman Index (HHI). We resort to using the number of bank branches of each bank in the postal zone to construct market shares. In effect, we assume that coordination occurs between branches of the same bank, while our previous measure of competition assumed branch independence. The resulting coefficient on the HHI equals a significant, but small, 35.3**. This estimate implies that an increase of 0.1 in the HHI, say from a competitive ($\text{HHI} < 0.1$) to a highly concentrated ($\text{HHI} > 0.18$) market, would increase the loan rate by only 3.5 basis points. The coefficient on HHI in our regression model corresponds to the (mostly) positive coefficients reported in the literature (see Degryse and Ongena (2003)).

Next, we introduce postal zone effects to better control for the geographical variation in competition and firm characteristics. A Lagrange multiplier test indicates that the effects are significant. Using a Hausman (1978) test, we cannot reject orthogonality. In addition, our sample has been drawn from a large population. Hence, we report the coefficients for the random effects model in Model III (the results for the fixed effects model are very similar). The coefficients on all variables of interest are virtually unaffected.

We replace the postal zone effects by bank branch effects to capture branch-specific variation in competition (e.g., Barros (1999), Calem and Nakamura (1998)) and/or spatial variation. Again, random effects seem preferable and the estimated coefficients of the other variables remain similar. We choose not to report the results. Finally, in Model IV we introduce the *average real estate price* in each postal zone in 1995. The cost of bricks and mortar may affect the pricing of loans (the prices range from 0.35 to 7.84 million BEF). However, Model IV shows—surprisingly—that the average real estate price does not seem to have an effect on the loan rate, neither statistically nor economically. Adding the *change in average real estate price* in the preceding and/or following 5 years does not alter this result.

Table V
Borrowing Costs and the Role of Distance

The table lists the coefficients from regressions with the *loan rate* until the next revision, in basis points, as the dependent variable. *Distance to lender* is the shortest traveling time, in minutes. *Distance to closest competitors* is the shortest traveling time to the closest quartile competitor in the borrower's postal zone, in minutes. *Main bank* equals 1 if the bank considers itself as the main bank and zero otherwise. *Duration of relationship* is the length of relationship with the current lender, in years. *Number of competitors* is the number of branches (minus the lender's) in the borrower's postal zone. *Herfindahl-Hirschman Index* is the summed squares of bank market shares, by number of branches, in each postal zone. *Average real estate price* is recorded per postal zone in 1995, in millions of BEF. *Urban* equals 1 if the firm is located in an area with more than 250,000 inhabitants and zero otherwise. The number of observations is 15,044. We employ ordinary least squares estimation.

Independent Variables	Models						
	I	II	III	IV	V	VI	VII
Distance							
ln(1 + Distance to Lender)	-4.3*	-5.4**	-10.3***	-5.4**	-8.3***	-14.2***	-12.8**
	(2.5)	(2.5)	(2.7)	(2.5)	(2.2)	(5.5)	(5.5)
ln(1 + Distance to Closest Competitors)	16.1***	16.6***	18.5***	16.7***	8.3***	14.2***	12.8**
	(3.8)	(3.6)	(4.0)	(3.6)	(2.2)	(5.5)	(5.5)
Relationship Variables							
Main bank	-40.9***	-41.1***	-53.0***	-41.1***	-41.0***	-44.4***	-44.9***
	(3.7)	(12.7)	(3.8)	(3.7)	(3.7)	(3.9)	(3.9)
ln(1 + Duration of Relationship)	18.8***	18.8***	23.9***	18.9***	18.6***	18.4***	18.7***
	(2.3)	(2.3)	(2.4)	(2.3)	(2.3)	(2.5)	(2.5)
Main bank × ln(1 + Distance to Lender)						11.1**	11.1**
						(4.6)	(4.6)
Main bank × ln(1 + Distance to Closest Competitors)						-11.1**	-11.1**
						(4.6)	(4.6)
ln(1 + Duration of Relationship) × ln(1 + Distance to Lender)						-0.1	-0.0
						(2.7)	(2.7)
ln(1 + Duration of Relationship) × ln(1 + Distance to Closest Competitors)						0.1	0.0
						(2.7)	(2.7)

Competition							
ln(1 + Number of Competitors)	−0.4 (2.6)						
Herfindahl—Hirschman Index		35.3** (15.2)		34.4** (15.3)	37.6** (15.2)	36.5** (15.2)	45.3*** (15.3)
Postal zone random effects			Yes ^b				
Firm location							
Average real estate price ^a				−1.1 (2.2)			
Urban							14.6 (24.8)
Urban × ln(1 + Distance to Lender)							−10.5 (7.3)
Urban × ln(1 + Distance to Closest Competitors)							23.8 (15.0)
Loan contract characteristics (including four loan revisability dummies), Loan purpose firm characteristics (including 8 postal area and 49 industry dummies), Interest rate variables (including 2-year dummies), and intercept	Yes	Yes	Yes ^c	Yes	Yes	Yes	Yes
Equality restriction(s), <i>F</i> -statistic					8.645	3.597	3.231
Adjusted <i>R</i> ²	0.227	0.223	0.143 ^d	0.223	0.222	0.222	0.224

* **, and *** indicate significance at the 10%, 5%, and 1% level, two-tailed.

^aIn millions of BEF.

^bLagrange multiplier test of effects versus no effects = 390.1***, and Hausman (1978) test of fixed versus random effects = 35.0.

^cExcluding postal area and industry dummies.

^dCorresponding fixed effects model statistic.

D. Distance

We now turn to the coefficients on the distance variables. We take for each of our distance measures the log of (one plus) the distance, as we conjecture the marginal impact on the loan rate to decrease with distance. We will use a robustness exercise to investigate the impact of this choice of functional form. The negative and significant coefficients on $\ln(1 + \text{Distance to Lender})$ in Models I–IV suggest that borrowers located farther away from the lender pay a lower loan rate at the lending bank. These results are consistent with spatial price discrimination. In addition, the lender's market power increases with the distance between the borrower and the closest competitors, as indicated by the positive and significant coefficient on the variable $\ln(1 + \text{Distance to Closest Competitors})$. Our proxy for the distance between the borrower and the closest competitor may identify strategic behavior between banks that our other competition variables did not (or only partly) pick up. These results thus reject uniform pricing and monitoring cost theories without discriminatory pricing.

The price discrimination models based on linear transportation costs and/or monitoring costs discussed in Section I further provide precise theoretical predictions concerning the sum of the coefficients on both distance measures (this prediction is not present in the asymmetric information models we discussed). In particular, a marginal shift in the location of the borrower implies that the sum of the coefficients on both distance measures should equal zero. We therefore restrict the sum of the coefficients on both distance measures to equal zero in Model II (these coefficients are mostly easily interpretable). We report the results in Model V. The F -statistic equals 8.6; hence, we cannot reject the equality restriction.

Both distance effects are not only statistically but also economically relevant. An increase of one standard deviation in the distance between borrower and lender (i.e., the traveling time increasing from 0 to 7.3 minutes), decreases the loan rate by 18 basis points in Model V. An increase of one standard deviation in the distance between borrower and the closest competitors (from 0 to 2.3 minutes) increases the loan rate by about 10 basis points.

For the median loan of BEF 300,000 (USD 7,500), annual outlays for the borrower decrease by BEF 72 (USD 1.8) per extra minute of traveling time to the lender (averaged over the 0–1 standard deviation interval). Belgian entrepreneurs and (bank) managers made around BEF 20 per minute in 1995, while the operating costs for a car (gas, maintenance, and tires) may have amounted to around BEF 3 per minute of driving. According to a linear transportation cost model, thus, the median borrower is expected to make one-and-a-half additional round trips to his bank branch as a direct result of the new loan. Alternatively, according to a linear monitoring cost model, loan officers are expected to make three round trip visits to their median borrowers. Hence, we find our spatial discrimination estimates economically interesting on the margin, but also reasonable.

On the basis of the estimates, we can also assess the magnitude of possible bank rents. Borrowers located very close to the lender will be charged 14 basis

points more, on average, than borrowers located right between the lender and the quartile closest competitor (Model V estimates). Hence, location rents extracted from the closest borrowers are around 4% (and can be as high as 9%) of the bank's marginal cost of funding (we take it to be the interest rate on a Belgian government security with equal repayment duration). Location rents extracted from the average borrower amount to around 0.5% of this marginal cost.

To put these location rents in perspective, note that the loan rate increases by 62 basis points over 26 years (the period that the longest observed relationship lasts). This maximum increase implies annualized information rents of less than 7% of the marginal cost of funding. Information rents extracted from the average borrower amount to 1.5% of the marginal cost.

E. Transportation Costs or Asymmetric Information?

As argued in Section I, distance may also affect the quantity and quality of information that banks and borrowers have about each other. To disentangle whether the effects of distance on the loan rate hinge on transportation costs or on informational asymmetries, we start by interacting our two distance measures with the bank–firm relationship variables in Model VI. The results are very interesting. The distance coefficients now capture the impact of distance for transactional borrowers (*main bank* = 0 and *duration of relationship* = 0). The restricted coefficients from this regression (which equal $\pm 14.2^{***}$) suggest that (according to a linear transportation model) a transactional borrower in our sample expects to visit his branch two-and-a-half times per year as a result of a new BEF 300,000 (USD 7,500) loan—one time more than the median borrower in Model V. Again, we would argue that the number of imputed visits is quite reasonable.

Main bank—relationship customers, on the other hand, seem shielded from discriminatory loan pricing. Indeed, we cannot reject the joint equality to zero of the sum of the coefficients on the distance measures and the respective interaction terms with the *main bank* variable ($F = 0.156$). The lender probably knows its main bank borrowers better than it knows its other borrowers. At the same time, the main bank borrowers themselves may be less informed about alternative banks, their products, and prices.

How then to interpret our results? The uninformed lender in Hauswald and Marquez (2003) charges a higher loan rate to remote borrowers in order to compensate for the adverse selection problem, which intensifies in the vicinity of an informed lender. The informed lender accordingly extracts a higher loan rate from less distant borrowers. However, our results so far show a loan rate charged to relationship borrowers that is essentially unaffected by the lender–borrower distance, and a loan rate to transactional borrowers that actually decreases with the lender–borrower distance (this result is independent of the equality restriction, which cannot be rejected in the first place).

It is possible that no bank in the vicinity of a firm is informed. In other words, the loans we classify as transactional are of this type in general. The lending

bank is uninformed about the borrower, but can infer that no alternative lender in the vicinity of the borrower is informed, either. In that case, there is obviously no adverse selection issue. However, this interpretation seems at odds with our finding that the transactional borrowers are on average more than 5 years older than the main bank borrowers (we collect *age* for 2,655 borrowing firms). The age differential suggests that transactional borrowers may be switching banks, which makes it less likely that other lenders are uninformed. In addition, the positive coefficient of the duration of the relationship variable suggests that lenders do become more informed about their borrowers. Admittedly, the other banks may have lent on the basis of distance or may not have lent at all. And even if these other banks were relationship lenders, the information they had collected over time may have become stale. While in all these cases, the banks in the vicinity of the transactional borrower are not that well-informed either, we suspect that they are at least on average more informed than the current lender. It is just that the magnitude of the adverse selection problem in our data set does not increase discernibly with physical distance.

What about the differential information that borrowers (but not lenders) have as a driver of our results? Since nonmain bank borrowers in our sample possibly patronized other banks before turning to the currently observed lender, they may have been initially less informed about the lending conditions that the observed lender was willing to provide. The more distant, the less informed they might have been. It is possible that these transactional firms become more informed and interested in a particular term loan or line of credit by learning about the advertisements of lower loan rates by the observed lender (Bester and Petrakis (1995)). The offered rate could then reasonably be expected to decrease with distance, commensurate with the informational asymmetry. However, a critical problem with this interpretation is that nonmain bank customers actually pay a higher loan rate in our sample. The latter result is not at all compatible with the nonmain bank borrowers becoming more informed in a location-*cum*-information model. Indeed, more informed borrowers are expected to be more price-sensitive, not less. Alternatively, the negative sign on the *main bank* variable could be a reflection of cross-subsidization.

To conclude, we think a more mundane but possibly more coherent explanation for our findings is that the borrowers are exposed to price discrimination based on transportation costs. However, the effects are somewhat obfuscated for main bank borrowers, simply because of the possibilities for cross-subsidization between banking products. We now critically investigate the transportation cost story further.

F. Firm Location, Loan Characteristics, and Distance

Both MapBlast.com and Mappoint account for road categorization when calculating traveling times. Traffic congestion, however, is not taken into account. We introduce a dummy variable *urban* and interaction terms for our two distance measures. *Urban* equals 1 when the borrower is located in an area with more than 250,000 inhabitants, and is 0 otherwise. The coefficients on the

interaction terms in Model VII indicate that urban borrowers experience discrimination twice as harshly, possibly suggesting that traffic congestion increases traveling times in urban areas (the other coefficients are broadly unaffected). In addition, rural borrowers pay on average 35 basis points less than urban dwellers.¹¹

Next, we split the sample by relative distance, that is, by whether or not the borrower is closer to the lender or closer to the quartile closest competitor. The characteristics of the firms borrowing from closer or more distant lenders do not differ substantially (see Degryse and Ongena (2003)). These findings cast further doubt on a lender information interpretation of the distance coefficients, as we argue in the next section. Even more striking is the observation that distant borrowers obtain larger- or longer-term loans at a lower rate on a collateralized or transactional basis. These observed differences in loan characteristics are, we contend, fully reflective of the fixed-cost nature of transportation costs, on the basis of which the lender price discriminates.

Start with *loan size*, loan size is actually exogenous in most location models. By introducing *loan size*, we assume a sequential decision process (first loan size followed by the loan rate). We focus on the equivalent of a stripped-down version of earlier models in the first column of Table VI, as its parsimony is needed in subsequent exercises. The coefficient on *loan size* equals -22.6^{**} . The coefficient indicates that an increase in loan size from the median (BEF 0.30 million, USD 7,500) to the mean (BEF 0.88 million, USD 22,000) amount decreases the interest rate by 13 basis points. The distance coefficients remain virtually unaltered, and again, we cannot reject the equality restriction involving these coefficients.

Next, we recognize the interdependence between loan size, rate, and distance. Loan size and rate may be determined jointly. In addition, the impact of distance on the loan rate may decrease with loan size, due to the fixed-cost character of the incurred transportation costs. We opt for stratifying by loan size, with cutoffs at BEF 0.2 and 2 million (USD 5,000 and 50,000), and report the results

¹¹ The latter result raises the troubling possibility that farms (located in rural areas) and manufacturing companies (located on the outskirts of towns) pay a lower loan rate than service-type companies (located downtown close to bank branches)—not because of location, but because of, say, the tangibility of their assets. The firm variables employed so far, including the 49 industry dummies, may not fully absorb such differences in firm characteristics across location, resulting in a spuriously estimated effect of distance on the loan rates. We therefore also split the sample by sector. We identify 247 agricultural, fishing, and mining (AFM) firms, 900 manufacturing firms, and 13,897 service firms. The average AFM firm in the sample is indeed located around 10% farther from the lending branch and closest competitor than the average manufacturing firm (for details, see Degryse and Ongena (2003)). On the other hand, manufacturing and service firms do not differ statistically in their location vis-à-vis the lending or the closest competitor's bank branch. We also rerun the main regressions split along sector. The distance coefficients for the three sectors are surprisingly similar in magnitude, although fewer observations in the AFM and manufacturing sectors prevent most coefficients from being statistically significant. Hence, differences in firm characteristics (such as asset tangibility) that may be correlated with location seemingly do not drive our results. We use augmented samples later in the paper to control even better for firm heterogeneity.

Table VI
Loan Size, Duration, and Collateral

The table lists the coefficients from regressions with the *loan rate* until the next revision, in basis points, as the dependent variable. *Distance to lender* is the shortest traveling time, in minutes. *Distance to closest competitors* is the shortest traveling time to the closest quartile competitor in the borrower's postal zone, in minutes. *Main bank* equals one if the bank considers itself as the main bank and zero otherwise. *Duration of relationship* is the length of relationship with the current lender, in years. *Herfindahl–Hirschman Index* is the summed squares of bank market shares, by number of branches, in each postal zone. *Loan size* is in millions of BEF. We employ ordinary least squares estimation.

Independent Variables	Incl. Loan Size	By Loan Size (LS), in millions of BEF			By Duration of Loan (DL), in years		Collateral	
		LS ≤ 0.2	0.2 < LS ≤ 2	2 < LS	DL < 0.55	0.55 ≤ DL	No	Yes
ln(1 + Distance to Lender)	−13.6*** (2.4)	−15.0*** (4.1)	−4.0* (2.1)	−0.7 (2.3)	−21.0*** (4.1)	−6.3** (2.8)	−12.9*** (2.9)	−2.3 (2.0)
ln(1 + Distance to Closest Competitors)	13.6*** (2.4)	15.0*** (4.1)	4.0* (2.1)	0.7 (2.3)	21.0*** (4.1)	6.3** (2.8)	12.9*** (2.9)	2.3 (2.0)
Main bank	−43.0*** (3.9)	−32.9*** (6.4)	8.3** (3.5)	−6.6* (4.0)	−53.1*** (6.5)	−35.3*** (4.5)	−45.6*** (4.7)	−7.6** (3.2)
ln(1 + Duration of Relationship)	29.3*** (2.4)	26.0*** (4.4)	14.4*** (2.0)	10.7*** (2.1)	36.9*** (4.3)	24.7*** (2.6)	29.9*** (3.0)	1.8 (1.7)
Herfindahl–Hirschman Index	10.3 (16.0)	32.0 (29.8)	14.0 (13.6)	38.3*** (14.3)	19.3 (27.8)	1.6 (17.9)	−11.0 (19.5)	37.0*** (12.9)
Loan size	−22.6*** (1.1)				−56.6*** (2.6)	−11.4*** (1.1)	−140.6*** (3.5)	−4.7*** (0.5)
Interest rate variables (including 2-year dummies) and intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	15,044	5,850	7,344	1,850	6,698	8,346	11,073	3,971
Equality restriction, <i>F</i>	0.115	3.268	4.616	1.717	0.491	0.411	0.091	1.733
Adjusted <i>R</i> ²	0.084	0.011	0.136	0.665	0.089	0.085	0.175	0.447

*, **, and *** indicate significance at the 10%, 5%, and 1% level, two-tailed.

in Table VI. The noticeable increase in adjusted R^2 across size categories may reflect the greater role played by observable, hard information in the pricing of larger loans. The distance coefficients decrease by loan size, but remain significant for the two categories containing the smallest- and medium-sized loans. We can also not reject the equality restriction of the distance coefficients in either of the size categories. In addition, although the coefficients decrease, the outlays per minute of extra travel time are strikingly similar. For the median loan sizes in each group (i.e., BEF 109,000, BEF 500,001, and BEF 3,105,000), a minute of extra travel time costs BEF 47, 58, and 63, respectively. We find this equality in imputed traveling costs very suggestive of price discrimination on the basis of transportation costs. Though currently not theoretically modeled, the deterioration of information quality across distance would, we conjecture, give rise to loan rate schedules in distance that are independent of loan size. Obviously, that is not what we find.

We also split the sample at the median *repayment duration of the loan* (0.55 years) and tabulate the results in Table VI. The distance coefficients for the group of loans with a duration shorter than 0.55 equal $\pm 21.0^{***}$; the coefficients for the longer-term loans equal $\pm 6.3^{**}$. As the median duration in the short-term group is 0.4 and in the long-term group is 2.4 years, the size of the coefficients again implies a strikingly similar fixed transportation cost per loan of equal duration.

Next, we drop the *collateral* dummy and then study separately the sets of contracts with and without collateral. Dropping *collateral* hardly affects our main results, and we choose not to tabulate the results. The sample split results are in the last two columns of Table VI. Distance continues to play a large role in the pricing of the 11,073 contracts without collateral. The distance coefficients equal $\pm 12.9^{***}$, respectively. On the other hand, the distance coefficients for the 3,971 collateralized contracts drop to ± 2.3 , with a standard deviation of 2.0 no longer significant at conventional levels. However, we also cannot reject the equality restriction of the two distance coefficients. Though borrowers with or without collateral are equally likely to be main bank customers, posting collateral softens spatial price discrimination. However, posting collateral also substantially weakens the impact of the *duration of the relationship*, *loan size*, and *main bank* on the loan rate. This finding suggests that collateralization blurs the informativeness of the loan rate in general.

In the first two columns in Table VII we further distinguish by *loan type* between lines of credit and term loans. Berger and Udell (1995) and Harhoff and Körting (1998), for example, argue that lines of credit tend to be relationship-driven and based on the overall creditworthiness of the firm. However, more than 90% of the 3,678 loans in our sample that embed a revolving option are actually collateralized, and none involve the upfront or backend fees and compensating balances often observed in the United States (Saunders and Cornett (2002, p. 329)). In addition, revolving loans are on average more than seven times larger than nonrevolving loans. Nevertheless, the results again confirm that spatial price discrimination mainly affects the “transactional” loans. Unreported sample split exercises suggest that also uncollateralized or

Table VII
Loan Type/Purpose, Firm Type, and Relative Distance

The table lists the coefficients from regressions with the *loan rate* until the next revision, in basis points, as the dependent variable. *Distance to lender* is the shortest traveling time, in minutes. *Distance to closest competitors* is the shortest traveling time to the closest quartile competitor in the borrower's postal zone, in minutes. *Main bank* equals one if the bank considers itself as the main bank and zero otherwise. *Duration of relationship* is the length of relationship with the current lender, in years. *Herfindahl–Hirschman Index* is the summed squares of bank market shares, by number of branches, in each postal zone. *Loan size* is in millions of BEF. We employ ordinary least squares estimation.

Independent Variables	Loan Type		Loan Purpose		Firm Type		Relative Distance	
	Lines of Credit	Term	Capital Expenditures	Noncapital Expenditures	SPB & SP ^a	Other	Lender = Closest	Lender ≠ Closest
ln(1 + Distance to Lender)	3.7 (2.5)	−10.5*** (2.7)	−0.2 (1.7)	−16.0*** (2.9)	−11.2*** (2.6)	−19.1*** (5.8)	−14.7** (7.2)	−12.3*** (3.9)
ln(1 + Distance to Closest Competitors)	−3.7 (2.5)	10.5*** (2.7)	0.2 (1.7)	16.0*** (2.9)	11.2*** (2.6)	19.1*** (5.8)	14.7** (7.2)	12.3*** (3.9)
Main bank	3.1 (4.0)	−34.3*** (4.4)	−5.0* (2.9)	−50.4*** (4.7)	−51.3*** (4.2)	25.9** (10.2)	−53.3*** (5.9)	−34.9*** (5.2)
ln(1 + Duration of Relationship)	9.3*** (3.5)	23.1*** (2.8)	3.6** (1.5)	33.4*** (3.0)	25.1*** (2.6)	24.4*** (6.5)	25.5*** (3.7)	31.6*** (3.1)
Herfindahl–Hirschman Index	22.6 (16.5)	−13.8 (18.0)	30.1** (11.8)	−5.9 (19.4)	10.0 (17.4)	−10.0 (38.2)	−5.2 (42.3)	11.2 (17.4)
Loan size	−5.8*** (0.6)	−224.5*** (4.1)	−3.8*** (0.4)	−73.3*** (2.5)	−36.6*** (1.8)	−11.0*** (1.5)	−33.9*** (2.2)	−18.6*** (1.3)
Interest rate variables (including 2-year dummies) and intercept	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	3,678	11,366	3,490	11,554	12,360	2,684	6,341	8,703
Equality restriction, <i>F</i>	0.173	1.798	3.453	1.861	0.411	0.999	0.004	0.039
Adjusted <i>R</i> ²	0.357	0.248	0.563	0.120	0.093	0.100	0.100	0.075

*, **, and *** indicate significance at the 10%, 5%, and 1% level, two-tailed.

^aSingle-person businesses operating as sole proprietorships.

small- and medium-sized (<2 million BEF) lines of credit are not affected by spatial price discrimination.

Finally, we break up the sample by *loan purpose* and obtain 3,490 capital expenditure and 11,554 noncapital expenditure loans (mortgage, term, and securitizable term loans are classified as capital expenditure loans). All capital expenditure loans are revolving loans, and most are collateralized. Capital expenditure loans are on average more than seven times larger than the other loans. Not surprisingly, the coefficients (listed in the next two columns in Table VII) are very similar to the lines of credit coefficients just reported. Spatial price discrimination seemingly affects only the “noncapital expenditure loans” category. However, unreported exercises show that the transactional loans (*main bank* = 0 and *duration of relationship* = 0) among the 1,773 small- and medium-sized (<2 million BEF) capital expenditure loans are subject to statistically significant and economically relevant spatial price discrimination: The coefficients on the distance variables equal $\pm 9.3^*$. This is not the case for the transactional uncollateralized capital expenditure loans. If anything, the coefficients on the distance variables for the 187 uncollateralized capital expenditure loans are actually the opposite of the full sample results.

G. Firm Characteristics and Distance

We remain concerned that firm characteristics may drive both loan rate and distance, and thus spuriously affect our results. The bank may ration credit to more distant borrowers unless they are assessed to be of impeccable quality. Problematic for the econometrician is that the bank may determine the quality of the firm by combining both observable and (for us) unobservable firm characteristics. The lower loan rate for the more distant borrowers in the specifications we report so far would then simply be the result of an omitted variable problem.

We address this critical issue first by altering the degree of firm heterogeneity in the sample, and second by investigating an augmented sample for which we obtain more firm characteristics. We start by restricting the sample to single-person businesses that are also sole proprietorships. We are left with 12,360 observations, and report the results in Table VII. The coefficients on all measures of interest (except *main bank*) remain largely unaltered.

Next, we drop 1,744 contracts located in 149 postal zones bordering other countries. Firms located in one of these postal zones may differ from interior firms in terms of specialization, customer base, and labor force. These firms also face additional constraints in finding another Belgian bank, or alternatively have the opportunity to employ a foreign bank located in an area adjacent to their postal zone (given the size of the firms in our sample and the exchange rate exposure involved, however, we consider the latter scenario to be rather unlikely). Dropping these contracts does not affect our results, and we choose not to report the almost identical coefficients.

Finally, the last two columns in Table VII split the sample by relative distance (i.e., by whether the lender or the quartile competitor is closest to the borrower).

We thus check for possible structural differences in the determination of the loan rate across the two groups of borrowers. All coefficients, except the coefficient on loan size, are remarkably similar across the two groups. Hence, at first sight the firms in both groups do not differ dramatically in (for us) unobservable characteristics.

To further investigate the issue of missing firm characteristics, we match loan contracts to BelFirst, a data set containing yearly balance and profit/loss statements of more than 250,000 Belgian corporations. Conservatively matching by tax identification numbers, we track 1,008 firms. Quite a few sole proprietorships are not listed in BelFirst. Nevertheless, the means of most loan and firm characteristics of the augmented sample (see Degryse and Ongena (2003)) are surprisingly similar to the means for the entire data set. Most importantly, the means of both distance measures and the loan rate are not significantly different between the full and the newly constructed augmented samples. The differences in the other variables constitute an additional robustness check on the empirical work we have reported so far.

We study accounting data from the year preceding the origination date of the loan contract. To evaluate firm risk and funding needs, we compare means of firm assets and the ratios of earnings, short-term debt, net trade credit, and intangible assets over assets between the two relative distance groups. More distant firms are somewhat larger, more intangible, and obtain larger- or longer-term loans than closer firms. Otherwise, more distant and closer firms are seemingly similar in profitability and debt structure. Loan size/assets does not significantly differ across groups. If anything, more distant firms seem less credit-constrained once they obtain a loan. We also track 936 firms through time, and use the earnings in 2 years/assets in 2 years (after the loan origination year) and assets in 2 years/assets as admittedly ad hoc measures of expected future profitability and growth. Distant firms outperform close firms on average, both in earnings and asset growth, but the differences are not significant and the measures are fraught with survivorship biases (we cannot establish for sure why BelFirst ceased reporting the records of some firms).

Next, we introduce age of the firm, which we collected separately, and the newly constructed accounting measures in a set of basic specifications. Despite the endogeneity issue, we also add earnings in 2 years/assets in 2 years and assets in 2 years/assets (details are in Degryse and Ongena (2003)). We find that smaller and more indebted firms and firms taking out smaller loans (either absolute or relative to its assets size) end up paying higher loan rates. The distance coefficients increase in absolute value to more than 20. But these coefficients are estimated less precisely and remain significant only at the 5% level in all but one model (the standard deviations on the coefficients increase to more than 10). Again, we cannot reject the equality restriction on our distance measures at the 1% level of significance.

To conclude, more distant firms are somewhat larger and take out loans that are significantly larger in absolute size, though not in relative size. Otherwise, distant and close firms do not differ significantly. Controlling for the additional

firm characteristics does not affect the distance—loan rate correspondence. We contend that these empirical results are fully in line with price discrimination on the basis of transportation costs. Remember that our estimates of the distance coefficients by loan size imply almost the same imputed traveling cost per minute. These estimates and the results in this section indicate that borrowers because of the fixed-cost nature of traveling, consider driving to more distant lenders when seeking larger loans. On average, somewhat larger firms seek and obtain these larger amounts of funding.

H. Further Robustness Checks

Before concluding, we subject the main results reported in Table V to a battery of additional robustness checks. First, we revisit our a priori choices regarding our distance measures. We rerun all models employing traveling times in levels (rather than logs), we replace the $\ln(1 + \text{Distance to Closest Competitors})$ (i.e., the 25 percentile measure) by the (possibly more noisy) $\ln(1 + \text{Distance to the actual Closest Competitor})$, and we employ fastest driving distance in kilometers (rather than traveling time) in all specifications. Results are mostly unaffected.

We remain concerned that technological developments and/or the location of competitors determine the choice of lender, partly driving our results rather than spatial price discrimination. We add the starting year of the relationship (assuming technology progresses linearly through time) and the (national) number of branches to all models. The results for the distance coefficients of interest in all discussed models remain virtually unaltered. We also split the sample by contracting year on January 1, 1996,¹² and run parsimonious models including distance measures, relationship variables, and the concentration index using alternatively the 393 contracts signed in 1995 and the remaining 14,651 later contracts. Though estimated imprecisely in the first subsample, the coefficients on our distance measures actually increase in absolute value from $\pm 18.3^*$ in 1995 to $\pm 26.1^{***}$ in 1996–1997. Combining these results with our earlier discussion leads us to conclude that technological developments may not be a major issue when interpreting our results.

Finally, we return to the 612 contracts located in postal zones without any identified bank branches. We add these contracts to the sample, bringing the number of observations to 15,656. We calculate the distance to the lender for each of these additional contracts, but we set their distance to the closest competitors equal to zero. We add a dummy (which equals 1 for each of the 612 contracts, and zero otherwise) to account for the undetermined effect of distance, and rerun all models. The coefficient on the dummy in the postal zone

¹² We find justification for this date in the observation that the Belgian monopoly telecom Belgacom (partly privatized only 17 days earlier) drastically reorganized itself to better focus on its customers. While the costs of telephone calls did not drop substantially at once, this remarkable corporate refocusing may have raised expectations of lower communications costs in the near future.

effects model, for example, equals 39.5*** (with a standard deviation of 13.9). Hence, borrowers located in a postal zone without any competing bank pay on average 40 basis points more than borrowers located in contested postal zones. This coefficient is quite reasonable when interpreted within the confines of a linear transportation model. The average postal zone covers a square of 5 km \times 5 km. For example, driving 5 km to get to the closest competitor (now located outside the postal zone) at 31 km/h (the average speed) would result in 10-minute traveling time. According to the estimates gleaned from the original effects model, a 10-minute distance increases the loan rate by 44 basis points.

IV. Conclusion

We study the effect on loan conditions of the geographical distance between firms and both the lending bank and all other banks in the vicinity of the firm. As far as we are aware, we report the first comprehensive evidence for spatial price discrimination in bank lending. Loan rates decrease with the distance between the firm and the lender and increase similarly with the distance between the firm and competing banks. Both effects are statistically significant and economically relevant. The results are robust to various changes in model specifications and variable definitions, and do not seem to be induced by the modest changes in lending technology we infer. The observed stability of the Belgian bank branch system during our sample period allows us to interpret the coefficients of the simple reduced-form specifications within the framework of static models explaining spatial price discrimination.

According to the theoretical predictions, loan rates may reflect both transportation costs and informational effects. We find that loan rates decrease more with lender–firm distance for transactional (single-product), short-term, uncollateralized, term (not line of credit), and noncapital expenditure loans. Spatial price discrimination relaxes as borrowers engage the lending bank more broadly, for a longer time period, postcollateral, obtain a line of credit, or use the loan for capital expenditure purposes.

Transportation costs provide a simple yet coherent explanation for the loan rate schedules we observe. Informational issues faced by the lender, on the other hand, do not play a prominent role in the pricing of loans according to the borrower's location. While we find no direct evidence that adverse selection increases with geographical distance, it is possible either that most borrowers we classify as transactional are unknown to all banks in the vicinity or that distances involved are just too small for informational asymmetries to become meaningful.

Loan officers seemingly price loans by location, although distance variables are not featured explicitly in the credit-scoring system described to us in interviews. However, the revealed autonomy granted to local loan officers in assessing and pricing local loan applications may be optimal (Stein (2002)). The acknowledged importance of qualitative soft factors in the decision process

provides the loan officers with the necessary discretion. Such discretion is not unusual. Brunner, Krahnen, and Weber (2000), for example, provide preliminary empirical evidence (for Germany) of the importance of qualitative factors in setting loan rates through internal bank ratings. The loan officers employed at the bank we study may wield *soft* factors to practice a *hard*-edged discriminatory pricing policy based on location and the presence of alternative providers of financing in the vicinity of the firm.

While adverse selection does not increase with geographical distance, we confirm the previous evidence based on the current data set that loan rates increase with the duration of the bank–firm relationship. Hence, both branch location and information acquisition during a relationship may yield bank rents. Spatial price discrimination applied to borrowers located near the lending bank branch results in average location rents of around 4% of the bank's marginal cost of funding. Loan rate increases during the average bank–firm relationship point to annual information rents of somewhat less than 2% of the marginal cost.

To conclude, brick-and-mortar branching may remain vital in ensuring access to credit at reasonable rates, particularly for small firms and entrepreneurs. Belgium was clearly overbranched in the late 1990s. Hence, the opportunities for spatial price discrimination were rather limited. Nevertheless, distance still seemed to have played a visible role in the setting of loan rates. While technological developments in communication and travel may ultimately diminish the relevance of distance, we find only minor traces of such developments in our sample (which covers the 1975–1997 period). Consequently, presaging “the death of distance” remains somewhat premature in a European banking context.

REFERENCES

- Aharony, Joseph, and Itzhak Swary, 1996, Additional evidence on the information-based contagion effects of bank failures, *Journal of Banking and Finance* 20, 57–69.
- Ayres, Ian, and Peter Siegelman, 1995, Race and gender discrimination in negotiation for the purchase of a new car, *American Economic Review* 84, 304–321.
- Barclay, Michael J., and Clifford W. Smith, 1995, The maturity structure of corporate debt, *Journal of Finance* 50, 609–631.
- Barros, Pedro P., 1999, Multimarket competition in banking, with an example from the Portuguese market, *International Journal of Industrial Organization* 17, 335–352.
- Berger, Allen N., 2003, The economic effects of technological progress: Evidence from the banking industry, *Journal of Money, Credit, and Banking* 35, 141–176.
- Berger, Allen N., Qinglei Dai, Steven Ongena, and David C. Smith, 2003, To what extent will the banking industry be globalized? A study of bank nationality and reach in 20 European nations, *Journal of Banking and Finance* 27, 383–415.
- Berger, Allen N., and Robert DeYoung, 2001, The effects of geographic expansion on bank efficiency, *Journal of Financial Services Research* 19, 163–184.
- Berger, Allen N., and Robert DeYoung, 2002, Technological progress and the geographic expansion of the banking industry, mimeo, Board of Governors of the Federal Reserve System.
- Berger, Allen N., Robert DeYoung, Hesna Genay, and Gregory F. Udell, 2000, Globalization of financial institutions: Evidence from cross-border banking performance, *Brookings—Wharton Papers on Financial Services* 3, 23–120.

- Berger, Allen N., and Gregory F. Udell, 1990, Collateral, loan quality and bank risk, *Journal of Monetary Economics* 25, 21–42.
- Berger, Allen N., and Gregory F. Udell, 1992, Some evidence on the empirical significance of credit rationing, *Journal of Political Economy* 100, 1047–1077.
- Berger, Allen N., and Gregory F. Udell, 1995, Relationship lending and lines of credit in small firm finance, *Journal of Business* 68, 351–381.
- Berlin, Mitchell, and Loretta J. Mester, 1998, On the profitability and cost of relationship lending, *Journal of Banking and Finance* 22, 873–897.
- Besanko, David, and Anjan V. Thakor, 1987, Collateral and rationing: Sorting equilibria in monopolistic and competitive credit markets, *International Economic Review* 28, 671–689.
- Bester, Helmut, and Emmanuel Petrakis, 1995, Price competition and advertising in oligopoly, *European Economic Review* 39, 1075–1088.
- Broecker, Thorsten, 1990, Credit-worthiness tests and interbank competition, *Econometrica* 58, 429–452.
- Brunner, Antje, Jan P. Krahn, and Martin Weber, 2000, Information production in credit relationships: On the role of internal ratings in commercial banking, mimeo, Center for Financial Studies, Frankfurt.
- Buch, Claudia M., 2004, Distance and international banking, *Review of International Economics* (forthcoming).
- Calem, Paul S., and Leonard I. Nakamura, 1998, Branch banking and the geography of bank pricing, *Review of Economics and Statistics* 80, 600–610.
- Cavalluzzo, Ken S., Linda C. Cavalluzzo, and John D. Wolken, 2002, Competition, small business financing, and discrimination: Evidence from a new survey, *Journal of Business* 75, 641–680.
- Cole, Rebel A., and John D. Wolken, 1995, Financial services used by small businesses: Evidence from the 1993 national survey of small business finances, *Federal Reserve Bulletin* 81, 629–639.
- Corvoisier, Sandrine, and Reint Gropp, 2001, Contestability, technology, and banking, mimeo, European Central Bank, Frankfurt.
- Coval, Joshua D., and Tobias J. Moskowitz, 2001, The geography of investment: Informed trading and asset prices, *Journal of Political Economy* 109, 811–841.
- Crabbe, Lee, 1991, Event risk: An analysis of losses to bondholders and “Super Poison Put” bond covenants, *Journal of Finance* 46, 689–706.
- de Bodt, Erik, Frédéric Lobe, and Jean C. Statnik, 2001, Credit rationing, customer relationship, and the number of banks: An empirical analysis, mimeo, University of Lille.
- Degryse, Hans, and Steven Ongena, 2003, Distance, lending relationships, and competition, Discussion paper CES 02-16 (r) and CentER 03-123, Center for Economic Studies, KU Leuven and Center for Economic Research, Tilburg University.
- Degryse, Hans, and Patrick Van Cayseele, 2000, Relationship lending within a bank-based system: Evidence from European small business data, *Journal of Financial Intermediation* 9, 90–109.
- Dell’Ariccia, Giovanni, 2001, Asymmetric information and the market structure of the banking industry, *European Economic Review* 45, 1957–1980.
- Elliehausen, Gregory E., and John D. Wolken, 1990, Banking markets and the use of financial services by small and medium-sized businesses, Staff Studies 160, Board of Governors of the Federal Reserve System.
- Elsas, Ralf, and Jan P. Krahn, 1998, Is relationship lending special? Evidence from credit-file data in Germany, *Journal of Banking and Finance* 22, 1283–1316.
- Fischer, Klaus, 1990, Hausbankbeziehungen als Instrument der Bindung zwischen Banken und Unternehmen—Eine Theoretische und Empirische Analyse, Dissertation, Universität Bonn.
- Fried, Joel, and Peter Howitt, 1980, Credit rationing and implicit contract theory, *Journal of Money, Credit and Banking* 12, 471–487.
- Fuentelsaz, Lucio, and Jamie Gomez, 2001, Strategic and queue effects on entry in Spanish banking, *Journal of Economics and Management Strategy* 10, 529–563.
- Gary-Bobo, Robert J., and Sophie Larribeau, 2003, A structural econometric model of price discrimination in the mortgage lending industry, *International Journal of Industrial Organization* 22, 101–134.

- Goldberg, Pinelopi K., 1996, Dealer price discrimination in new car purchases: Evidence from the consumer expenditure survey, *Journal of Political Economy* 104, 622–654.
- Grinblatt, Mark, and Matti Keloharju, 2001, How distance, language, and culture influence stock-holdings and trades, *Journal of Finance* 56, 1053–1073.
- Grosse, Robert, and Lawrence G. Goldberg, 1991, Foreign bank activity in the United States: An analysis by country of origin, *Journal of Banking and Finance* 15, 1093–1112.
- Grossman, Gene, and Carl Shapiro, 1984, Informative advertising with differentiated products, *Review of Economic Studies* 51, 63–82.
- Harhoff, Dietmar, and Tim Körting, 1998, Lending relationships in Germany: Empirical evidence from survey data, *Journal of Banking and Finance* 22, 1317–1353.
- Hau, Harald, 2001, Location matters: An examination of trading profits, *Journal of Finance* 56, 1959–1984.
- Hausman, Jerry, 1978, Specification tests in econometrics, *Econometrica* 46, 1251–1271.
- Hauswald, Robert, and Robert Marquez, 2003, Competition and strategic information acquisition in credit markets, mimeo, University of Maryland.
- Hotelling, Harold, 1929, Stability in competition, *Economic Journal* 39, 41–45.
- Huberman, Gur, 2001, Familiarity breeds investment, *Review of Financial Studies* 14, 659–680.
- Kim, Moshe, Doron Kliger, and Bent Vale, 2003, Estimating switching costs: The case of banking, *Journal of Financial Intermediation* 12, 25–56.
- Klemperer, Paul, 1995, Competition when consumers have switching costs: An overview with applications to industrial organization, macroeconomics, and international trade, *Review of Economic Studies* 62, 515–539.
- Lederer, Phillip J., and Arthur P. Hurter, 1986, Competition of firms: Discriminatory pricing and location, *Econometrica* 54, 623–640.
- Lerner, Josh, 1995, Venture capitalists and the oversight of private firms, *Journal of Finance* 50, 301–318.
- Machauer, Achim, and Martin Weber, 1998, Bank behavior based on internal credit ratings of borrowers, *Journal of Banking and Finance* 22, 1355–1383.
- Morton, Fiona S., Florian Zettlemeyer, and Jorge Silva-Risso, 2003, The effect of the internet on the pricing of new cars to women and minorities, *Journal of Quantitative Marketing and Economics* 1, 77–92.
- Ongena, Steven, and David C. Smith, 2000, What determines the number of bank relationships? Cross-country evidence, *Journal of Financial Intermediation* 9, 26–56.
- Ongena, Steven, and David C. Smith, 2001, The duration of bank relationships, *Journal of Financial Economics* 61, 449–475.
- Petersen, Mitchell A., and Raghuram G. Rajan, 1994, The benefits of lending relationships: Evidence from small business data, *Journal of Finance* 49, 3–37.
- Petersen, Mitchell A., and Raghuram G. Rajan, 1995, The effect of credit market competition on lending relationships, *Quarterly Journal of Economics* 110, 406–443.
- Petersen, Mitchell A., and Raghuram G. Rajan, 2002, Does distance still matter? The information revolution in small business lending, *Journal of Finance* 57, 2533–2570.
- Phlips, Louis, 1983, *The Economics of Price Discrimination* (Cambridge University Press, London).
- Pinkse, Joris, Margaret E. Slade, and Craig Brett, 2002, Spatial price competition: A semiparametric approach, *Econometrica* 70, 1111–1153.
- Portes, Richard, and Helen Rey, 2001, The determinants of cross border equity flows: The geography of information, NBER Working paper 7336.
- Rajan, Raghuram G., 1992, Insiders and outsiders: The choice between informed and arm's-length debt, *Journal of Finance* 47, 1367–1400.
- Salop, Steven, 1979, Monopolistic competition with outside goods, *Bell Journal of Economics* 10, 141–156.
- Saunders, Anthony, and Marcia M. Cornett, 2002, *Financial Institutions Management: A Risk Management Approach* (McGraw-Hill Irwin, New York).
- Sharpe, Steven A., 1990, Asymmetric information, bank lending and implicit contracts: A stylized model of customer relationships, *Journal of Finance* 45, 1069–1087.

- Stein, Jeremy, 2002, Information production and capital allocation: Decentralized versus hierarchical firms, *Journal of Finance* 57, 1891–1922.
- Stole, Lars A., 2001, Price discrimination in competitive environments, mimeo, University of Chicago.
- Sussman, Oren, and Joseph Zeira, 1995, Banking and development, CEPR Discussion paper 1127.
- Thisse, Jacques F., and Xavier Vives, 1988, On the strategic choice of spatial price policy, *American Economic Review* 78, 122–137.
- Tirole, Jean, 1988, *The Theory of Industrial Organization* (MIT Press, Boston).
- von Thadden, Ernst L., 2004, Asymmetric information, bank lending, and implicit contracts: The winner's curse, *Finance Research Letters* 1, 11–23.

Foreign Banks in Poor Countries: Theory and Evidence

ENRICA DETRAGIACHE, THIERRY TRESSEL, and POONAM GUPTA*

ABSTRACT

We study how foreign bank penetration affects financial sector development in poor countries. A theoretical model shows that when domestic banks are better than foreign banks at monitoring soft information customers, foreign bank entry may hurt these customers and worsen welfare. The model also predicts that credit to the private sector should be lower in countries with more foreign bank penetration, and that foreign banks should have a less risky loan portfolio. In the empirical section, we test these predictions for a sample of lower income countries and find support for the theoretical model.

IN RECENT YEARS MANY POOR COUNTRIES HAVE BEEN A LABORATORY of financial sector reform. A rigorous evaluation of these efforts is still work in progress, but available accounts suggest that key deficiencies have been difficult to resolve.¹ This paper studies how one aspect of financial sector reform, the entry of foreign banks, affects financial sector development in poor countries.

Proponents of foreign banks claim that these banks can achieve better economies of scale and risk diversification than domestic banks, and that they introduce more advanced technology (especially risk management), import better supervision and regulation, and increase competition. Because they are backed by their parent banks, foreign affiliates of international banks may also be perceived as safer than private domestic banks, especially in times of economic difficulty. Last but not least, foreign banks may be less susceptible to political pressure and less inclined to lend to connected parties.

Despite these advantages, critics point out that an important part of a bank's business, namely, lending to informationally opaque firms, is inherently local in nature, and is not easily carried out by large organizations managed from

*Detragiache and Tressel are at the IMF. Gupta is at the Delhi School of Economics. The authors would like to thank an anonymous referee, Thorsten Beck, Stijn Claessens, Simon Johnson, Sole Martinez Peria, Raghu Rajan, Arvind Subramanian, and participants at the joint World Bank/IMF Seminar, the Paris School of Economics lunch seminar, the 2006 Annual Research Conference of the IMF, and the 2006 Financial Intermediation Research Society Conference for very helpful comments. We are also greatly indebted to Ugo Panizza and Monica Yañez for sharing their data on bank ownership. The views expressed in this paper are those of the authors and do not necessarily represent those of the IMF or IMF policy.

¹ Comprehensive descriptions of financial sector structure, performance, and soundness for several poor countries are provided in the Financial Sector Stability Assessments (FSSAs), jointly carried out by the World Bank and the IMF. Most of these reports are available at www.imf.org.

afar. Indeed, evidence from bank consolidation in advanced countries suggests that large banks are less likely than small banks to lend to informationally difficult firms, such as small firms, because there is a greater distance between loan officers and management (Berger et al. (2005)). Using Italian data, Guiso, Sapienza, and Zingales (2004) find that local financial development matters to firms' creation and growth even when there are no barriers to cross-regional financial flows, as entrepreneurs find it difficult to obtain financing from institutions located at a geographical distance.

In the case of foreign banks operating in poor countries, the distance (both geographic and cultural) between headquarters and local subsidiaries is likely to be especially large. In addition, many, if not most, potential borrowers lack usable collateral and reliable accounting information, and are therefore informationally difficult. Thus, the problems highlighted by studies of bank consolidation in advanced countries may be compounded when foreign banks operate in poor countries. Consistent with this view, several studies find that foreign banks in poor countries lend predominantly to multinational corporations, large domestic firms, or the government.² Even when foreign banks enter by purchasing local banks, local market knowledge and relationships with customers may be lost as distant managers need to impose formal accountability to monitor local loan officers. This is borne out by evidence from advanced countries indicating that when a bank is acquired by another bank, the bank-firm relationships of the target bank are disrupted (Sapienza (2002), Carow, Kane, and Narayanan (2003), Karceski, Ongena, and Smith (2005), Degryse, Masschelein, and Mitchell (2005)).

From a public policy perspective, however, it is not clear that foreign banks' focus on high-end customers should be a concern. As long as domestic banks continue to lend to more opaque but profitable customers, there should be no welfare loss and foreign bank entry may simply result in a welfare-improving segmentation of the market. On the other hand, if foreign bank entry forces domestic banks out of the market, then more opaque firms may become credit constrained, aggregate credit may decline, and profitable investment opportunities may be lost. In this paper, we explore these questions both theoretically and empirically.

In our theoretical model, foreign banks are better than domestic banks at monitoring "hard" information, such as accounting information or collateral values, but not "soft" information, such as the borrower's entrepreneurial ability or trustworthiness. In this setup, under some parameter configurations foreign bank entry increases cost efficiency and welfare, while in others it leads to a reduction in overall lending, efficiency, and welfare. The intuition for the latter, and more surprising, result is that foreign bank entry causes "cream-skimming," whereby hard information borrowers are no longer pooled with other borrowers. This has two consequences. First, soft information borrowers

² See Bonin and Wachtel (2003) on Eastern Europe, Brownbridge and Harvey (1998) on Anglophone Africa, Mian (2006) for Pakistan, Haber and Musacchio (2005) for Mexico, Clarke et al. (2005) for Latin America, and Gormley (2005) for India.

find themselves in a worse pool (because the “cream” has been “skimmed”), and have to pay such high interest rates that they may no longer want to borrow. Second, monitoring costs are paid in equilibrium, which increases operating costs. Welfare may increase or decrease depending on the parameters, but, in this model, soft information borrowers are never better off and sometimes they are worse off.

The model has two empirical implications. First, across countries a larger foreign bank presence is associated with less credit to the private sector. Second, within any given country domestic banks have a riskier loan portfolio than foreign banks. In the second part of the paper we test these predictions for a sample of lower income countries and find support for the theoretical model. In particular, we find that countries with a larger foreign bank presence have shallower credit markets in poor countries. This effect is large, and is robust to the choice of specification. In addition, credit growth is slower in countries with a larger initial foreign bank presence. The relationship continues to hold when we instrument the foreign share to correct for potential endogeneity bias. We also find that in poor countries loan loss provisions and loan loss reserves are higher in domestic banks than in foreign banks after controlling for bank characteristics and country-time fixed effects.

The paper is organized as follows. Section I reviews the empirical literature on foreign banks in poor countries. Section II presents the theoretical model and derives testable implications. Section III discusses the empirical methodology and data. Section IV presents the results of the main empirical tests and Section V presents additional empirical results. Section VI concludes.

I. Empirical Evidence on Foreign Banks in Poor Countries

Based on cross-country studies, foreign-owned banks have been found to have lower operating costs and higher profitability than private domestic banks, while state-owned banks have higher costs and lower profitability than the other two categories (Mian (forthcoming), Micco, Panizza, and Yañez (2004)). Foreign bank entry in developing countries also appears to lower interest margins and profitability, suggesting an increase in competition (Claessens, Demirgüç-Kunt, and Huizinga (2001), Gelos and Roldós (2004), Micco et al. (2004), Martinez-Peria and Mody (2004)). A recent study of eight Latin American countries, however, finds the opposite to be true (Levy-Yeyati and Micco (2003)).

Turning to the effects of foreign bank entry on access to credit, surveys of entrepreneurs indicate that firms are less credit-constrained in countries with more foreign bank participation (Clarke et al. (2001)). A study of four Latin American countries concludes that foreign banks lend less to small and medium enterprises than domestic banks on average, although this is not true for foreign banks that have a large presence in the country (Clarke et al. (2005)). In Eastern Europe, Giannetti and Ongena (2005) find that foreign bank presence benefits all firms, though the effects are more pronounced for large firms and firms less likely to be involved in connected lending.

Turning to individual country studies, Haber and Musacchio (2005) analyze Mexico's experience. In Mexico, foreign bank entry was liberalized after the financial crisis of 1994 to 1995. With foreign bank entry, bank capitalization improved and both nonperforming loans (NPLs) and operational expenses declined, but lending, particularly to the private sector, also declined. The fall in private lending was more pronounced in foreign than in domestic banks. Haber and Musacchio's view is that deep reforms to improve the enforcement of property rights are necessary to enable financial intermediation, and especially lending by foreign banks, to reach risky borrowers in Mexico.

Drawing on an exceptionally rich data set of 80,000 business loans in Pakistan, Mian (2006) finds that private domestic banks lend more to informationally opaque businesses than foreign banks, and are more successful at recovering defaulted debt. The interpretation of these results is that distance constraints (both cultural and geographic) between top management and loan officers force foreign banks to curtail discretion in lending decisions, resulting in less lending to informationally opaque smaller businesses, as in the theoretical model of Stein (2002). Distance also appears to impair the recovery of defaulted loans.

In a third country study on India, Gormley (2005) compares borrowing behavior of firms located in districts with and without foreign bank entry. He concludes that the 10% most profitable firms benefited from foreign bank entry through an increase in loan size, while other firms experienced a 7.6% reduction in their likelihood of having a loan. This result is driven by a decrease in domestic bank loans to group-affiliated firms. The result holds after instrumentation of foreign bank location.³

II. Cream-Skimming Effects of Foreign Bank Entry: Theory

In this section, we develop a simple theoretical model to explore how entry by banks that are more skilled at lending to high quality, less opaque customers may affect credit market equilibrium and welfare. The model is a simple variant of the standard credit market model with adverse selection.

A. The Model with Only Domestic Banks

There are two categories of agents, banks and entrepreneurs, and two time periods. Banks are perfectly competitive. They have access to a perfectly elastic supply of funds and their cost of funds is normalized to one. Entrepreneurs are risk neutral and are one of three types $\theta \in \{H, S, B\}$ randomly assigned in the first period. The proportion of each type of entrepreneur is given by $\mu \in \{\mu_H, \mu_S, \mu_B\}$, where $\mu_H + \mu_S + \mu_B = 1$. Each entrepreneur knows his type, but other market participants do not; he has no private resources and must

³ Gormley also presents a theoretical model in which foreign banks have higher monitoring costs but lower funding costs than domestic banks. In this model foreign bank entry can result in less credit being made available to creditworthy but lower quality borrowers.

obtain financing from a bank.⁴ Banks can raise unlimited funds. Entrepreneurs of type H and S have access to an identical, safe, socially efficient project requiring an initial investment of size $I = 1$ and returning $R > 1$ in period two with probability one. Individuals of type B (the bad borrowers) have access to a risky project that requires an initial investment of one unit and returns R with probability p in period two. The project is assumed to have negative net present value, that is, $pR < 1$, but limited liability makes it an attractive gamble, so if B types receive financing they invest.

Two monitoring technologies allow banks to identify the type of an agent ex ante. Through the first technology, which costs c_H per project, banks monitor hard information, such as balance sheets prepared according to transparent accounting standards or assets that can be used as collateral. Based on this information, banks can perfectly identify agents of type H , but cannot distinguish type S entrepreneurs from type B entrepreneurs. To identify type S entrepreneurs, banks must monitor soft information, such as the person's entrepreneurial skills and honesty. The soft information technology costs c_S per project. We assume that monitoring soft information is more costly than monitoring hard information ($c_S > c_H$).

At the beginning of the first period, banks offer potential customers a menu of contracts consisting of one or more interest rate/monitoring strategy combinations. For instance, a bank may offer an interest rate with no monitoring, another interest rate with monitoring of the applicant's hard information, and a third interest rate with monitoring of the applicant's soft information. Perspective borrowers choose one of the available contracts or decline to borrow.

In this setup, there are four possible equilibrium outcomes. Consider first the pooling outcome (equilibrium A), where banks offer a contract involving no monitoring and all firms accept it. For banks to break even under pooling, they must charge an interest factor r_P such that

$$r_P = \frac{1}{\mu_H + \mu_S + p\mu_B} = \frac{1}{p + (1-p)(\mu_H + \mu_S)}. \quad (1)$$

For all entrepreneurs to accept the pooling contract, the return from the project must be large enough to cover the pooling rate ($R > r_P$) and there must not be a more attractive interest rate on offer.⁵ Since monitoring hard information is cheaper than monitoring soft information, a sufficient condition is that the break-even interest factor r_H that a bank has to charge when monitoring hard information exceed the pooling rate, that is

$$r_H = 1 + c_H > r_P. \quad (2)$$

This condition holds if the cost of monitoring hard information is large relative to the potential loss from lending to bad borrowers.

⁴ The model could easily be enriched by adding moral hazard and collateral constraints. The main conclusions would hold or even be reinforced.

⁵ We are assuming that banks can commit to monitor even when they know that only a certain type of borrower will approach them in equilibrium, and hence monitoring is not necessary ex post.

Suppose this condition fails to hold so pooling is not an equilibrium outcome. Then banks can attract type H agents by offering to monitor hard information and charging the interest factor r_H . If H types sort themselves out, banks can either monitor soft information and lend to agents of type S (equilibrium B) or they can choose not to monitor and pool S and B types together (equilibrium C). A third possible outcome occurs if the return on the project R is not sufficient to cover the cost of monitoring soft information or the cost of adverse selection (i.e., the cost to S types of pooling with B types). In this case, only H types receive credit (equilibrium D).

Monitoring soft information strictly dominates pooling S types and B types together if and only if $r_S = 1 + c_S < \hat{r}_P$, where \hat{r}_P is the break-even interest factor when the S and B types are pooled together, that is,

$$\hat{r}_P = \frac{1}{\frac{\mu_S}{\mu_S + \mu_H} + p \frac{\mu_B}{\mu_S + \mu_H}} = \frac{1}{p + (1-p) \frac{\mu_S}{(1-\mu_H)}}. \quad (3)$$

Note that r_P , the pooling interest factor, is always lower than \hat{r}_P because when H types are monitored and drop out of the pool, banks face a less attractive pool of borrowers.⁶ With these results in hand, it is straightforward to derive the following proposition:

PROPOSITION:

1. (Pooling equilibrium): If $R > r_P$ and $r_H > r_P$, then the equilibrium is pooling. All projects are funded and no monitoring costs are paid.
2. (Separating equilibrium): If $r_H < r_P$, $r_S < \hat{r}_P$, and $r_S < R$, then the equilibrium is separating. Banks monitor both hard information and soft information and lend to H types and S types. B types do not receive any credit.
3. (Semi-pooling equilibrium): If $r_H < r_P$, $r_S < \hat{r}_P$, and $r_S < R$, then the equilibrium is semi-pooling. Banks monitor hard information only. H types borrow at interest factor r_H ; S and B types are pooled together and borrow at interest factor \hat{r}_P .
4. (Credit-constrained equilibrium): If $r_H < r_P$, $R > r_H$, and $R < \min[r_S, \hat{r}_P]$, then in equilibrium banks monitor hard information and lend to H types, while S and B types do not receive any credit.

B. The Model with Domestic and Foreign Banks

Consider now a model in which both domestic and foreign banks compete. Foreign banks are assumed to have a lower cost of monitoring hard information but a higher cost of monitoring soft information than domestic banks. Let $c_H - \Delta$ and $c_S + \Delta'$ denote monitoring costs for foreign banks, with $\Delta > 0$ and

⁶ To show that $\hat{r}_P > r_P$, it is sufficient to show that $\mu_H + \mu_S > \frac{\mu_S}{1-\mu_H}$, which is always the case since $1 - \mu_S - \mu_H < 1$.

$\Delta' > 0$.⁷ This assumption is consistent with the findings in Mian (2006) that foreign banks lend disproportionately to hard information borrowers relative to domestic banks. Anecdotal evidence from Mexico also suggests that foreign banks can better screen hard information than domestic banks.⁸ Similar results could be obtained by assuming that foreign banks have the same costs of monitoring hard information as domestic banks but have a lower cost of funding. As long as the cost-of-fund differential between domestic and foreign banks is smaller than the differential in the cost of monitoring soft information, then the same equilibrium outcomes would obtain.

In the version of the model with foreign and domestic banks, it is straightforward to see that the results of the proposition continue to hold, except that in the definition of r_H , the interest factor banks offer when monitoring hard information, c_H should be replaced by $c_H - \Delta$, the lowest cost of monitoring hard information available on the market. Accordingly, other things being equal, the pooling equilibrium becomes less likely when foreign banks are present, as hard information firms are more likely to sort themselves out. If the equilibrium with domestic banks only is not a pooling equilibrium, the parameter regions in which the other three outcomes arise do not change because they do not depend on c_H .

Let us consider the allocation of lending between domestic and foreign banks in the various equilibrium outcomes. If the equilibrium is pooling, no monitoring takes place and the better monitoring skills of foreign banks are immaterial. Accordingly, firms borrow only from domestic banks. In the other equilibrium outcomes, on the other hand, foreign banks lend to hard information firms, since they can offer such firms more attractive terms than domestic banks. Domestic banks lend to soft information firms only (in the separating and credit constrained outcomes) or to both soft information and bad firms (in the semi-pooling outcome).

C. Simulation of the Model

To gain a better understanding of the effects of foreign bank entry in the cream-skimming model, we simulate the model for alternative parameterizations (Table I). Since foreign entry has interesting effects mainly when the initial equilibrium is pooling, all parameterizations are such that this is the case.

In the baseline simulation, the return on the safe project is 10%. The proportion of bad borrowers in the market is also 10%. These borrowers' projects succeed with a probability of 50%. Because of the adverse selection created

⁷ To keep things simple, we assume that, when indifferent, borrowers choose to borrow from domestic banks. This assumption can be rationalized by the presence of small entry costs for foreign banks.

⁸ In 2004, investments in technology allowed Scotiabank Inverlat to approve car loans electronically in 2 hours, down from 4 days in 2000. Processing time for mortgage loans was reduced from 7 working days to 4 hours (*The Globe and Mail*, October 16, 2004, p. B4, quoted in Schulz (2006)). The assumption that foreign banks have higher cost of monitoring soft information than domestic banks is needed to ensure that domestic banks do some lending in equilibrium.

Table I
Simulations of the Theoretical Model

The table summarizes the results of simulations of the theoretical model. For each parameterization of the model, the equilibrium without foreign banks is pooling. Depending on the parameters, foreign bank entry may change the equilibrium to a semi-pooling, separating, or credit constrained equilibrium. The table also illustrates how total credit and output net of investment costs and monitoring costs changes in the equilibrium with foreign entry relative to the equilibrium with domestic banks only.

Baseline Assumptions		Equilibrium with Domestic Banks Only						Equilibrium with Foreign Banks					
Share of hard information projects		$\mu_h = 0.3$											
Share of soft information projects		$\mu_s = 0.6$											
Return on project		$R = 1.1$											
Probability of success of bad project		$p = 0.5$											
Cost of monitoring soft information		$c_S = 0.08$											
Cost of monitoring hard information		$c_H = 0.06$											
Cost of monitoring hard information-foreign banks		$c_H - \Delta = 0.04$											
Gross interest rate on pooled loans (baseline)		$R_P = 1.05$											
		Equilibrium with Domestic Banks Only			Equilibrium with Foreign Banks			Equilibrium with Domestic Banks Only			Equilibrium with Foreign Banks		
		Pooling	Pooling	Pooling	Pooling	Pooling	Pooling	Pooling	Pooling	Pooling	Pooling	Pooling	Pooling
A. Baseline		1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045
B. Lower cost of monitoring soft information, $c_S = 0.07$		1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045
C. Lower return on the project, $R = 0.07$		1.0165	1.0165	1.0165	1.0165	1.0165	1.0165	1.0165	1.0165	1.0165	1.0165	1.0165	1.0165
D. Smaller gains in monitoring efficiency from foreign entry, $c_H - \Delta = 0.053$		1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045
E. Fewer bad borrowers, more soft information borrowers, $\mu_s = 0.65$		1.0725	1.0725	1.0725	1.0725	1.0725	1.0725	1.0725	1.0725	1.0725	1.0725	1.0725	1.0725
F. Riskier bad project, $p = 0.45$		1.0395	1.0395	1.0395	1.0395	1.0395	1.0395	1.0395	1.0395	1.0395	1.0395	1.0395	1.0395

by the presence of bad borrowers, the expected return from funding a random project is 4.5%. Avoiding adverse selection through monitoring is expensive. Monitoring hard information is assumed to absorb 6% of the loan, and monitoring soft information requires 8% of the loan.⁹ For these parameter values, the equilibrium without foreign banks is pooling: All borrowers are funded and there is no monitoring (baseline scenario in Table I).

Foreign banks are assumed to be able to monitor hard information at a cost of 4% of the loan, which is one third lower than the cost to domestic banks. This makes monitoring attractive to hard information borrowers and the equilibrium with foreign banks is semi-pooling. All borrowers are funded, but hard information borrowers are monitored and borrow from foreign banks. Soft information borrowers have to bear the full cost of adverse selection. Because in this case monitoring costs are paid and bad borrowers continue to be funded, net output is lower than in the equilibrium without foreign banks, but total credit does not change as all projects are funded.¹⁰

In the first variant to the baseline simulation (scenario B), the cost of monitoring soft information is assumed to be lower. The equilibrium with foreign banks is separating, as soft information types prefer to pay monitoring costs rather than bear the burden of adverse selection. In this case bad borrowers are not funded, so total credit falls by 10%, but net output is still lower than in the pooling equilibrium because monitoring costs have to be paid.¹¹

A second variant assumes a lower project return than in the baseline (7%). In this case, foreign bank entry results in a credit constrained equilibrium, where only hard information borrowers are funded. This occurs because the project return is not sufficient to cover adverse selection costs when soft information borrowers have to bear all these costs themselves by cross-subsidizing bad borrowers or by paying monitoring costs. In this scenario, credit falls by 70%, and net output falls by 0.0075.

In a third variant, the cost advantage of foreign banks is assumed to be more limited and, predictably, foreign bank entry does not change the initial equilibrium. The same result occurs in a fourth variant in which adverse selection is reduced because fewer bad borrowers are assumed to be in the market. Finally, the last simulation assumes that the bad project has a lower probability of success. Since this increases adverse selection, the new equilibrium after foreign bank entry is separating rather than semi-pooling, and total credit falls by 10%. In sum, these simulations show that foreign bank entry can result in a large reduction in total credit, and unchanged or lower net output for the parameters considered.

⁹ To put these numbers in perspective, in the sample of banks from low income countries that is in the empirical work, operating expenses are about 12% of loans.

¹⁰ Assuming that foreign banks are even more efficient at monitoring hard information borrowers would not change these results. The equilibrium would still be semi-pooling and net output would still fall, albeit by a smaller amount.

¹¹ However, as shown in Figure 1 and discussed earlier, net output could also increase if the reduction in the cost of monitoring hard information is large enough relative to the output lost on bad projects. In scenario B, this would happen if the cost of monitoring hard information was even lower, by at least $0.045 - 0.036 = 0.009$. So, with a cost of monitoring hard information below 0.03, net output would increase after foreign bank entry.

Table II
Theoretical Model: Equilibrium Values of Observable Variables

The theoretical model predicts that one of four equilibria obtains depending on several observable and unobservable parameters. To identify testable implications of the model, this table provides the equilibrium values of some observable variables. Countries with more foreign bank penetration have less bank credit and, within an individual country, foreign banks have smaller loan losses than domestic banks. Implications for overhead costs are ambiguous.

	Pooling	Partially Pooling	Separating	Credit- Constrained
Total output	$R(\mu_H + \mu_S + p\mu_b)$	$R(\mu_H + \mu_S + p\mu_b)$	$R(\mu_H + \mu_S)$	$R\mu_H$
Total credit	1	1	$\mu_H + \mu_S$	μ_H
Credit/output	$\frac{1}{R(\mu_h + \mu_s + p\mu_b)}$	$\frac{1}{R(\mu_h + \mu_s + p\mu_b)}$	$\frac{1}{\bar{R}}$	$\frac{1}{\bar{R}}$
Foreign bank assets/bank assets	0	μ_H	$\frac{\mu_H}{\mu_H + \mu_S}$	1
Loan losses/interest earned in foreign banks	No lending	0	0	0
Loan losses/interest earned in domestic banks	$(1 - p)\mu_b$	$\frac{(1 - p)\mu_B}{\mu_S + \mu_B}$	0	No lending
Overheads/assets foreign	0	$c_H - \Delta$	$c_H - \Delta$	$c_H - \Delta$
Overheads/assets domestic	0	0	c_S	No lending

D. Testable Implications

Obtaining testable implications from the cream-skimming model is complicated by the fact that the equilibrium can be of four different types depending on the values of the parameters. Because many of the parameters (for instance, the proportions of the various types of borrowers in the market) are not directly observable, we cannot determine in which type of equilibrium a particular banking system is at any given time. Our strategy to identify testable implications is to look for predictions for observable variables that would hold in a sample of banking systems that are in all the various possible equilibria.

Table II summarizes the values of some observable endogenous variables in the four possible equilibria. Consider first the relationship between the ratio of bank credit to output and foreign bank penetration (lines three and four, Table II). Moving from the pooling equilibrium to the semi-pooling, separating, and the credit-constrained equilibria, foreign bank penetration gradually increases. The ratio of credit to output remains constant in the semi-pooling equilibrium, but then declines in the separating and credit-constrained equilibria. Hence, in a sample that contains countries in all types of equilibria, we would expect to find a negative correlation between foreign bank penetration and the ratio of credit to GDP.

Next, consider differences in cost efficiency between foreign and domestic banks. In the semi-pooling equilibrium domestic banks do not pay monitoring costs while foreign banks do, so domestic banks have lower overhead costs. On the other hand, in the separating equilibrium both types of banks pay

monitoring costs, but the cost of monitoring hard information (paid by foreign banks) is lower than the cost of monitoring soft information (paid by domestic banks). So the model does not provide clearcut implications for differences in cost efficiency between foreign and domestic banks.¹²

Consider now loan losses. Foreign banks only lend to hard information borrowers who never default, so loan losses are always zero. On the other hand, in some equilibria domestic banks lend also to bad borrowers, and a fraction $(1 - p)$ of these borrowers defaults ex post. Hence, a testable implication of the cream-skimming model is that, in a sample rich enough to include countries in various types of equilibria, foreign banks should have a safer loan portfolio than domestic banks.¹³

It is important to note that an alternative model, in which foreign banks have a better loan portfolio because of a technological advantage in risk management, would yield the opposite prediction as to the relationship between foreign bank penetration and private credit than the cream-skimming model: Better risk management should lead to a deepening of the credit market, not a shallowing. So, testing both the prediction on loan losses and that on total credit should allow us to differentiate among the two models.

E. Welfare Effects of Foreign Bank Entry

Our definition of welfare is aggregate output net of investment and monitoring costs. Consider first the case in which the initial equilibrium is one of the outcomes in which banks monitor hard information, that is one of the non-pooling outcomes. With foreign bank entry, the cost of monitoring hard information falls, making pooling even less attractive for H types. So the equilibrium continues to be non-pooling. Can the equilibrium type change (for instance from separating to semi-pooling)? The answer is no. Once pooling is ruled out, the nature of the equilibrium does not depend on the parameter c_H , so if the initial equilibrium is separating it will continue to be separating, and similarly for the other possible outcomes (see Proposition 1). The equilibrium payoff to B and S types is unchanged, while H types are better off because they pay lower interest rates. Thus, if the parameters are such that the initial equilibrium is not pooling, foreign bank entry is welfare increasing but all the gains are appropriated by the less opaque borrowers in the market.

Consider now the case in which the initial equilibrium is pooling. If the cost of monitoring H is much lower, then pooling no longer is an equilibrium after foreign bank entry. When the cost of monitoring soft information is relatively

¹² It can also be easily shown that the model yields ambiguous implications about the relationship between average cost efficiency in the banking system and foreign bank penetration. In an earlier version of this paper we found an insignificant relationship between these two variables in cross-country regressions.

¹³ Another implication of the model is that banking sectors with more foreign banks should have, on average, smaller loan losses. Because rules on loan classification and provisioning vary widely across countries, however, international comparisons of accounting measures of loan losses have little meaning, and we do not explore this testable implication.

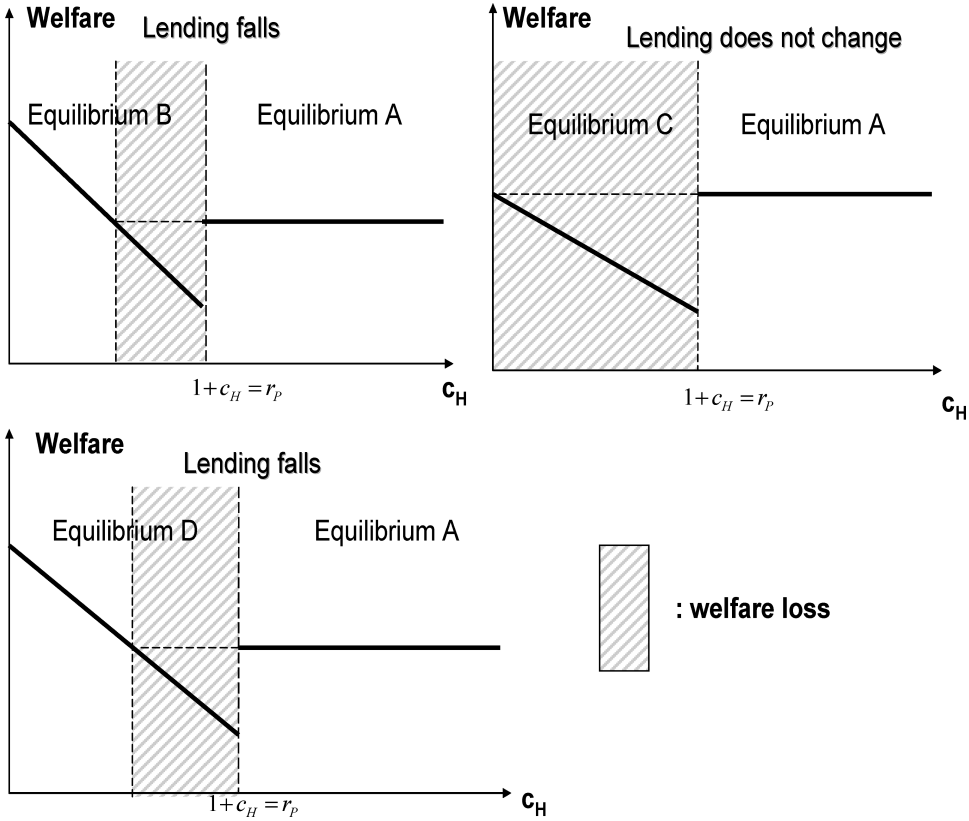


Figure 1. Impact of foreign bank entry on welfare and aggregate lending. This figure describes how aggregate welfare evolves as a function of the monitoring cost c_H , and summarizes the effect on aggregate lending of a switch away from the pooling equilibrium. In the pooling equilibrium, welfare does not depend on c_H since all agents are pooled together and no monitoring costs are paid. In the other equilibria, the welfare function increases linearly with c_H .

low, entry by foreign banks causes the economy to move to the separating equilibrium *B*. This is depicted in the first panel of Figure 1. As a result, type *B* agents no longer get credit and aggregate lending falls. The overall welfare impact, however, is ambiguous (see Appendix A) because while it is efficient not to lend to type *B* individuals, this comes at the cost of monitoring the other types. The reason a decline in welfare is possible is that type *H* agents choose to be monitored whenever monitoring costs are less than the subsidy to type *B* agents that they pay via a higher cost of capital. But the social cost of switching away from the pooling to the separating equilibrium also includes the cost of monitoring *S* types and the rents earned by *B* types when their project succeeds.¹⁴

¹⁴ The transition from equilibrium A to equilibrium B that occurs for $c_H = r_p - 1$ is socially optimal only for some parameter values, specifically, for a large enough decline in the cost of monitoring hard information.

If the cost of monitoring soft information is relatively large while the cost of adverse selection is small, then the economy moves to the semi-pooling equilibrium C, in which it is not profitable for banks to separate between type *B* and type *S* agents. In this case, all agents continue to receive credit, so aggregate credit does *not* change. However, it is easy to see that welfare unambiguously declines because the inefficient investment projects of type *B* agents are still financed while additional resources are spent on monitoring costs (see second panel in Figure 1).

Finally, if the cost of monitoring soft information and the cost of adverse selection are both large relative to the return from the project, the economy moves to the credit-constrained equilibrium D, in which total lending falls because both *S* and *B* types are unable to borrow. The welfare impact is again ambiguous, as the benefit of not financing *B* types has to be set against the increased cost of monitoring *H* types and the cost of losing the project of the *S* types. Again, one can show that the transition between the pooling equilibrium A and the credit-constrained equilibrium D will occur at a monitoring cost c_H that is too high from the point of view of social efficiency, and welfare may decrease (shaded area of Figure 1).

To sum up, entry by foreign banks has ambiguous welfare effects. However, the distributional consequences are clear: Hard information borrowers are always either indifferent or better off, while other borrowers are always either indifferent or worse off.

III. The Empirical Test: Methodology and Data

A. Sample

Since our focus is on poor countries, we restrict our analysis to the countries defined by the World Bank as low income and lower middle income.¹⁵ The total number of countries is 89, but the sample used in the regressions is smaller and varies somewhat across specifications depending on data availability. In the country-level regressions, four countries (China, Jordan, Eritrea, and Thailand) are excluded because they are outliers with respect to private credit. We also consider alternative samples including higher income countries.

B. Identifying Bank Ownership

To identify bank ownership we use data constructed by Micco et al. (2004) from the Bankscope database for the period 1995 to 2002. A bank is classified as foreign if at least 50% of its capital is in the hands of nonresidents.

The share of foreign bank assets to total bank assets in each country used in the country-level regressions is computed aggregating individual bank

¹⁵ As customary, we exclude very small countries, defined as countries with a population of less than one million.

information. A limitation of our data is that coverage of Bankscope changes over time, as the database becomes more comprehensive. To the extent that broadening coverage does not disproportionately affect banks of different ownership, our measure of foreign bank penetration should be accurate. Even if there is measurement error, perhaps because coverage of domestic banks improves over time but coverage of foreign banks does not, we would still have no bias as long as the error does not systematically differ for countries with different growth rates of aggregate private credit. We have no reason to believe this to be the case. In any case, this limitation only affects panel regressions using aggregate data, while cross-country regressions and bank-level regressions are not affected.

Based on these data, foreign bank presence is especially pronounced in Sub-Saharan Africa, while it is most limited in the Middle East and North Africa and in Eastern Europe and Central Asia (Figure 2).¹⁶

C. Country-Level Regressions

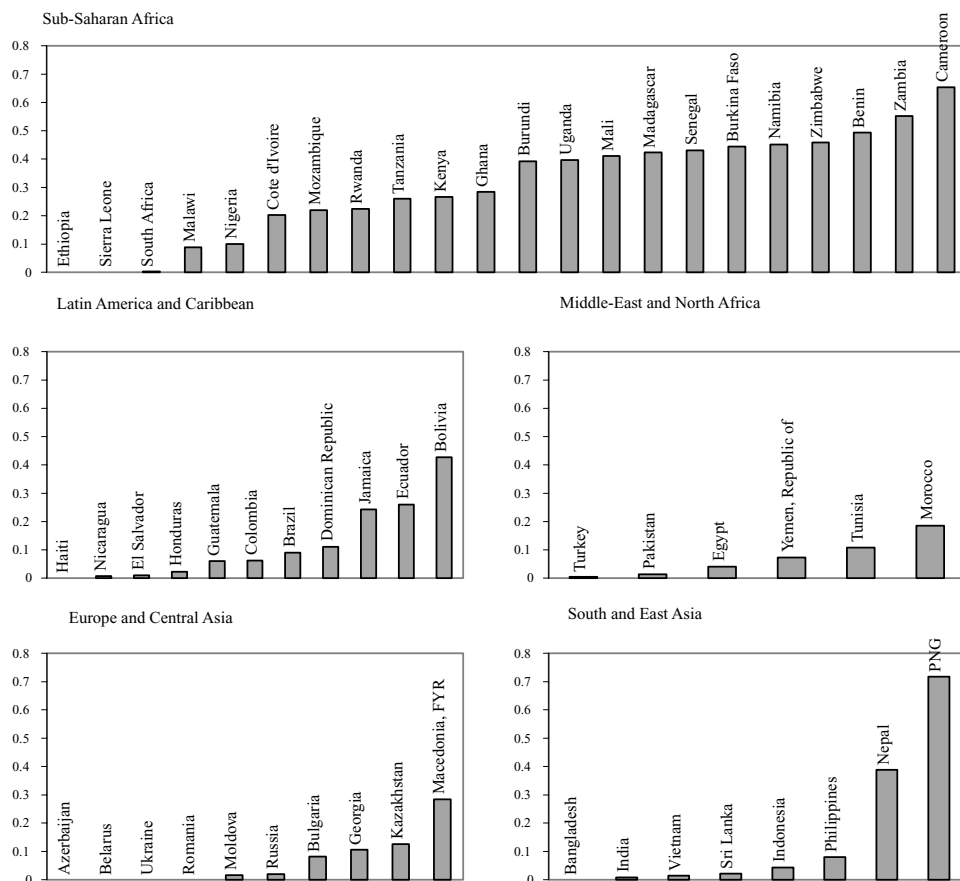
The dependent variable is the volume of credit, measured as the ratio of commercial bank credit to the private sector to GDP from the International Financial Statistics of the IMF.¹⁷ In the cross-sectional regressions, the variable is computed as a 3-year average (1999 to 2002) to smooth out business cycle effects. On average, banking systems in South and East Asia and the Middle East and North Africa (MENA) have a higher value of private credit than other regions (Figure 3).

To limit joint endogeneity concerns, in the cross-sectional regressions we measure foreign bank presence at the earliest possible date. The Micco et al. (2004) data set starts in 1995 for most countries, but for some we only have data for later years. To maximize sample size, we also include countries for which foreign bank presence is available in 1996, 1997, or 1998. An alternative measure of foreign bank presence drawn from a survey of bank supervisors is available from Barth, Caprio, and Levine (2001). However, their variable applies the 1998 to 1999 period, so we use this measure for robustness tests rather than in the main specification.

Economic theory and existing empirical research point to a very broad set of potential determinants of financial sector performance, so selecting a benchmark specification is difficult. Our approach is to include variables that capture several basic country characteristics and then conduct extensive sensitivity analysis to verify the robustness of the coefficient on the foreign bank to the set of included controls.

¹⁶ This would not be the case if we included upper-middle income countries in Eastern Europe, where foreign bank entry has been particularly strong.

¹⁷ We only use private credit data for deposit money banks (IFS line 22d) rather than the sum of lines 22d and 42d (which refers to other financial institutions), as is done in other studies. Line 42d is available only for a subset of countries, and setting it equal to zero for missing countries obviously misstates cross-country differences in depth.

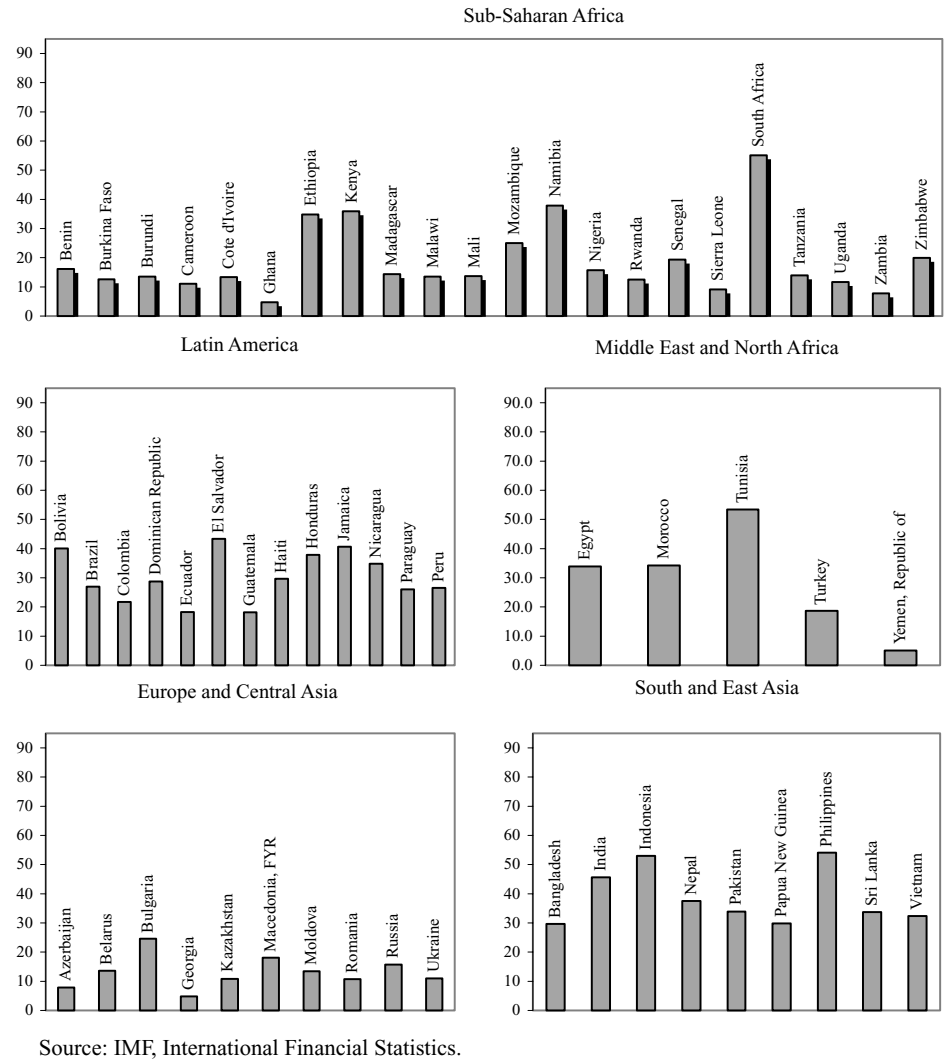


Source: Micco, Panizza, and Yanez (2004).

Figure 2. Foreign bank presence by region in selected lower income countries.

The first control variable is the overall level of development in the country as measured by GDP per capita. A dummy for countries that made the transition to a market economy is also introduced as a control, as these countries encountered unique obstacles in creating a market-based financial system after decades of central planning.¹⁸ Inflation has also been found to correlate with measures of financial depth in broad samples of countries (Boyd, Levine, and Smith, 2001), so we include it among our control variables. We experimented with various measures of political stability, internal conflict, military control, and freedom from corruption, and found the latter to be most strongly correlated

¹⁸ Some of the more advanced transition countries are not low income or lower-middle income countries, so they are excluded from our sample.



Source: IMF, International Financial Statistics.

Figure 3. Bank credit to the private sector in lower income countries by region (percent of GDP).

with financial performance. We therefore include freedom from corruption as a regressor in the benchmark specification.¹⁹

It is widely acknowledged that “market infrastructure” is important to financial sector performance. The Doing Business database by the World Bank provides a comprehensive new set of measures of administrative and regulatory

¹⁹ It might be argued that more corruption might result in more lending if loans are used as instruments to allocate favors to connected parties. Even though our sample of countries has a fairly high average level of corruption, we find that more corruption is associated with less, not more, private credit.

obstacles to business activity for a large group of countries. One advantage of these indicators is that they directly measure quantifiable aspects of the business environment, rather than reflecting broad judgments by market participants. Among indicators directly related to banking, the more robust correlates to private credit are an index of the availability of information to creditors and the time it takes to enforce contracts.²⁰ We use these two variables as controls in the benchmark regression.

We estimate several versions of the following basic cross-sectional equation:

$$y_i = \alpha + \beta f_i + \gamma \mathbf{X}_i + u_i,$$

where y_i is the ratio of private credit to GDP, f_i is the share of bank assets held by foreign banks, \mathbf{X}_i is a matrix of control variables, u_i is the error term, and α , β , and γ are parameters to be estimated. The parameter of interest is β , the coefficient on the foreign bank share. To reduce joint endogeneity problems, whenever possible we measure right-hand side variables at dates earlier than the dependent variable. Also, to reduce measurement error we average the control variables over 1991 to 1998 whenever the data are available.

An obvious problem is that the market share of foreign banks is likely to be endogenous. A priori, it is not clear how endogeneity might bias the coefficient. Foreign banks may be more prone to enter countries where, for exogenous reasons, financial development is particularly low, as in these markets growth prospects may be stronger. In this case, the OLS coefficient would be biased downwards. Conversely, business prospects for foreign banks may be poor in countries with little financial development to begin with, so foreign banks may be more prone to enter the more financially developed among low income countries, biasing the OLS coefficient upwards.

One strategy to address the endogeneity problem is to rely on fixed effects panel estimation. With panel data, it is possible to control for unobserved country-specific fixed characteristics that might affect private credit, and rely on the within-country dimension to identify the parameter of interest. In other words, we can estimate whether within any given country a larger foreign bank presence is associated with less credit to the private sector. We are restricted by the availability of data to an average of 5 years of observations per country. As a result, we can use the panel at an annual frequency only, and cannot smooth out noise in the data by averaging over several years. We estimate the panel model first with OLS using country and time fixed effects and then with a system GMM estimator (Arellano and Bover, 1995), as is described in more detail in Section V below. The set of regressions we estimate can be summarized as follows:

$$\ln y_{i,t} = \alpha + \mu \ln y_{i,t-1} + \beta f_{i,t} + \gamma \mathbf{X}_{i,t} + \delta_i + u_{i,t},$$

where the variables are defined as above, and δ_i is a country fixed effect.

²⁰ Contract enforcement is likely to be more important than the legal rights of creditors in low income countries, where laws are often not effectively enforced. In fact, Djankov, McLiesh, and Shleifer (2007) finds that measures of creditor rights do not significantly affect private credit in low income countries.

Another approach to address potential endogeneity as well as possible omitted country-specific effects is to test whether a larger foreign bank presence in year t is associated with less growth in credit in subsequent years. In this regression, the endogeneity bias should be upwards, as foreign banks presumably would not want to enter countries where private credit prospects are expected to worsen for exogenous reasons. In addition, in these regressions we control for depth in the initial year (as well as for other factors), so omitted country characteristics or shocks that affect private credit contemporaneously should not alter the coefficient on foreign bank share, as they should be already captured by the initial value of the performance indicator. Accordingly, the second set of regressions we estimate is as follows:

$$\Delta \ln y_i = \alpha + \beta f_i + \delta y_{i0} + \gamma \mathbf{X}_i + u_i,$$

where y_{i0} is the performance indicator in an initial year, f_i is the foreign bank share, \mathbf{X}_i is a vector of other controls, and u_i is the error term.

A third strategy to deal with endogeneity is to rely on instrumental variable estimation. We will discuss instrumental variables regressions in Section V below.

D. Bank Level Regressions

The second empirical implication of the cream-skimming model is that foreign banks have a better quality loan portfolio than domestic banks within any given country. To test this prediction, we use a panel of bank-level data for poor countries from Bankscope. The quality of a bank's loan portfolio is measured by the ratio of loan-loss provisions to interest income. We obtain very similar results using the ratio of loan-loss reserves to total assets. Data on nonperforming loans is too sparse to be useful for our set of countries. Note that differences across countries in regulatory provisioning rules do not affect our tests, since we are comparing provisions across two groups of banks *within a given country*.

The empirical model for the bank-level regressions is the following:

$$\log(1 + llp_{ijt}) = \alpha + \beta f_{ijt} + \lambda \mathbf{X}_{ijt} + \theta_{jt} + \varepsilon_{ijt},$$

where llp_{ijt} is the loan-loss provisioning of bank i in country j in year t , expressed as a share of net interest revenues, f_{ijt} is an indicator variable equal to one if bank i in country j in year t is foreign-owned, \mathbf{X}_{ijt} is a vector of bank-level control variables, θ_{jt} is a matrix of country-time fixed effects, and ε_{ijt} is the error term.

The inclusion of country-year fixed effects is a simple but powerful way to control for macroeconomic shocks that simultaneously affect the balance sheets of all banks in the same country in any given year. Thus, we estimate whether, in any given year, foreign-owned banks provision less for bad loans than domestic banks even after accounting for all potential common shocks. The set of bank-level control variables includes bank size, the loan-to-asset ratio, capitalization, profitability, overhead costs, and a dummy for government ownership. The regressions are estimated using OLS. Standard errors are clustered by country to allow for arbitrary correlation of error terms across banks within a given country.

Table III
Private Credit and Foreign Bank Presence in Poor Countries: OLS
Cross-sectional Regressions

This table reports the results of cross-sectional OLS regressions for the sample of poor countries. The dependent variable is the ratio of bank credit to the private sector to GDP. GDP per capita is GDP in U.S. dollars divided by population. Foreign ownership is the ratio of bank assets in banks controlled by foreigners to total bank assets in the country. Transition is a dummy variable for formerly centrally planned economies. Inflation is the log difference in the consumer price index. Lack of corruption is an index measuring the freedom from corruption. Creditor information measures the cost to banks of obtaining information about borrowers. Enforcement speed is the inverse of the number of days it takes to enforce a basic business contract. State banks is the share of bank assets in state-owned banks. Concentration is the share of bank assets in the five largest banks. Fiscal is the ratio of interest payments on public debt to the stock of public debt. Robust *t*-statistics are in brackets. *Significant at 10%; **significant at 5%; and ***significant at 1%.

	(1)	(2)	(3)	(4)	(5)
GDP per capita	7.04 [3.50]***	8.16 [3.94]***	9.05 [5.59]***	6.99 [4.57]***	5.65 [3.40]***
Foreign ownership	-6.59 [0.94]	-15.3 [2.20]**	-22.56 [3.31]***	-19.6 [3.37]***	-18.88 [3.09]***
Transition		-14.33 [3.05]***	-8.88 [2.31]**	-6.99 [1.95]*	-5.2 [1.34]
Inflation			-7.02 [4.67]***	-5.92 [4.30]***	-5.76 [4.13]***
Lack of corruption				10.54 [2.67]**	8.45 [2.00]*
Creditor information					1.48 [2.34]**
Enforcement speed					423.6 [2.78]***
Observations	62	62	61	61	59
R^2	0.21	0.34	0.56	0.61	0.63

IV. Empirical Results

A. Country-Level Tests: Cross-sectional OLS Regressions

Table III presents various versions of the OLS regression of private credit on foreign share and other control variables. When we control for GDP per capita only, the coefficient on foreign share is negative but not significant, but it becomes larger in size and statistically significant as we introduce additional controls. All the controls have the predicted signs and have significant coefficients.²¹ The magnitude of the effect of foreign bank presence on private credit is not trivial: A one-standard deviation increase in the foreign share leads to a

²¹ Additional controls, such as the share of bank assets in state-owned banks, the concentration of the banking sector, a variable proxying the size of government debt, latitude, the density of the rural population, the share of production in agriculture, export orientation, the extent of controls on the powers of the executive, and regional fixed effects are either not significant or do not change the foreign share coefficient much.

decline in private credit of about six percentage points of GDP. This is about a third of the average ratio of private credit to GDP in our sample.

Table IV contains robustness tests. The coefficient on the foreign share changes little when we use an alternative measure of foreign bank presence, if we control for the level of development using GDP in 1980, or if we replace the institutional control variables with measures of the “deep determinants” of institutions (legal origin and settlers’ mortality).²² The negative relationship between foreign share and private credit becomes stronger when we control for banking crises, while controlling for the size of the informal sector or financial openness does not change the results.

To summarize, the OLS cross-sectional regressions indicate that there is a negative, significant, and robust correlation between the penetration of foreign banks in poor countries and the depth of the private credit market. In addition, the economic magnitude of the effect is quite substantial.

B. Panel Regressions

A concern with cross-sectional regressions is that the relationship of interest may be disturbed by omitted country characteristics. The extensive robustness tests in the previous section help reduce this concern. As an alternative, we also estimate the relationship between foreign bank presence and private credit using panel data and controlling for country characteristics through country fixed effects. Table V reports these regression results. Given the persistence in the level of private credit, a lagged dependent variable is introduced in the regression as an additional control. In these fixed effect regressions, the share of foreign banks is significantly and negatively associated with private credit to GDP in most specifications.

Fixed effects regressions of dynamic panels yield significantly biased OLS coefficients (Nickell, 1981), and the size of the bias is larger the shorter the time dimension of the panel. Moreover, the right-hand side variables are potentially endogenous, which could further bias the results. To address these issues, we estimate the model using the system GMM estimator developed by Arellano and Bover (1995), which uses lagged *levels* of the series as instruments for the pre-determined and endogenous variables in the equations in *first differences*, and lagged *differences* of the dependent variable as instruments for equations in *levels*.²³ A test of overidentifying restrictions (Sargan test) and tests of serial correlations for the error terms of the differenced equation support the validity of the instruments. Our key instrumentation strategy of foreign bank presence is that *past* foreign bank market share affects *current* credit to the private sector *only* through the *current* foreign bank market share.

²² In the sample including settlers’ mortality there are no countries of German or Scandinavian legal origin nor any transition countries. We do not use settlers’ mortality in the baseline regression to preserve sample size.

²³ An alternative GMM estimator is the difference GMM estimator developed by Arellano and Bond (1991). However, this estimator performs poorly for highly autoregressive panel series in finite samples (Blundell, Bond, and Windmeijer (2000)), because lagged levels are poor instruments for the variables in differences.

Table IV
Private Credit and Foreign Banks in Poor Countries: Robustness Tests

This table reports the results of cross-sectional OLS regressions for the sample of poor countries. The dependent variable is the ratio of bank credit to the private sector to GDP. GDP per capita is GDP in U.S. dollars divided by population. Foreign ownership is the ratio of bank assets in banks controlled by foreigners to total bank assets in the country. Transition is a dummy variable for formerly centrally planned economies. Inflation is the log difference in the consumer price index. Lack of corruption is an index measuring the freedom from corruption. Creditor information measures the cost to banks of obtaining information about borrowers. Enforcement speed is the inverse of the number of days it takes to enforce a basic business contract. Settlers' mortality is the mortality rate of settlers who colonized the country (Acemoglu, Johnson, and Robinson, 2001). French legal origin is a dummy variable for countries where the legal system is derived from the French Civil Code. Banking crises are dummies for the occurrence of a systemic banking crisis in the period indicated (constructed from Detragiache and Demirgüç-Kunt). Informal sector is the share of the informal sector in the economy from Schneider (2005). Foreign assets (liabilities) measure stock of foreign (domestic) claims in the hands of domestic (foreign) residents as a share of GDP. Robust *t*-statistics are in brackets. *Significant at 10%; **significant at 5%; and ***significant at 1%.

	Benchmark	(1)	(2)	(3)	(4)	(5)	(8)	(13)
GDP per capita	5.65 [3.40]***	6.35 [2.54]**			8.21 [4.18]***	5.18 [2.84]***	5.55 [3.22]***	6.27 [2.95]***
Foreign ownership	-18.88 [3.09]***		-16.17 [2.49]**	-18.26 [2.73]***	-19.62 [2.40]**	-21.66 [3.27]***	-20.46 [-3.37]***	-20.01 [2.78]***
Foreign banks (Barth et al.)		-13.49 [2.76]***						
Transition	-5.2 [1.34]	-4.06 [1.11]	-0.82 [0.28]	-12.35 [3.55]***		-4.98 [1.56]	-4.53 [-1.12]	-4.79 [1.15]
Inflation	-5.76 [4.13]***	-5.02 [3.57]***	-4.58 [4.04]***	-5.81 [3.28]***	-7.3 [3.84]***	-6.07 [4.71]***	-6.21 [-3.99]***	-5.4 [3.38]***
Lack of corruption	8.45 [2.00]*	4.4 [0.76]	13.64 [2.92]***	10.58 [2.34]**		9.09 [2.13]**	8.80 [2.15]**	7.58 [1.63]
Enforcement speed	1.48 [2.34]**	580.33 [3.32]***	547.14 [3.79]***	396.5 [2.26]**		396.56 [2.38]**	425.67 [2.62]***	424.09 [2.03]**
Creditor information	423.6 [2.78]***	2.54 [2.58]**	2.63 [3.92]***	1.55 [2.10]**		1.41 [2.28]**	1.71 [2.52]***	1.64 [2.34]**
GDP per capita 1980				5.4 [2.51]**				

(continued)

Table IV—Continued

	Benchmark	(1)	(2)	(3)	(4)	(5)	(8)	(13)
Settlers' mortality					−4.59 [2.24]**			
French legal origin					−0.46 [0.14]			
Banking crisis 1990–93					−4.82 [1.66]			
Banking crisis 1994–2002					3.38 [0.97]			
Informal sector							0.09 [0.48]	
Foreign liabilities								2.43 [0.68]
Foreign assets								−2.8 [0.32]
Observations	59	54	59	48	41	59	58	54
R ²	0.63	0.65	0.56	0.61	0.63	0.66	0.64	0.62

Table V
Private Credit and Foreign Bank Presence in Poor Countries: Panel Estimation

This table reports the results of panel regressions for the sample of poor countries. The dependent variable is the ratio of bank credit to the private sector to GDP. GDP per capita is GDP in U.S. dollars divided by population. Foreign ownership is the ratio of bank assets in banks controlled by foreigners to total bank assets in the country. Inflation is the log difference in the consumer price index. State banks is the share of bank assets in state-owned banks. Panel A presents regression results using OLS with country and time fixed effects. Panel B presents results of estimation using two-step system GMM with finite sample correction to the covariance matrix (Windmeijer (2005)), with up to three lags for instruments. Robust *t*-statistics in brackets. *Significant at 10%; **significant at 5%; and ***significant at 1%.

Panel A: Fixed Effects Regressions					Panel B: System GMM Regressions				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	
Lagged dependent variable									
Foreign ownership	-0.68 [3.55]***	-0.3 [1.78]*	-0.38 [2.15]**	-0.42 [2.35]**	-0.3 [1.43]	-0.44 [2.04]**	-0.24 [1.64]*	-0.39 [1.67]*	
Log(inflation)			-0.1 [5.44]***	-0.1 [4.84]***	-0.09 [4.79]***	-0.13 [4.10]***	-0.12 [3.71]***	-0.14 [4.46]***	
GDP per capita				0.44 [1.69]*	0.48 [1.82]*		0.05 [1.31]	0.06 [1.70]*	
State banks					0.21 [1.17]			-0.24 [1.99]*	
Observations	422	419	392	392	392	392	392	392	
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
R ²	0.92	0.94	0.94	0.94	0.94	0.341	0.836	0.991	
Serial correlation test (<i>p</i> value)									
Order 1	0.000	0.02	0.44	0.46	0.38	0.039	0.047	0.042	
Order 2						0.616	0.665	0.75	

Panel B of Table V presents various GMM regressions. The coefficient on the lagged dependent variable is close to one, which confirms that it is highly serially correlated, and justifies the use of the system GMM. Among the control variables considered, inflation is robustly and negatively associated with private credit, even after instrumentation. State bank share also has a negative and significant coefficient, while GDP per capita is not significant. In all specifications, the presence of foreign banks is significantly and negatively associated with private credit, confirming the results of the cross-sectional regressions.

C. Foreign Bank Presence and Credit Growth

If a larger foreign bank presence is detrimental to private credit, then we should observe a negative correlation between foreign presence and subsequent credit growth. In this regression, controlling for the initial level of private credit should ensure that the results are not driven by the fact that foreign banks may choose to enter in more underbanked countries. Table VI presents these regression results. The dependent variable is computed as the log difference of the private credit-to-GDP ratio in 1999 to 2001 and in 1994 to 1996. The basic specification includes as controls inflation and the share of state banks, both of which have a negative and significant effect on credit growth, and lack of corruption, which has a positive effect. GDP per capita and the transition dummy are not significant and have been omitted, though including these variables does not change the results. In this basic specification, a larger presence of foreign banks is associated with lower subsequent growth in credit to the private sector. The result holds also in a number of alternative specifications. Controlling for the occurrence of banking crises and a dummy for Sub-Saharan Africa does not change the results, and the same is true when we control for hyperinflation or changes in adult mortality rates, capturing the possible effects of the AIDS epidemics on growth.

Turning to the magnitude of the effect, based on the regression in column 3, a one-standard deviation increase in the foreign share would lead to a decline in the growth rate of credit of about 20%, a sizable decline.

D. Instrumental Variable Regressions

An alternative approach to address endogeneity concerns is instrumental variable estimation. The challenge is to find instruments that explain foreign bank presence but have no other direct effects on private credit after controlling for other determinants of financial development. We use three sets of instruments to explain foreign bank penetration in poor countries: (i) the share of large international banks located in a former colonizing country of the host country; (ii) a measure of potential market size (population); and (iii) a measure of cultural distance based on language.²⁴

²⁴ The data on international banks are from Cerutti, Dell'Ariccia, and Martinez Peria (2007), who construct them from Bankscope.

Table VI

Foreign Bank Presence and Private Credit Growth in Poor Countries

This table reports the results of cross-sectional OLS regressions for the sample of poor countries. The dependent variable is the log difference in the ratio of bank credit to the private sector to GDP between 1995 to 1998 and 1999 to 2002. Initial depth is the ratio of bank credit to the private sector measured in 1995 to 1998. Foreign ownership is the ratio of bank assets in banks controlled by foreigners to total bank assets in the country. Inflation is the log difference in the consumer price index. Lack of corruption is an index measuring the freedom from corruption. Banking crises are dummies for the occurrence of a systemic banking crisis in the period indicated (constructed from Detragiache and Demirgüç-Kunt). Africa is a dummy for countries in Sub-Saharan Africa. Change in mortality is the change in the mortality rate of the population between 2002 and 1995. Hyperinflation is a dummy variable for countries that experienced a hyperinflation during 1995 to 2002. Robust *t*-statistics are in brackets. *Significant at 10%; **significant at 5%; and ***significant at 1%.

	(1)	(2)	(3)	(4)	(5)	(6)
Initial depth	-0.01 [3.38]***	-0.02 [4.57]***	-0.02 [4.83]***	-0.02 [5.12]***	-0.02 [3.84]***	-0.02 [4.49]***
Foreign ownership	-0.55 [2.29]**	-0.56 [2.42]**	-0.68 [2.77]***	-0.52 [2.05]**	-0.58 [2.12]**	-0.54 [2.33]**
Inflation	-0.09 [2.13]**	-0.08 [1.98]*	-0.1 [2.68]***	-0.11 [2.87]***	-0.08 [1.84]*	-0.12 [2.42]**
State banks	-0.35 [1.73]*	-0.4 [2.05]**	-0.38 [1.85]*	-0.37 [1.80]*	-0.37 [1.62]	-0.43 [2.26]**
Lack of corruption		0.3 [2.44]**	0.33 [2.69]***	0.34 [2.87]***	0.32 [2.01]*	0.29 [2.37]**
Banking crisis 1990–1993			-0.16 [1.16]	-0.15 [1.07]		
Banking crisis 1994–2002			0.16 [2.01]**	0.13 [1.52]		
Africa				-0.2 [1.76]*		
Change in mortality					-0.01 [0.06]	
Hyperinflation						0.2 [0.88]
Observations	59	59	59	59	50	59
R^2	0.23	0.29	0.34	0.38	0.29	0.3

The theory behind the first instrument is that large international banks are the primary source of supply of foreign direct investment in the banking sector and, moreover, a shared colonial past between the host country and the country of origin of an international bank means closer cultural and economic ties. Thus, we conjecture that a country whose former colonial power is well represented among global banks is, other things being equal, in a better position to attract foreign banks. In addition, it seems plausible that this instrument should not affect the overall size of private credit in the host country once foreign bank penetration and other institutional characteristics are controlled for, satisfying the exclusion assumption.

The second instrument is country size as measured by population. In this case, the conjecture is that global banks operating in many markets can better diversify country-specific risk than domestic banks, a benefit particularly valuable in smaller countries. In addition, in smaller countries a relatively small initial investment would give a foreign bank sufficient size to achieve a dominant position in the market. To be a valid instrument, population should not affect private credit through other channels. It may be argued that in larger countries it is easier for banks to achieve economies of scale, thereby reducing unit cost. Lower unit cost, in turn, would lead to lower interest rates and more lending. However, in separate regressions we find that population size is not a significant determinant of bank operating costs, suggesting that this channel is not operative in our sample.²⁵

The third is a variable that measures how many European languages are official languages in the host country.²⁶ This captures cultural proximity to Western Europe or North America, the areas of origin of the largest global banks.²⁷

Our identification strategy relies upon the hypothesis that the instruments have no other direct nor indirect effects on domestic financial development. A potential concern is that measures of cultural and economic ties could proxy for broad institutions in the host country, if for example countries with larger international banks happened to be more likely to set up deficient institutions in their colonies, which then result in less private credit. However, the coefficient on the instrument in the first-stage regression is not sensitive to the inclusion of broad institutional variables such as settlers' mortality, or to specific institutional features such as the time to enforce contracts (Table VII). Another concern is that this variable could capture other omitted effects of international capital flows on the domestic financial system. However, our results are not affected by the introduction of various proxies for international financial integration. If anything, capital flows (in particular, equity and FDI liabilities) are positively, instead of negatively, associated with domestic financial development, which is inconsistent with such a concern. Finally, tests of overidentifying restrictions in regressions including another instrument do not reject the validity of the instrument.

In the first-stage regressions, the instruments are highly significant, and the partial- R^2 is almost always above 20% (Table VII). Moreover, in specifications including our main instrument, the share of global banks from former colonizers, the F -test of joint significance of the instruments is very high, dispelling

²⁵ Operating cost regressions are reported in an earlier version of this paper (IMF Working Paper WP/06/18).

²⁶ Data on languages are from the distance database of the CEPII, available at: <http://www.cepii.fr/anglaisgraph/bdd/distances.htm>.

²⁷ Of the top 100 banks in the world by asset size in 2002, 83 were headquartered in a Western country (i.e., the United States and countries in Western Europe) or in Australia, while the remaining 17 were headquartered in Japan, China, South Korea, or India. The first group of banks was also more international than the second, operating in 16.9 different countries on average, as opposed to 8.4 countries on average for the Asian banks (Cerutti, Dell'Ariccia, and Martinez Peria (2007)).

Table VII
Private Credit and Foreign Bank Presence in Poor Countries: Instrumental Variables Estimation

The table reports results of 2SLS estimation of the relationship between private credit and foreign bank presence. The dependent variable is bank credit to the private sector (in % of GDP). GDP per capita is GDP in U.S. dollars divided by population. Foreign ownership is the ratio of bank assets in banks controlled by foreigners to total bank assets. Transition is a dummy variable for formerly centrally planned economies. Inflation is the log difference in the consumer price index. Lack of corruption is an index measuring freedom from corruption. Creditor information measures the cost to banks of obtaining information about borrowers. Enforcement speed is the inverse of the number of days it takes to enforce a basic business contract. The instruments are the share of top 100 international banks located in former colonizer countries (banks from colonizer), log of population, and a dummy for using a European language as official language. Robust *t*-statistics are in brackets. *Significant at 10%; ** significant at 5%; and *** significant at 1%.

Second Stage	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Foreign ownership	-23.29 [1.75]*	-24.43 [2.16]**	-31.13 [2.50]**	-25.01 [2.26]**	-27.6 [2.74]***	-32.67 [2.46]**	-25.2 [2.31]**	-31.2 [2.10]**	-31.57 [2.18]**
Transition	-5.9 [1.40]	-7.57 [2.08]**	-9.74 [2.60]***	-8.53 [2.24]**		-4.73 [1.22]	-6.16 [1.63]	-7.07 [1.77]*	-7.14 [1.76]*
GDP per capita	5.99 [3.77]***	7.19 [4.54]***	9.23 [5.77]***	7.45 [4.63]**	8.2 [3.49]***	4.87 [2.84]***	5.86 [3.71]***	6.06 [3.70]***	6.18 [3.77]***
Inflation	-5.98 [4.20]***	-6.19 [4.19]***	-7.37 [4.76]***	-6.37 [4.29]***	-7.84 [4.17]***	-6.48 [5.03]***	-6.09 [4.47]***	-6.41 [4.44]***	-6.42 [4.49]***
Lack of corruption	7.64 [1.81]*	9.9 [2.44]**		9.6 [2.49]**		6.55 [1.71]*	7.83 [1.99]**	7.24 [1.82]*	6.99 [1.71]*
Enforcement speed	418.38 [2.79]***					42.64 [0.21]	402.73 [2.86]***	382.93 [2.69]***	386.86 [2.62]***
Creditor information	1.47 [2.32]**					1.48 [2.09]**	1.41 [2.33]**	1.35 [2.08]**	1.37 [2.05]**
FDI liabilities						24.54 [2.49]**			
Portfolio equity liabilities						180.73 [1.77]*			
Settler mortality					-4.17 [1.73]*				

(continued)

Table VII—Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
French legal origin									
Observations	58	60	60	-1.55 [0.56]	0.23 [0.07]				
R^2	0.63	0.61	0.55	0.61	0.62	56	59	59	58
Hansen J stat	0.82	0.08	0.02	0.01	0.01	0.66	0.62	0.61	0.6
P -value	0.36	0.78	0.88	0.93	0.93	0.46	1.03		0.01
90% confidence interval (CLR)	[-25.8, -21.4]	[-26.5, -22.4]	[-33.2, -29.1]	[-33.8, -29.7]	[-20.0, -15.3]	0.50	0.31	[-33.3, -29.1]	0.91 [-33.6, -29.6]
First Stage									
Banks from colonizer	2.59 [6.96]***	2.69 [8.25]***	2.76 [12.27]***	2.69 [6.49]***	3.06 [8.47]***	2.62 [5.57]***	2.21 [4.94]***		
Population									
European language	0.16 [2.8]***	0.16 [3.12]***	0.16 [3.09]***	0.16 [3.1]***	0.15 [2.92]***	0.17 [2.81]***	-0.05 [-4.02]***	-0.06 [-4.22]***	-0.05 [-3.36]***
Partial R^2	0.19	0.21	0.22	0.20	0.28	0.21	0.24	0.18	0.23
F statistic (excluded instruments)	37.68	46.21	107.08	30.59	48.07	24.19	41.34	17.81	10.63
p -value of F -test	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001

possible concerns about weak instruments (Stock and Yogo, 2005). As an additional check, we also report second-stage confidence intervals for the foreign ownership variable that are robust to weak instrument bias (Moreira, 2003; Andrews, Moreira, and Stock, 2006). In the second stage regressions, we do not reject the null hypothesis of validity of the overidentifying restrictions (Hansen J statistics) when more than one instrument is used. In addition, the coefficient on foreign share not only continues to be negative and significant, but becomes even slightly larger in size. This is the opposite of what should happen under the hypothesis that low financial development causes more foreign bank entry. In fact, these results suggest that instrumental variable estimation might be removing attenuation bias caused by measurement error. Altering the specification by changing the set of included controls does not change the coefficient estimate much.²⁸

While there are always questions about the suitability of instruments, we take these results as evidence that a larger presence of foreign banks reduces credit availability, consistent with the cream-skimming model.

E. Loan Loss Provisions: Panel Regression Results

As shown in the theoretical part of the paper, the cream-skimming model also implies that foreign banks should have a higher quality loan portfolio than domestic banks within any given country. We test this prediction using a panel of bank-level data for a sample of poor countries. Loan quality is measured by the ratio of loan loss provisions to interest income. Regression results are in Table VIII. Specifications differ depending on the control variables used (variables are defined in Appendix B). All regressions include country-time fixed effects to control for common macroeconomic shocks and country characteristics.

Not surprisingly, loan-loss provisions are larger in banks that have a larger proportion of assets in the form of loans, that are less profitable, and that have less capital. In addition, large banks have more loan-loss provisions, although the significance of the coefficient is low. Higher operating costs are associated with higher loan quality, perhaps suggesting more intensive monitoring and screening of borrowers. More importantly, regardless of the specification, the dummy for foreign banks is always negative and significant, indicating that foreign banks have better quality loan portfolios than domestic banks. The dummy for state ownership, on the other hand, is not significant.

We find similar results when we measure loan quality using loan-loss reserves as a share of assets, when we use time-averaged data in a cross-country specification, and when we include a lagged endogenous variable in the regression. Controlling for bank liquidity also does not alter the results.

²⁸ As an alternative measure of cultural proximity we have used religion: Since global banks are primarily based in countries where the dominant religion is Protestant or Catholic, foreign bank presence should be smaller the larger the share of the population that practices other religions. Religion turns out to be a somewhat weaker instrument than the others, but the significance of foreign share in the second stage regression remains (results not reported).

Table VIII
Panel Regressions—Loan Loss Provisions

The table presents OLS regression results for a panel of banks from poor countries. The dependent variable is the ratio of loan-loss provisions to interest earned. Loans/assets is the ratio of bank loans to total bank assets. Size is the log of bank assets divided by GDP. Foreign ownership is a dummy variable for foreign-owned banks, while state-owned is a dummy for banks owned by the government. Capitalization is the ratio of equity to assets. Profitability is return on average assets. Costs is overhead costs to assets. Regressions include country-year fixed effects to control for common country characteristics and macroeconomic shocks. Standard errors are clustered by country. Robust *t*-statistics in brackets. *Significant at 10%; **significant at 5%; and ***significant at 1%.

	(1)	(2)	(3)	(4)	(5)	(6)
Foreign	−0.24 [3.03]***	−0.27 [3.32]***	−0.28 [3.38]***	−0.26 [3.17]***	−0.27 [3.43]***	−0.27 [3.49]***
Loans /assets	0.54 [6.42]***	0.54 [6.48]***	0.54 [6.38]***	0.51 [6.17]***	0.50 [6.09]***	0.51 [6.20]***
Size		0.07 [2.75]***	0.07 [2.78]***	0.00 [0.06]	0.07 [2.06]**	0.06 [1.77]*
State-owned			−0.10 [0.72]	−0.07 [0.49]	−0.22 [1.70]*	−0.21 [1.63]
Capitalization				−0.33 [4.15]***	−0.19 [2.14]**	−0.19 [2.07]**
Profitability					−0.25 [3.76]***	−0.25 [3.70]***
Costs						−1.40 [2.24]**
Observations	1,876	1,864	1,864	1,864	1,714	1,712
<i>R</i> ²	0.3	0.31	0.31	0.32	0.37	0.37
Number of banks	872	866	866	866	812	811
Country-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank clusters	Yes	Yes	Yes	Yes	Yes	Yes

To summarize, we find that foreign-owned banks provision less for bad loans than domestic banks in poor countries, even after controlling for observable bank characteristics and macroeconomic shocks affecting the balance sheets of all banks in a given country. This robust pattern is consistent with the “cream-skimming” effect formalized in the theoretical model. In contrast, if better risk management by foreign banks is driving the result on loan-loss provisions, we would expect foreign bank presence to increase overall credit in the country, which is the opposite of what we find in the data.

V. Additional Empirical Results

A. Foreign Banks and Access to Banking Services

We have interpreted our results as being consistent with the cream-skimming model. To further probe our interpretation, we investigate whether the association between foreign bank presence in poor countries is associated with lower

Table IX
Access to Financial Services and Foreign Bank Presence in Poor Countries: Cross-Sectional OLS Regressions

This table reports OLS cross-sectional regression results on the relationship between foreign bank presence and access to finance. The dependent variables are five alternative indicators of access to financial services from Beck et al. (2005). Demographic branch penetration is the number of bank branches divided by population. Geographic branch (ATM) penetration is the number of bank branches (ATM machines) divided by the area of the country (in square miles). Loan accounts per capita is the number of bank accounts in the country divided by population. GDP per capita is GDP in U.S. dollars divided by population. Population density is population per square mile. Foreign ownership is the ratio of bank assets in banks controlled by foreigners to total bank assets in the country. Inflation is the log change in the consumer price index. Lack of corruption is an index of freedom from corruption. Robust *t*-statistics are in brackets. *Significant at 10%; **significant at 5%; and ***significant at 1%.

	Demographic Branch Penetration	Demographic Branch Penetration	Demographic Branch Penetration	Geographic Branch Penetration	Geographic Branch Penetration
GDP per capita	2.33 [4.72]***	2.13 [4.89]***	-1.28 [0.70]	-0.77 [0.52]	-1.28 [0.70]
Population density	0 [1.45]	0 [1.92]*	0.02 [1.22]	0.02 [1.22]	0.02 [1.22]
Foreign ownership	-5.34 [3.10]***	-4.6 [2.92]***	-13.34 [2.38]**	-12.99 [2.50]**	-13.34 [2.38]**
Inflation		0.67 [1.16]		-1.95 [1.73]*	
Lack of corruption			2.88 [1.13]		2.88 [1.13]
Observations	39	39	39	39	39
R ²	0.47	0.49	0.44	0.46	0.44

(continued)

Table IX—Continued

	Loan Accounts Per Capita	Loan Accounts Per Capita	Loan Accounts Per Capita	Deposit Accounts Per Capita	Deposit Accounts Per Capita	Deposit Accounts Per Capita
GDP per capita	30.42 [1.91]*	18.33 [1.43]	28.08 [2.00]*	337.85 [4.06]***	252.12 [2.96]***	359.53 [3.01]***
Population density	0.02 [0.59]	0 [0.06]	0.03 [0.90]	-0.24 [1.38]	0 [0.02]	-0.24 [1.35]
Foreign ownership	-91.42 [1.42]	-143.35 [1.68]	-77.83 [1.38]	-926.77 [3.12]***	-601 [2.52]**	-892.7 [3.23]***
Inflation			7.56 [0.52]		193.54 [2.35]**	
Corruption		57.67 [1.44]				-106.8 [0.41]
Observations	18	18	18	24	24	24
R ²	0.32	0.41	0.33	0.58	0.68	0.58

access to financial services. Indicators of access to financial services come from Beck, Demirgüç-Kunt, and Martinez Peria (2005) and apply 2003 to 2004. They include the extent of the branch and ATM networks, which measures the outreach of financial services, and the number of loan and deposit accounts, which measures actual usage of such services. Table IX shows that financial access indicators tend to be worse in countries that had a large foreign bank presence in the mid-1990s, after controlling for the level of development or institutional quality.²⁹

B. Extending the Sample to Higher Income Countries

An interesting question is whether the negative relationship between private credit and foreign bank penetration also holds when we extend the sample to include more advanced countries. Because most international banks are based in advanced countries, we expect differences in monitoring abilities between domestic and foreign banks to be less pronounced in advanced countries, so that cream-skimming is likely to be less widespread. This is indeed the case. When we utilize the full sample, the coefficient on foreign banks becomes much smaller and is no longer significant, although it is still negative (results not reported).

VI. Conclusions

A number of empirical studies find that, in poor countries, foreign banks tend to lend mainly to large firms (domestic or multinationals) and the government rather than to smaller businesses for which local knowledge is necessary. In this paper, we develop a theoretical model to study the effects of foreign bank entry when foreign banks have a cost advantage in lending to larger, more transparent firms but not in lending to smaller, more opaque customers. We find that while total lending, cost efficiency, and welfare may improve with foreign bank entry, this is not warranted. For some parameter configurations, a perverse effect may arise whereby entry by foreign banks results in cream-skimming, which increases overall operating costs and lowers aggregate welfare. In addition, in all possible equilibria foreign bank entry only benefits more transparent firms, while other firms are either indifferent or worse off.

The cream-skimming model predicts that countries with more foreign bank penetration will have a shallower banking sector, and that foreign banks will have a safer loan portfolio than domestic banks within a given country. We find these predictions to be consistent with data from a sample of 60 lower income countries.

These findings raise concerns about the ability of foreign banks to boost financial development in poor countries. They should not come as a surprise, however, in light of recent research on banking, suggesting that lending to opaque businesses—which, arguably, constitute a large fraction of the economy in poor countries—is not something large banks are particularly good at.

²⁹ Access indicators are not highly correlated with private credit in our sample, suggesting that a separate analysis is justified.

Indeed, the recent trend towards greater consolidation in the banking business in advanced countries has raised concerns about the loss of “relationship capital” and the availability of credit to SMEs (Berger et al., 2005). Such concerns can only be heightened in the case of large international banks operating in poor countries, where cultural and geographic distance between loan officers and management is maximal.

Appendix A: Welfare Comparison under Alternative Equilibria

The welfare attained in each of the possible equilibria is the following:

1. Pooling equilibrium (A): $S_{(A)} = (\mu_H + \mu_S + p\mu_B) \cdot R - 1$.
2. Separating equilibrium (B): $S_{(B)} = (\mu_H + \mu_S) \cdot R - \mu_H \cdot (1 + c_H) - \mu_S \cdot (1 + c_S)$.
3. Semi-separating equilibrium (C): $S_{(C)} = (\mu_H + \mu_S + p\mu_B) \cdot R - 1 - c_H\mu_H$.
4. Credit-constrained equilibrium (D): $S_{(D)} = \mu_H \cdot (R - (1 + c_H))$.

A. Comparison of Welfare in Equilibria (A) and (B)

The difference between expected net output in the separating and pooling equilibria is

$$S_{(B)} - S_{(A)} = \underbrace{\mu_B \cdot (1 - pR)}_{>0} - \underbrace{\mu_H c_H - \mu_S c_S}_{<0}.$$

The first term is the welfare gain from not financing type B anymore; the second term is the welfare cost of monitoring soft and hard information. The overall effect is ambiguous. Notice, however, that when $c_H + 1 = r_P$, the welfare in the separating equilibrium is unambiguously lower (see also Figure 1, Panel 1):

$$S_{(B)}|_{1+c_H=r_P} - S_{(A)} = \Delta S_{(B)} = \underbrace{\frac{p\mu_B}{\mu_H + \mu_S + p\mu_B} - p\mu_B \cdot R}_{<0} - \underbrace{\mu_S(c_S - c_H)}_{<0},$$

Where the first term is negative because $R > r_P = \frac{1}{\mu_H + \mu_S + p\mu_B}$.

B. Comparison of Welfare in Equilibria (A) and (C)

The comparison is straightforward: $S_{(C)} - S_{(A)} = \Delta S_{(C)} = -\mu_H c_H \leq 0$. In this case, welfare falls because all projects are financed, but monitoring costs are paid in equilibrium.

C. Comparison of Welfare in Equilibria (A) and (D)

One can show that for $c_H + 1 = r_P$, $S_{(D)}|_{c_H+1=r_P} - S_{(A)} = \Delta S_{(D)} = -(\mu_S + p\mu_B) \cdot (R - r_P) < S_{(A)}$, and for $c_H = 0$, $S_{(D)}|_{c_H=0} = S_{(A)} - (\mu_S + p\mu_B) \cdot (R - \hat{r}_P) > S_{(A)}$, where \hat{r}_P is the interest rate charged by banks pooling type S and type B together, because in this case the interest rate that pools types B and S is too high to sustain such a pooling equilibrium ($\hat{r}_P > R$).

D. Comparison of Welfare in Equilibria (B) and (C)

This comparison shows that welfare in the separating equilibrium is always higher than welfare in the semi-pooling equilibrium whenever the separating equilibrium is feasible:

$$S_{(B)} - S_{(C)} = -p\mu_B R - \mu_S \cdot (1 + c_S) + (\mu_S + \mu_B),$$

hence

$$S_{(B)} - S_{(C)} > 0 \Leftrightarrow 1 + c_S < \frac{\mu_S + \mu_B(1 - pR)}{\mu_S}.$$

As shown in the comparison between $S_{(B)}$ and $S_{(A)}$, this always holds.

Appendix B

Table BI
Data Sources for Country-Level Data

Country-Level Variables	Time Period	Data Sources
GDP per capita (logs)	Average 1991–1998	World Bank, WDI
Inflation (in logs)	Average 1991–1998	IMF-IFS
Lack of corruption		Kaufmann, Kraay, and Mastruzzi (2003)
Foreign Bank Assets	Average 1995–1998	Micco, Panizza, and Yañez (2004)
Days to enforce a contract	2004	World Bank; Doing Business database
Credit information index	2004	World Bank; Doing Business database
State-Owned Bank Assets	Average 1995–1998	Micco, Panizza, and Yañez (2004)
Interest on public debt (% of GDP)	Average 1991–1998	IMF-IFS
Concentration	1998–1999	World Bank, Financial Structure Database, Barth, Caprio, Levine, and FSSAs
English legal origin (dummy)		La Porta, Lopez De Silanes, and Shleifer (2002)
French legal origin (dummy)		La Porta, Lopez De Silanes, and Shleifer (2002)
Settlers' mortality		Acemoglu, Johnson, and Robinson (2001)
Official European language	2003	CEPII (2006)
Foreign assets and liabilities	1991–1998	Lane and Milesi-Ferretti (2006)
Banking crises	1980–2002	Demirgüç-Kunt and Detragiache (2005)
Mortality rate	1990–2002	World Bank-WDI
Population	Average 1995–1998	World Bank-WDI
Share of international banks from colonizer	2002	Cerutti, Dell'Ariccia, and Martinez Peria (2007)
Informal sector	1991–1998	Schneider (2005)

Table BII
Definitions of Bank-Level Variables

Variable Name	Time Period	Definition
Loan-loss provisioning/net interest revenue	1995–2003	$\text{Log}(1 + \text{loan loss provisioning/net interest revenue})$
Net loans/total assets	1995–2003	$\text{Log}(1 + \text{net loans/total assets})$
Size	1995–2003	$\text{Log}(\text{total assets})/\text{GDP}$
Foreign	1995–2003	Dummy equal to one if a foreign owner holds more than 50% of shares
State-owned	1995–2003	Dummy equal to one if the state holds more than 50% of shares
Capitalization	1995–2003	$\text{Log}(1 + \text{equity/total assets})$
ROAA	1995–2003	$\text{Log}(1 + \text{return over average assets})$
Overhead	1995–2003	Overhead costs/total assets

Source: Bankscope database.

REFERENCES

- Acemoglu, Daron, Simon Johnson, and James A. Robinson, 2001, The colonial origins of comparative development, *American Economic Review* 91, 1369–1410.
- Andrews, Donald W. K., Marcelo J. Moreira, and James H. Stock, 2006, Optimal two-sided invariant similar tests for instrumental variables regression, *Econometrica* 74, 715–752.
- Arellano, Manuel, and Stephen R. Bond, 1991, Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations, *Review of Economic Studies* 58, 277–297.
- Arellano, Manuel, and Olympia Bover, 1995, Another look at the instrumental variable estimation of error-components models, *Journal of Econometrics* 68, 29–52.
- Barth, James R., Gerard Caprio, and Ross Levine, 2001, The regulation and supervision of banks around the world: A new database, in Robert E. Litan, and Richard Herring, eds.: *Integrating Emerging Market Countries into the Global Financial System* (Brookings-Wharton Papers on Financial Services, Brookings Institution Press Washington, D.C.).
- Beck, Thorsten, Asli Demirgüç-Kunt, and Maria Soledad Martinez Peria, 2005, Reaching out: Access to and use of banking services across countries, Working paper No. 3754, The World Bank.
- Berger, Allen N., Nathan H. Miller, Mitchell A. Petersen, Raghuram Rajan, and Jeremy Stein, 2005, Does function follow organizational form? Evidence from the lending practices of large and small banks, *Journal of Financial Economics* 76, 237–269.
- Blundell, Richard, Stephen R. Bond, and Frank Windmeijer, 2000, Estimation in dynamic panel data models: Improving on the performance of the standard GMM estimators, Working paper, The Institute for Fiscal Studies.
- Bonin, John, and Paul Wachtel, 2003, Financial sector development in transition economies: Lessons from the first decade, *Financial Markets, Institutions, and Instruments* 12, 1–63.
- Boyd, John H., Ross Levine, and Bruce D. Smith, 2001, The impact of inflation on financial sector performance, *Journal of Monetary Economics* 47, 221–248.
- Brownbridge, Martin, and Charles Harvey, 1998, *Banking in Africa: The Impact of Financial Sector Reform Since Independence* (Africa World Press, Trenton, NJ).
- Carow, Kenneth A., Edward Kane, and Rajesh Narayanan, 2003, How have borrowers fared in banking mega-mergers? Working paper, National Bureau of Economic Research.
- Cerutti, Eugenio, Giovanni Dell’Ariccia, and Maria Soledad Martinez Peria, 2007, How banks go abroad: Branches or subsidiaries? *Journal of Banking and Finance* 31, 1669–1692.
- Claessens, Stijn, Asli Demirgüç-Kunt, and Harry Huizinga, 2001, How does foreign entry affect the domestic banking market? *Journal of Banking and Finance* 25, 891–911.

- Clarke, George R.G., Robert Cull, and Maria Soledad Martinez-Peria, 2001, Does foreign bank penetration reduce access to credit in developing countries? Evidence from asking borrowers, Mimeo, Working paper, The World Bank.
- Clarke, George, Robert Cull, Maria Soledad Martinez Peria, and Susana M. Sanchez, 2005, Bank lending to small businesses in Latin America: Does bank origin matter? *Journal of Money, Credit, and Banking* 37, 83–118.
- Degryse, Hans, Nancy Masschelein, and Janet Mitchell, 2005, SMEs and bank lending relationships: The impact of mergers, Working paper, Center for Economic Policy and Research.
- Demirgüç-Kunt, Asli, and Enrica Detragiache, 2005, Cross-country empirical studies of systemic distress: A survey, *National Institute Economic Review* 192, 68–83.
- Djankov, Simeon, Caralee McLiesh, and Andrei Shleifer, 2007, Private credit in 129 countries, *Journal of Financial Economics* 84, 299–329.
- Gelos, R. Gaston, and Jorge Roldos, 2004, Consolidation and market structure in emerging market banking systems, *Emerging Markets Review* 5, 39–59.
- Giannetti, Maria Assunta, and Steven Ongena, 2005, Financial integration and entrepreneurial activity: Evidence from foreign bank entry in emerging markets, Working paper, Center for Economic Policy and Research.
- Gormley, Todd A., 2005, Banking competition in developing countries: Does foreign bank entry improve credit access? Working paper, Massachusetts Institute of Technology.
- Guiso, Luigi, Paola Sapienza, and Luigi Zingales, 2004, Does local financial development matter? *Quarterly Journal of Economics* 119, 929–969.
- Haber, Stephen, and Aldo Musacchio, 2005, Contract rights and risk aversion: Foreign banks and the Mexican economy, 1997–2004, Working paper, Stanford Center for International Development.
- Karceski, Jason, Steven Ongena, and David C. Smith, 2005, The impact of bank consolidation on commercial borrower welfare, *Journal of Finance* 60, 2043–2082.
- Kaufmann, Daniel, Aart Kraay, and Massimo Mastruzzi, 2003, Governance matters III: Governance indicators for 1996–2002, Policy research Working paper, The World Bank.
- Lane, Philip R., and Gian Maria Milesi-Ferretti, 2006, The external wealth of nations Mark II: Revised and extended estimates of foreign assets and liabilities, 1970–2004, Working paper, International Monetary Fund.
- La Porta, Rafael, Fernando Lopez deSilanes, and Andrei Shleifer, 2002, Government ownership of commercial banks, *Journal of Finance* 57, 265–301.
- Levy-Yeyati, Eduardo, and Alejandro Micco, 2003, Concentration and foreign penetration in Latin American banking sectors: Impact on competition and risk, Working paper, Inter-American Development Bank.
- Martinez Peria, Maria Soledad, and Ashoka Mody, 2004, How foreign participation and market concentration impact bank spreads: Evidence from Latin America, *Journal of Money, Credit, and Banking* 36, 511–537.
- Mian, Atif, forthcoming, Foreign, private domestic, and government banks: New evidence from emerging markets, *Journal of Banking and Finance*.
- Mian, Atif, 2006, Distance constraints: The limits of foreign lending in poor economies, *Journal of Finance* 61, 1465–1505.
- Micco, Alejandro, Ugo Panizza, and Mónica Yañez, 2004, Bank ownership and performance: Are public banks different? Working paper, Inter-American Development Bank.
- Moreira, Marcelo J., 2003, A conditional likelihood test for structural models, *Econometrica* 71, 1027–1048.
- Nickell, Stephen J., 1981, Biases in dynamic models with fixed effects, *Econometrica* 49, 1417–1426.
- Sapienza, Paola, 2002, The effects of banking mergers on loan contracts, *Journal of Finance* 57, 1891–1921.
- Schneider, Friedrich, 2005, Shadow economies of 145 countries all over the world: Estimation results over the period 1999 to 2003, Working paper, University of Linz.
- Schulz, Heiner, 2006, Foreign banks in Mexico: New conquistadors or agents of change? Working paper, University of Pennsylvania.

- Stein, Jeremy, 2002, Information production and capital allocation: Decentralized versus hierarchical firms, *Journal of Finance* 57, 1891–1921.
- Stock, James H., and Motohiro Yogo, 2005, Testing for weak instruments in IV regressions, in James H. Stock and Donald W. L. Andrews, eds.: *Identification and Inference for Econometric Models: A Festschrift in Honor of Thomas Rothenberg* (Cambridge University Press, Cambridge).
- Windmeijer, Frank, 2005, A finite sample correction for the variance of linear efficient two-step GMM estimators, *Journal of Econometrics* 126, 25–51.

Mergers and Acquisitions of Financial Institutions: A Review of the Post-2000 Literature

Robert DeYoung · Douglas D. Evanoff ·
Philip Molyneux

Received: 30 June 2009 / Accepted: 1 July 2009 /
Published online: 24 July 2009
© Springer Science + Business Media, LLC 2009

Abstract This paper provides a review of the recent financial institution mergers and acquisition (M&A) literature covering over 150 studies. Several robust themes emerge in the post-2000 literature. North American bank mergers are (or can be) efficiency improving, although the event-study literature presents a mixed picture regarding stockholder wealth creation. In contrast, European bank mergers appear to have resulted in both efficiency gains and stockholder value enhancement. There is robust evidence linking high CEO compensation to merger activity and strong implications that deals can be motivated by the desire to obtain ‘too-big-to-fail’ status and reap the associated subsidies. Evidence on the impact of both geographic and product diversification via merger is mixed. There is growing evidence that financial institution M&As can adversely impact certain types of borrowers, depositors, and other external stakeholders.

Keywords Banks · Financial institutions · Literature review · Mergers and acquisitions

JEL G21 · G34

This paper has benefited from valuable insights from a large number of individuals. We would particularly like to thank Robert Adams, Yener Altunbas, Rym Ayadi, Santiago Carbo, Barbara Casu, Ken Cyree, Franco Fiordelisi, Regina Frank Claudia Girardone, John Goddard, Ken Jones, Ximo Maudos, David Marquez, Fabio Panetta, Evren Ors, Fotios Pasiouras, Klaus Schaek, Jon Williams and John Wilson. All remaining errors, as usual, rest with the authors.

R. DeYoung (✉)
University of Kansas, Lawrence, KS, USA
e-mail: rdeyoung@ku.edu

D. D. Evanoff
Federal Reserve Bank of Chicago, Chicago, IL, USA

P. Molyneux
Bangor University, Bangor, Wales, UK

1 Introduction

The firms that comprise the global financial system have been consolidating since the 1980s and are likely to face further re-structuring in the aftermath of the recent crisis in financial markets. The number of financial services firms has declined significantly in recent years and the typical surviving firm is larger, more diversified, and operates in more places than ever before. The broad forces promoting this consolidation are well-known and have been documented in a number of review articles, e.g., Berger et al. (1999), Dymski (1999), Group of Ten (2001), Amel et al. (2004), and Jones and Critchfield (2005). Industry consolidation occurred primarily as a result of financial and technological innovation that altered the optimal production functions of financial firms. The enabling force was a wave of financial deregulation that was necessary for banks and other financial services to take full advantage of the new production processes. Technological advances revolutionized back-office processing, front-office delivery systems, and payments systems (Berger 2003; Humphrey et al. 2006). Financial innovations included but were not limited to financial engineering and new risk management tools, larger and more sophisticated derivatives markets (e.g., asset-backed securities, credit default swaps), and the ability of large and mid-sized businesses to float their own debt securities. These innovations have drastically changed the competitive and strategic conditions faced by financial firms (Frame and White 2004; DeYoung 2007a, 2007b). The changes in deregulation that followed allowed commercial banks and other financial services firms to expand—almost always via mergers and acquisitions (M&As)—into geographic markets and product markets that were previously off-limits.

Despite general agreement on the broad forces driving consolidation and M&As in the financial sector, there is little consensus regarding this consolidation on industry performance. For example, the extant literature provides no consistent evidence regarding whether, on average, the participating financial firms benefit from M&As, whether the customers of these firms benefit, or whether societal risks have increased or decreased as a result of this activity. While these mixed findings could reflect the different methodologies used in previous studies, we believe it is more likely that the high incidence of contradictory findings results from the time period being studied. Much of the extant literature examined M&A data at early stages in the industry consolidation process, mainly from the mid-1980s through the mid-1990s, and as a result may have been observing disequilibrium or pre-equilibrium phenomena. The data in Figs. 1, 2, 3, 4, and 5 illustrate this point. In terms of aggregate dollars, the annual value of deals that combined commercial banks, insurance companies, or firms from different industry segments did not peak until the late 1990s in either the U.S. or in Europe. Additionally, the data suggest that the annual value of deals that combined securities firms, or financial services firms across international borders, has not yet peaked.

The aim of this paper, therefore, is to provide a substantive update of the previous literature reviews on financial sector consolidation, focusing primarily on the post-2000 literature. The paper is structured as follows. Section 2 discusses the influence of M&As on financial firm performance, including evidence from market reaction (event studies), analysis of efficiency frontiers, and standard accounting (performance) ratios. Section 3 focuses on merger motives other than shareholder value maximization, such as the pursuit of managerial utility and/or the financial benefits of becoming a ‘too-big-to-fail’ financial institution. Section 4 analyzes the recent evidence on the substantial diversification of financial firms across financial sectors, domestic markets, and international markets, which has been achieved mainly via M&As. Section 5 discusses the impact of financial M&As on borrowers, depositors, and other external stakeholders. Section 6 concludes.

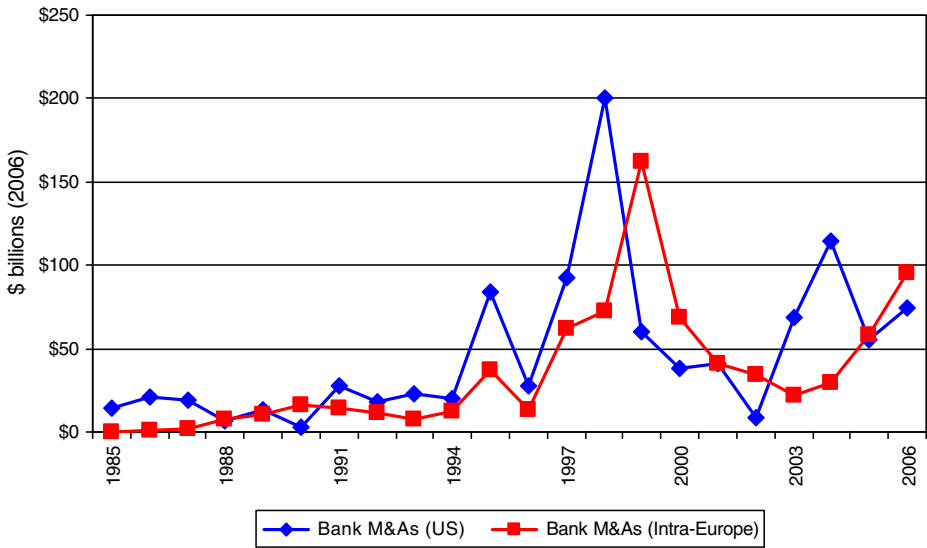


Fig. 1 Consolidation of banks

2 The financial performance of merging firms

Financial gains generated by M&As emanate from one of two sources: improvements in operational efficiency or increases in market power. Merger-induced improvements in operational efficiency can be tested directly by comparing pre- and post-merger levels of simple accounting ratios or more complicated frontier-based (cost or profit) efficiency

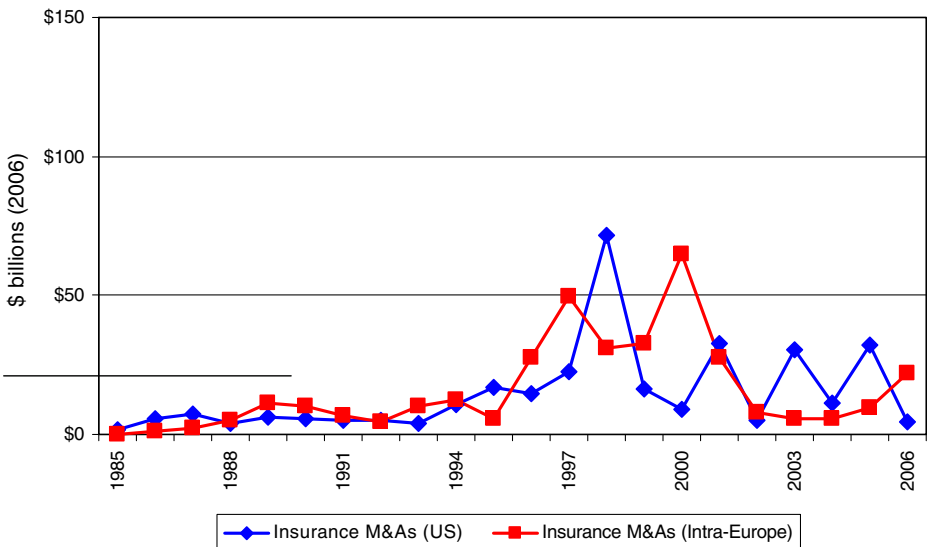


Fig. 2 Consolidation of insurance companies

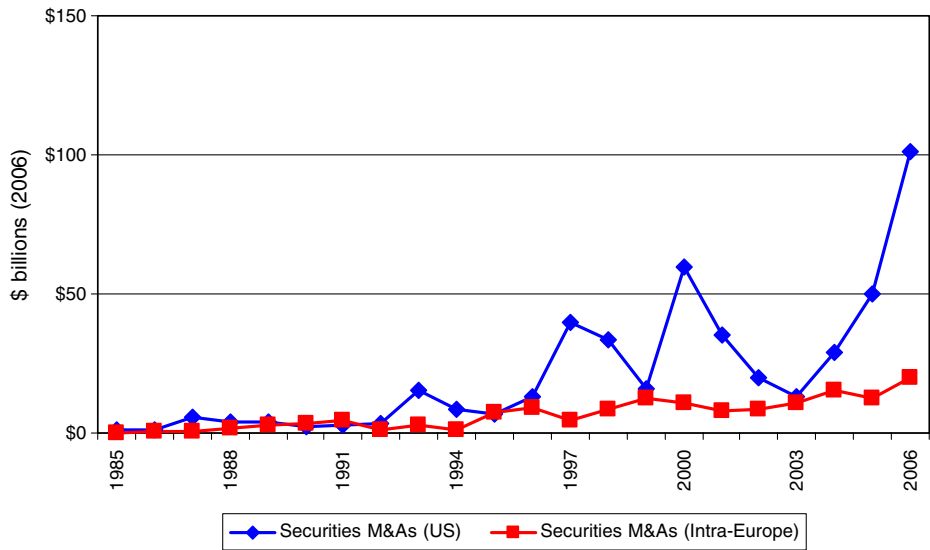


Fig. 3 Consolidation of securities firms

measures. The consensus view regarding mergers of financial institutions (mostly commercial bank mergers) during the 1980s and early 1990s is that accounting ratio, cost efficiency, and (although less studied) profit efficiency improvements were elusive.¹ Another strand of the literature takes a more comprehensive approach and uses ‘event-study’ methodology to gauge the stock or bond market reaction to M&A announcements. In these studies, the combined effects of the abnormal returns to acquiring and target firm shareholders in reaction to the merger announcement reflect the market’s perception of the value created or destroyed by the merger, where the abnormal return is the amount by which an actual stock price exceeds the stock price predicted by an asset-pricing model. One problem with this approach is that the source of any value creation cannot be easily identified, and must be teased out of the data using a second-stage statistical procedure—for example, positive abnormal returns could be the result of either greater market power or improved efficiency.

The consensus view regarding event studies of bank M&As in the 1980s and 1990s is that, on average, target shareholders earned strong positive abnormal returns, bidder stockholders earned marginally negative returns, and the combined abnormal returns were statistically insignificant or economically trivial (e.g., Houston and Ryngaert 1994, Hudgins and Seifert 1996, Pilloff 1996, Subrahmanyam et al. 1997).² However, results from M&A performance studies published since 2000 diverge from this pre-2000 consensus. In general, the recent literature suggests that both North American and European bank mergers are

¹ Again, see Berger et al. (1999), Dymksi (1999), Group of Ten (2001), Amel et al. (2004), and Jones and Critchfield (2005).

² A consensus does not imply unanimity. Kwan and Eisenbeis (1999) concluded that bank M&As during the 1990s did create value for shareholders. Kane (2000) found that acquiring stockholders in U.S. bank ‘mega-mergers’ earned positive abnormal returns, and argues that this may be a consequence of access to greater market power and/or regulatory subsidies flowing to TBTF firms.

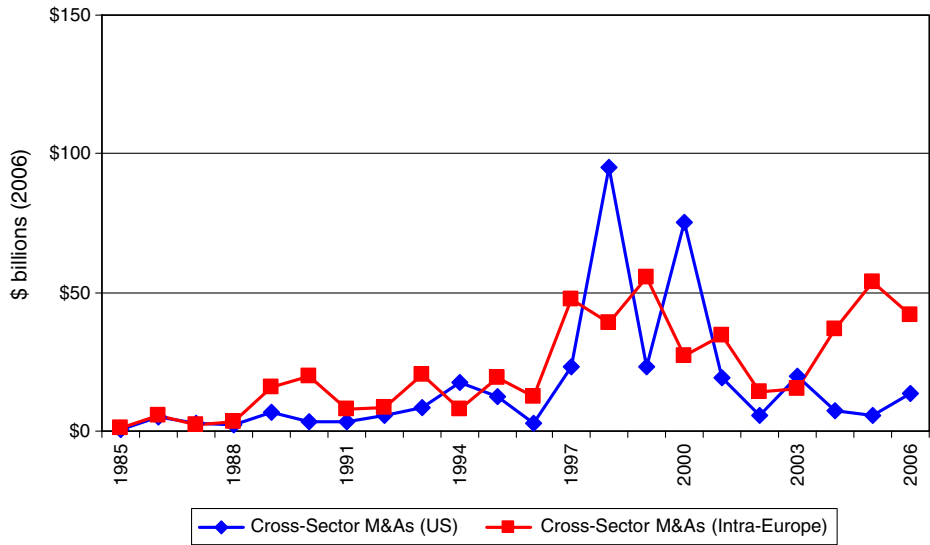


Fig. 4 Cross sector financial firm consolidation

efficiency improving, but only European bank deals have resulted in stockholder value enhancement.³

2.1 Post-merger performance in the U.S.

The most unambiguous evidence of merger-induced financial gains in the U.S. comes from firm's financial statements: either straight ratio analysis or efficiency frontiers derived from financial statement information. For instance, Kwan and Wilcox (2002) found evidence of significant cost reductions in their study of U.S. bank mergers during the 1990s, but only after adjusting the data for merger accounting rules. Consistent with this, Knapp et al. (2006) found that bank holding company (BHC) mergers between 1987 and 1998 generated substantial profit gains up to five years post-merger, after adjusting annual BHC profits to the average industry trend (otherwise known as profits mean reversion). Cornett et al. (2006) found evidence of revenue efficiency improvements for large mergers, product-focused mergers, and geographical focused mergers. Hannan and Pilloff (2006) used a hazard function approach to examine the features of acquired banks between 1996 and 2003 and show that cost-efficient banks tend to acquire their more inefficient counterparts; this finding suggests the existence of potential post-merger performance gains.⁴ In the only recent study looking at post-merger market share gains, Berger and Dick (2007) found that large BHCs that entered new local markets between 1972 and 2002 were better able to maintain the target banks' market share if they were an early entrant into that market and/or

³ The event study methodology is not without its critics. Becher (2009, 2000) argued that event 'windows' are difficult to identify and are often too narrowly defined as mergers are anticipated by the market well before they are announced publicly.

⁴ The earlier literature found potential efficiency gains [see Rhoades (1993), Shaffer (1993), Kohers et al. (2000)], but little evidence that these potential gains were typically realized [see Berger and Humphrey (1992), Linder and Crane (1993) and Focarelli et al. (2002).]

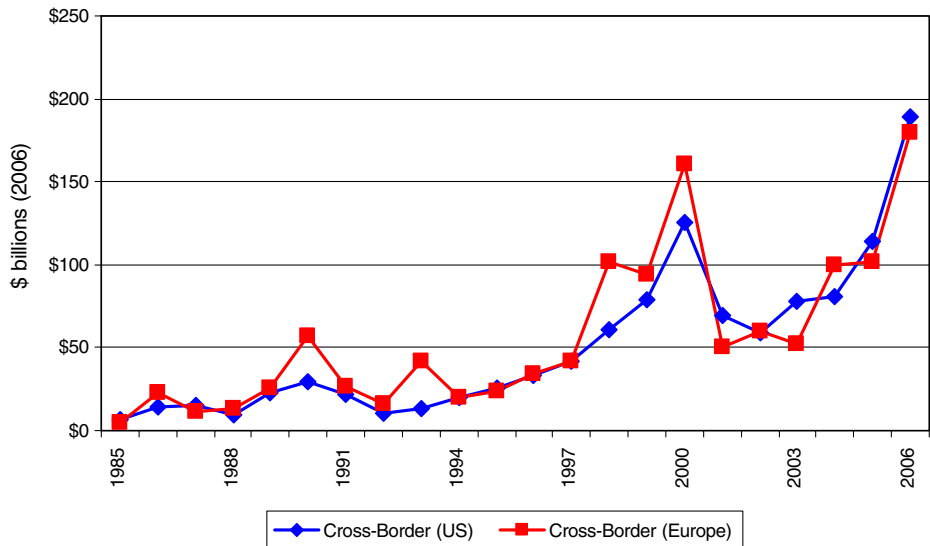


Fig. 5 Cross border M&As

had a recognized brand image. Hagendorff and Keasey (2009) used accounting data to compare bank M&As in the U.S. and Europe between 1996 and 2004 and find that U.S. banks tend to focus on revenue generation post-merger although this does not result in improved performance as costs increase.

Performance gains may extend well beyond the merging firms. Evanoff and Örs (2008) argued that merely evaluating the impact of a merger on the combining parties may miss much, if not most, of the overall impact of that merger. Following but substantially extending work by DeYoung et al. (1998), they evaluated the response of non-merging incumbent banks in markets where consolidation occurred; their findings suggest that the incumbent banks made significant efforts to remain viable in the new post-merger competitive environment. Incumbents significantly improved their efficiency following M&As, with the most significant improvements coming in markets where the potential for improvements was greatest, e.g., in markets initially characterized by significant market power. They conclude that the literature may be overlooking the most significant welfare-enhancing aspect of merger activity.

Studies that examine the reactions of stock and bond prices to bank merger announcements tend to yield more mixed results. Houston et al. (2001) failed to find conclusive evidence that mergers create value for large bank deals between 1985 and 1996. Knapp et al. (2005) found negative returns to shareholders in large bank deals between 1987 and 1998, as well as reductions in post-merger profits, credit quality, and fee income. DeLong (2001) noted that focused bank deals—that is, deals in which the merging banks practice similar strategies with respect to product offerings or geography—enhance stockholder value by around 3.0%, but non-focused bank mergers do not create value. Becher and Campbell (2005) found different effects for focused deals before and following geographic deregulation (Riegle-Neal Act). In the earlier period they found that geographically focused mergers were value-enhancing with significant abnormal returns, more so than mergers which expanded the acquiring bank's geographic footprint. However, in the post-deregulation period focused mergers showed less success than expanding mergers. These

findings may indicate that it became more difficult to acquire market power via merger after deregulation, when the threat of potential entry kept downward pressure on profit margins.

Stakeholder gains have been linked to a wide range of market and firm-specific factors. Brewer et al. (2000) found that bank takeover premiums tended to be higher for more profitable banks. Penas and Unal (2004) found evidence of bondholder gains due to reduced post-merger cost of debt. Henock (2004) finds that takeover speculation (as opposed to an actual acquisition) yields significant returns to bank shareholders, while ‘defensive’ acquisitions designed to prevent takeovers destroy shareholder value. Olson and Pagano (2005) identified shareholder gains related to the pre-merger ‘sustainable’ growth rate (that incorporates bank’s return on assets, dividend payout, and equity capital ratio) of the acquirer. DeLong and DeYoung (2007) found positive abnormal returns to bank merger announcements that dissipate rather quickly; perhaps more importantly, they find that these short-run market reactions, as well as the longer run financial performance of the merged banks, are positively related to the number of mergers that took place in the years prior to the deal announcement. Their conclusion that M&As generate spillover knowledge that is exploitable in later M&As—which they characterize as ‘learning-by-observing—is consistent with the generally mediocre financial performance of early bank M&As in the U.S. during the 1990s and the generally improved financial performance of European bank M&As that occurred later on during the 2000s.

Evidence on non-bank financial institution mergers in the U.S. is rather scarce. Adams et al. (2002) found significant and positive scale economies in the provision of electronic payment processing services by the Federal Reserve (Fedwire, ACH, and book-entry securities). Jayaraman et al. (2002) studied U.S. mutual fund mergers between 1994 and 1997 and found that target fund shareholders experienced positive abnormal gains, acquiring funds experienced negative abnormal losses, and poor past fund performance increases the likelihood of acquisition for certain types of funds. Bauer et al. (2009) use an event study approach to investigate utility gains relating to credit union mergers between 1994 and 2004 and find evidence of gains to the owners/members of target credit unions and to the regulators, but not to the acquirers.

2.2 Post-merger performance outside the U.S.

A large volume of studies in recent years on European bank mergers provides compelling evidence of performance improvements. Huizinga et al. (2001) examined 53 European bank M&A’s between 1994 and 1998 and found evidence of cost efficiency improvements and positive, but relatively small, profit efficiency gains. Other pan-European studies find efficiency or/and profit gains post merger (Diaz et al. 2004; Kapopoulos and Siokis 2005; Campa and Hernando 2006; Altunbas and Marques 2008; Fritsch 2007; Hagendorff and Keasey 2009; Beccalli and Frantz 2009). These studies also suggested that focused deals in which the merging banks practice similar strategies (Altunbas and Marques 2008) as well as bank-to-bank mergers (Diaz et al. 2004) tend to perform better in terms of efficiency and profit performance. Other studies find that post-merger profit improvements can take a while to appear (Diaz et al. 2004; Campa and Hernando 2006). De Guevara et al. (2005) suggested that measured efficiency gains at the bank level may be masking harmful effects at the market level; in their study of market power in EU banking (using the Lerner index) they find that consolidation drove down marginal costs faster than output prices, suggesting an increase in market power.

Evidence from single-country studies tends to confirm the findings from the pan-European studies. Resti and Siciliano (2001) examined post-merger accounting perfor-

mance, as well as shareholder wealth effects, for a sample of Italian bank mergers between 1992 and 1997; they find that profits improve post-merger. Similar effects were found by Carbó and Humphrey (2004) who used a variety of estimation approaches (translog, Fourier, and cubic spline cost functions) to predict scale-related cost effects from 22 mergers involving Spanish savings banks between 1986 and 2000. They found that unit costs fall by 0.5% post-merger, boosting returns by about 4%. Similarly, De Guevara and Maudos (2007) determined that the cost efficiency of Spanish banks improved between 1986 and 2002 during a period of consolidation, due largely to declines in marginal costs. Humphrey and Vale (2004) examined the cost efficiency features of Norwegian banks (using the cubic spline approach) between 1987 and 1998 and found evidence of cost improvements resulting from mergers. To put these gains in perspective, the authors noted that the merger-induced cost improvements were not as large as those obtained when banks switched from paper-based to electronic payments systems. Koetter (2005) found that only about half of German bank mergers during the 1990's were successful in improving cost efficiency, and that these cost efficiency gains took up to seven years to fully materialize. Behr and Heid (2008) found evidence of cost (but not profit) efficiency improvements in German bank deals between 1995 and 2000. Ashton and Pham's (2007) analysis of 61 UK bank mergers between 1988 and 2004 found efficiency improvements on average, but little evidence that cost savings were generated by reductions in retail deposit rates. In contrast, Carbó et al. (2003) found that mergers of Spanish savings banks had no impact on efficiency; costs at merging savings banks rose at the same rate as the (non-merging) industry average over the 1986 to 1998 period. Cummins and Misas (2001) found that insurance company mergers in Spain between 1989 and 1998 resulted in productivity improvements.

A more limited number of studies examine shareholder wealth effects in European bank mergers, and these present a general picture of positive value creation. Cybo-Ottone and Murgia (2000) studied 54 relatively large European bank mergers (assets in excess of \$100 billion) between 1989 and 1997. They found positive abnormal returns for in-country mergers of banks and insurance companies, as well as for in-country bank-to-bank deals, but found no efficiency gains for mergers of banks with securities firms or mergers of institutions from two different countries. Resti and Siciliano's (2001) event study analysis of Italian bank mergers between 1992 and 1997 also found positive shareholder wealth effects. Beitel et al. (2004) used a sample of 98 large European bank mergers from 1985 to 2000 to investigate the drivers of excess returns. Overall, the results indicate positive cumulative abnormal returns for the combined bidder and target shareholders. They also note that more than 60% of all transactions were value creating. Positive wealth effects were found to be greater for non-diversifying transactions, when acquirers engaged in fewer M&A transactions, and when the target exhibited poor past stock performance. Campa and Hernando (2006) examined 244 European bank M&As between 1998 and 2002 and investigated both shareholder value effects as well as pre-and post merger profits and efficiency. They found evidence of positive abnormal returns to target shareholders, and significant improvements in the target bank's financial performance around two years following the completion of the transaction, with no significant influence on bidder's stock prices. Schmutz (2006) found that the gains for target shareholders outweigh the losses for bidders in cross-border deals involving European, U.S., and also found that the acquired banks were relatively cost efficient. Lepetit et al. (2004) and Ekkayokkaya et al. (2009) both used event study approaches to examine bidder returns involving European bank M&As; the former study found positive abnormal returns for bank/non-bank deals, while the latter study found more value enhancement for bank-to-bank mergers prior to the adoption of the euro in 1999.

There is also some evidence of merger-induced performance improvements outside of the U.S. and Europe. A study of hypothetical large Canadian bank mergers using data from 1976 to 1996 revealed potentially large scale economy benefits (McIntosh 2002). Hosono et al. (2006) studied Japanese bank mergers and found evidence of substantial post-merger cost and profit efficiency gains, although the capital positions of the merging banks tended to weaken.

3 Non-profit maximization motives for M&As

The fact that many earlier merger studies found little evidence of performance improvements has encouraged researchers to investigate alternative explanations for the consolidation phenomenon, paying particular attention to alternative managerial motives. There are two main arguments. First, managers may engage in M&As in order to maximize their own utility at the expense of shareholders, including objectives geared to such things as maximizing CEO remuneration, choosing a ‘Quiet Life,’ or building a personal empire (Dymski 1999; Hadlock et al. 1999). Second, managers of large financial institutions may seek growth-by-acquisition in order to attain the status of a “too-big-to-fail” (TBTF) bank. TBTF status results in an implicit government guarantee which reduces investor and creditor risk and provides a cost-of-credit advantage over smaller rivals.⁵

3.1 Utility maximization

The primary effect of a merger or acquisition is increased firm size. Managers are likely to pursue a strategy of fast growth if their pay and other benefits are linked to firm size. Large size sometimes confers market power on a firm, which can result either in higher prices and profits or to a ‘quiet life’ for managers that is free from the hassles of competition (Berger and Hannan 1998). Large size can also destroy firm value if ‘hubris’ leads managers to systematically overestimate their ability to manage a large organization, and therefore overbid for targets (Roll 1986).

Anderson et al. (2004) examined large U.S. bank mergers and found that total post-merger CEO compensation is positively related to the anticipated gains from merger (i.e., measured at the announcement date) and that post-merger CEO compensation packages are often restructured to include greater incentives for managerial productivity. Other researchers report less optimistic findings. Bliss and Rosen (2001) studied 32 large U.S. banks (over \$1 billion) and found increased CEO compensation after large mergers or rapid internal growth; however, the authors interpreted their findings as evidence of managerial empire building and suggested that these increases in compensation occur irrespective of value creation or productivity improvements. Rosen (2004) found that when CEOs can expect large compensation increases from increased size, they tend to engage in extended merger programs. Hughes et al. (2003) noted that BHCs with higher levels of managerial ownership tend to make performance-destroying acquisitions. Gupta and Misra (2007) found that acquisitions made by bank managers with value-enhancing motivations tend to have a very different impact on stockholder returns from acquisitions made by bank managers acting based on agency problems. Hagendorff et al. (2007) suggested that weak

⁵ Such efforts may actually be profit maximizing behavior, but the gains realized do not result from the standard efficiency or diversification gains associated with merger related structural changes.

governance structures may be the explanation for the typically negative abnormal returns to acquiring bank shareholders in the U.S. bank mergers of the 1980s and 1990s.⁶

Outside the U.S., there are few studies that focus on the managerial motives for bank mergers. In the case of Europe this may be because of the overriding evidence that bank mergers are indeed performance-enhancing. However, De Guevara et al. (2005) and De Guevara and Maudos (2007) suggest that, if CEO pay and market power are positively related, then lower competitive pressure following large mergers may be related to managerial motives—although as far as we are aware, this has never been tested.

3.2 Safety net subsidies and systemic risk

Given the turmoil faced in global banking systems since mid-2007 and the bailouts of large financial institutions during 2008 and 2009, it is now clear that the increased size of banking firms raises major policy concerns about bank risk and the implications for macro-economic and financial market stability. As recent experience shows, banks that grow very large are eventually viewed as TBTF or ‘too big to discipline adequately’ and may have the opportunity to exploit safety net subsidies (Kane 2000; Stern and Feldman 2004; Mishkin 2006). The literature on bank consolidation in the U.S. prior to the recent crisis expressed growing concerns about TBTF subsidies. As far as we can ascertain, no studies have examined safety net subsidy issues relating to consolidation outside the U.S.

While it is generally recognized that TBTF subsidies are difficult to evaluate (Ennis and Malek 2005), evidence from the U.S. suggests these subsidies are likely to be substantial. Shull and Hanweck (2001) argued that the 10 largest U.S. banks enjoyed advantages of TBTF implicit guarantees, because they paid less for funds than did smaller banks and operated with lower capitalization rates. Penas and Unal (2004) find that merger-related bondholder gains could be explained by banks obtaining TBTF status. Morgan and Stiroh (2005) noted that after regulatory authorities named eleven U.S. banks as TBTF in 1984, the ratings on new bond issues of these banks increased relative to other banks. In addition, they find that bond spreads at TBTF banks became less sensitive to changes in bond ratings after that event, suggesting that investors were more optimistic than credit raters about the probability of support for the TBTF banks. This condition remained flatter for TBTF banks (than other unnamed banks) post FIDICIA. Although Mishkin (2006) argued that the Federal Deposit Insurance Corporation Improvement Act of 1991 (FIDICIA) may have reduced the TBTF subsidy, Morgan and Stiroh (2005) found that the bond spreads at TBTF banks continued to be less sensitive than average to bond ratings changes even during the 1990s.

Other studies focus on the merger premium paid for large banks as an indicator of the safety net subsidy, the argument being that higher premiums will be paid for banks that have implicit bailout guarantees. Schmid and Walter (2009) examined large conglomerate deals between 1985 and 2004 and find that significant premiums are paid in mega-conglomerate (\$100 billion plus) deals. Brewer and Jagtiani (2007) also found higher premiums for targets banks over a critical size. Jones and Oshinsky (2007) examined the probability of insolvency for the FDIC-administered Bank Insurance Fund; they find that fund insolvency risk has increased over time and that the size of the ten largest banks now poses a higher fund insolvency risk than in the past.

⁶ On perhaps a more positive note, there is some evidence that managers do not take account of insider information about bank M&As. Madison et al. (2004) find that target bank insiders significantly decrease both share purchases and share sales prior to merger announcements.

Closely related to the arguments linking consolidation to safety net subsidies are those that examine systemic risk, an area of on-going concerns in global banking systems. Systemic risk can be defined as the risk that the insolvency of one large or otherwise important financial institution might cause financial losses and insolvencies at other financial institutions, with the end result being a system-wide financial panic and potential macroeconomic disruption. De Nicolo and Kwast (2002) examined the correlations of stock returns (net of diversification effects) for a sample of large and complex U.S. banking organizations over 1988 to 1999 and found that correlations had increased, although the specific impact from consolidation appeared to have fallen in the latter half of the 1990s. They argued that systemic risk may have increased but not particularly as a result of the consolidation trend. Trends in international consolidation and conglomeration are also likely to increase risks for large complex financial firms (De Nicolo et al. 2003). D'Souza and Lai (2006) showed that financial sector consolidation can influence the amount of liquidity in money markets, and that the extent of this influence depends on the post-merger allocation of capital within merging firms.

A limited number of recent studies have examined systemic risk issues in European banking, although none of them directly examined the impact of bank M&As. Dermine (2006) reviewed recent regulatory developments in European banking and discusses concerns over large banks and the potential bailout costs. Uhde and Heimeshoff (2009) examined concentration and risk issues using a large sample of EU-25 banks between 1997 and 2005, and found that both bank profitability and the probability of bank insolvency are positively related to banking sector concentration. Baele et al. (2007) used a stock-return model to examine franchise value, systematic risk, and idiosyncratic risk at European banks between 1989 and 2004. They found that increased levels of non-interest income boosts franchise values but also increases systematic risk, suggesting that bank returns have become more highly correlated with the market over time.

4 Diversification

Greater geographical and product diversification has accompanied the financial sector consolidation trend. The Gramm-Leach-Bliley (GLB) Act 1999 (also known as the Financial Services Modernization Act) effectively repealed the Glass-Steagall Act of 1933 and granted broad-based securities and insurance powers to commercial banking companies in the U.S. Japan's 'Big-Bang' reforms (also completed in 1999) removed the separation between commercial and investment banking. The 1992 EU Single Market Program also legislated for a universal banking system. By 2000, therefore, all major financial systems had removed the primary product-based barriers in the financial services sector (although combining 'banking' with 'commerce' remains for the most part restricted). Acquisition has been the preferred approach for U.S., European and Asian financial institutions to expand into new financial areas; it is faster than growing the new franchise internally and it delivers needed expertise and human capital not already present in the acquiring firm.

Geographic restrictions to branch banking had been removed several years earlier in most countries. The Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 repealed the McFadden Act of 1927 (which had long prohibited nationwide branching in the U.S.) and resulted in the highest-ever five-year run of bank mergers in the country's history, measured in both the number and the value of the banks acquired (Berger et al.

2004b).⁷ Brewer et al. (2000) found that merger premiums increased by around 35% during this period. Similar geographic deregulation occurred in Italy and Spain in 1992—after which the number of domestic mergers and new bank branches grew significantly (ECB 2000)—and a surge of cross-border M&A activity followed the implementation of the Single Market Program in Europe.

Expanding into new geographic markets or new product lines has the potential to generate an improved risk-return tradeoff via diversification. The early literature tended to find that diversification, whether geographical or product, did lead to reductions in risk; however, there is also evidence that banks consumed these positive benefits by shifting to higher risk portfolios, income streams, and banking practices (Berger et al. 1999; Group of Ten 2001). As we shall see below, the more recent literature tends to confirm these findings. Deregulation has also had a material influence on the market for financial institutions M&As. Colombo and Turati (2004) found in Italy that competition in local market increases the likelihood of M&A (as do higher loans-to-deposits ratios). Other European bank studies such as Bikker and Haaf (2002), Weill (2004) and Casu and Girardone (2006) have found mixed results, while the U.S. literature has tended to find increases in merger activity related to deregulation; for example, Brewer et al. (2000) found that deregulation boosts bid premiums for target banks.

As banking systems have been deregulating, it needs to be borne in mind that the regulatory approval process (e.g., antitrust, community reinvestment) can act as a constraint on bank merger activity (Wheelock and Wilson 2004). The regulatory process for mergers, as shown by Carletti et al. (2007a) study of international bank deals between 1987 and 2004, illustrates that having less-transparent rules governing both competition and the supervision of bank mergers is associated with higher market returns from M&As.

4.1 Product diversification

Because regulations have long prevented financial institutions from diversifying across product lines, a handful of mainly U.S. studies have attempted to forecast the potential diversification gains from hypothetical combinations of banks and nonbank financial firms. Lown et al. (2000) and Estrella (2001) both found the potential for risk-reducing diversification benefits in hypothetical combinations of banking companies with insurance providers. Allen and Jagtiani (2000) found that hypothetical diversification of banking companies into insurance and/or securities businesses reduces overall firm risk but increases systematic market risk, and concluded that diversification benefits are insufficient to justify the expansion of banks into these areas. Wall et al. (2007) analyzed the potential for diversification benefits by combining banking services with various nonfinancial activities; they found the potential for significant risk-return improvements from combining firms from the banking sector with firms from the construction, retail, or wholesale sectors.

One obvious weakness of studying hypothetical merged firms is the inability to observe the cash flow synergies (either positive or negative) that would occur in actual merged firms. Rime and Stiroh (2003) found no evidence of scope economies (or scale economies) at large banks, and no evidence of cost efficiencies at any banks, in their study of product diversification acquisitions made by Swiss banks between 1996 and 1999. Studying German banks, Hayden et al. (2006) found no gains from diversification into non-bank

⁷ See DeYoung (2007b) for a detailed analysis of the recent evolution of the U.S. banking system.

financial products, but they did find evidence of diversification benefits from expansion into non-financial/commerce areas.

Another strand of the product-diversification literature uses stock return event studies. Results from recent studies have been mixed. Hendershott et al. (2002) studied the market reaction to the Gramm-Leach-Bliley Act of 1999, and concluded that benefits from diversification into new product lines are more likely to accrue to non-bank financial firms than to banking firms. They found that insurance firms and investment banks experienced positive market reactions to the new law, whereas the stock prices of commercial banking companies were left statistically unaffected. Cornett et al. (2003) found that bank mergers that increased the product line focus (as well as the geographic focus) of the acquiring bank resulted in significantly higher stock market reactions, a finding confirmed by DeLong (2003).

Researchers have examined a wide range of other phenomena related to product-diversification mergers. Drucker (2005a, 2005b) looked at the potential for conflicts of interest in commercial bank/investment bank mergers. He found that rates paid on high-yield debt (junk bonds) increased post-merger when bank borrowers have only one lender, which suggests that banks exploit such relationships. Similarly, Kang and Liu (2007) found that Japanese banks tended to discount corporate bond issues after they entered the securities market. Cornett et al. (2002) examined U.S. bank holding company adoption (mostly via acquisition) of Section 20 investment banking subsidiaries during the 1990s, and found improved cash flow performance for these companies. Ely and Robinson (2004) showed that small U.S. banks that also operate securities affiliates make fewer loans to small businesses. Slijberman et al. (2005) concluded that reductions in downside risk occur when large U.S. and European banks diversify into insurance. Stiroh and Rumble (2006) found that U.S. bank expansion into non-interest income between 1997 and 2002 generated diversification benefits, but that these benefits were generally offset by the volatility of these new income streams. Others, such as Fecht and Grüner (2006) and Carletti et al. (2007b) have presented theoretical models to illustrate how liquidity shocks can limit the benefits of diversification. Finally, some studies have found substantial conglomerate discounts in financial services firms (Schmid and Walter 2009 for U.S. firms; Laeven and Levine, 2007 for banks operating in 43 countries) while others have not (Elsas et al. 2006 for U.S. and European banks; and van Lelyveld and Knot 2009 for European bank-insurance conglomerates).⁸

4.2 Geographic diversification

Financial institutions have tended to expand domestically before leaping across international borders. Hence, much of the earlier literature on geographic expansion examined domestic M&As, while more recent studies have examined cross-border M&As. The recent literature on cross-border mergers involving U.S. and European banks tends to find little or no evidence of cost efficiency improvements (Berger et al. 2001; Vander Venet 2002), although there is some evidence of improvements in profit efficiency and accounting returns (Vander Venet 2002; Elsas et al. 2006). Cross-country European bank merger studies have also yielded mixed results. Beitel et al. (2004), for example, found that focused mergers do better than diversifying mergers in terms of returns to stockholders, whereas

⁸ While van Lelyveld and Knot (2009) do not find evidence of a universal diversification discount they do find substantial variation around the mean valuation of European bank-insurance conglomerates, with (among other things) discounts tending to be larger for bigger conglomerates.

Lepetit et al. (2004) and Ekkayokkaya et al. (2009) found the opposite result. Buch et al. (2005) compared actual versus optimal cross-border portfolios for banks in France, Germany, the UK, and the U.S between 1995 and 1999; they concluded that banks over-invest domestically and therefore could realize potential diversification gains from further international expansion.⁹

A handful of recent studies have examined the impact of geographic expansion within the U.S. Emmons et al. (2004) examine two aspects of hypothetical mergers between actual U.S. commercial banks: increased bank size and increased geographic scope. They found that mergers between small community banks located in different geographic markets reduced risk by no more than mergers of similar-sized banks located in the same market. Berger and DeYoung (2001, 2006) found that the greatly increased geographic footprints of U.S. bank holding companies due to industry consolidation resulted in managerial difficulties that reduced operational efficiency. However, they also found that technological advancement has gradually reduced the importance of these inefficiencies over time. Because geographic expansion inevitably leads to multi-market contact, there is some concern that competitive rivalry may diminish as banking companies enter each others' home markets, and allow the 'home bank' to dominate and drive prices, i.e., mutual forbearance. Cohen (2004) presented a model suggesting that banks and thrifts do not compete in segmented markets, whereas a study by Adams et al. (2007) suggested the opposite.¹⁰

A large related literature examines the determinants of cross-border banking, which is usually accomplished via acquisition. Generally, these studies have found that large efficient banks (from developed financial systems) are more likely to be engaged in overseas expansion (Berger et al. 2000; Focarelli and Pozzolo 2001a, 2001b; Buch and DeLong 2004; Berger 2007; Havrylchyk and Jurzyk 2007; Buch and DeLong 2003; Hernando et al. 2009; Correa 2009). The reasons for bank and insurance firm expansion within Europe appear to be similar (Pozzolo and Focarelli 2007).

For banks considering entry into new markets via acquisition, selecting the best target banks is an important consideration. Wheelock and Wilson (2004) used a cross-sectional approach to examine 890 U.S. bank mergers between 1984 and 1993 and found that efficient banks are less likely to be acquired. Consistent with these findings, Akhigbe et al. (2004) showed that the chances of a U.S. bank being acquired is higher if the bank is large and/or relatively less profitable, while an earlier study by Wheelock and Wilson (2000) found that banks with lower capital ratios are more likely to be acquisition targets. Collectively, these studies suggest an efficient market for corporate control. Studies of European bank mergers also find that poorly performing banks are more likely to be acquired. Beitel et al. (2004) and Pasiouras et al. (2007) showed that targets are less cost- or profit-efficient than acquirers on average. Focarelli et al. (2002) found that the targeted banks in Italian bank acquisitions have relatively poor credit management, and that the M&As tend to result in improved credit allocation and loan portfolio quality. However, some studies generate conflicting evidence. Valkanov and Kleimeier (2007) examined large bank deals in the U.S. and Europe between 1997 and 2003; they found little difference in the capital strength of European banks engaged in M&A activity, and also that U.S. target banks tend to be more highly capitalized than their acquirers. In a study of distressed and

⁹ Francis et al. (2008) also find positive cross-border wealth effects for deals involving U.S. non-banks during the 1990s to the early 2000s.

¹⁰ See also Cohen and Mazzeo (2004) and Hannan and Prager (2004).

non-distressed German bank mergers, Koetter et al. (2007) found that the financial performance of banks engaging in M&As is poor relative to regulator-ratings. Similar results were found by Hosono et al. (2006) for Japan, where cost- and profit-inefficient banks were most likely to engage in M&A activity. Goddard et al. (2009) use a hazard function approach to investigate consolidation in the US credit union industry between 2001 and 2006. They find that the hazard of acquisition is inversely related to asset size and profitability. Credit unions that were more liquid, and those that had no Internet presence, were more likely to be acquired.

5 External effects of M&As

A substantial literature has investigated the impact of industry consolidation on bank customers. Early U.S. studies tended to find that consolidation in the 1980s resulted in market power effects, with lower deposit rates and higher loan rates in more concentrated markets, although studies using 1990s data found weaker relationships between local market concentration and deposit rates (Shull and Hanweck 2001). There is also considerable evidence that large banks, and especially merging banks, allocate a lower proportion of their assets to small business loans compared to small banks, although these adverse effects appeared to be offset by an increased flow of credit to small businesses from small incumbent banks (Berger et al. 1998; Berger et al. 1999). Overall, the pre-2000 literature suggests that the impact of bank mergers on both the price and availability of banking services is relatively modest.

5.1 The price and availability of business credit

Recent studies have focused predominantly on the influence of bank mergers on the price and availability of small business credit. These studies have been driven not only by the desire to understand the market power effects from mergers, but increasingly by an interest in relationship lending and the role of soft and hard information processing in banks' credit decisions (Stein 1998; Boot 2000; Boot and Thakor 2000). A stylized fact has emerged that small banks rely on soft information to construct enduring bank-borrower relationships, while large banks tend to rely more on hard information to write loans that are securitizable or otherwise saleable in secondary markets (DeYoung et al. 2004). For example, Cole et al. (2004) found that large banks tend to base their small business lending decisions more on financial ratios than on prior lender-borrower relationships, while small banks rely more on the character of the borrower in making lending decisions. Like all stylized facts, this dichotomy is only an approximation of reality: Berger and Black (2008) and Uchida et al. (2006) point out that small banks also use a variety of hard information sources to make business loans, such as collateral, spreadsheet analysis of audited financial statements, etc.

The recent evidence on the net effects of bank M&As and market consolidation on credit availability is mixed. Some studies have found that consolidation has reduced credit availability for small borrowers (Craig and Hardee 2007) and capital constrained firms (Carow et al. 2006), while other studies have found that these market power effects can vary depending on the specific product in question (Park and Pennachi 2007). A study of the Italian banking system found that bank mergers have a substantial adverse effect on small business credit availability that lasts at least three years after the merger (Bonaccorsi di Patti and Gobbi 2007); another study found similar results for Spanish bank mergers (Montoriol-Garriga 2008). However, other studies have found little difference in the small

business lending behaviour of small and large banks (Berger et al. 2007). Francis et al. (2008) found that mergers between large banks reduce small business formation in local U. S. markets for two years after the merger, while small- to medium-sized bank deals boost business creation. In their study on small firm banking relationships in selected European regions Mercieca et al. (2009) find that concentration reduces the number of banking relationships, implying that consolidation may encourage small companies to have fewer banking links. Marsch et al. (2007) found that consolidation in German banking has no impact on small firm credit availability.

Similar mixed or neutral findings have been generated in studies that examine third-party responses to bank mergers. Avery and Samolyk (2004) found that the post-merger decline in lending to small business in the U.S. tends to be matched by increased credit from other incumbent (local, non-merging) banks. Berger et al. (2004a) found a similar increase in post-merger credit supplied by alternative sources including newly chartered banks.

Hauswald and Marquez (2006) developed a theoretical model to show that mergers enable banks to acquire proprietary information, and they use that information to both soften lending competition and grow their market share. They argued that as competition increases, investment in information acquisition declines, which leads both to lower loan rates and inefficient lending decisions. These findings are partially supported by Ogura and Uchida's (2007) study of Japanese bank consolidation, which found that mergers of small banks reduce their ability to acquire soft information; the authors did not find this to be the case for larger bank combinations.

Whether credit availability declines or holds steady in the aftermath of bank mergers, the bulk of the evidence suggests that credit becomes more expensive. Calomiris and Pornrojngangkool (2005) examined the specific case of a merger between two U.S. banks (Fleet and BankBoston) and found higher post-merger spreads for medium-sized mid-market borrowers, but no change in post-merger spreads for small-sized mid-market borrowers. Garmaise and Moskowitz (2006) found that U.S. bank mergers typically do result in higher loan rates.¹¹ Sapienza (2002) examined Italian bank mergers between 1989 and 1995 and found that target bank borrowers faced lower loan rates following M&As, but this effect attenuated for larger target banks. Montoriol-Garriga (2008) found that Spanish businesses that manage to maintain their lending relationship after their banks are acquired benefit from reduced loan rates, especially if the merger is between two large banks with substantial market overlaps. Finally Panetta et al. (2009) showed that the merging institutions make significant adjustments to loan rates post-merger to better reflect the riskiness of existing borrowers.

Holding constant the post-merger effects on the price and quantity of credit, the recent studies suggest that clients of target banks are deleteriously affected relative to clients of acquiring banks. In their study of Belgium banking between 1997 and 2003, Degryse et al. (2006) found that acquiring bank borrowers are less likely to lose lending relationships compared to target bank borrowers. Karceski et al. (2005) found that upon the announcement of Norwegian bank mergers, the equity value of small publicly traded firms that are target customers falls, and this decline increases with the size of the target bank.

5.2 Depositors and other stakeholders

Bank mergers and banking market consolidation tend to impact some deposit rates more than others. The cross-country study by Corvoisier and Gropp (2002) showed that increased

¹¹ This study also famously found a positive association between bank mergers and crime rates, with an estimated elasticity of property crime with respect to merger-induced banking concentration of 0.18.

banking sector concentration between 1993 and 1999 resulted in less competitive pricing on demand deposits, but not on other types of deposits. Craig and Dinger (2009) replicated the findings of earlier studies that found only modest effects from U.S. bank mergers on deposit prices; using improved econometric techniques they showed that checking account interest rates actually fell substantially (while MMDA rates held steady) in the two years following bank mergers. It is notable that these findings are limited to the main checking accounts of businesses and households: evidently, post-merger banks are able to exploit the price inelasticities and switching costs associated with these accounts. Focarelli and Panetta (2003) found that post-merger deposit rates decline initially, but increase in the longer run. However, their results are the strongest for the most productively efficient banks, and therefore may reflect the ability of efficient banks to out-compete their rivals rather than a more general post-merger finding.

Recent studies document a wide-range of other post-merger effects. Kahn et al. (2000) found that mergers resulted in higher market rates on unsecured personal loans, but lower interest rates on automobile loans which are secured by liens. They stressed the importance of soft versus hard information. Stavins (2004) argued that industry consolidation should have a significant effect on the correspondent banking business, and found that the Federal Reserve System saw significant declines in check-processing volumes as industry consolidation intensified. Wu and Zang (2007) found that bank mergers result in higher analyst turnover, especially for the top forecast performers. Robinson et al. (2005) found that Community Reinvestment Act (CRA) protests and negotiated lending agreements that typically follow the announcement of large U.S. bank mergers had no significant effects on stockholder returns at the merging bank.

Merger activity can also have a significant influence on other market participants and potential entrants. Reinforcing the results of earlier studies, recent studies have found strong evidence that inter- and intrastate deregulation led to more new bank charters (Jeon and Miller 2007), that mergers encourage new bank charters (Keeton 2000; Seelig and Critchfield 2003), and that the presence of a large BHC stimulates entry into rural banking markets (Feinberg 2009).

6 Conclusion

This paper tracks the evolution of the financial firm M&A literature from 2000 onward. Studies prior to 2000 typically focused on the U.S. bank merger wave, because the industry consolidation process occurred earlier in the U.S. compared to Europe and elsewhere. Typically, the bulk of the pre-2000 literature concluded that bank mergers had the potential to be efficiency improving, although the event-study literature found little evidence of positive stockholder wealth effects. This encouraged North American researchers to investigate other dimensions of the merger wave, focusing on explanations for mergers such as managerial motives or diversification effects. In contrast, studies of the consolidation process outside North America continued to investigate efficiency and wealth effects.

Our review of the post-2000 financial institution M&A literature discusses over 150 studies and concludes that North American bank mergers are (or can be) efficiency improving, although stockholder wealth effects still remain inconclusive. In contrast, a clear consensus emerges from studies of European bank deals, which appear to have resulted in both efficiency gains and enhanced stockholder value. This could be because European banks involved in merger deals learned best-practices (and worst-practices) from the earlier

North American deals. The (mainly) U.S. evidence on managerial motives for bank M&As tends to find positive relationships between CEO compensation and merger activity.

The post-2000 literature also suggests that the subsidies associated with becoming ‘too big to fail’ are important incentives for large bank acquisitions; a prescient suggestion that aligns well with recent events in both the U.S. and Europe. Evidence regarding the impact of geographic- and product-diversification mergers on bank performance is mixed. There is growing, albeit mixed, evidence that financial M&As have adverse impacts on a variety of borrowers, depositors and other external stakeholders.

The turmoil that engulfed global financial systems starting in the summer of 2007, the ensuing weakness and insolvencies of hundreds of banks and other financial firms, and the widespread intervention of governments to prevent the largest financial firms from failing, are all likely to influence the future size and frequency of financial institution mergers and acquisitions. This review highlights that while future M&A activity in the financial sector can result in performance improvements, policymakers need to be aware of the potential negative impact on prices, credit availability, too big to fail and related subsidies, and market power effects. The current environment also provides a unique opportunity for researchers to fill major gaps in the extant literature. Managerial motives and the risk effects of financial sector consolidation have barely been analysed outside North America. The literature on nonbank financial institution M&A and deals outside Western financial systems is also limited. We suggest that future research should aim to fill these gaps while bearing in mind the current overriding policy concerns related to systemic stability.

References

- Adams RM, Bauer PW, Sickles RC (2002) Scale economies, scope economies and technical change in Federal Reserve payment processing, December 17, 2002. FEDS Working Paper No. 2002-57; FRB of Cleveland Working Paper No. 02-13. Available at SSRN: <http://ssrn.com/abstract=369542> or doi: [10.2139/ssrn.369542](https://doi.org/10.2139/ssrn.369542)
- Adams RM, Brevoort KP, Kiser EK (2007) Who competes with whom? The case of depository institutions. *J Ind Econ* 55:141–167
- Akhigbe AJ, Madura J, Whyte AM (2004) Partial anticipation and the gains to bank merger targets. *J Financ Serv Res* 26:55–71
- Allen L, Jagtiani J (2000) The risk effects of combining bank, securities, and insurance activities. *J Econ Bus* 52:485–497
- Altunbas Y, Marques D (2008) Mergers and acquisitions and bank performance in Europe. The role of strategic similarities. *J Econ Bus* 60:204–222
- Amel D, Barnes C, Panetta F, Salleo C (2004) Consolidation and efficiency in the financial sector: a review of the international evidence. *J Bank Financ* 28:2493–2519
- Anderson C, Becher D, Campbell T (2004) Bank mergers, the market for bank CEOs, and managerial incentives. *J Financ Intermed* 13:6–27
- Ashton JK, Pham K (2007) Efficiency and price effects of horizontal bank mergers, CCP Working Paper 07-9 Available at SSRN: <http://ssrn.com/abstract=997995>
- Avery RB, Samolyk KA (2004) Bank consolidation and the provision of banking services: small commercial loans. *Journal of Financial Services Research* 25:291–325
- Baele L, De Jonghe O, Vander Vennet R (2007) Does the stock market value bank diversification? *J Bank Financ* 31:1999–2023
- Bauer KJ, Miles LL, Nishikawa T (2009) The effects of mergers on credit union performance. *J Bank Financ* (in press)
- Beccalli E, Frantz P (2009) M&A Operations and performance in banking. *J Financ Serv Res* (this issue)
- Becher DA (2000) The valuation effects of bank mergers. *J Corp Finance* 6:189–214
- Becher DA (2009) Bidder returns and merger anticipation: evidence from banking deregulation. *J Corp Finance* 15:85–98

- Becher DA, Campbell TL (2005) Interstate banking deregulation and the changing nature of bank mergers. *J Financ Res* 28:1–20
- Behr A, Heid F (2008) The success of bank mergers revisited—an assessment based on a matching strategy, Deutsche Bundesbank Discussion Paper Series 2: Banking and Financial Studies, No 06/2008
- Beitel P, Schiereck D, Wahrenburg M (2004) Explaining M&A success in European banks. *Eur Financ Manag* 10:109–139
- Berger AN (2003) The economic effects of technological progress: evidence from the banking industry. *J Money, Credit Bank* 35:141–176
- Berger AN (2007) Obstacles to a global banking system: ‘Old Europe’ versus ‘New Europe’. *J Bank Financ* 31:1955–1973
- Berger AN, Black LK (2008) Bank size and small business finance: tests of the current paradigm, Working Paper, May 2008
- Berger AN, DeYoung R (2001) The effects of geographic expansion on bank efficiency. *J Financ Serv Res* 19:163–184
- Berger AN, DeYoung R (2006) Technological progress and the geographic expansion of the banking industry. *J Money, Credit Bank* 38:1483–1513
- Berger AN, Dick AE (2007) Entry into banking markets and the early-mover advantage. *J Money, Credit Bank* 39:775–807
- Berger AN, Hannan TH (1998) The efficiency cost of market power in the banking industry: a test of the ‘quiet life’ and related hypotheses. *Rev Econ Stat* 80:454–465
- Berger AN, Humphrey DB (1992) Megamergers in banking and the use of cost efficiency as an antitrust defense. *Antitrust Bull* 37:541–600
- Berger AN, Saunders A, Scalise JM, Udell GF (1998) The effects of bank mergers and acquisitions on small business lending. *J Financ Econ* 50:187–229
- Berger AN, Demsetz RS, Strahan PE (1999) The consolidation of the financial services industry: causes, consequences, and implications for the future. *J Bank Financ* 23:135–194
- Berger AN, DeYoung R, Genay H, Udell GF (2000) The globalization of financial institutions: evidence from cross-border banking performance. *Brookings — Wharton Papers on Financ Serv* 3:23–125
- Berger AN, DeYoung R, Udell GF (2001) Efficiency barriers to the consolidation of the European financial services industry. *Eur Financ Manag* 7:117–130
- Berger AN, Bonime SD, Goldberg LG, White LJ (2004a) The dynamics of market entry: the effects of mergers and acquisitions on entry in the banking industry. *J Bus* 77:797–834
- Berger AN, Buch CM, DeLong GL, DeYoung R (2004b) Exporting financial institutions management via foreign direct investment mergers and acquisitions. *J Int Money Financ* 22:333–366
- Berger AN, Rosen RJ, Udell GF (2007) Does market size structure affect competition? The case of small business lending. *J Bank Financ* 31:11–33
- Bikker JA, Haaf K (2002) Competition, concentration and their relationship: an empirical analysis of the banking industry. *J Bank Financ* 26:2191–2214
- Bliss R, Rosen R (2001) CEO compensation and bank mergers. *J Financ Econ* 61:107–138
- Bonaccorsi di Patti E, Gobbi G (2007) Winners or losers? The effects of banking consolidation on corporate borrowers. *J Finance* 62:669–695
- Boot AWA (2000) Relationship banking: what do we know? *J Financ Intern* 9:7–25
- Boot AWA, Thakor AV (2000) Can relationship banking survive competition? *J Finance* 55:679–713
- Brewer E, Jagtiani JA (2007) How much would banks be willing to pay to become “Too-Big-to-Fail” and to capture other benefits? Federal Reserve Bank of Kansas City Research Working Paper RWP 07-05
- Brewer E, Jackson WE, Jagtiani J, Nguyen T (2000) The price of bank mergers in the 1990s. *Fed Reserve Bank Chicago Econ Perspect*, March, 2–23
- Buch CM, DeLong GL (2004) Cross-border bank mergers: what lures the rare animal? *J Bank Financ* 28:2077–2102
- Buch CM, DeLong GL (2003) Determinants of cross-border bank mergers: is Europe different? In: Herrmann H, Lipsy R (eds) *Foreign direct investment in the real and financial sector of industrial countries*. Springer, Heidelberg
- Buch CM, Driscoll JC, Ostergaard C (2005) Cross-border diversification in bank asset portfolios, European Central Bank Working Paper No. 429 January
- Calomiris C, Pornrojngangkool T (2005) Monopoly-creating bank consolidation? The merger of Fleet and BankBoston, NBER Working Paper 11351
- Campa JM, Hernando I (2006) M&As performance in the European financial industry. *J Bank Financ* 30:3367–3392
- Carbó VS, Humphrey DB (2004) Predicted and actual costs from individual bank mergers. *J Econ Bus* 56:137–157

- Carbó VS, Humphrey DB, Fernández FR (2003) Bank deregulation is better than mergers. *J Int Financ Mark, Inst Money* 13:429–449
- Carletti E, Hartmann P, Ongena S (2007) The economic impact of merger control: what is special about banking? European Central Bank Working paper No 786, July
- Carletti E, Hartmann P, Spagnolo G (2007b) Bank mergers, competition and liquidity. *J Money, Credit Bank* 39:1067–1107
- Carow KA, Kane EJ, Narayanan RP (2006) How have borrowers fared in banking mega-mergers? *J Money, Credit Bank* 38:821–836
- Casu B, Girardone C (2006) Bank competition, concentration and efficiency in the single European market. *Manch Sch* 74:441–468
- Cohen AM (2004) Market structure and market definition: the case of small market banks and thrifts. *Econ Lett* 85:77–83
- Cohen AM, Mazzeo M J (2004) Competition, product differentiation and quality provision: an empirical equilibrium analysis of bank branching decisions, Board of Governors of the Federal Reserve System Finance and Economics Discussion Series Working Paper 2004-46
- Cole RA, Goldberg LG, White LJ (2004) Cookie cutter vs. character: the micro structure of small business lending by large and small banks. *J Financ Quant Anal* 39:227–251
- Colombo L, Turati G (2004) The role of local real and financial variables in banking industry consolidation – The case of Italy, Working Paper
- Cornett MM, Örs E, Tehranian G (2002) Bank performance around the introduction of a Section 20 subsidiary. *J Finance* 57:501–521
- Cornett MM, Hovakimian G, Palia D, Tehranian H (2003) The impact of the manager-shareholder conflict on acquiring bank returns. *J Bank Financ* 27:103–131
- Cornett MM, McNutt JJ, Tehranian H (2006) Performance changes around bank mergers: revenue enhancements versus cost reductions. *J Money, Credit Bank* 38:1013–1050
- Correa R (2009) Cross-border bank acquisitions: is there a performance effect? *J Financ Serv Res* (this issue)
- Corvoisier S, Gropp R (2002) Bank concentration and retail interest rates. *J Bank Financ* 26:2155–2189
- Craig BR, Dinger V (2009) Bank mergers and the dynamics of deposit interest rates. *J Financ Serv Res* (this issue)
- Craig SG, Hardee P (2007) The impact of bank consolidation on small business credit availability. *J Bank Financ* 31:1237–1263
- Cummins JDD, Misas MR (2001) Deregulation, consolidation, and efficiency: evidence from the Spanish insurance industry, Wharton Financial Institutions Center Working Paper No. 02–01. Available at SSRN: <http://ssrn.com/abstract=294687>
- Cybo-Ottone A, Murgia M (2000) Mergers and shareholder wealth in European banking. *J Bank Financ* 24:831–859
- De Guevara JF, Maudos J (2007) Explanatory factors of market power in the banking system. *Manch Sch* 75:275–296
- De Guevara JF, Maudos J, Perez F (2005) Market power in the European banking sector. *J Financ Serv Res* 27:109–137
- De Nicolo G, Kwast M (2002) Systemic risk and financial consolidation. Are they related? *J Bank Financ* 26:861–880
- De Nicolo G, Bartholomew P, Zaman J, Zephirin M (2003) Bank consolidation, internationalization, and conglomeration: trends and implications for financial risk, IMF Working Paper No. 03/158 Available at SSRN: <http://ssrn.com/abstract=879234>
- Degryse HA, Masschelein N, Mitchell J (2006) Staying, dropping, or switching: the impacts of bank mergers on SMEs, Tilburg Law and Economics Center (TILEC) Discussion Paper No. 2006-034, December, Available at SSRN: <http://ssrn.com/abstract=951422>
- DeLong GL (2001) Stockholder gains from focusing versus diversifying bank mergers. *J Financ Econ* 59:221–252
- DeLong GL (2003) Does long-term performance of mergers match market expectations? Evidence from the U.S. banking industry. *Financial Management* 32:5–25
- DeLong GL, DeYoung R (2007) Learning by observing: Information spillovers in the execution and valuation of commercial bank M&As. *J Finance* 62:181–216
- Dermine J (2006) European banking integration: don't put the cart before the horse. *Financ Mark, Inst Instrum* 15:57–106
- DeYoung R (2007a) The limits of information technology: how much will the banking industry change? In *Technology-driven Efficiencies in Financial Markets*, Bank of Finland 35-46
- DeYoung R (2007b) Safety, soundness, and the evolution of the U.S. banking industry. *Fed Reserve Bank of Atlanta Quart Rev* 92:41–66

- DeYoung R, Hasan I, Kirchhoff B (1998) The impact of out-of-state entry on the efficiency of local banks. *J Econ Bus* 50:191–204
- DeYoung R, Hunter WC, Udell GF (2004) The past, present, and probable future for community banks. *J Financ Serv Res* 25:85–133
- Diaz B, Olalla M, Azorfa S (2004) Bank acquisitions and performance: evidence from a panel of European credit entities. *J Econ Bus* 56:377–404
- Drucker S (2005a) Information asymmetries and the effects of banking mergers on firm-bank relationships. *Federal Reserve Bank of Chicago Proceedings* 140–147
- Drucker S (2005b) Information asymmetries, cross-product banking mergers, and the effects on corporate borrowers, FDIC Center for Financial Research Paper, October, Available at SSRN: <http://ssrn.com/abstract=723164>
- D'Souza C, Lai A (2006) The effects of bank consolidation on risk capital allocation and market liquidity. *J Financ Res* 29:271–291
- Dymski GA (1999) The bank merger wave: the economic causes and social consequences of financial consolidation. ME Sharpe, New York
- Ekkayokkaya M, Holmes P, Paudyal K (2009) The Euro and the changing face of European banking: evidence from mergers and acquisitions. *Eur Financ Manag* 15:451–476
- Elsas R, Hackethal A, Holzhauser M (2006) The anatomy of bank diversification, Working Paper, June 2006, http://epub.ub.uni-muenchen.de/11671/1/ehh_lmu_0906.pdf
- Ely DP, Robinson KJ (2004) The impact of banks expanded securities powers on small business lending. *Rev Financ Econ* 13:79–102
- Emmons WR, Gilbert RA, Yeager TY (2004) Reducing the risk at small community banks: is it size or geographic diversification that matters? *J Financ Serv Res* 25:259–281
- Ennis HM, Malek HS (2005) Bank risk of failure and the too-big-to-fail policy. *Fed Reserve Bank of Richmond Econ Quart* 91(2):21–44
- Estrella A (2001) Mixing and matching: Prospective financial sector mergers and market valuation. *J Bank Financ* 25:2367–2392
- European Central Bank (ECB) (2000) Mergers and acquisitions involving the EU banking industry - facts and implications. ECB, Frankfurt
- Evanoff DD, Örs E (2008) The competitive dynamics of geographic deregulation in banking: Implications for productive efficiency. *J Money, Credit Bank* 40:897–928
- Fecht F, Grüner HP (2006) Limits to international banking consolidation, Available at SSRN: <http://ssrn.com/abstract=966048>
- Feinberg RM (2009) Patterns and determinants of entry in rural county banking markets. *J Ind Compet Trade* 9:101–115
- Focarelli D, Panetta F (2003) Are mergers beneficial to consumers? Evidence from the market for bank deposits. *Am Econ Rev* 93:1152–1172
- Focarelli D, Pozzolo AF (2001a) The patterns of cross-border bank mergers and shareholdings in OECD countries. *J Bank Financ* 25:2305–2337
- Focarelli D, Pozzolo AF (2001b) Where do banks expand abroad? Bank of Italy Working Paper
- Focarelli D, Panetta F, Salleo C (2002) Why do banks merge? *J Money Credit Bank* 34:1047–66
- Frame WS, White LJ (2004) Empirical studies of financial innovation: lots of talk, little action? *J Econ Lit* 42:116–144
- Francis B, Hasan I, Wang H (2008) Bank consolidation and new business formation. *J Bank Financ* 32:1598–1612
- Fritsch M (2007) Long term effects of bank acquisitions in central and Eastern Europe, Available at SSRN: <http://ssrn.com/abstract=1008838>
- Garmaise MJ, Moskowitz TJ (2006) Bank mergers and crime: the real and social effects of credit market competition. *J Finance* 61:495–538
- Goddard J, McKillop D, Wilson JOS (2009) Why credit unions are acquired. *J Financ Serv Res* (this issue)
- Group of Ten (2001) Report on consolidation in the financial sector. Bank for International Settlements, Basel
- Gupta A, Misra L (2007) Deal size, bid premium, and gains in bank mergers: the impact of managerial motivations. *Financ Rev* 42:373–400
- Hadlock C, Houston J, Ryngaert M (1999) The role of managerial incentives in bank acquisitions. *J Bank Financ* 3:221–249
- Hagendorff J, Keasey K (2009) Post-merger strategy and performance: evidence from the US and European banking industries. *Account Finance* (in press)
- Hagendorff J, Collins M, Keasey K (2007) Bank governance and acquisition performance. *Corp Govern Int Rev* 15:957–968

- Hannan TH, Pilloff SJ (2006) Acquisition targets and motives in the banking industry, Federal Reserve Board Finance and Economics Discussion Series 2006-40
- Hannan TH, Prager R (2004) The competitive implications of multimarket bank branching. *J Bank Financ* 28:1889–1914
- Hauswald R, Marquez R (2006) Competition and strategic information acquisition in credit markets. *Rev Financ Stud* 19:967–1000
- Havrylychuk O, Jurzyk E (2007) Profitability of foreign banks in central and Eastern Europe: Does the mode of entry matter? CEPII Working Paper 2005-21
- Hayden E, Porath D, von Westernhagen N (2006) Does diversification improve the performance of German banks? Evidence from individual bank portfolios, Oesterreichische Nationalbank Working Paper No 110
- Hendershott RJ, Lee DE, Tompkins JG (2002) Winners and losers as financial service providers converge: evidence from the Financial Modernization Act of 1999. *Financ Rev* 37:53–72
- Henock L (2004) The cost of using bank mergers as defensive mechanisms against takeover threats. *J Bus* 77:295–310
- Hernando I, Nieto MJJ, Wall LD (2009) Determinants of domestic and cross-border bank acquisitions in the European Union. *J Bank Financ* 32:1022–1032
- Hosono K, Sakai K, Tsuru K (2006) Consolidation of cooperative banks (shinkin) in Japan: Motives and consequences, RIETI Discussion Paper Series 06-E-034
- Houston JF, Ryngaert M (1994) The overall gains from large bank mergers. *J Bank Financ* 18:1155–1176
- Houston JF, James C, Ryngaert M (2001) Where do merger gains come from? Bank mergers from the perspective of insiders and outsiders. *J Financ Econ* 60:285–331
- Hudgins S, Seifert B (1996) Stockholders and international acquisitions of financial firms: an emphasis on banking. *J Financ Serv Res* 10:163–180
- Hughes J, Lang W, Mester L, Moon CG, Pagano M (2003) Do bankers sacrifice value to build empires? Managerial incentives, industry consolidation, and financial performance. *J Bank Financ* 27:417–447
- Huizinga HP, Nelissen JHM, Vander Venet R (2001) Efficiency effects of bank mergers and acquisitions in Europe, Ghent University Working Paper No 106
- Humphrey DB, Vale B (2004) Scale economies, bank mergers, and electronic payments: a spline function approach. *J Bank Financ* 28:1671–1696
- Humphrey DB, Willeson M, Bergendahl G, Lindblom T (2006) Benefits from a changing payment technology in European banking. *J Bank Financ* 30:1631–1652
- Jayaraman N, Khorana A, Nelling E (2002) An analysis of the determinants and shareholder wealth effects of mutual fund mergers. *J Finance* 57:1521–1551
- Jeon Y, Miller SM (2007) Births, deaths, and marriages in the U.S. commercial banking industry. *Economic Inquiry* 45:324–341
- Jones KD, Critchfield T (2005) Consolidation in the U.S. banking industry: is the ‘long, strange trip’ about to end? *FDIC Bank Rev* 17:31–61
- Jones KD, Oshinsky R (2007) The effect of industry consolidation and deposit insurance reform on the resiliency of the U.S. bank insurance fund, Available at SSRN: <http://ssrn.com/abstract=997844>
- Kahn CM, Pennachi GC, Spranzetti BJ (2000) Bank consolidation and consumer loan interest rates. In *The Changing Financial Industry Structure and Regulation: Bridging States, Countries, and Industries*, Proceedings of the 36th Annual Conference on Bank Structure and Competition. Federal Reserve Bank of Chicago 563–93
- Kane EJ (2000) Incentives for banking megamergers: what motives might regulators infer from event-study evidence? *J Money, Credit Bank* 32:671–701
- Kang J-K, Liu W-L (2007) Is universal banking justified? Evidence from bank underwriting of corporate bonds in Japan. *J Financ Econ* 84:142–186
- Kapopoulos P, Siokis F (2005) Market structure, efficiency and rising consolidation of the banking industry in the euro area. *Bull Econ Res* 57:67–91
- Karceski J, Ongena S, Smith DC (2005) The impact of bank consolidation on commercial borrower welfare. *J Finance* 60:2043–2082
- Keeton WR (2000) Are mergers responsible for the surge in new bank charters? *Fed Reserve Bank Kansas City Econ Rev* 85:21–41
- Knapp M, Gart A, Becher D (2005) Post-merger performance of bank-holding companies 1987–1998. *Financ Rev* 40:549–574
- Knapp M, Gart A, Chaudhry M (2006) The impact of mean reversion of bank profitability on post-merger performance in the banking industry. *J Bank Financ* 30:3503–3517
- Koetter M (2005) Evaluating the German bank merger wave, Deutsche Bundesbank Discussion Paper Series 2: *Bank Financ Stud* 2005-12
- Koetter M, Bos JWB, Heid F, Kolari JW, Kool CJM, Porath D (2007) Accounting for distress in bank mergers. *J Bank Financ* 31:3200–3217

- Kohers T, Huang M, Kohers N (2000) Market perception of efficiency in bank holding company mergers: the roles of the DEA and SFA models in capturing merger potential. *Rev Financ Econ* 9:101–120
- Kwan S, Eisenbeis RA (1999) Mergers of publicly traded banking organizations revisited. *Fed Reserve Bank Atlanta Econ Rev*, Fourth Quarter 84:26–37
- Kwan S, Wilcox J (2002) Hidden cost reduction in bank mergers: accounting for more productive banks. *Res Finance* 19:109–124 edited by Andrew H. Chen, Elsevier Press
- Laeven L, Levine R (2007) Is there a diversification discount in financial conglomerates? *J Financ Econ* 85:331–367
- Lepetit L, Patry S, Rous P (2004) Diversification versus specialization: an event study of M&As in the European banking industry. *Appl Financ Econ* 14:663–669
- Linder JC, Crane DB (1993) Bank mergers: integration and profitability. *J Financ Serv Res* 7:35–55
- Lown CS, Osler CL, Strahan PE, Sufi A (2000) The changing landscape of the financial service industry: what lies ahead? *Econ Pol Rev*, Fed Reserve Bank New York 6(4):39–54
- Madison TF, Roth G, Saporoschenko A (2004) Bank mergers and insider nontrading. *Financ Rev* 39:203–229
- Marsch K, Schmieder C, Forster-van Aerssen K (2007) Banking consolidation and small business finance: Empirical evidence for Germany, Deutsche Bundesbank Discussion Papers Series 2: Bank Financ Stud, 2007-09
- McIntosh J (2002) A welfare analysis of Canadian chartered bank mergers. *Can J Econ* 35:457–475
- Mercieca S, Schaeck K, Wolfe S (2009) Bank market structure, competition, and SME financing relationships in European regions. *J Financ Serv Res* (this issue)
- Mishkin FS (2006) How big a problem is too big to fail? *J Econ Lit* 44:988–1004
- Montoriol-Garriga J (2008) Bank mergers and lending relationships, European Central Bank Working Paper, no 934, September
- Morgan DP, Stiroh KJ (2005) Too big to fail after all these years, Federal Reserve Bank of New York Staff Report No. 220, September
- Ogura Y, Uchida H (2007) Bank consolidation and soft information acquisition in small business lending, RIETI Discussion Paper No. 07-E-037 May Available at SSRN: <http://ssrn.com/abstract=991249>
- Olson GT, Pagano MS (2005) A new application of sustainable growth: a multi-dimensional framework for evaluating the long run performance of bank mergers. *J Bus Finance Account* 32:1995–2036
- Panetta F, Schivardi F, Shum M (2009) Do mergers improve information? Evidence from the loan market. *J Money, Credit Bank* 41:673–710
- Park K, Pennachi GG (2007) Harming depositors and helping borrowers: the disparate impact of bank consolidation, Federal Reserve Bank of Cleveland Working Paper, wp0704
- Pasiouras F, Tanna S, Zopounidis C (2007) The identification of acquisition targets in the EU banking industry: an application of multicriteria approaches. *Int Rev Financ Anal* 16:262–281
- Penas MF, Unal H (2004) Gains in bank mergers: evidence from the bond market. *J Financ Econ* 74:149–179
- Pilloff SJ (1996) Performance changes and shareholder wealth creation associated with mergers of publicly traded banking institutions. *J Money, Credit Bank* 28:294–310
- Pozzolo AF, Focarelli D (2007) Cross-border M&As in the financial sector. Is banking different from insurance? Bank of Italy Working Paper
- Resti A, Siciliano G (2001) Do bank acquisitions increase shareholders' wealth? A comparison between market-based and accounting-based performance indicators for some Italian banks" Available at SSRN: <http://ssrn.com/abstract=223523>
- Rhoades SA (1993) Efficiency effects of horizontal (in-market) bank mergers. *J Bank Financ* 17:411–22
- Rime B, Stiroh KJ (2003) The performance of universal banks: evidence from Switzerland. *J Bank Financ* 27:2121–2150
- Robinson BL, Schweitzer RL, Bostic RW, Black HA (2005) Do CRA-related events affect shareholder wealth? The case of bank mergers. *Financ Rev* 40:575–586
- Roll R (1986) The hubris hypothesis of corporate takeovers. *J Bus* 59:197–216
- Rosen RJ (2004) Betcha can't acquire just one: merger programs and compensation, Federal Reserve Bank of Chicago Working Paper 2004-22
- Sapienza P (2002) The effects of banking mergers on loan contracts. *J Finance* 57:29–67
- Schmautzer D (2006) Cross-border bank mergers: who gains and why? Available at SSRN: <http://ssrn.com/abstract=924373>
- Schmid MM, Walter I (2009) Do financial conglomerates create or destroy economic value? *J Financ Intermed* 18:193–216
- Seelig SA, Critchfield T (2003) Merger activity as determinants of de novo entry into urban bank markets, Federal Deposit Insurance Corporation Working paper 2003-01
- Shaffer S (1993) Can megamergers improve bank efficiency?. *J Bank Financ* 17:423–36

- Shull B, Hanweck G (2001) Bank mergers in a deregulated environment: promise and peril. Quorum Books, Westport
- Slijckerman JF, Schoenmaker D, de Vries CG (2005) Risk diversification by European financial conglomerates, Tinbergen Institute Discussion Paper 110/2
- Stavins J (2004) Do bank mergers affect Federal Reserve check volume? Federal Reserve Bank of Boston Public Policy Discussion Paper No. 04-7, October, Available at SSRN: <http://ssrn.com/abstract=887930>
- Stein J (1998) An adverse-selection model of bank asset and liability management with implications for the transmission of monetary policy. *Rand J Econ* 29:466–87
- Stern GH, Feldman RJ (2004) Too big to fail: the hazards of bank bailouts. Brookings Institution Press, Washington DC
- Stiroh KJ, Rumble A (2006) The dark side of diversification: the case of U.S. financial holding companies. *J Bank Financ* 30:2131–2161
- Subrahmanyam VN, Rangan N, Rosenstein S (1997) The role of outside directors in bank acquisitions. *Financ Manage* 26:23–36
- Uchida H, Udell GF, Yamori N (2006) Loan officers and relationship lending, RIETI Discussion Paper, 06-E-031
- Uhde A, Heimeshoff U (2009) Consolidation in banking and financial stability in Europe: empirical evidence. *J Bank Financ* 33:1299–1311
- Valkanov E, Kleimeier S (2007) The role of regulatory capital in international bank mergers and acquisitions. *Res Int Bus Finance* 21:50–68
- Van Lelyveld I, Knot K (2009) Do financial conglomerates create or destroy value? Evidence for the EU. *J Bank Financ* (in press)
- Vander Venet R (2002) Cross-border mergers in European banking and bank efficiency. In: Herrmann H. and Lipsey R (eds) Foreign direct investment in the real and financial sector of industrial countries. Springer Verlag, pp 295–315
- Wall, L, Reichert, A, Liang H (2007) The final frontier: the integration of banking and commerce in the U.S. Proceedings of a Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago, May, Chicago
- Weill L (2004) On the relationship between competition and efficiency in the EU banking sector. *Kredit Kap* 37:329–352
- Wheelock DC, Wilson PW (2000) Why do banks disappear? The determinants of U.S. bank failures and acquisitions. *Rev Econ Stat* 82:127–138
- Wheelock DC, Wilson PW (2004) Consolidation in U.S. banking: which banks engage in mergers? *Rev Financ Econ* 13:7–39
- Wu JS, Zang AY (2007) Earnings forecast performance and financial analyst turnover during mergers, Simon School Working Paper No. FR07-01, March Available at SSRN: <http://ssrn.com/abstract=973750>



BANK INTERNATIONALIZATION AND TRADE: WHAT COMES FIRST?

GIOVANNI FERRI
Università degli Studi di Bari

ALBERTO FRANCO POZZOLO
Università degli Studi del Molise
MoFiR

MoFiR working paper n° 11

January 2009

Bank internationalization and trade: What comes first?*

Giovanni Ferri

Università degli Studi di Bari

Alberto Franco Pozzolo

Università degli Studi del Molise

Abstract

We study the dynamic nexus that changes in foreign bank penetration have with changes in trade and FDI between some selected OECD countries and Central and Eastern Europe countries (CEECs). Following the literature, we contemplate the possibility that such a nexus might differ depending on whether foreign bank entry materializes through the opening of branches or by acquiring local subsidiaries. The question that we try to answer is whether bank internationalization led or followed the increase in trade and manufacturing FDI. Using data on the changes in the bilateral linkages between OECD origin countries and CEECs target countries between 1995 and 2002, we find only one strong link, going from the share of bilateral trade over total trade from the country of origin, which we define a “push factor”, to the change in the presence of foreign branches. The link from trade to bank acquisition of foreign subsidiaries is instead much weaker. In addition, we find some evidence that the share of bilateral trade over total trade with the target country, which we define a “pull factor”, affects bank internationalization through the acquisition of subsidiaries, but not through the opening of branches.

* We thank seminar participants at the CNR Workshop “Improving the functionality of markets: Micro and macro scenarios”, Lecce, 22-23 May 2008 and Angela Pavan for helping us with the construction of the data base.

1. Introduction

The pattern of bank internationalization is correlated with the degree of integration between the home country of the parent company and the country where the branch or the subsidiary is located. This is a well established fact in the economic literature. Integration relates both to strictly economic variables, such as the levels of trade or foreign direct investment (FDI), and to non-economic aspects, such as linguistic, legal and cultural similarities. In this paper we try to move one step forward analyzing the dynamic aspects of the relationship between bilateral integration in the real sector and bank internationalization, by studying bank internationalization from some OECD countries to Central and Eastern Europe countries (henceforth CEECs).

The case of flows to CEECs is very well suited for our research purposes. Foreign bank presence in the Central and Eastern Europe countries has become sizeable in recent years, due to the widespread bank distress and closure that these countries suffered in the post-1989 years, favouring the penetration of foreign intermediaries. By the second half of the 1990s, more than 50 per cent of bank assets in the region were in the hands of foreign, mostly EU-owned banks, twice as much as in Asia and Latin America (Claessens et al., 2001). Moreover, not all countries entered Central and Eastern Europe at the same time. For some countries – e.g. Germany – this happened since the early 1990s, while others – e.g. Austria and Italy – sped up only later (Papi and Revoltella, 1999).

At the same time, foreign trade and FDI in manufacturing also increased significantly during the Nineties. Trade flows with Central and Eastern Europe have been guided by a number of factors, including increased openness, higher GDP and the rising share of intermediate goods trade, related to the fragmentation in production processes and the outsourcing of high-labour intensive phases of production to low-wage transition countries (Arndt and Kierzkowski, 2001; Baldone et al., 2001). For several years, Central and Eastern Europe has been the favoured destination of such outsourcing, especially from EU countries, for two main reasons: (i) vicinity, and thus ease to reach these locations; (ii) general flexibility of markets in transition economies.

The question that we try to answer is whether bank internationalization led or followed the increase in trade and manufacturing FDI. In practice, we contemplate two alternative hypotheses. On the one hand, OECD banks' expansion to Central and Eastern Europe could have led the increase in bilateral trade. This could be the case if two features held true: (i) opportunities for bank

FDI in Central and Eastern Europe materialized early on, and (ii) the opening of financial markets preceded the increase in bilateral trade. Furthermore, foreign bank entry could help lure manufacturing FDI and therefore bilateral trade in intermediate products to any emerging/transition country by making its financial system more stable (Dages, et al., 2000; Reynoso, 2002) and by reducing credit constraints (Clarke, et al., 2001), even though foreign banks might be less lenient to lend to small business (Berger, et al., 2002; Clarke, et al., 2003). On the other hand, the opposite hypothesis holds that OECD banks followed their customers abroad. According to this hypothesis, OECD manufacturing companies first increased their trade with Central and Eastern Europe. In the second stage, also banks foresaw the business opportunities of expanding their activities in these same countries, possibly by lending to trade partners and newly established multinational firms, or by keeping track of the overall risk of their home country customers that moved part of their activities in Central and Eastern Europe.

To shed light on whether any causal link of the type discussed above emerges, we use bilateral data on foreign bank penetration and on the intensity of trade/FDI. Specifically, controlling for other factors, we study the dynamic nexus that changes in foreign bank penetration have with changes in trade and FDI between some selected OECD countries and the CEECs between 1995 – a few years since both types of integration between the former and the latter countries could be re-established after the fall of the iron curtain – and 2002. Furthermore, following the literature, we contemplate the possibility that such a nexus might differ depending on whether foreign bank entry materializes through the opening of branches – supposedly identifying a wholesale and arm's length approach – or it takes the shape of acquisitions of local subsidiaries – suggesting a retail and relationship banking oriented modality of entry.

In the rest of the paper, section 2 sketches the pertinent literature outlining the reasons why the entry in a target transition economy by foreign banks originating from a rich country might be related to the intensity of economic integration between the two countries as measured, alternatively, by trade flows or by FDI stocks. This survey of the literature allows us to motivate a few testable hypotheses. Section 3 describes the data and the methodology used in the empirical analysis, introducing, in particular, the indicators developed in order to analyze the phenomena under scrutiny, presenting some descriptive statistics of the relevant variables and describing the econometric set up. Section 4 reports and discusses our econometric results. Section 5 concludes.

2. Background Literature and Testable Hypotheses

The literature on banks' and nonfinancial firms' internationalization has made considerable progress over the recent years. For the sake of exposition, in this section we will discuss both channels of causation. First, we will describe the ways through which relationships with banks, and to a lesser extent the presence of domestic banks in the country chosen to expand abroad, can affect the firm's choice to go international, either through trade or FDI. Second, we will spell out the factors affecting banks' decision to go international, watching in particular at the potential benefits for firms when also banks go international.

Regarding their internationalization, nonfinancial enterprises can be classified in three different categories. Firstly, and this is the case for most cases, firms may have no foreign relationships: in this case they only produce domestically and sell entirely in the domestic market. The second case is that of the firms whose production is entirely domestic but which sell a portion of their output abroad. Finally, the third case concerns those companies which, besides exporting, choose to move some of their plants abroad.

Firms deciding to go international typically must sustain relevant sunk costs at the beginning of the process, that must be financed upfront. Here is where the role of banks in assisting firms' internationalization can become very relevant, both for exporters and for those making FDI.

In the case of exporters, it is clear that a company wishing to sell its product abroad must bear some fixed sunk costs related to identifying its specific export market and undertaking the adjustments needed to make its products adequate to that market (e.g., specific R&D or marketing expenses) and conforming to the target country's regulations. These costs are sunk in the sense that they will be wholly lost in case the company discontinues exporting that product to that market.¹

The costs entailed in the internationalization of production take various shapes. For example, investors undertake the risk that initially economic and normative favorable conditions might change subsequently to the point of causing divesting at an unfavorable time.² Clearly, they are

¹ The literature points to those sunk costs as a key factor helping explain a series of puzzles, such as why the intensity of international trade is still relatively low or why the increase in exports of countries whose exchange rate depreciates lags until depreciations become large (Roberts and Tybout, 1997; Melitz, 2003).

² There is a wide number of motivations why a firm can choose to invest abroad and become a multinational – economies of scale at the firm or plant level, trade costs specific to the product, costs stemming from the disintegration of production phases, differences in factor intensity across production phases (e.g. capital vs. labor; skilled vs. unskilled labor) – and where to locate FDIs – trade costs specific to the target country (e.g. distance, trade barriers etc.), market size, differences in factor cost. An key distinction is between horizontal FDI (HFDI), aiming to improve export

much higher than those of becoming an exporter, and as a consequence also the related financial needs are much more relevant. For this reason, internationalization of production is more likely for larger-sized enterprises, since it entails sunk costs which are generally higher than those implied by a lighter form of internationalization, such as simple exports (Helpman, Melitz and Yeaple, 2003).

The various modalities of company internationalization all have implications on the need of and ability to obtain external financing on the part of the internationalizing company. As outlined in De Bonis et al. (2008), it seems that both forms of internationalization have a double impact on external financing. On the one hand, at least temporarily, the need for external financing increases. On the other hand, obtaining external financing becomes more difficult. This situation stems from the fact that the company experiences increasing financial needs while its assets become more opaque vis-à-vis external financiers, typically a bank. This unfolds because of sunk investments. Even in the case of exports, though less markedly, an effect like that ensues. Sunk investments must, in fact, be financed and they imply shifting some of the company's assets abroad, to the country where it starts exporting. From an accounting perspective, the goodwill capital of the firm increases and a part of it is now abroad. From the perspective of economic theory, this intensifies the company's asymmetries of information vis-à-vis its domestic banks both because the firm experiences a rising ratio of intangible capital – in its goodwill component – to tangible capital (where only the latter may be used as collateral) and, most importantly, because the increase in intangible capital takes place abroad in a distant context for the domestic bank. Accordingly, the bank's ability to classify the company's credit worthiness worsens with respect to its previous status.

The available evidence confirms the link between financial market development and real sector internationalization. In a cross-country comparison over 30 years, Beck (2002) finds that the countries with more developed financial systems show a larger share of manufacturing exports over GDP. Extending the analysis to the industrial sector level, Becker and Greenberg (2005) find that the degree of financial development increases exports and that such an impact is stronger for those industries with larger fixed costs. On the basis of a large sample of companies from Argentina, Espanol (2007) reports that the probability for a firm to become an exporter rises when it has better

penetration in final markets, and vertical FDI (VFDI) or international outsourcing of production, that have the objective of lowering production costs by moving production where factor costs are lower. In the case analyzed in this paper, we may presume that VFDIs will be the norm among FDIs.

access to finance (measured through the answers the firm gives to a questionnaire). Analogously, using a large sample of Italian enterprises, Grisorio (2007) finds that the probability for a firm to start exporting increases along with the degree of financial development (measured by the number of per capita bank branches) of the province where the firm is located.

The step from the development of the financial sector in the home country to its internationalization is straightforward. Clearly, the negative effect of information asymmetries on the firm's funding ability is much lower if its lending bank is already operating in the countries chosen as foreign export or FDI destinations. Therefore, banks are more likely to finance a firm's internationalization if it knows the market where it is going to expand. Banks are therefore more likely to finance the sunk investment needed by manufacturing firms to expand abroad if they already have set operations in that same country. As such, foreign banks can pull trade and FDI from their home countries.

Clearly, the opposite link, going from real sector to bank internationalization, can also be envisaged. Banks go abroad for different reasons (Farabullini and Ferri, 2005; Pozzolo, 2008). One is risk diversification: to be active in different countries helps dealing with idiosyncratic shocks in any specific country. Second, banks internationalize to enter profitable markets, for example economies with a high rate of growth; in emerging countries the presence of foreign banks may improve the efficiency of financial systems. According to Focarelli and Pozzolo (2001), banks buying foreign subsidiaries are usually large and come from developed credit systems: these large intermediaries enter markets where banks are less efficient, with the aim of restructuring to save costs. Third, banks' expansion abroad may be explained by the search for scale and scope economies. Fourth, banks active in high concentrated markets may be forced to go abroad because antitrust authorities may limit further national expansion. Fifth, when firms go abroad, banks follow suit in order to maintain the links built within the national borders. In terms of the form of the foreign presence, branches are mainly active in wholesale markets, especially in the interbanking segment, while the subsidiaries are more focused on retail markets. Branches tend to be more localized in large financial centres, with London in first place, while the subsidiaries are relatively more present in emerging markets (Focarelli and Pozzolo, 2005).

A traditional hypothesis in the empirical literature is indeed that bank internationalization follows firm internationalization. Bilateral integration, in particular, has been shown to be a key

determinant of the patterns of bank foreign expansion.³ However, starting from Seth et al. (1998), a number of authors have observed that the “follow the customer” hypothesis was becoming too restrictive, stressing that the largest part of loans granted abroad by banks did not finance national firms on foreign markets. Yamori (1998) finds that Japanese banks’ FDIs were influenced originally by the FDIs of the country’s multinational but are also sensible to the conditions of the destination markets. In examining the Japanese firms’ FDIs in Europe, von der Ruhr and Ryan (2005) show how initially industrial FDIs attract the banking ones; subsequently the banking FDIs attract new industrial FDIs. In analysing the Chinese case, He and Gray (2001) find that non financial FDIs increase strongly in those regions where banks previously invested. In their study of the patterns of bank internationalization within 29 OECD countries, Focarelli and Pozzolo (2005) provide compelling evidence that banks’ motivation to go abroad is not just to follow their national customers, but rather to exploit available profit opportunities.

This points to the main object of this paper, i.e. the links between bank and firm internationalization and their timing. Indeed, it is reasonable to imagine that banks “follow the customer and then gain new ones”, as suggested by von der Ruhr and Ryan (2005). According to Roberto Nicastrò (2007) the process has been guided by the goals of growth and profit opportunities; this strategy would be coherent with the idea of “anticipating the customer”. As recognized by Nicastrò – a top manager at Unicredit Group, one of the leading European multinational banks, which has its home base in Italy and relevant interests in the CEECs – even though the original goals were different, bank internationalization is today an important competitive aspect for the entire Italian economic system. Accordingly, the foreign retail network of the most important banks could be a launching pad towards the foreign markets for those small and medium firms which, otherwise, would not be able to launch their internationalization.

In analyzing the links between bank and firm internationalization, one important additional factor to consider is the difference between “push” and “pull” factors. Push factors can be defined as those at work when it is the domestic firms operating abroad that put pressure on their banks in order to obtain financial services in a foreign country. These are more likely to be sizeable when

³ A non exhaustive list includes Goldberg and Saunders (1980 and 1981), Ball and Tschoegl (1982), Nigh, et al. (1986), Goldberg and Johnson (1990), Grosse and Goldberg (1991), Sagari (1992), ter Wengel (1995), Brealey and Kaplanis (1996), Miller and Parkhe (1998), Yamori (1998), Williams (1998), Berger et al. (2003), Buch (2000 and 2003), Buch and Delong (2004), Buch and Lapp (1998), Berger et al. (2003 and 2004), Magri et al. (2005), Focarelli and Pozzolo (2005 and 2008), Paladino (2007).

trade relationships and FDIs to a foreign country reach a relevant share of the total value of trade and FDIs of the origin country. Pull factors are instead those at work when foreign firms with strong trade relationship with the country of origin of the internationalizing banks signal the opportunity to offer services abroad. Contrary to the previous case, they are more likely to be sizeable when trade relationships and FDIs to a foreign country reach a relevant share of the total value of trade and FDIs of the country which is the destination of bank internationalization. The empirical analysis will distinguish between these two factors.

3. Data and methodology

Data on the number of foreign bank branches and bank FDI (measured by the total asset of foreign subsidiaries) subsidiaries were painstakingly constructed aggregating individual shareholdings and branches by OECD banks in the CEECs, respectively from the Bankscope database by Fitch-IBCA/Bureau Van Dijk and from The Bankers. Data on bilateral trade are from the IMF's Direction of trade statistics, those on total bilateral FDI are from the OECD database.⁴

Table 1 reports some descriptive statistics on the foreign presence of selected OECD countries in the CEECs, in 1995 and in 2002. The most striking fact is the significant increase in almost all indicators considered. While this is not surprising, in light of the radical change that the CEECs experienced with their transition to market economies, it confirms that these countries provide an adequate framework to test our hypotheses. The second aspect to notice is that the increase in foreign bank presence and in total FDI is larger than that in bilateral trade. These trends are substantially confirmed by those of the total foreign presence of our set of selected OECD countries in each one of the CEECs in the same years, as reported in table 2.

To test the alternative hypotheses discussed in the previous section, we decided to avoid using absolute values, and constructed instead two sets of indicators, accounting for the relative weight of each bilateral relationship with respect to total trade and foreign bank presence, respectively in the origin and destination countries. In particular, the role of push factors is analyzed considering the ratio of bank FDI of country W (for selected Western countries) to country E (for Central and Eastern Europe) to that of all FDI from the selected OECD countries to Central and Eastern Europe:

⁴ Unfortunately, bilateral OECD data on FDI do not permit to distinguish between those in the manufacturing sector and those in the financial sector.

$$I(i)_{wePUSH} = \frac{FP(i)_w^e}{\sum_{w=1}^W FP(i)_w^e} \quad i = B, Br, T, F \quad (1)$$

where $i = B, Br, T, F$ stands respectively for foreign presence through bank subsidiaries, bank branches, trade and total FDI. In other words, we are therefore measuring the weight of the origin country w over total foreign presence of our selected OECD countries towards Central and Eastern Europe.

Symmetrically, the role of pull factors is analyzed considering the ratio of the index of foreign presence (FP) of country W in country E to that of total foreign presence from country W to CEECs:

$$I(i)_{wePULL} = \frac{FP(i)_w^e}{\sum_{e=1}^E FP(i)_w^e} \quad i = B, Br, T, F \quad (2)$$

In this case, we are therefore measuring the weight of the destination Central or Eastern European country e over total foreign presence (e.g., all bank subsidiaries) of country w towards Central and Eastern European countries.

Table 3 reports some descriptive statistics for the shares described above, and for their changes between 1995 and 2002. Starting from bank foreign subsidiaries, $I(B)_{wePUSH}$, the average value of the share with respect to the country of origin, therefore measuring the push factor, was in 1995 3.57, with a standard deviation of 16.11. The average change between 1995 and 2002 is zero, but the sample includes both positive and negative values and the standard deviation of the change is 12.20, a level of heterogeneity that permits sound econometric identification of the determinants of the different patterns. Similarly, the average value of the share with respect to the country of destination, $I(B)_{wePULL}$, which measures the pull factor, was 3.93 in 1995. The average change is in this case 0.61, and as before the sample includes both positive and negative values, with a standard deviation of changes of 9.31. In the case of foreign bank branches, $I(Br)_{wePUSH}$ is 3.53, with an average change of 1.15. Similarly, the mean value of I^B_{wePULL} is 2.27, with an average change of 0.41. As in the previous cases, the sample includes both positive and negative values, and the standard deviation of the changes is 9.34. For trade and total FDI, the average changes are respectively 0.01 and 0.41 for the push factors and 0.01 and -0.35 for the pull factor.

From the descriptive statistics described above it is not possible to understand whether the clear increase in the presence of banks from the OECD countries included in our sample in the CEECs is a cause or a consequence of the increase in trade and total FDI. In order to answer to this question we then conducted an econometric analysis based on the above indicators. In particular, we have estimated the following equations:

$$\Delta I(i)_{wePUSH} = \alpha(i)_{PUSH} + \sum_{j=1}^4 \beta(i, j)_{PUSH} I(j)_{wePUSH, t-7} + \Gamma(i)_{PUSH} X + \varepsilon(i)_{PUSH}, i, j = B, Br, F, T \quad (3)$$

$$\Delta I(i)_{wePULL} = \alpha(i)_{PULL} + \sum_{j=1}^4 \beta(i, j)_{PULL} I(j)_{wePULL, t-7} + \Gamma(i)_{PULL} X + \varepsilon(i)_{PULL}, i, j = B, Br, F, T \quad (4)$$

where X is a set of exogenous variables, $\alpha(i)_{PUSH}$ and $\alpha(i)_{PULL}$, $\beta(i, j)_{PUSH}$ and $\beta(i, j)_{PULL}$, $\Gamma(i)_{PUSH}$ and $\Gamma(i)_{PULL}$ are the parameters to be estimated for each one of the four equations implied by the different measures of foreign presence, and $\varepsilon(i)_{PUSH}$ and $\varepsilon(i)_{PULL}$ are i.i.d errors. Overall, we estimate 8 different specifications.

The number of observations in these sets of regressions is given by the product of the set of OECD countries and the CEECs. The exogenous explanatory variables introduced in the regression are a measure of bilateral geographical distance and a dummy for a common border. All regressions include dummy variables for the country of origin and of destination. While this specification choice prevents the possibility of including among the explanatory variables country specific characteristics, whose effects could be interesting per se, it permits a more careful control of the possibly exogenous determinants of bilateral relationships, allowing a more precise estimation of the coefficients of interest for our analysis.

Within this framework, Granger type causality tests of foreign bank presence to trade and total FDI – and vice-versa – are conducted. In particular, the generic coefficient β_{PULLij} measures the effect of the pull factor j (for example, for $j = T$, the level of bilateral trade) on the change in the share of the foreign presence measured by the indicator i (for example, for $i = B$, the level of bank FDI). Similarly, β_{PUSHij} measures the same effect for the push factors.

4. Econometric results

As we mentioned above, the econometric analysis distinguishes between push and pull factors, and between effects going from bank internationalization to trade or total FDI and effects going the

other way round. All specifications are identical, and all estimates are conducted on the same sample of 504 country pairs, with the only exception of those involving total FDI, that are conducted on a narrower sample of 154 country pairs due to data availability.⁵ All regressions have remarkably high Rs-squared, ranging from 0.34 to 0.79, suggesting that the models are capable of explaining a relevant share of the total variance (thanks also to the inclusion of the country specific dummy variables).

4.1. Push factors

Table 4 reports the results of the estimations analyzing the effects of push factors on the presence of foreign banks. Panel 1 reports the coefficient of a first specification in which the dependent variable is the change in the share of the stock of foreign bank FDI from a given OECD country to a given CEEC over the total value of bank FDI from that same OECD country to all CEECs, as defined in equation (2). Panel 1 reports the estimates of the model using a sample of 504 observations and therefore excludes from the explanatory variables the share of total FDI.

The negative coefficient (-0.41, significantly different from zero at the 1 per cent level) of the 7-years lagged share of bank FDI suggests that banks from a given country are less likely to make FDI towards countries that represent already a relatively high share of their total FDI in the financial sector. We can call this a convergence effect. Abstracting from this effect, only the presence of foreign branches seems to have a weak push effect on the change in the share of bank FDI, with a coefficient of 0.10, significantly different from zero at the 10 per cent level. Panel 2 reports the results including the lagged share of total FDI, and therefore reducing the estimation sample to 154 country pairs, with the exclusion of 16 smaller CEECs. The coefficient of the additional explanatory variable is positive (0.38) and significantly different from zero at the 10 per cent level, implying a significant positive push effect of lagged total FDI on bank FDI. Within this smaller sample, also the effect of lagged bilateral trade becomes significantly different from zero. An unreported regression excluding total FDI from the set of explanatory variables but estimated on the same sample gave once again an insignificant coefficient on trade, showing that it is indeed the inclusion of FDI, and not the change in the sample, that determines this result. While the specification reported in panel 1 might be more robust due to the larger sample used, it seems therefore the case that it is omitting a relevant explanatory variable.

⁵ The 16 countries for which total FDI are not available are the smallest CEECs in our sample.

Panels 3 and 4 present the results of the estimates on the share of foreign branches, showing a strong and positive effect of lagged bilateral trade, with a coefficient of 1.33, significantly different from zero at the 1 per cent level. In this case, total FDI have instead no significant effect.

Table 5 reports the results of the estimation of a set of regressions analyzing the effects of push factors on bilateral trade and FDI. Panel 1 shows that the lagged share of bank FDI has a small positive effect on trade, with a coefficient of 0.02, significantly different from zero at the 5 per cent level. While the share of total FDI has no effects on bilateral trade, considering the smaller sample the effect of bank FDI on the change in the share of trade is confirmed, with a coefficient of 0.04 (with a p-value of 0.01), and also that of foreign bank branches becomes significant, with a coefficient of 0.03 significantly different from zero at the 5 per cent level. However, the identical results obtained from unreported estimates on the same sample, but excluding total FDI, suggest that these small differences depend only on the sample considered. The effect of bank FDI on bilateral integration of the real economy is confirmed also by the results considering the change in the share of total FDI, reported in Panel 3, which show a positive coefficient, significantly different from zero at the 5 per cent level. Foreign branches have in this case no effect.

The analysis of the push factors provides a first set of answers to our research question. The link going from trade and FDI to bank FDI is indeed present, but it is quite weak. On the contrary, lagged trade has a very strong and significant effect on the growth of foreign bank branches. Taken together, these results show that the “follow the client” hypothesis adequately describe the foreign expansion of banks through branches, less that through subsidiaries. However, this is not the entire story, as we find weak but significant evidence of a push effect going from foreign banking to increased internationalization in the real sector, both through branches and through subsidiaries.

4.2. Pull factors

Table 6 reports the results of the estimation of a set of regressions concentrating on the effects of pull factors on the presence of foreign banks. Panel 1 reports the coefficient of a first specification in which the dependent variable is the change in the share of the stock of bank FDI from a given OECD country in a given CEEC over the total value of foreign bank FDI in that same CEEC from the whole set of OECD countries in our sample, as defined in equation (2). As before, these estimates are conducted on the larger sample of 504 observations, therefore excluding from the explanatory variables total FDI.

The lagged share of bilateral trade has a significant effect on bank FDI, with a coefficient of 0.09 significantly different from zero at the 10 per cent level. This suggests that CEECs with a relevant share of bilateral trade with a given OECD partner are more likely to pull bank FDI. Also the coefficient of the share of foreign branches is positive (0.37) and significantly different from zero at the 1 per cent level, suggesting that foreign branches may pull a stronger presence of foreign banks from the same country of origin.

As we mentioned above, including among the explanatory variables the share of total FDI the number of observations drops to 154, with the exclusion of 16 smaller CEECs. Panel 2 shows that in this case a number of coefficients become insignificant or change substantially. In the end, only the coefficients of the lagged share of foreign banks and that of lagged bilateral trade turn out to be statistically significant, although the second increases by a factor of 10, to 0.94. The differences between the two specifications are entirely attributable to the sample composition, as confirmed by the results of an unreported regression on the same sample but excluding total FDI from the set of explanatory variables, which gave coefficients substantially identical to those reported in panel 2. Remarkably, the effect of total FDI is very small and not significantly different from zero, suggesting that the omission of this variable from the previous specification is not likely to affect the estimates of the other coefficients. While it is our interpretation that the specification reported in panel 1 is likely to be more robust, due to the larger sample used, it is indeed the case that some information can also be drawn from the differences between the two estimates, considering that the sample including FDI excludes mostly small and less developed countries. Following this interpretation, it can be sensibly argued that only trade relationship with larger CEEC countries matter in explaining foreign bank expansion, and that the presence of branches has a pulling effect only for bank FDI in smaller countries.

Panels 3 and 4 report the results of the analysis of the effect of internationalization in 1995 on the share of foreign bank branches. The most noticeable difference with respect to the case of bank FDI is that trade and total FDI have no significant effects. Indeed, both including and excluding FDI, the only significant explanatory variables are the share of bank FDI, with a positive effect, and the share of foreign bank branches, with a negative coefficient, consistent with the convergence effect found for bank FDI.

The second set of regressions that we consider concentrates on the effects of pull factors on bilateral trade and FDI. Panel 1 of Table 7 shows the results of a specification that excludes total FDI, showing once again evidence of a convergence effect, in that the coefficient of lagged bilateral trade is negative and significantly different from zero at the 1 per cent level. With respect to our research question, the results show quite clearly that foreign bank presence has no significant pull effects on bilateral trade, neither through branches nor through bank FDI.

This evidence is not entirely confirmed once we include the lagged share of total FDI, reported in panel 2. While the coefficient on total FDI is also in this case not significantly different from zero, the coefficients on the lagged shares of bank FDI and foreign bank branches become both positive and significantly different from zero at the 5 and at the 1 per cent level, respectively. As before, results from an unreported regression confirm that all the changes are to be attributed to the different sample considered. Following the previous line of reasoning, it can be argued that foreign bank presence only pulls trade with large countries. The determinants of the change in the share of total FDI provide further support to this interpretation, showing a positive and significant effect of lagged bank FDI. On the contrary, the presence of bank branches has no significant effect on the growth in the share of FDI in the following years. Interestingly, also in this case the positive coefficient on lagged total FDI shows the existence of momentum.

When considering the smaller sample, both effects of the lagged share of trade on its change in the following years and that of total FDI on its change are positive and significant, implying a momentum in these processes.

Overall, we therefore find some evidence that bilateral trade is capable of pulling bank FDI, but unable to pull foreign bank branches, while total FDI have no effect on the relative growth of foreign bank presence. On the contrary, we find evidence that the channel going from foreign bank presence to bilateral trade and total FDI is at work, although whether the effects come from branches or subsidiaries seems to depend on the sample of countries considered.

5. Conclusions

What comes first: bank or firm internationalization? Or do they come at the same time? Or are the two processes quite independent?

The evidence presented in this paper, based on an analysis of the relative changes in the bilateral linkages between a set of OECD countries and the Central and Eastern Europe countries (CEECs) showed only one strong push link, going from bilateral trade over total trade from the country of origin, that we have defined a push factor, to the change in the presence of foreign branches. Although we also found a link from trade to bank FDI, it is much weaker. In addition, we provided some evidence that the share of bilateral trade over total trade with the country of destination, that we defined a pull factor, affects bank internationalization through FDI, but not through branches.

These results are indeed consistent with the hypothesis that banks open foreign branches in order to help their clients operating abroad, suggesting at the same time that foreign firms only have a weak ability to attract banks from their country of origin. The opposite channel of causation seems to be less important, as shown by the weak effect of bank FDI and foreign branches on trade and total FDI, and only depends on pull rather than push factors. While we can by no means consider ours as definitive evidence, a first tentative answer to our research question could then be that the two processes are quite independent but, if anything, it is more the firms that push banks abroad, rather than the opposite.

References

- Arndt, S., and H. Kierzkowski (eds) (2001), *Fragmentation. New production patterns in the World economy*, Oxford University Press.
- Baldone, S., F. Sdogati, and L. Tajoli (2001), "Patterns and determinants of international fragmentation of production. Evidence from outward processing trade between the EU and the countries of Central-Eastern Europe", *Welwirtschaftliches Archiv*.
- Ball, C. A. and A. E. Tschoegl (1982), "The Decision to Establish a Foreign Branch or Subsidiary: An Application of Binary Classification Procedures", *Journal of Financial and Quantitative Analysis*, 17, 411-24.
- Beck, T. (2002), "Financial Development and International Trade. Is there a Link?", *Journal of International Economics*, 57, 107-131.
- Becker, B., and D. Greenberg (2005), "Financial development and international trade", Paper series, University of Illinois at Urbana-Champaign, www.business.uiuc.edu/bobecker/beckergreenberg.pdf.
- Berger, A.N., L. F. Klapper, and G. F. Udell (2001), "The ability of banks to lend to informationally opaque small businesses", *Journal of Banking and Finance*, 25, 2127–2167.
- Berger, A.N., C.M. Buch, G. DeLong and R. DeYoung (2004), "Exporting financial institutions management via foreign direct investment mergers and acquisitions" *Journal of International Money and Finance*, 23, 333-366.
- Berger, A.N., Q. Dai, S. Ongena and D.C. Smith (2003), "To what extent will the banking industry be globalized? A study of bank nationality and reach in 20 European nations", *Journal of Banking and Finance*, 27, 383-415.
- Brealey, R. A. and E. C. Kaplanis (1996), "The Determination of Foreign Banking Location", *Journal of International Money and Finance*, 15, 577-597.
- Buch, C.M. (2000), "Why Do Banks Go Abroad - Evidence from German Data", *Financial Markets, Institutions and Instruments*, 9(1), 33.
- Buch, C.M., and S. Lapp (1998), "The Euro - No Big Bang for European Financial Markets", *Konjunkturpolitik*, 47, 11.
- Buch, C. M. (2003), "Information or Regulation: What Drives the International Activities of Commercial Banks?", *Journal of Money Credit and Banking*, 35, 851-869.
- Buch, C.M. and G. DeLong (2004), "Cross-border bank mergers: What lures the rare animal?", *Journal of Banking and Finance*, 28, 2077-2102.
- Claessens, S., A. Demirgüç-Kunt, and H. Huizinga (2001), "How Does Foreign Entry affect The Domestic Banking Market?", *Journal of Banking and Finance*, 25, 891–911.
- Clarke, G., R. Cull, M. Martinez Peria, and S. Sanchez (2003), "Bank Lending to Small Businesses in Latin America: Does Bank Origin Matter?", *Journal of Money Credit and Banking*.

- Clarke, G., R. Cull, and M. Martinez Peria (2001), "Does Foreign Bank Penetration Reduce Access to Credit in Developing Countries? Evidence from Asking Borrowers", World Bank Policy Research Working Paper.
- Dages, B.G., L. Goldberg, and D. Kinney (2000), "Foreign and Domestic Bank Participation in Emerging Markets: Lessons from Mexico and Argentina", Federal Reserve Bank of New York Economic Policy Review, 6, No. 3.
- De Bonis, R., G. Ferri, and Z. Rotondi (2008), "Firms' internationalization and relationships with banks", presented at the FIRB workshop The International Firm: Access to Finance and Organisational Modes, 21-22 February, Università degli Studi di Milano.
- Espanol, P. (2007), "Exports, sunk costs and financial restrictions in Argentina during the 1990s", Paris School of Economics working paper, No. 2007-01.
- Farabullini, F., and G. Ferri (2005), "Eastern Passages for Italy's Banks and Industrial Districts: Are the Two Related or Independent?", in D. Masciandaro (ed.) Financial Intermediation in the New Europe, Edward Elgar.
- Focarelli, D., and A.F. Pozzolo (2001), "The pattern of cross border bank mergers and shareholdings in OECD countries", Journal of Banking and Finance, 25, 2305-2337.
- Focarelli D. and A.F. Pozzolo (2005), "Where Do Banks Expand Abroad? An Empirical Analysis", Journal of Business, 78, 2435-2463.
- Focarelli D. and A.F. Pozzolo (2008), "Cross-Border M&As in the Financial Sector: Is Banking Different from Insurance?", Journal of Banking and Finance, 32, 15-29.
- Goldberg, L. G. and D. Johnson (1990), "The Determinants of U.S. Banking Activity Abroad", Journal of International Money and Finance, 9, 123-37.
- Grisorio, J. (2007), "Local Financial Development and Internationalization: Microevidence for Italian Firms", Università di Bari, chapter 2 of doctoral thesis, mimeo.
- Grosse, R. and L. G. Goldberg (1991), "Foreign Bank Activity in the United States: an analysis by Country of Origin", Journal of Banking and Finance, 15, 1092-112.
- He, Q., and H.P. Gray (2001), "Multinational banking and economic development: a case study", Journal of Asian Economics, 12, 233-43.
- Helpman, E., M.J. Melitz, and S.R. Yeaple (2003), "Export Versus FDI", NBER Working Paper, No. 9439, January.
- Melitz, M. (2003), "The impact of trade on intraindustry reallocations and aggregate industry productivity", Econometrica, 71, 1695-1725.
- Magri, S., A. Mori and P. Rossi (2004), "The entry and the activity level of foreign banks in Italy: An analysis of the determinants", Journal of Banking and Finance, 29, 1295-1310.
- Miller, S., and A. Parkhe (1998), "Patterns in the Expansion of U.S. Banks' Foreign Operations", Journal of International Business Studies, 29(2), 359-390.
- Nicastro, R. (2007), "Le strategie di internazionalizzazione delle banche italiane", Round Table on Globalization of markets and the internationalization of the Italian economy: the value

- added of the partnership between banks, firms and institutions, Forum on Internationalization, Rome, 24/25 September.
- Nigh, D., K.R. Cho, and S. Krishnan (1986), "The Role of Location-Related Factors in U.S. Banking Involvement Abroad: An Empirical Analysis", *Journal of International Business Studies*, 59–72.
- Paladino, G. (2007), "Location decisions of Italian banks: drivers of expansion into emerging and transition economies", in: G. BRACCHI and D. MASCIANDARO (eds.), *Banche Italiane: Un'Industria al Bivio*, Rome, Bancaria Editrice.
- Papi, L., and D. Revoltella (1999), "Foreign Direct Investment in the Banking Sector: A Transitional Economy Perspective", Centro Studi Luca d'Agliano, Development Studies Working Paper No. 133.
- Pozzolo, A. F. (2008), "Bank cross-border mergers and acquisitions (Causes, consequences and recent trends)", mimeo, Università del Molise.
- Reynoso, A. (2002), "Can Subsidiaries of Foreign Banks Contribute to the Stability of the Forex Market in Emerging Economies? A Look at Some Evidence from the Mexican Financial System", NBER Working Paper No. 8864.
- Roberts, M.J., and J.R. Tybout (1997), "The decision to export in Colombia: An empirical model of entry with sunk costs", *American Economic Review*, 87 (4), 545–564.
- Ruhr, M., and M. Ryan (2005), "'Following' or 'attracting' the customer? Japanese Banking FDI in Europe", *Atlantic Economic Journal*, International Atlantic Economic Society, vol. 33(4), pages 405-422.
- Sagari, S. B. (1992), "United States Foreign Direct Investment in the Banking Industry", *Transnational Corporations*, 93–123.
- ter Wengel (1995), "International Trade in Banking Services", *Journal of International Money and Finance*, 14, 47-64.
- Seth, R., D.E. Nolle, and S.K. Mohanty (1998), "Do Banks Follow Their Customers Abroad?", *Financial Markets, Institutions & Instruments*, 7 (4), 1–25.
- Williamson, O.E. (1979), "Transaction Cost Economics: The Governance of Contractual Relations", *Journal of Law and Economics*, XXII, 233-61.
- Yamori, N. (1998), "A Note on the Location Choice of Multinational Banks: The Case of Japanese Financial Institutions", *Journal of Banking and Finance*, 22, 109-120.

Table 1

Foreign presence of selected OECD countries in CEECs

Bank assets are from Bankscope and are expressed in millions of 1995 US dollars. Bank branches are from The Bankers and are expressed in units. Trade is the sum of import from and export to CEECs and is expressed in millions of 1995 US dollars; the source is IMF. FDI is only towards Bulgaria, Czech Republic, Hungary, Romania, Russia, Slovenia and Ukraine and they are expressed in million of 2005 US dollars; the source is OECD.

	Bank assets in CEECs		Bank branches in CEECs		Trade with CEECs		FDIs with CEECs	
	1995	2002	1995	2002	1995	2002	1995	2002
Belgium	683,033	1,829,164	0	0	333,396	373,654	-	-
Germany	62,885	428,906	92	390	3,107,319	4,913,684	288,195	666,588
Spain	0	0	0	78	144,935	397,425	-	-
France	147,627	223,948	46	195	544,447	1,052,328	59,138	169,107
Italy	899,262	1,377,057	92	156	1,157,933	1,822,404	-	56,290
Korea	8	1,844	0	0	127,056	191,467	11,792	21,470
Netherlands	130,020	323,584	46	312	571,324	812,014	44,666	247,511
Sweden	77,049	436,617	46	39	240,804	380,234	-	81,588
Switzerland	0	0	0	39	384,170	364,834	43,902	110,962
UK	18,474	125,206	46	273	542,216	815,781	26,818	131,070
USA	185,118	538,889	0	117	695,122	875,682	147,246	146,365

Table 2

Foreign presence in CEECs countries from selected OECD countries

Bank assets are from Bankscope and are expressed in millions of 1995 US dollars. Bank branches are from The Bankers and are expressed in units. Trade is the sum of import from and export to CEECs and is expressed in millions of 1995 US dollars; the source is IMF. FDIs are in million of 2005 US dollars; the source is OECD.

	Foreign bank assets		Foreign bank branches		Trade with selected OECD countries		FDIs with selected OECD countries		
	1995	2002	1995	2002	1995	2002	1993	1995	2002
Albania	0	0	0	0	6,446	8,537	-	-	-
Armenia	0	0	0	19	2,151	5,453	-	-	-
Azerbaijan	0	0	0	37	2,362	3,786	-	-	-
Bulgaria	106,543	80,131	0	0	58,160	67,352	648	1,621	31,232
Czech Republic	1,046,150	1,516,262	44	130	268,793	384,525	51,483	134,607	305,146
Estonia	16,565	113,894	22	19	11,202	26,682	-	-	-
Georgia	524	2,778	0	37	643	1,220	-	-	-
Hungary	1,138	8,410	22	112	230,256	289,557	101,967	157,645	324,821
Kyrgyzstan	0	568	0	19	2,334	1,291	-	-	-
Croatia	0	0	0	0	102,493	129,709	-	-	-
Kazakhstan	0	4,304	22	93	29,295	35,465	-	-	-
Lithuania	2,106	40,374	0	0	31,209	39,255	-	-	-
Latvia	9,945	85,692	0	0	12,006	22,248	-	-	-
Moldova	1,329	1,127	0	37	2,435	3,729	-	-	-
Macedonia	0	9,834	0	0	15,242	19,654	-	-	-
Poland	520,504	1,368,168	22	168	471,582	628,552	-	-	-
Romania	0	3,428	66	130	114,580	185,814	1,965	7,557	46,909
Russia	0	0	66	503	714,318	874,919	13,054	46,598	151,378
Slovenia	31,717	45,773	22	56	170,185	215,476	5,915	11,293	28,853
Slovakia	129,331	198,637	0	19	67,557	111,595	-	-	-
Turkmenistan	0	0	0	19	7,557	8,094	-	-	-
Ukraine	0	7,706	0	19	75,289	94,969	1,179	2,592	13,625
Uzbekistan	0	0	0	0	17,559	22,421	-	-	-

Table 3

Summary statistics on foreign presence shares

All values are expressed in percentage points.

	Mean	Median	St. dev.	Maximum
Shares with respect to totals of the country of origin in 1995:				
Bank FDI	3.57	0.00	16.11	100.00
Foreign bank branches	2.38	0.00	13.90	100.00
Trade	4.36	1.17	8.02	53.12
Total FDI	5.61	0.00	11.90	49.41
Shares with respect to totals of the country of origin in 2002:				
Bank FDI	3.57	0.00	15.48	99.59
Foreign bank branches	3.53	0.00	14.09	100.00
Trade	4.36	1.30	7.28	44.37
Total FDI	7.27	3.44	8.04	28.39
Changes in the shares with respect to totals of the country of origin between 1995 and 2002:				
Bank FDI	0.00	0.00	12.20	99.59
Foreign bank branches	1.15	0.00	14.01	100.00
Trade	0.01	0.05	2.70	10.66
Total FDI	0.41	0.37	8.92	27.41
Shares with respect to totals of the country of origin in 1995:				
Bank FDI	3.32	0.00	16.11	100.00
Foreign bank branches	1.85	0.00	11.74	100.00
Trade	9.11	4.65	12.00	76.51
Total FDI	7.42	0.00	16.46	86.83
Shares with respect to totals of the country of destination in 2002:				
Bank FDI	3.93	0.00	15.83	100.00
Foreign bank branches	2.27	0.00	9.44	100.00
Trade	9.12	4.43	11.73	76.47
Total FDI	7.07	4.39	8.89	40.54
Changes in the shares with respect to totals of the country of destination between 1995 and 2002:				
Bank FDI	0.61	0.00	9.31	93.76
Foreign bank branches	0.41	0.00	9.34	50.00
Trade	0.01	-0.02	7.50	44.68
Total FDI	-0.35	0.00	12.68	26.73

Table 4

Changes in foreign bank assets and branches (Push factors)

The dependent variable measures the absolute change of the share of the value of the variable measuring foreign presence in destination country j (Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Macedonia, Moldova Poland, Romania, Russia, Slovak Republic, Slovenia, Ukraine) from origin country i (France, Germany, Italy, Korea, Netherlands, Sweden, United Kingdom and United States) as a ratio of total foreign presence in destination country j . Foreign bank assets are from Bankscope. Foreign bank branches are from The Bankers. Bilateral trade is from the IMF and is the share of the sum of import and exports. Estimation is conducted using an OLS specification. Standard errors in parenthesis. * indicates significance at 10 per cent level, ** at 5 per cent and *** at 1 per cent.

	(1)	(2)	(3)	(4)
	Dependent variable is the absolute change between 1995 and 2002 in the share of:			
	Foreign bank assets in 2002	Foreign bank assets in 2002	Foreign bank branches in 2002	Foreign bank branches in 2002
Foreign bank assets in 1995 (share)	-0.41*** -0.1	-0.62*** (0.13)	0.02 (0.05)	-0.06 (0.06)
Bilateral FDIs in 1995 (share)		0.38* (0.22)		0.03 (0.10)
Bilateral trade in 1995 (share)	0.38 -0.27	0.36* (0.20)	1.33*** (0.44)	2.28*** (0.29)
Foreign bank branches in 1995 (share)	0.10* -0.05	0.00 (0.03)	-0.54*** (0.10)	-0.62*** (0.10)
Geographical distance (log.)	0.00 -0.02	0.04 (0.04)	0.05** (0.02)	0.28*** (0.04)
Common border	0.01 -0.13	-0.17* (0.09)	-0.10** (0.05)	0.02 (0.04)
Constant	-0.06 -0.13	-0.43 (0.38)	-0.34** (0.15)	-2.57*** (0.30)
Observations	504	154	504	154
R-squared	0.38	0.64	0.47	0.66

Table 5

Changes in bilateral trade and FdIs (Push factors)

The dependent variable measures the absolute change of the share of the value of the variable measuring foreign presence in destination country j (Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Macedonia, Moldova Poland, Romania, Russia, Slovak Republic, Slovenia, Ukraine) from origin country i (France, Germany, Italy, Korea, Netherlands, Sweden, United Kingdom and United States) as a ratio of total foreign presence in destination country j . Foreign bank assets are from Bankscope. Foreign bank branches are from The Bankers. Bilateral trade is from the IMF and is the share of the sum of import and exports. Estimation is conducted using an OLS specification. Standard errors in parenthesis. * indicates significance at 10 per cent level, ** at 5 per cent and *** at 1 per cent.

	(1)	(2)	(3)
	Dependent variable is the absolute change between 1995 and 2002 in the share of:		
	Bilateral trade in 2002 (change)	Bilateral trade in 2002 (change)	Bilateral FDI in 2002 (share)
Foreign bank assets in 1995 (share)	0.02** (0.01)	0.04*** -0.01	0.08** (0.04)
Bilateral FDI in 1995 (share)		-0.02 -0.02	0.54*** (0.06)
Bilateral trade in 1995 (share)	-0.26*** (0.05)	-0.22*** -0.07	0.74*** (0.12)
Foreign bank branches in 1995 (share)	0.01 (0.01)	0.03** -0.02	0.00 (0.02)
Geographical distance (log.)	-0.01*** (0.00)	-0.02*** -0.01	0.08*** (0.02)
Common border	0.01 (0.01)	0.01 -0.02	-0.04 (0.03)
Constant	-0.39** (0.15)	0.12*** -0.02	0.12*** (0.02)
Observations	126	504	504
R-squared	0.79	0.56	0.56

Table 6

Changes in foreign bank assets and branches (Pull factors)

The dependent variable measures the absolute change of the share of the value of the variable measuring foreign presence in destination country j (Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Macedonia, Moldova Poland, Romania, Russia, Slovak Republic, Slovenia, Ukraine) from origin country i (France, Germany, Italy, Korea, Netherlands, Sweden, United Kingdom and United States) as a ratio of total foreign presence in destination country j . Foreign bank assets are from Bankscope. Foreign bank branches are from The Bankers. Bilateral trade is from the IMF and is the share of the sum of import and exports. All regressions include dummies for the countries of origin and of destination. Estimation is conducted using an OLS specification. Standard errors in parenthesis. * indicates significance at 10 per cent level, ** at 5 per cent and *** at 1 per cent.

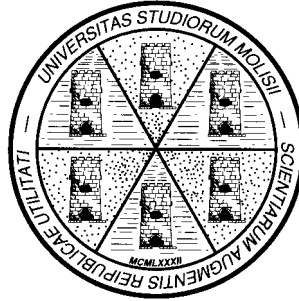
	(1)	(2)	(3)	(4)
	The dependent variable is the absolute change between 1995 and 2002 in the share of:			
	Foreign bank assets in 2002	Foreign bank assets in 2002	Foreign bank branches in 2002	Foreign bank branches in 2002
Foreign bank assets in 1995 (share)	-0.23*** (0.05)	-0.28*** -0.08	0.11** (0.05)	0.19*** (0.06)
Bilateral FDIs in 1995 (share)		-0.00 -0.17		0.04 (0.06)
Bilateral trade in 1995 (share)	0.09* (0.06)	0.94* -0.57	0.05 (0.04)	0.36 (0.26)
Foreign bank branches in 1995 (share)	0.37*** (0.12)	0.03 -0.07	-0.52*** (0.09)	-0.62*** (0.10)
Geographical distance (log.)	0.01 (0.01)	0.01 -0.02	-0.01 (0.01)	0.02** (0.01)
Common border	-0.13* (0.07)	-0.17 -0.12	-0.08 (0.06)	0.03 (0.05)
Constant	-0.05 (0.05)	-0.28* -0.16	0.09* (0.05)	-0.25*** (0.09)
Observations	504	154	504	154
R-squared	0.39	0.34	0.51	0.55

Table 7

Changes in bilateral trade and FdIs (Pull factors)

The dependent variable measures the absolute change of the share of the value of the variable measuring foreign presence in destination country j (Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Macedonia, Moldova Poland, Romania, Russia, Slovak Republic, Slovenia, Ukraine) from origin country i (France, Germany, Italy, Korea, Netherlands, Sweden, United Kingdom and United States) as a ratio of total foreign presence in destination country j . Foreign bank assets are from Bankscope. Foreign bank branches are from The Bankers. Bilateral trade is from the IMF and is the share of the sum of import and exports. All regressions include dummies for the countries of origin and of destination. Estimation is conducted using an OLS specification. Standard errors in parenthesis. * indicates significance at 10 per cent level, ** at 5 per cent and *** at 1 per cent.

	(1)	(2)	(3)
	Dependent variable is the absolute change between 1995 and 2002 in the share of:		
	Bilateral trade in 2002 (change)	Bilateral trade in 2002 (change)	Bilateral FDI in 2002 (share)
Foreign bank assets in 1995 (share)	0.03 -0.02	0.05** (0.02)	0.23*** (0.05)
Bilateral FDI in 1995 (share)		-0.02 (0.02)	0.35*** (0.11)
Bilateral trade in 1995 (share)	-0.51*** -0.1	0.20*** (0.07)	0.97*** (0.30)
Foreign bank branches in 1995 (share)	-0.02 -0.03	0.14*** (0.03)	-0.04 (0.10)
Geographical distance (log.)	-0.05*** -0.01	-0.00 (0.00)	0.08*** (0.03)
Common border	0.09** -0.04	0.02 (0.02)	-0.01 (0.06)
Constant	0.42*** -0.08	-0.03 (0.03)	-0.68*** (0.23)
Observations	504	154	154
R-squared	0.35	0.59	0.56



ECONOMICS & STATISTICS DISCUSSION PAPER
No. 9/03

Where Do Banks Expand Abroad?
An Empirical Analysis

by

Dario Focarelli
Bank of Italy, Research Dept.

and

Alberto Franco Pozzolo
University of Molise, Dept. SEGeS

Where Do Banks Expand Abroad?

An Empirical Analysis

by Dario Focarelli and Alberto Franco Pozzolo*

Abstract

This paper investigates the determinants of the pattern of banks' foreign investment. We extended previous analyses in three directions. First, we use a unique database that includes information on 260 large banks from OECD countries and all their foreign branches and subsidiaries in each one of the other OECD countries. Second, we consider explicitly the role of institutional and regulatory characteristics. Third, we considered within a unified framework a wide set of variables that are likely to influence the pattern of bank internationalization. Consistent with previous research, we find that a high degree of integration between the home and the destination countries has an effect on the location choice of multinational banks. However, we also find that the marginal effect of integration is much lower than that of other explanatory variables. Profit opportunities resulting from a high expected economic growth and the prospect of competing with relatively less efficient banks appear to be a key factor affecting the expansion abroad, especially in the case of subsidiaries. Institutional characteristics of the destination country also play a crucial role. For example, financial centers attract branches of foreign banks, but not subsidiaries, while lower regulatory restrictions on banking activities are associated with a stronger presence of foreign subsidiaries, but not of branches.

JEL-classification: E30, G21, F21, F23.

keywords: international banking, foreign direct investment

* Focarelli: Banca d'Italia, Research Department. Pozzolo: University of Molise and Ente Luigi Einaudi. Opinions expressed are those of the authors and do not necessarily reflect those of the Banca d'Italia. For comments and suggestions we thank Jason Abrevaya, Allen Berger, Claudia Buch, Nicola Cetorelli, Luca De Benedictis, Robert DeYoung, Michele Gambera, Hesna Genay, Giorgia Giovannetti, Giorgio Gobbi, Luigi Guiso, Anil Kashyap, George Kaufman, Lucia Piscitello, Fabio Panetta, Luigi Zingales, an anonymous referee and seminar participants at the Banca d'Italia, at the Federal Reserve Bank of Chicago, at the Finance Brown Bag lunch of the University of Chicago, at the 2nd Kiel Workshop in Economics, at the 36th Annual Conference on Bank Structure and Competition of the Federal Reserve Bank of Chicago, at the 2000 European Economic Association Congress, at Ente Einaudi and at the June 2002 CNR meeting on international and development economics in Alghero. This paper was written while Alberto Pozzolo was mainly with the Research Department of Banca d'Italia. Address for correspondence: Dario Focarelli, Banca d'Italia, Servizio Studi, Via Nazionale 91, 00184, Rome, Italy. Tel.: +39-06-47921 Fax: +39-06-47923723 E-Mail: focarelli.dario@insedia.interbusiness.it.

1 Introduction

International banking has gone through alternate fortunes in the last 150 years. It was very common at the end of the XIX century, when foreign banks were deeply involved in financing large investment abroad, in particular towards colonies; it declined during the inter-war period, only to reemerge in the 1970s, following financial innovation and the rapid increase in international trade. In recent years, international banking activities have reached a historical peak, thanks also to an increase in cross-border mergers (see, for example, Berger et al. 2000).

The strong expansion in banks' internationalization observed in recent years is raising a number of questions about its determinants and its possible effects on the shape of the banking industry. There are essentially three ways that banks can follow in order to extend their activities abroad: providing loans and asset and liability management to foreign counterparts, opening a foreign branch, and acquiring shareholdings in a foreign bank (subsidiary).¹ Direct lending is typically offered to large-scale borrowers, such as states and multinational companies, often in the form of syndicated loans. It does not require the physical presence of the bank in the foreign country, although representative offices may prove useful. Foreign branches are an integral part of the parent bank and can offer a broad range of banking services to both domestic and foreign customers. Traditionally, their activity is primarily concentrated in the wholesale market. Finally, subsidiaries have identical banking powers as domestic banks and are typically retail oriented.

This paper concentrates on the two strategies of expansion that require a physical presence abroad: branching and acquisition of subsidiaries. In fact, although banks with their head offices in foreign countries may have a comparative advantage with respect to the quality of the financial services they offer, they are very unlikely to be in a better position when it comes to building relationships with local clients. A physical presence can be considered a precondition for developing personal

relationships, which remain fundamental for most traditional banking activities (see, for example, Rajan, 1998).

The development of foreign branches and subsidiaries in the last 40 years has been largely uneven. Foreign branching can be considered a more mature form of expansion abroad. According to Brealey and Kaplanis (1996), the number of banks' foreign branches increased very rapidly from about 1960 to the mid-1980s and slowed significantly after 1985.² In contrast, the number of cross-border mergers and acquisitions in the banking industry has risen most rapidly in the 1990s. However, they are still a small fraction of banking M&A activity within individual nations (Group of Ten, 2001) and they are rarer than in other industries (Focarelli and Pozzolo, 2001).

Three major factors explaining the pattern of bank internationalization have been identified in the empirical literature: economic integration, institutional characteristics and profit opportunities. It is a well accepted fact in the economic literature that the pattern of bank internationalization is correlated with the degree of integration between the home country of the parent company and the country where the branch or the subsidiary is located. Integration relates both to strictly economic variables, such as the levels of trade or foreign direct investment, and to non-economic aspects, such as linguistic and cultural similarities.³

Regulatory restrictions also significantly affect how banks configure their international activities. Governments, for example, may reduce the degree of cross-border consolidation either directly, by putting explicit limits on cross-border M&As or blocking single takeovers, or indirectly, by failing to harmonize structural differences among the financial systems or imposing limits on domestic banking activity.⁴ Moreover, the characteristics of the banking sector can also affect the probability of entry. Boot (1999), for example, argues that governments may wish to have the largest institutions in their nations domestically owned. If this is the case, it can be expected that in more concentrated markets the entry of foreign banks will be more difficult, because one single acquisition would imply the loss of a significant share to the advantage of foreign investors.⁵

Profit opportunities are probably the most basic determinant of the pattern of bank internationalization. These can be related to bank-specific factors, to the characteristics of the country of origin of the investing bank, and to the characteristics of the country of destination of the investment. Among bank-specific characteristics, size has been found to affect mainly the patterns of internationalization: larger banks are much more international than smaller ones, most likely because they have larger and more internationally diversified customers (Berger et al., 1995), they have stronger incentives to diversify internationally their portfolio and to smooth the effects of asynchronous fluctuations in loans and deposits, they are involved in activities, such as portfolio management and investment banking, that are typically international and are characterized by economies of scale and scope.⁶ Among home country characteristics, those with a stronger effect on the pattern of bank internationalization relate to the development of the financial markets. In fact, banks that operate in developed markets are likely to be more efficient and therefore to hold a comparative advantage with respect to their competitors in the destination country.⁷ Finally, although no conclusive empirical evidence has been so far provided on their importance, profit opportunities in the destination market of investment have been related to country risk (Grosse and Goldberg, 1991; Fisher, and Molyneux, 1996; Yamori, 1998), the size of the banking financial sector (Goldberg and Grosse, 1994), income per capita (Goldberg and Johnson, 1990; Claessens et al., 2000; Yamori, 1998), and total income (Brealey and Kaplanis, 1996; Buch, 2000).

Economic integration, institutional characteristics and profit opportunities are indeed the driving forces of bank internationalization, but their effect may be different depending on the expansionary policy followed by the bank.⁸ For this reason, in our empirical analysis we distinguish between foreign branches and foreign subsidiaries. Our sample includes 260 large banks from OECD countries and all their foreign branches and subsidiaries in each one of the other OECD countries. By comparing within a unified framework the determinants of alternative expansionary policies we are able to gather further insights into the prospects of international banking.

The rest of the paper is organized as follows. The next section presents the main theoretical hypotheses under scrutiny and the econometric methodology adopted. Section 3 describes the data used in the empirical analysis. Section 4 presents the results of the econometric analysis. The final section concludes.

2 Empirical model

2.1 Choice of explanatory variables

A major strength of our data set is that it allows us to study the pattern of bank internationalization controlling for the role of factors specific to the investing bank and to the country where its headquarters are located. In choosing these control variables we have followed Focarelli and Pozzolo (2001), where it is shown that banks with foreign shareholdings are on average larger, have a larger share of non-interest income and have headquarters in countries with an efficient banking market, measured by the average return on assets.

We measure the degree of economic integration between countries by the geographical distance and by the level of bilateral trade (computed as the ratio of sum of imports from and exports to a destination country and the total value of imports and exports of the origin country). We assume that information costs are lower within countries that share the same language. Further, we test whether in the euro area (the 11 countries now members of the EMU) bank cross-border expansion is more intense. Clearly, these last two factors are more likely to be relevant in the case of subsidiaries, which are specialized in offering retail services to local customers.

We measure regulatory restrictions with an index of the limitations on domestic banking activities. Moreover, as a proxy for implicit limitation to entry we consider the degree of bank concentration (measured by the market share of the 5 largest institutions). Further, we also control for the law and order tradition (La Porta et al., 1998); foreign banks are in fact likely to feel more secure about expanding in countries where enforcement of contracts is easier, since this favors the

development of the banking system (Levine, 1998). Clearly, institutional aspects are more liable to be important in explaining the location of subsidiaries than of branches, as the former require a stronger presence in the foreign country.

Finally, we consider whether the country of destination hosts an international financial center, such as London, New York and Tokyo. Indeed, in particular within OECD countries, this characteristic cannot be considered strictly institutional, but it is instead primarily the outcome of historical factors. It is in any case likely to have a strong impact, especially for branches.

As we mentioned in the introduction, the literature on international banking considered total and per capita GDP as proxies for the level of profit opportunities in the foreign market. In our view, these measures have two main drawbacks. First, unitary bank profits are likely to be lower in more developed countries, where the banking sector is usually more competitive. Second, within a group of countries whose long-run rate of economic growth is likely to be converging to a common level, such as the OECD countries, poorer nations have higher expected rates of economic development than wealthier ones. For these reasons, we adopt a broader definition of local market opportunities: we assume that banks prefer to expand to countries where the expected rate of economic growth is higher and the banking system is on average less efficient. Following the results of the recent empirical literature on the determinants of growth, we then assume that countries with a lower level of initial output, lower inflation, higher levels of schooling and more developed financial markets are those more likely to have a faster rate of economic growth in the coming years. With respect to the size of the financial market we follow Levine and Zevros (1998), considering two proxies: the value of stock market capitalization and that of total credit, both measured as ratios to GDP.

Finally, we consider the role of the profitability and efficiency of the banking sector in the country of destination of the investment. In particular, among the explanatory variables we include the average levels of: free cash flow (equity net of fixed assets and loan loss reserves), cost-income ratio (overheads to total income), and return on assets. High levels of free cash flows might indicate an inefficient use of capital, possibly because of a lower ability in taking on investment opportunities;

high cost-income ratios are associated with less cost efficient banking industries (although this could be due to the presence of highly skilled workers); and high return on assets characterizes more profitable banking markets, possibly due to a less competitive environment.

2.2 Econometric setup

The empirical analysis seeks to answer the following question: what are the characteristics of countries where banks are more likely to have a foreign branch or subsidiary? We model this as a set of binary choices that each bank makes on whether or not to operate a branch or a subsidiary in any one of the countries in our sample. In practice, we estimate

$$Pr(Y_{ijh} = k) = f(X_i, Z_j, B_{jh}, K_h), \quad k = 0, 1, 2 \quad (1)$$

where: $Y_{ijh} = 0$ when the bank i of country j has no foreign branches or subsidiaries in country h , $Y_{ijh} = 1$ when the bank has a foreign branch but no subsidiaries, and $Y_{ijh} = 2$ when the bank has a foreign subsidiary, irrespective of whether it has a branch or not; X_i is a vector of bank-specific variables; Z_j is a vector of country-specific variables; B_{jh} is a vector of variables describing the relationship between the home country and the destination country and K_h is a vector of variables specific to the destination country. The product of the number of banks in the sample times the number of possible countries of destination of the investment gives the number of observations used in the estimation.

We acknowledge that considering all banks with foreign subsidiaries as a single group, irrespective of whether they have a foreign branch in the same country, is somewhat arbitrary, even if the ownership of a subsidiary is an incontrovertible sign of a major interest of the bank in expanding its activities in that country. To check whether our results are sensitive to the chosen specification, we have also re-estimated the model allowing for an additional category when a bank has both a foreign branch and a foreign subsidiary in a given country (see, below, section 4.2).

3 Data and summary statistics

3.1 Data on banks

Information on foreign branches are from The Bankers' Almanac. All other bank-specific data are from Bankscope, an international data set of balance-sheet items on individual banks, where all the main information on assets, liabilities and revenues is reported according to a common, comparable standard. Foreign subsidiaries are included in the sample as autonomous banks. As is common in the literature, we consider only the first level of foreign shareholdings. In order to minimize the effects of particular events, all data on banks' assets, liabilities and revenues are averages of annual values from 1994 to 1997. Information on branches and foreign shareholders refers to the end of 1998.

The first question is how to define foreign shareholdings. In principle, one would like to find a minimum percent equity interest needed to ensure the effective power in determining the bank's activity. Clearly, this depends on the distribution of ownership, so that the extreme case that a 50 per cent share is needed for an effective control might be too stringent. Thus, we took the opposite route, defining as foreign subsidiaries all banks with a shareholder out of the country, without any participation threshold. We acknowledge that this choice is somewhat questionable, and for this reason we will check the robustness of our results under the more stringent hypothesis that a majority equity interest is needed in order to gain operational control (see, below, section 4.2).

The data set includes 260 banks with total assets of more than \$ 25 billion and with headquarters in one of the 29 OECD countries (table 1). Japan has the largest number of banks in the sample (56); the United States have 42 banks, Germany 33; Italy, the United Kingdom and France have between 15 and 22 each; all the other countries have fewer than 10. Of the 260 banks in the sample, 168 have foreign branches (65 per cent) and 114 have foreign subsidiaries (44 per cent); 30 have foreign shareholders (12 per cent).

Table 2 reports the location of foreign branches of banks included in the sample. There are 683 instances of foreign branches, 9.4 per cent of the total number of possible foreign branches (given by the product of the number of banks, 260, times the number of possible countries of destination, 28). Japanese banks have the largest number of foreign branches (123), followed by those from the United States (96) and Germany (87). The United States host the largest number of foreign branches (117), closely followed by the United Kingdom (116). Japan, France, Germany and Italy host between 51 and 36 foreign branches. In the last column of table 2 we report the number of instances where a bank has a foreign branch in a country of destination without having a subsidiary. There are 102 instances of banks having both a branch and a subsidiary in the same country (1.4 per cent of the total number), nearly half of them are located in the United Kingdom (25) and in the United States (16), two major financial centers.

Table 3 reports that there are 299 cross-border shareholdings in the sample, or 4.1 per cent of the total number of possible foreign subsidiaries. German banks have the largest number of foreign subsidiaries (68), followed by Japan (39) and the United States (36). The largest number of banks with foreign shareholders is hosted by Luxembourg (47), followed by the United Kingdom (31), the United States (20), France and Germany (19). The last column of table 3 reports the number of instances where a bank has a foreign subsidiary in a country of destination without having also a branch. In total there are 197 of such cases, or 2.7 per cent of the total.

Table 4 reports some summary statistics for the 260 banks in the sample. Banks with cross-border interests are in general larger. However, banks that only have a foreign branch are smaller, have on average higher net interest margins and net charge-offs, lower levels of profitability, and cash flows. Banks with foreign subsidiaries have instead higher profitability and non-interest income, and lower interest margins.

3.2 Data on countries

Data on GDP, population, bank credit and inflation are from IMF, International Financial Statistics (1998). Bilateral trade data are from IMF Direction of Trade Statistics (1998). Stock market capitalization is from IFC, Emerging Stock Markets Factbook (1998). Data on the “rule of law” are taken from La Porta et al. (1998). Data on the level of regulatory restrictions on domestic banking activity are taken from Barth et al. (2000). Finally “schooling” is the average schooling years in the total population in 1995; it is taken from Barro and Lee (2000). All the variables considered have a high degree of cross-country variability (table 5).

4 Econometric results

4.1 Results from the basic model

In the estimates, we exclude Luxembourg, Iceland, the Czech Republic, Hungary and Poland from our sample due to the lack of information on several variables. Multiplying the number of remaining banks (257) by the number of remaining countries (23) we obtain 5,911 paired bank-country observations. In the sample, there are 561 cases (9.5 per cent of all possible cases) of banks having a foreign branch in a country without having a subsidiary and 228 cases (3.9 per cent of all possible cases) of banks having a subsidiary, irrespective of whether or not they have also a branch in the destination country. The results of the estimation of equation (1) are reported in table 6.

The coefficients are estimated with respect to the baseline case of no foreign branches or subsidiaries. The test for the independence of irrelevant alternatives (IIA), verifying that the multinomial logit framework is to be preferred to two binomial logit regressions, was unable to reject the null hypothesis that the remaining alternative available to a bank is irrelevant: the multinomial logit seems correctly specified and provides consistent and efficient estimates of the coefficients. The R-squared of the regression is 0.35, a fairly good result for a cross-section analysis.

Table 6 also reports the magnitude of the marginal effect of each explanatory variable. In the case of continuous variables this is measured as the change in the probability that a bank will have a branch or a subsidiary in a given country associated with a change in the covariate from the 25th to the 75th percentile of its sample distribution, leaving all other variables at their sample values. For dummy variables, the marginal effect is calculated as the change in the probability associated with a change of the variable from zero to one.

Some of the variables included in the empirical model describe complementary aspects of what can be identified as a unique factor affecting the pattern of bank internationalization. In order to make it easier to compare the effects of the different factors, we calculated the marginal effect of a set of synthetic variables defined as weighted averages of sets of regressors included in the basic specification.⁹ We have identified 5 factors describing respectively: attributes of the single bank and its country of origin, the degree of bilateral integration, institutional features of the country of destination, and the overall growth opportunities for the country of destination, separating the growth prospects of the whole economy from the characteristics of its banking sector.

4.1.1 Characteristics of the bank and of the country of origin

Characteristics of the bank and of the country of origin are introduced in the estimation mainly as control variables. The attributes of banks with foreign equity interests are studied in more detail in Focarelli and Pozzolo (2001).

The size of the bank is a key determinant of the decision to expand abroad. Larger banks are more likely to have both foreign branches and foreign subsidiaries. Similarly, banks with a larger share of non-interest income are more likely to have foreign activities, probably because they have more innovative and aggressive strategies both at home and abroad.¹⁰ Banks in countries where the banking sector is more profitable are also more likely to expand abroad, consistent with the hypothesis that they are specialized in the supply of more advanced services which are typically more lucrative. Overall, the factor describing the characteristics of the bank and of the country of origin has more than double the

marginal effect in the case of branches (11.4 per cent) than in the case of subsidiaries (5.1 per cent); normalizing with the level of the predicted probabilities they have approximately the same size.

4.1.2 Economic integration between countries

The coefficient of bilateral trade is positive and significant for both branches and subsidiaries. In both cases the effect of increasing the share of bilateral trade between the two countries from the 25th to the 75th percentile is very small.

The coefficient of the dummy variable taking the value of one for country pairs where the same language is spoken is negative but not significantly different from zero in the case of branches. It is positive but not significantly different from zero in the case of subsidiaries. However, the difference between the two coefficients is significant at the 5 per cent level, possibly because banks consider easier to control the activities of the foreign subsidiary in countries where a common language is spoken.¹¹ The probability that a bank will have a foreign subsidiary in a country where the same language is spoken is 1.6 per cent higher than average.

The coefficient of the geographical distance is negative and significant for both branches and subsidiaries, showing that banks are less likely to have foreign interests in countries far away. Consistent with previous results, the marginal effect is 1.5 per cent for branches and 1.2 for subsidiaries. After normalization it is therefore larger for the latter.

As it is shown in the rich literature on gravity models of trade, it could be the case that these three variables are highly collinear, especially when per capita GDP of the country of destination is also included in the regression. However, our results are robust to the exclusion of each one of these variables.¹²

Finally, the positive coefficients of the dummy variables for the countries that eventually joined the European Monetary Union confirm that the prospect of a common monetary market and the absence of exchange rate risk resulted in an increase in the number of foreign branches and subsidiaries. Consistent with the interpretation of the dummy for countries where a common language

is spoken, the coefficient is larger in the case of subsidiaries, and the difference with that for branches is highly significant. The probability that a bank will have a cross-border interest in a country that eventually joined the European Monetary Union is 2.5 per cent higher than average in the case of branches, 4.9 per cent in the case of subsidiaries. The difference is much larger when the effects are normalized with the predicted probabilities.

Overall, the factor describing the effect of the degree of integration between countries has a stronger marginal effect for branches (3.0 per cent) than for subsidiaries (1.5 per cent), but this result is reversed if normalized with respect to the predicted probability. This result is mainly driven by the effect of the dummy for countries that eventually joined the EMU.

4.1.3 Institutional characteristics

The results of table 6 show that implicit and explicit institutional barriers play a crucial role in the pattern of bank internationalization. This finding, common in the literature, is confirmed and reinforced in our analysis.

The coefficient of the level of restrictions on banking activities is not significantly different from zero in the case of branches, but it is negative and significant for subsidiaries (the difference between the two is highly significant). This result is not obvious. In fact, some authors have suggested that banks prefer to invest in more regulated and protected markets, possibly because they expect to obtain higher profits because markets are less competitive. By contrast, other authors have suggested that, even when explicit legislative limitations are not present, heavily regulated banking systems are typically less accessible to foreign banks. This latter interpretation is in line with our results, which are reinforced if one considers that regulation is likely to be less binding for branches than for subsidiaries. A change of the level of restrictions from the 25th to the 75th percentile reduces the probability that a country hosts foreign subsidiaries by 1.3 per cent.

The concentration of the banking sector, an indirect measure of the accessibility of the market for both residents and non-residents, also affects the probability that a country hosts foreign banks. The

coefficients for branches and subsidiaries are both significantly different from zero, but the latter is significantly larger. The marginal effect in both cases is sizeable, between 4 and 5 per cent. After normalization it is much larger for subsidiaries, as is to be expected given that they are more likely than branches to compete with local banks.

The presence of a stronger law and order tradition in the country (the "rule of law") increases the probability that it will host foreign banks. As expected, this only happens for subsidiaries, which typically have a larger involvement with activities regulated by local laws. An increase in the measure of law and order tradition from the 25th to the 75th percentile augments the probability that a country hosts a foreign subsidiary by 2.6 per cent.

The presence of a financial center is also a major factor affecting the probability that a country hosts foreign banks, but only in the case of branches. This result is not surprising as most foreign branches operate in wholesale markets, such as the financial markets. Indeed, the marginal effect of the dummy for the three financial centers in our sample (London, New York and Tokyo) is the largest of all, increasing the probability of a bank opening a foreign branch in that country by 15.6 per cent.

As we claimed at the start, institutional factors play a pivotal role in determining the pattern of banks' international expansion; the factor has indeed a strong marginal effect. In absolute terms it is larger for branches (6.5 per cent) than for subsidiaries (2.7 per cent); but as to the value of predicted probabilities they are quite similar.

4.1.4 Profit opportunities

The results presented in table 6 provide strong evidence that profit opportunities in the destination country are another key factor affecting the pattern of banks' international expansion.

In our analysis we have divided the variables describing profit opportunities into two major groups: those related to the general prospects of growth of the hosting country, and those describing the characteristics of its banking sector. Within the first group we have considered per capita GDP, the level of inflation, the level of schooling, and the size of the banking sector. We interpreted the latter

variable as a proxy of the financial development of the country and therefore included it among the factors describing its general prospects of growth because of its relation with the ratio of stock market capitalization over GDP. Indeed, we obtained similar results to those presented in table 6 substituting credit size with stock market capitalization.¹³

The coefficients of the variables describing the country's growth prospects are significant in all but one case (inflation in the regression for subsidiaries). In particular, per capita GDP and schooling (the two variables most commonly included in the growth regressions) are significantly larger in absolute size for subsidiaries than for branches, a result that is consistent with the stronger involvement of subsidiaries in the local economy.

Overall the marginal effects of a change from the 75th to the 25th percentile of the value of the factor describing the effect of country growth opportunities is 3.4 per cent for branches, 2.2 per cent for subsidiaries; therefore, normalizing with respect to predicted probabilities it is much larger for the latter.

Turning to variables describing the efficiency of the banking sector in the destination country, the research on banking consolidation at domestic level has shown that in a substantial share of mergers and acquisitions, larger and more efficient institutions tend to take over smaller, less efficient firms, possibly to spread their expertise and operating procedures over additional resources (see, for example, Berger et al., 1999; Focarelli et al., 2002). Consistent with this hypothesis, our evidence shows that foreign banks are more likely to establish branches and subsidiaries in countries where banks have on average higher cash flow, higher costs, and higher profitability. Indeed, high cash flow is likely to be due to an inefficient use of equity capital; more efficient investors coming from abroad might then be in the position to have a better than average capital structure, and therefore to have higher profits. Besides, the effect is significantly larger for subsidiaries. The positive sign of the coefficient of costs is similarly consistent with the view that foreign investors can gain extra profits when operating in less efficient markets. Finally, after controlling for inefficiency, we also find that

foreign banks are more likely to be present in countries where profitability is higher, consistent with the view that profit opportunities are a key determinant of the pattern of cross-border expansion.

In the case of branches, the factor describing the effect of the characteristics of the host-country banking sector has a marginal effect of 3.1 per cent, similar to that describing the country's general growth prospects. In the case of subsidiaries the marginal effect is also equal to 3.1 per cent, a large value compared with both the other four factors and the average predicted probability.

4.2 Robustness checks

We tested for the robustness of the results reported in table 6 in a number of ways. First, we adopted different estimation techniques. The results reported in panel A of table 7 show that the sign and the significance of the coefficients are not different from those of our preferred specification, even estimating equation (1) with fixed effects for the individual banks, the origin country, and the destination country. The only minor exception is the coefficient of the dummy for common language, which becomes significant for subsidiaries when either the individual-bank or the origin-country fixed effects are included in the regression.

Second, in order to control for the role of extreme values, we estimated equation (1) on each subsample obtained after dropping recursively one destination country from our original sample and calculated a jackknife estimator as the mean of the 24 estimates. The results show that our basic estimates are not driven by some extreme values taken by variables describing the destination-country characteristics. Indeed, the estimates reported in panel B of table 7 are similar to those in table 6, and minima and maxima are not too far apart from mean values.

Third, in an unreported regression we estimated a multinomial logit specification allowing for 4 categories: (i) no presence abroad, (ii) only a foreign branch, (iii) only a foreign subsidiary and (iv) both a foreign branch and a foreign subsidiary.¹⁴ We found only three variables with statistically and economically different coefficients in cases (iii) and (iv): language, financial center and rule of law.¹⁵ The coefficient of the dummy variable taking the value of one for country pairs where the same

language is spoken is positive and significantly different from zero when banks have in a given foreign country only a subsidiary, while it is negative and not significantly different from zero when they have both a branch and a subsidiary. The coefficient of the dummy for financial centers is negative when banks have in a given foreign country only a subsidiary and positive when they have both a branch and a subsidiary; in both cases, the coefficients are significantly different from zero. The coefficient of rule of law is positive and significantly different from zero when banks have in a given foreign country only a subsidiary, while it is negative and not significantly different from zero when they have both a branch and a subsidiary. If anything, these results strengthen the interpretation given to previous results that: i) sharing the same language only matters in the case of foreign subsidiaries; ii) financial centers attract branches of foreign banks, but not subsidiaries; iii) countries with a stronger law and order tradition, which proxies for the ability of the legal system to enforce contracts, are more likely to host foreign subsidiaries (while they are less likely to host foreign branches).

Finally, we ran a supplementary unreported regression in which foreign subsidiaries were defined as banks where out of the country shareholders hold at least the 50 per cent of total equities, which also corroborated our previous results. Indeed, despite a reduction in the number of foreign subsidiaries from 228 to 154, the only difference that we found relates to the coefficients of distance, cost-income and return on assets in the destination country for the case of subsidiaries, which turn out being not significantly different from zero, although they maintain the same sign and a similar size as those reported in table 6.

5 Conclusions

Our analysis of the pattern of banks' foreign investment, based on a sample of 260 large banks from OECD countries, shows that the degree of integration between the home country and the destination country has a positive effect on the probability that a bank will expand in a given country, consistent with previous research. However, it also shows that the marginal effect of integration is much lower than that of other explanatory factors, such as institutional characteristics and profit opportunities.

In particular, profit opportunities appear to be a key factor affecting the pattern of banks' international expansion. The importance of lower per capita GDP, lower inflation, and larger credit market assigns a prominent role to the expected growth of the destination country. The positive correlation between the presence of foreign banks and high costs and a less efficient use of equity capital makes plausible the view that foreign investors gain profits when competing with less efficient banks. The marginal effect of these variables is relatively larger for subsidiaries, suggesting that the profitability of foreign branching is less dependent on the prospect of growth of the local economy.

Institutional characteristics of the destination country also play a crucial role in the pattern of bank internationalization. For these variables the separation between branches and subsidiaries turns out to be extremely informative.

On the one hand, we find that financial centers attract branches of foreign banks, but not subsidiaries. On the other hand, we find that banks prefer to acquire equity interests in countries where either regulatory restrictions on banking activities are lower or the market is less concentrated, possibly because these variables are proxies of actual, sometimes hidden, limitations to entry from abroad. Regulatory restrictions have no effects on the decision about where to open a branch. Further, countries with a stronger law and order tradition, which proxies for the ability of the legal system to enforce contracts, are more likely to host foreign subsidiaries.

A richer theory, possibly grounded on the search for profits in the presence of barriers to entry in foreign markets, seems more suitable than the "follow the client" hypothesis to explain the pattern of bank internationalization.

The entry of foreign banks in the domestic market has traditionally been a matter of concern for policymakers, because they are far more complicated to supervise (see Dale, 1984) and may enhance the financial fragility of the destination country by failing to continue operating when a worsening of the economic environment squeezes their profitability or increases their risk.¹⁶ Our results indirectly suggest a more positive interpretation of foreign banking activities. Foreign banks may indeed have a positive effect on the average efficiency of the banking sector in the destination country, because they

are likely to be among the most efficient in their country of origin, to come from the most developed banking markets and to be located in less efficient banking sectors.

References

- Ball, C. A. and A. E. Tschoegl (1982), “The Decision to Establish a Foreign Branch or Subsidiary: An Application of Binary Classification Procedures”, *Journal of Financial and Quantitative Analysis*, 17, 411-24.
- Barro, R. J. and J. Lee (2000), “International Data on Educational Attainment: Updates and Implications”, Harvard University, mimeo.
- Barth, J. R., G. Caprio Jr., R. Levine (2000), “Banking Systems Around the Globe: Do Regulation and Ownership Affect Performance and Stability?”, Working Papers – Domestic Finance No. 2325, World Bank
- Berger A. N., R. S. Demsetz, P. E. Strahan (1999), “The Consolidation of the Financial Services Industry: Causes, Consequences, and Implications for the Future”, *Journal of Banking and Finance*, 23, pp.135-194.
- Berger, A. N., R. DeYoung, H. Genay, and G. F. Udell (2000), “The Globalization of Financial Institutions: Evidence from a Cross-Border Banking Performance”, Brookings-Wharton Paper on Financial Service 2000, 23-120.
- Berger, A. N., A. K. Kashyap and J. M. Scalise (1995), “The Transformation of the U. S. Banking Industry: What a Long, Strange Trip It’s Been”, *Brookings Papers on Economic Activities*, 2, pp. 55-218.
- Boot, A. W. A. (1999), “European Lessons on Consolidation in Banking”, *Journal of Banking and Finance*, 23, pp. 609-613.
- Brealey, R. A. and E. C. Kaplanis (1996), “The Determination of Foreign Banking Location”, *Journal of International Money and Finance*, 15, pp. 577-97.

- Buch , C. M. (2000), “Why Do Banks Go Abroad? Evidence from German Data”, *Journal of Financial Markets, Instruments and Institutions*, 9, pp. 33-67.
- Buch , C. M. (2002), “Information or Regulation: What is Driving the International Activities of Commercial Banks?”, *Journal of Money Credit and Banking*, forthcoming.
- Claessens, S., A. Demirgüç-Kunt, and H. Huizinga (2000), “The Role of Foreign Banks in Domestic Banking Systems”, in S. Claessens and M. Jansen, (eds.), *The Internationalization of Financial Services: Issues and Lessons for Developing Countries*, Boston, MA, Kluwer Academic Press.
- Dale, R. (1984), *The Regulation of International Banking*, Cambridge, Woodhead Faulkner.
- Fisher, A., and P. Molyneux (1996), “A Note on the Determinants of Foreign Bank Activity in London Between 1980 and 1989”, *Applied Financial Economics*, 6, pp. 271–277.
- Focarelli, D., F. Panetta and C. Salleo (2002), “Why Do Banks Merge?”, *Journal of Money Credit and Banking*, Vol. 34, No. 3 (August, Part 1), pp. 784-803.
- Focarelli, D. and A. F. Pozzolo (2001), “The Patterns of Cross-Border Bank Mergers and Shareholdings in OECD Countries”, *Journal of Banking and Finance*, 25, pp. 2305-2337.
- Goldberg, L. G. and R. Grosse (1994), “Location Choice of Foreign Banks in the United States”, *Journal of Economics and Business*, 46, pp. 367-79.
- Goldberg, L. G. and D. Johnson (1990), “The Determinants of U.S. Banking Activity Abroad”, *Journal of International Money and Finance*, 9, pp. 123-37.
- Goldberg, L. G. and A. Saunders (1980), “The Causes of U.S. Bank Expansion Overseas: The Case of Great Britain”, *Journal of Money Credit and Banking*, 12, pp. 630-43.
- Goldberg, L. G. and A. Saunders (1981), “The Growth and Organizational Form of Foreign Banks in the U. S.”, *Journal of Money Credit and Banking*, 13, pp. 365-74.
- Grosse, R. and L. G. Goldberg (1991), “Foreign Bank Activity in the United States: an Analysis by Country of Origin”, *Journal of Banking and Finance*, 15, pp. 1092-112.

- Group of Ten (2001), “Consolidation in the Financial Sector - Summary Report”, available at the web sites of the BIS, the IMF, the OECD, the Bank of Italy.
- Hausman, J. A. and D. L. McFadden (1984), “Specification Tests for the Multinomial Logit Model”, *Econometrica*, 52, pp. 1219-1240.
- IFC (1998), *Emerging Stock Markets Factbook*.
- IMF (1998), *International Financial Statistics Yearbook*.
- IMF (1998), *Direction of Trade Statistics*.
- Kroszner, Randall S. (1999), “Is the Financial System Politically Independent? Perspectives on the Political Economy of Banking and Financial Regulation”, University of Chicago, mimeo.
- La Porta, R., F. Lopez-de-Silanes, A. Shleifer and R. W. Vishny (1998), “Law and Finance”, *Journal of Political Economy*, 106, pp. 1113-1155.
- Levine, R. (1998), “The Legal Environment, Banks, and Long-Run Economic Growth”, *Journal of Money Credit and Banking*, 30, pp. 596-613.
- Levine, R., and S. Zevros (1998), “Stock Markets, Banks, and Growth”, *The American Economic Review*, Vol. 88, No. 3, pp. 537-58.
- Miller, S.R., and A. Parkhe (1998), “Patterns in the Expansion of U.S. Banks’ Foreign Operations”, *Journal of International Business Studies*, 29, pp. 359–390.
- Nigh, D., K.R. Cho, and S. Krishnan (1986), “The Role of Location-Related Factors in U.S. Banking Involvement Abroad: An Empirical Analysis”, *Journal of International Business Studies*, pp. 59–72.
- Peek, J. and E. S Rosengren (1997), “The International Transmission of Financial Shocks: the Case of Japan”, *American Economic Review*, 87, pp. 495-505.
- Rajan, R. G. (1998), “The Past and Future of Commercial Banking Viewed through an Incomplete Contract Lens”, *Journal of Money Credit and Banking*, 30, pp. 524-50.
- Sagari, S. B. (1992), “United States Foreign Direct Investment in the Banking Industry”, *Transnational Corporations*, pp. 93–123.

- Tschoegl, A. E. (1982), "Concentration among International Banks", *Journal of Banking and Finance*, 6, pp. 567-78.
- Tschoegl, A. E. (1983), "Size, Growth, and Transnationality among the World's Largest Banks", *Journal of Business*, pp. 187-201.
- Ursacki, T. and I. Vertinsky (1992), "Choice of Entry Timing and Scale by Foreign Banks in Japan and Korea", *Journal of Banking and Finance*, 16, pp. 405-21.
- ter Wengel (1995), "International Trade in Banking Services", *Journal of International Money and Finance*, 14, pp. 47-64.
- Williams, B. (1996), "Determinants of the Performance of Japanese Financial Institutions in Australia 1987-1992", *Applied Economics*, 28, pp. 1153- 65.
- Williams, B. (1998), "Factors Affecting the Performance of Foreign-Owned Banks in Australia: a Cross-Sectional Study", *Journal of Banking and Finance*, 22, pp. 197-219.
- Yamori, N. (1998), "A Note on the Location Choice of Multinational Banks: the Case of Japanese Financial Institutions", *Journal of Banking and Finance*, 22, pp. 109-20.

FOOTNOTES

¹ For a more detailed analysis of the organizational structures available to a bank wishing to expand its activities abroad see Goldberg and Saunders (1981).

² For example, the 323 foreign branches operating in New York at the end of 1985, 5 times more than in 1971, declined to 205 by 1998.

³ The degree of economic integration between home and destination countries has been measured in the literature by at least three variables: geographical distance (Ball and Tschoegl, 1982; Grosse and Goldberg, 1991); the volume of bilateral trade flows (Goldberg and Saunders, 1980 and 1981; Goldberg and Johnson, 1990; Grosse and Goldberg, 1991; Brealey and Kaplanis, 1996; Yamori, 1998); and the value of bilateral foreign direct investment (Nigh, et al., 1986; Goldberg and Johnson, 1990; Grosse and Goldberg, 1991; ter Wengel, 1995; Sagari, 1992; Brealey and Kaplanis, 1996; Williams, 1998; Yamori, 1998; Miller and Parkhe, 1998; Buch, 2000). Cultural characteristics have been considered by Buch (2002), who finds that language is important in explaining

the degree of internationalization of Spanish banks, whereas it is not significant for the banks of other EU countries.

⁴ A number of studies (e.g., Nigh et al., 1986; Goldberg and Johnson, 1990; Sagari, 1992; Miller and Parkhe, 1998) find that restrictions on the entry of foreign investors significantly reduce the degree of internationalization of a country's banking market. A related result is that US banks prefer to expand in countries where capital requirements are less stringent and taxes are lower (Miller and Parkhe, 1998). Kroszner (1999) suggests that actions to permit more cross-border activities might indeed reflect an increased strength of interest groups that benefit from technological innovations and globalization of financial services.

⁵ Indeed, the causality of these relationships must be interpreted with caution. For example, if foreign investors can influence the political decision process (e.g., in favor of less restrictive regulations), regulations could be in part endogenous with respect to the presence of foreign banks. Similar, the presence of foreign banks might help reducing the concentration in the banking industry (for a closely related issue, see Tschoegl; 1982).

⁶ A positive correlation between the size of banks and their degree of internationalization has been found in a number of empirical studies: Ball and Tschoegl (1982), Tschoegl (1983), Ursacki and Vertinsky (1992), Williams (1996 and 1998).

⁷ Grosse and Goldberg (1991) find a positive correlation between the number of foreign banks in the United States from a given country and the development of that country's financial sector.

⁸ For example, Brealey and Kaplanis (1996) show that parent banks use foreign branches mainly to operate in the leading financial centers and to support the activities abroad of their home-country clients. Indeed, these two activities are less likely to be the driving forces for the acquisition of foreign subsidiaries, which are normally used by banks to offer retail services abroad.

⁹ The weights used in order to calculate the synthetic variables (factors) are given by the coefficients of the regressors included in the factor in two independent binomial logit regressions estimating separately the probability of a bank having a foreign branch and a foreign subsidiary (these estimates are consistent, although inefficient). By construction, the coefficients of the factors in the multinomial logit regression are all about one. Table 6 reports the marginal effects associated with a change in each factor from its level at the 25th to that at the 75th percentile in the sample distribution, leaving all other factors at their sample values.

¹⁰ One possibility is that banks with foreign interests are larger and have a larger share of non-interest income precisely because they have expanded abroad, i.e., that there is a causality issue to consider. We have excluded this interpretation after finding, in an unreported regression, that in our sample banks with cross-border interests did not experience a higher than average rate of growth of total assets and did not augment their share of non-interest income.

¹¹ This interpretation is also strengthened by the results of the robustness checks discussed in section 4.2 below, showing that the dummy for common language becomes positive and significant for subsidiaries when either the individual-bank or the origin-country fixed effects are included in the regression and when an alternative multinomial logit specification is adopted, which allows for an additional category when a bank has both a foreign branch and a foreign subsidiary in a given country.

¹² In some unreported regressions we have also considered the value of bilateral foreign direct investment, obtaining similar results. We preferred to measure trade integration because data are available for a larger number of countries.

¹³ Including both variables at the same time only had the effect of reducing the significance of the two estimated coefficients, without changing their sign.

¹⁴ We preferred to present the results of the multinomial logit specification with 3 categories because it delivers more concisely the same message as the 4 categories model.

¹⁵ Also the coefficients of the bank size and of the average return on assets in the banking sector of the country of origin in the two cases were significantly different from each other, but the differences were not economically meaningful.

¹⁶ Moreover, it is believed that they are excessively sensitive to economic conditions in the home country of the parent company. Peek and Rosengren (1997) actually found that lending by Japanese banks in the US declined as a result of the stock market crash in Japan.

Table 1

Bank's Distribution by Size and Country

Source: Bankscope and The Banker's Almanac. Panel A refers to the banks with total assets of more than \$25 billion at December 1997 surveyed by Bankscope. Panel B includes 2,148 banks with headquarters in an OECD country and total assets of more than \$1 billion at December 1997 (from the 2,449 banks surveyed by Bankscope, 301 banks are excluded since they have either negative net interest margins, or negative non-interest income, or net return on assets lower than -1.0 per cent or higher than 4.0 per cent, or overheads higher than total operating income).

Country	Panel A: Banks with total assets of more than \$25 billion				Panel B: Potential targets	
	Total	with foreign share- holders	with foreign branches	with foreign subsidi- aries	Total	with foreign share- holders
Australia	4	0	4	3	42	10
Austria	3	2	3	3	41	8
Belgium	6	1	4	5	27	7
Canada	7	0	6	4	23	9
South Korea	9	2	8	0	36	10
Denmark	4	1	3	2	14	2
Finland	3	0	2	0	7	1
France	20	1	9	12	178	11
Germany	33	3	24	26	472	19
Japan	56	5	46	14	159	6
Greece	1	0	1	1	12	1
Ireland	2	0	1	2	23	9
Iceland	0	0	0	0	2	0
Italy	15	5	12	7	138	13
Luxembourg	3	2	2	0	56	46
Mexico	3	0	3	0	12	1
Norway	1	1	1	0	21	10
New Zealand	0	0	0	0	9	6
Netherlands	5	0	3	3	31	8
Poland	0	0	0	0	16	10
Portugal	3	1	2	2	26	8
United Kingdom	22	2	9	8	119	29
Czech Republic	0	0	0	0	10	6
Spain	8	3	5	4	94	12
United States	42	1	15	14	488	18
Sweden	5	0	2	2	14	1
Switzerland	5	0	3	2	62	11
Turkey	0	0	0	0	9	0
Hungary	0	0	0	0	7	4
Total	260	30	168	114	2148	276

Table 2

Foreign Branches

(columns: markets of origin; rows: markets of destination)

Source: Bankscope and The Banker's Almanac. The table reports the number of foreign branches of one of the 260 banks with total assets of more than \$25 billion from an OECD country in any other OECD country.

Country	Aus- tra- lia	Aus- tria	Bel- gium	Can- ada	South Korea	Den- mark	Fin- land	Fran- ce	Ger- many	Ja- pan	Gree- ce	Ire- land	Italy	Luxem- bourg	Mexi- co	Nor- way	Neth- er- lands	Por- tugal	United King- dom	Spain	United States	Swe- den	Swit- zer- land	Total	With no subs	
Australia				2				1	3	3	1								3		5			18	15	
Austria									2	1			1				1				1			6	6	
Belgium								3	5	5			1				2		2	4	6			28	24	
Canada															1				1		5		1	8	7	
South Korea				3				4	1	13							2		4		8		1	38	33	
Denmark									1								1	1			1			5	5	
Finland						2																2		5	5	
France			1		1				7	9				3			3	2		5	4	6	2		44	38
Germany		1	1	1	1	3		4		8	1			4	1	1			2	2	6	1	1		39	32
Japan		4		3	8			5	5				3				2		5	2	11	1	2		51	50
Greece		1		1				4	2				1				2		4		3				18	18
Ireland			2					1	3					1			2		1		3				13	11
Iceland																									0	0
Italy			2	1				5	4	7							3		4	3	7				36	30
Luxembourg						1	1	3	9				2								2	1			19	7
Mexico				1					1								2				4		2		10	10
Norway						2															1	2			6	3
New Zealand		2							1								1		3						7	6
Netherlands			1		1			2	2		1		1						2	1	3				14	14
Poland			1					1	1								1								4	3
Portugal			1					1	1	1							1		1						7	7
United Kingdom		4	3	3	4	3	1	7	17	26	1	1	11	1	3	1	3			5	13	2	3		116	91
Czech Republic									4								2								6	5
Spain			2					6	5	8			4				1		2		5		1		34	30
United States		4	3	4	6	2	1	8	11	41	1		9		1	1	2		7	5		2	3		117	101
Sweden						2	2	1		1							1		2		1				11	10
Switzerland		1		1				1	2					1			1		2	1	4				14	11
Turkey													1				2		1		2				8	8
Hungary																		1							1	1
TOTAL	20	7	18	23	21	15	5	61	87	123	5	1	41	4	5	5	36	2	51	29	96	14	14		683	581

Cross-Border Shareholdings (columns: markets of origin; rows: markets of destination)

Source: Bankscope. The table reports the number of foreign subsidiaries of one of the 260 banks with total assets of more than \$25 billion from an OECD country in any other OECD country.

Country	Australia	Austria	Belgium	Canada	Denmark	France	Germany	Japan	Greece	Ireland	Italy	Netherlands	Portugal	United Kingdom	Spain	United States	Sweden	Switzerland	Total	With no branch
Australia				1		2	1	3				2		1				1	12	9
Austria		1				1	5				1						1		9	9
Belgium						1		2				2		1	1				7	3
Canada						1	1	1			1	1		1		1		2	9	8
South Korea						1	1	4						1		2			9	4
Denmark																1	1		2	2
Finland																	1		1	1
France		2					4	1	1		3	1		1	1	4		1	19	13
Germany	1					3		3			2	1		1	2	4		2	19	12
Japan																1			1	0
Greece																				0
Ireland	1						6					1		1		1			10	8
Iceland																				0
Italy			1				6	1						1	1	1			15	9
Luxembourg		3			2	6	25	1			7	1						2	47	35
Mexico															1				1	1
Norway					1			1				1		3		4	1	1	12	9
New Zealand	3													2		1			6	5
Netherlands			2				2	3											7	7
Poland		2					2					1	1			5	1		14	13
Portugal							4				1			1	3	2			12	12
United Kingdom	2			2		2	3	8			1	2			1	6		2	31	6
Czech Republic		1				3	2	1											7	6
Spain						3	5						2	2					12	8
United States	1			1		1	1	8	1	1		1		4				1	20	4
Sweden					1														1	0
Switzerland		1	1			3	3	1				1		1		2			13	10
Turkey																				0
Hungary							1	1			1								3	3
TOTAL	7	5	10	4	4	37	68	39	2	4	18	15	3	20	10	36	5	12	299	197

Table 4

Descriptive Statistics

Panel A refers to banks in the sample with assets of more than \$25 billion. Panel B refers to banks with at least one foreign branch. Panel C refers to banks with at least one foreign subsidiary. Total assets are expressed in billions of US dollars. ROE is defined as income after tax in proportion to equity. ROA (income after tax), net interest margin, cash-flow (equity minus fixed assets and loan loss reserves) and net charge-offs are expressed as percentage ratios of total assets. Non-interest income is expressed as a percentage ratio of the sum of net interest margin and non-interest income. All data are calculated as the average value of 1994-1997 figures.

Variables	Obs.	Median	Mean	Std. Dev.	Min.	Max.
Panel A:						
Banks with total assets of more than \$25 billion						
Total Assets	260	57.93	105.93	113.12	25.08	715.45
Net ROE	260	7.61	7.57	8.40	-20.95	31.92
Net ROA	260	0.28	0.41	0.50	-0.85	2.27
Net Interest Margin	259	1.63	1.75	1.02	0.09	5.07
Non-Interest Income	260	32.08	33.71	20.98	0.47	100.00
Cash Flow	260	2.74	3.36	2.95	-1.21	31.10
Overheads	260	65.11	63.55	15.20	14.91	98.61
Net Charge-offs	260	0.22	0.31	0.37	-0.94	2.15
Panel B:						
Banks with foreign branches						
Total Assets	168	71.39	123.62	15966.45	25.71	715.45
Net ROE	168	5.76	6.04	69.30	-20.95	27.30
Net ROA	168	0.22	0.31	0.19	-0.62	1.54
Net Interest Margin	168	1.65	1.76	0.71	0.13	4.63
Non-Interest Income	168	33.51	33.50	279.30	1.08	91.84
Cash Flow	168	2.37	2.63	2.90	-1.21	7.81
Overheads	168	65.50	65.64	136.66	26.64	94.27
Net Charge-offs	168	0.30	0.39	0.16	-0.94	2.15
of which: Banks with foreign branches and with no foreign subsidiaries						
Total Assets	76	44.96	65.74	3930.12	25.71	422.48
Net ROE	76	3.67	4.07	69.94	-20.95	23.59
Net ROA	76	0.15	0.25	0.19	-0.62	1.54
Net Interest Margin	76	1.75	1.84	0.71	0.34	4.63
Non-Interest Income	76	32.44	29.92	287.98	1.08	69.44
Cash Flow	76	2.17	2.48	3.64	-1.21	7.81
Overheads	76	65.23	65.84	112.86	27.22	90.04
Net Charge-offs	76	0.32	0.47	0.21	-0.17	2.15
Panel C:						
Banks with foreign subsidiaries						
Total Assets	114	110.91	159.44	19287.31	28.25	715.45
Net ROE	114	8.01	8.08	64.69	-15.19	29.73
Net ROA	114	0.30	0.38	0.21	-0.85	1.77
Net Interest Margin	114	1.45	1.62	0.75	0.13	3.92
Non-Interest Income	114	35.26	38.18	370.87	4.12	91.84
Cash Flow	114	2.68	3.18	5.07	-0.68	14.09
Overheads	114	65.95	65.46	179.65	26.64	98.61
Net Charge-offs	114	0.23	0.30	0.10	-0.94	1.33

Table 5

Country Summary Statistics

The summary statistics in panel A are country averages of the 2,168 potential target banks (see table 1) with the exception of the last column which refers to the 260 large banks with total assets of more than \$25 billion. ROA is defined as income after tax as a percentage of total assets. Overheads and non-interest income are expressed as percentages of the sum of net interest margin and non-interest income. In panel B, data on GDP, population, bank domestic credit and inflation are from IMF, *International Financial Statistics* (1998); stock market capitalization is from IFC (1998), *Emerging Stock Markets Factbook*. GDP is expressed in billions of dollars. Per capita GDP is expressed in dollars. Bank domestic credit, stock market capitalization and exports are expressed as percentages of GDP. Schooling is the average schooling years in the total population in 1995; it is taken from Barro and Lee (2000). All data in panels A and B, with the exception of schooling, are calculated as the average value of 1994–1997 figures. In panel C, “Rule of law” is taken from La Porta *et al.* (1998); “Restrictions on banking” are from Barth *et al.* (2000). Average total assets are expressed in billions of US dollars; “Market concentration” is computed by the market share of the largest 5 banks (our computation from the 2,168 banks included in the sample).

Country	Panel A					Panel B					Panel C				
	ROA	Non-Interest Income	Cost-Income	Cash flow	ROA Large Banks	GDP	Per capita GDP	Bank Domestic Credit	Stock Market	Inflation	Schooling	Average Total Assets	Market Concentration	Restrictions on banking	Rule of law
Australia	0.84	38.4	59.6	5.25	1.09	362.3	19918	84.9	114.2	2.4	10.3	12.8	66.3	2.00	10.00
Austria	0.28	28.8	64.0	2.96	0.31	213.4	26503	128.9	15.5	2.1	8.4	11.3	62.7	1.25	10.00
Belgium	0.33	28.0	70.7	2.88	0.35	253.2	24992	151.0	44.0	1.9	8.5	28.6	73.0	2.50	10.00
Canada	0.43	33.3	67.4	4.85	0.67	579.2	19445	76.2	74.9	1.4	11.2	31.9	81.2	2.25	10.00
South Korea	0.45	36.0	64.8	3.39	0.23	388.2	8566	64.4	35.7	5.0	10.1	15.8	35.7	2.25	5.35
Denmark	0.74	19.0	63.0	6.57	0.58	171.1	32635	55.1	40.3	2.1	9.9	16.3	84.0	1.75	10.00
Finland	0.30	37.7	62.2	2.59	0.56	118.1	23079	65.0	46.3	1.0	9.8	33.7	95.1	1.75	10.00
France	0.41	30.9	72.4	4.67	0.30	1451.4	24915	101.4	38.6	1.7	7.9	21.4	40.4	2.00	8.98
Germany	0.28	17.9	60.7	3.28	0.16	2220.6	27194	133.2	28.6	2.0	9.6	12.0	29.2	1.75	9.23
Japan	-0.03	14.9	67.2	1.79	-0.07	4429.3	35347	134.6	71.6	0.6	9.4	56.7	28.2	3.25	8.98
Greece	0.96	41.0	70.6	3.14	0.45	112.4	10751	59.2	20.1	8.4	8.0	9.5	79.5	2.25	6.18
Ireland	0.79	18.4	44.6	7.06	1.11	64.8	18159	44.6	27.2	2.0	8.8	5.5	61.5	1.75	7.80
Iceland	0.46	37.0	69.5	2.71	.	7.0	25757	54.8	11.6	1.8	8.3	1.3	100.0	2.75	.
Italy	0.39	28.5	67.1	6.33	0.10	1113.8	19422	96.5	22.3	3.8	6.6	12.4	35.5	2.25	8.33
Luxembourg	0.40	37.7	47.3	2.62	0.40	16.3	39873	.	192.0	1.7	.	7.2	30.5	.	10.00
Mexico	0.46	25.4	73.7	3.29	0.63	304.3	3234	29.4	39.8	24.2	6.4	11.9	61.4	3.25	5.35
Norway	0.99	21.6	60.4	5.28	1.45	145.5	33304	57.7	35.2	1.9	11.8	5.5	67.1	2.00	10.00
New Zealand	0.75	40.6	67.5	2.09	.	59.9	16673	89.1	78.6	2.2	11.3	9.4	82.8	1.25	10.00
Netherlands	0.53	29.0	56.9	4.12	0.46	368.7	23804	121.7	100.8	2.2	9.0	30.4	81.6	1.50	10.00
Poland	2.49	27.2	45.3	6.66	.	113.9	2950	36.4	6.2	24.0	9.7	3.0	62.6	.	.
Portugal	0.57	33.5	62.8	4.15	0.73	100.7	10199	93.1	24.4	3.6	4.5	8.9	57.1	2.00	8.68
United Kingdom	0.76	35.8	58.7	6.25	0.71	1174.4	20043	125.9	135.3	2.9	9.0	24.7	39.0	1.25	8.57
Czech Republic	0.85	41.1	53.7	3.98	.	48.8	4731	79.2	26.9	9.1	6.6	4.6	85.1	.	.
Spain	0.83	21.2	62.0	3.97	0.71	535.5	13648	105.4	41.4	3.7	12.2	10.5	46.7	1.75	7.80
United States	1.01	27.2	60.0	6.89	0.98	7496.2	28368	78.3	105.8	2.7	11.2	10.6	16.6	3.00	10.00
Sweden	0.52	16.9	49.7	3.28	0.73	229.8	26045	70.0	90.2	1.5	10.2	27.6	69.2	3.00	10.00
Switzerland	0.64	48.7	69.2	4.60	0.15	278.2	39478	182.8	152.3	1.0	4.6	20.5	75.8	1.50	10.00
Turkey	1.30	18.5	62.3	4.42	.	127.9	2058	31.1	26.1	90.1	8.5	4.2	75.8	3.00	5.18
Hungary	1.78	40.0	61.7	3.80	.	40.3	3945	55.8	15.1	22.2	.	2.7	75.8	.	.

Table 6

The Determinants of a Bank's Decision to Expand Abroad

The empirical model in equation (1) has been estimated using a multinomial logit specification, where the dependent variable equals 1 if the bank has only a branch in the destination county (panel A), 2 if the bank has a shareholding in the destination country (Panel B), and zero otherwise. Panel C reports a χ^2 test that coefficients of each variable are equal for branches and subsidiaries. All variables are defined in tables 4 and 5: (i) stands for individual bank data; (o) for origin country data; (b) for bilateral data; (d) for destination country data. The estimate also includes dummy variables (unreported) to account for the nature of the main activity of the bank (commercial banks, cooperative banks, medium and long term banks, real estate-mortgage banks, savings banks, specialized government credit institutions, and investment banks and securities houses). The marginal effect of each explanatory variable, measured as the change in the probability that a bank will have a branch (shareholding) in a given country (expressed in percentage points) associated with a change in the covariate from the 25th to the 75th percentile of the sample distribution, leaving all other variables at their sample values. In order to measure the relative importance of each factor discussed in section 3, we computed synthetic variables (factors) as weighted averages of those included in the basic regression, with the weights given by the estimated coefficients. Then we estimated previous regressions with the factors as explanatory variables (by construction their coefficients are all equal to 1) and computed the marginal effects associated with a change in each factor from its level at the 25th to that at the 75th percentile of the sample distribution, leaving all other factors at their sample values. Standard errors are reported in italics. The row IIA-test reports the test value on the Independence from Irrelevant Alternatives property (Hausman and Mc Fadden, 1984). The symbol *** indicates a significance level of 1 per cent or less; ** between 1 and 5 per cent; * between 5 and 10 per cent.

VARIABLES	Panel A: Branch				Panel B: Subsidiary				Panel C: Difference test	
	Coeff. (Std. Err.)	Signif.	Marginal Effect		Coeff. (Std. err.)	Signif.	Marginal effect		Chi2	Signif.
			Var.	Factor			Var.	Factor		
Size (log value) (i)	1.39 (0.08)	***	0.077		1.82 (0.13)	***	0.038		12.96	***
Non-interest income (i)	0.02 (0.00)	***	0.018	.114	0.02 (0.00)	***	0.009	.051	0.19	
Return on assets (o)	1.18 (0.17)	***	0.035		1.21 (0.31)	***	0.015		0.01	
Trade (b)	5.48 (0.91)	***	0.012		4.93 (1.08)	***	0.004		0.36	
Language (b)	-0.30 (0.24)		-0.021		0.37 (0.28)		0.016		5.21	**
Euro Countries (b)	0.68 (0.20)	***	0.025	.030	1.46 (0.26)	***	0.049	.015	7.87	***
Distance (log value) (b)	-0.16 (0.06)	***	-0.015		-0.24 (0.09)	***	-0.012		1.00	
Restrictions (d)	-0.04 (0.15)		0.003		-0.85 (0.24)	***	-0.013		10.45	***
Concentration (d)	-0.03 (0.00)	***	-0.046		-0.04 (0.01)	***	-0.041		3.89	**
Financial center (d)	1.85 (0.21)	***	0.156	.065	0.26 (0.42)		-0.015	.027	15.03	***
Rule of Law (d)	-0.19 (0.08)	**	-0.030		0.26 (0.15)	*	0.022		8.09	***
GDP pc (log value) (d)	-0.49 (0.26)	*	-0.001		-2.07 (0.60)	***	-0.049		6.82	***
Inflation (d)	-0.03 (0.01)	***	-0.001		-0.11 (0.09)		-0.006		1.40	
Schooling (d)	0.08 (0.04)	**	0.005	.034	0.29 (0.09)	***	0.020	.022	5.59	**
Credit market size (d)	1.08 (0.31)	***	0.032		1.36 (0.45)	***	0.019		0.33	
Cash-flow (d)	0.13 (0.06)	**	0.008		0.43 (0.11)	***	0.022		7.40	***
Cost-income (d)	0.03 (0.01)	**	0.009	.031	0.06 (0.02)	***	0.011	.031	1.78	
Return on assets (d)	1.02 (0.30)	***	0.020		1.40 (0.49)	***	0.014		0.54	
Observed probability			.095				0.039			
IIA test			15.0				-118.3			
N-observations				5,911						
Pseudo R-square				0.36						

The Determinants of a Bank's Decision to Expand Abroad (robustness check to different estimation techniques and sensitivity to outliers)

The empirical model in equation (1) has been estimated using a multinomial logit specification, where the dependent variable equals 1 if the bank has only a branch in the destination country abroad, 2 if the banks has a foreign subsidiary in the destination country, and zero otherwise. All variables are defined in tables 4 and 5: (i) stands for individual bank data; (o) for origin country data; (b) for bilateral data; (d) for destination country data. The estimate also includes (when appropriate) dummy variables (unreported) to account for the nature of the main activity of the bank (commercial banks, cooperative banks, medium and long term banks, real estate-mortgage banks, savings banks, specialized government credit institutions, and investment banks and securities houses). Panel A reports estimates obtained using a multinomial logit specifications, respectively with individual-bank fixed effect, origin-country fixed effects and destination-country fixed effects. The symbol *** indicates a significance level of 1 per cent or less; ** between 1 and 5 per cent; * between 5 and 10 per cent. The jackknife estimator in the column "Mean" of Panel B is obtained as the average of the coefficients obtained dropping recursively one destination country from the regression sample.

	Panel A:						Panel B:					
	Individual Bank Fixed Effects			Origin Country Fixed Effects			Destination Country Fixed Effects			jackknife estimation		
	Branch	Subsidiary		Branch	Subsidiary		Branch	Subsidiary		Branch	Subsidiary	
	Coeff.	Std.Err	Signif.	Coeff.	Std.Err	Signif.	Coeff.	Std.Err	Signif.	Coeff.	Std.Err	Signif.
Size (log value) (i)												
Non-interest income (i)												
Return on assets (o)												
Trade (b)	4.63	(1.35)	***	6.10	(1.71)	***	1.52	(0.09)	***	1.86	(0.15)	***
Language (b)	0.40	(0.30)		0.78	(0.36)	**	0.03	(0.00)	***	0.03	(0.01)	***
Euro Countries (b)	1.11	(0.28)	***	2.16	(0.40)	***	0.85	(0.25)	***	0.52	(0.31)	*
Distance (log value) (b)	-0.47	(0.10)	***	-0.33	(0.15)	**	-0.31	(0.09)	***	1.67	(0.33)	***
Restrictions (d)	0.04	(0.18)		-0.91	(0.27)	***	0.07	(0.16)		-0.30	(0.12)	**
Concentration (d)	-0.04	(0.01)	***	-0.05	(0.01)	***	-0.03	(0.00)	***	-0.80	(0.25)	***
Financial center (d)	2.88	(0.25)	***	1.14	(0.49)	**	1.98	(0.22)	***	-0.04	(0.01)	***
Rule of Law (d)	-0.16	(0.09)	*	0.24	(0.16)		-0.16	(0.08)	*	0.28	(0.15)	*
GDP pc (log value) (d)	-0.89	(0.31)	***	-2.42	(0.66)	***	-0.60	(0.27)	**	-2.19	(0.62)	***
Inflation (d)	-0.04	(0.01)	***	-0.11	(0.08)		-0.03	(0.01)	***	-0.11	(0.08)	
Schooling (d)	0.16	(0.05)	***	0.37	(0.10)	***	0.11	(0.05)	**	0.32	(0.09)	***
Credit market size (d)	1.26	(0.35)	***	1.75	(0.48)	***	1.06	(0.31)	***	1.47	(0.45)	***
Cash-flow (d)	0.15	(0.07)	**	0.51	(0.12)	***	0.11	(0.06)	*	0.44	(0.11)	***
Cost-income (d)	0.04	(0.01)	***	0.07	(0.02)	***	0.03	(0.01)	***	0.06	(0.02)	***
Return on assets (d)	1.43	(0.34)	***	1.67	(0.55)	***	1.19	(0.30)	***	1.50	(0.51)	***
N-observations	5,911			5,911			5,911			5,911		
Pseudo R-square	0.54			0.38			0.37			0.37		



ECONOMICS & STATISTICS DISCUSSION PAPER
No. 057/11

Do multinational banks create or destroy economic value?

M. A. Gulamhussen

Carlos Piheiro

Alberto Franco Pozzolo

Do multinational banks create or destroy economic value?

M. A. Gulamhussen*
(Lisbon University Institute)

Carlos Pinheiro
(Caixa Geral de Depósitos)

Alberto Franco Pozzolo
(Università degli Studi del Molise, MoFiR and Centro Studi Luca D'Agliano)

Abstract

Multinational banks are a distinctive feature of today's globalized economy with some institutions now operating in more than 100 countries. Despite the thorough analyses of bank internationalization over the last decades, the literature has failed to provide clear evidence that cross-border expansion is a profitable process from a firm's perspective. The analyses of the costs and benefits of focusing or diversifying the activities of a firm have a long tradition in the economic and business literatures. The overall evidence is mixed, due to the opposite effects of scale and scope economies on one side and agency costs on the other. In this paper, we study the value of internationally diversified commercial banks. In our analysis we construct a measure of banks' excess value using a large sample of more than 500 large banks from 56 countries between 2001 and 2007, and relate it to different measures of the international diversification of their activities. We find robust evidence of a statistically and economically significant diversification premium, suggesting that, in banking, the benefits of geographic scale and scope economies more than offset the agency costs.

JEL classification: G34; G21; G15; L22; F23; F36

Keywords: Geographical diversification; Corporate diversification; Multinational banking; Foreign Direct Investment

* We would like to thank Ines Chaieb, Mara Faccio, Roberta De Filippis, Phil Molyneux, Luca Papi, Alberto Sorrentino and seminar participants at the 51st Annual meeting of the Italian Economic Association, at the XIX International Tor Vergata Conference on Money, Banking and Finance and at the Paris December 2010 Finance Meeting EUROFIDAI - AFFI for their comments and suggestions. Address for correspondence: M. A. Gulamhussen, Lisbon University Institute, Av Forças Armadas Cacifo 101 B 1649-026, Lisbon, Portugal Phone +351217903954 Fax +351217964710 E-mail addresses: magn@iscte.pt (M. A. Gulamhussen); carlos.manuel.pinheiro@cgd.pt (C. Pinheiro); pozzolo@unimol.it (A. F. Pozzolo).

1. Introduction

Multinational banks are a distinctive feature of today's globalized economy. In the years prior to the 2007-2008 financial crisis, global players such as Citigroup (a group with 300,000 employees, about 16,000 offices and over 200 million customers in 140 different countries) or HSBC (330,000 employees, 8,500 offices, 128 million customers in 86 countries) were viewed as the trademarks of the worldwide integration of financial markets: They were also considered powerful and profitable companies with growing influence in nearly every corner of the world. The recent financial crisis has put many global banks in the verge of collapse. Massive liquidity problems and substantial losses suggested that they were much weaker players than they pretended to be. Were all these just castles built on sand?

Quite surprisingly, a large number of studies of the rapid growth of multinational banks in the last decades have been unable to provide clear evidence of the profitability of this process from a firm's perspective. Domestic and cross-border expansions of financial intermediaries have been shown to be beneficial (Jayaratne and Strahan, 1996, and Hauswald and Bruno, 2009) but most analyses have found weak evidence of economies of scale or scope, efficiency improvements and, more in general, increase in shareholder value (DeLong, 2001, and Cornett et al., 2003). Whether geographic diversification and cross-border expansion increase shareholder value is a question still lacking a neat answer.

The debate on the costs and the benefits of focusing or diversifying the activities of firms has a long tradition in the economic and business literatures. From a theoretical point of view, it has been argued that diversification can augment firm value thereby increasing firms' market power and enable more efficient use of physical and human resources; but it can also diminish the mentioned benefits as a result of stronger agency problems (Montgomery, 1994, and Martin and Sayrak, 2003). At the same time, the empirical literature has been unable to draw conclusive evidence on what forces prevail, although it mostly points towards a diversification discount, driven by powerful agency problems.

In the case of financial intermediaries, the causes and the consequences of product and geographic diversification can be rather different from those of manufacturing firms, because of the overwhelming role of regulation, the importance of intangible assets such as soft information and reputation, and the necessity of a physical presence for selling retail financial services. For

all these reasons, some recent studies have watched more specifically at banks: Laeven and Levine (2007) and Schmidt and Walter (2009) find a significant corporate diversification discount for banking activities, while Deng and Elyasiani (2008) find a geographic diversification premium in the U.S. banking industry. To the best of our knowledge, a study of the effect of international diversification on shareholder value is still missing.

In this paper we fill this gap comparing the value of internationally diversified commercial banks with that of purely domestically focused banks. Our methodology follows Laeven and Levine (2007) in constructing a measure of each bank's excess value, and relates it to different indices of the international geographic diversification whilst controlling for a host of other possible influences as well. Studying a large sample of more than 500 large banks from 56 countries between 2001 and 2007, we find robust evidence of a statistically and economically significant diversification premium. Well diversified international banks can have an excess Tobin's q that is nearly twice as big as that of more domestically focused intermediaries. Our findings are consistent with the results of Deng and Elyasiani (2008) for geographic diversification within the U.S., and suggest that the benefits of scale and scope economies generated by multinational banks more than offset the agency costs, thus providing a strong rationale for the rapid growth of the international activity of banks during the last couple of decades.

The rest of the paper is organized as follows. Section 2 relates our research to the previous literature on firm diversification and multinational banking. Section 3 presents our empirical strategy. Section 4 presents our data sources and describes the measures of firm value and geographic diversification used in the empirical analyses. Results are presented in Section 5. The final section concludes and discusses some open issues.

2. Related Literature

Our paper relates to the general literature on the costs and benefits of focusing versus diversifying firms' activities, and more specifically to the recent analyses watching at financial intermediaries. At the same time, it is also linked to the literature on multinational banking.

The debate on focus versus diversification has a very long tradition, shared by both the economic and the management literature. From a theoretical point of view, a large number of

motivations have been put forward both in favor and against diversification. Most of them can be applied also to the case of financial intermediaries, although with some important qualifications.

The arguments in favor of diversification can be broadly grouped into three categories: increased market power, better resource management, and reduction of agency problems. According to the market power view (Edwards, 1955), firms' incentives to diversify their lines of business come from the possibility of extending their market power from one sector to another, through predatory pricing in other sectors, collusion with other large and diversified companies, and the exclusion of smaller size competitors (Montgomery, 1994; Villalonga, 2004a and 2004b). Clearly, this analysis applies also to the case of financial intermediaries. Sharpe (1990) and Rajan (1992), in particular, show how lending relationships give banks a monopoly on information about their borrowers, that can be exploited to gain monopoly power (e.g., Petersen and Rajan, 1994).

The resource management argument hinges essentially on the presence of economies of scope, and suggests that firms can profitably readdress their unused resources to business activities that are somehow linked to those of their core business. Clearly, also this argument applies to banks expanding their activities, for example cross-selling financial products (Saunders, 1994) or following their clients abroad (Focarelli and Pozzolo, 2005). A parallel justification, hinging more on the financial aspects of firm management, is that diversification reduces the effect of idiosyncratic shocks on cash flow variance, therefore increasing the stock market value (Lewellen, 1971).

A more recent strand of literature has analyzed the problem of corporate diversification applying the tools of agency theory to the analysis of the functioning of firms' internal capital markets (Houston et al., 1997). The key insight of this line of research is that a firm's internal cash flows are a less expensive source of funds than external capital. Better informed internal managers can therefore increase firm value by selecting the most remunerative projects, instead of paying out dividends that would be invested elsewhere by less informed externals (Stein, 1997; Cremers et al., 2010).

This positive view of firm diversification is opposed by an equally large amount of arguments against it. From a general perspective, the increase in firm value due to stronger market power comes at the customers' expense, and therefore it is not socially optimal. From a firm specific perspective, it has been forcefully argued that agency problems can have a huge

negative impact on the allocation of resources with respect to what is optimal for shareholders. Most problems come from the well known conflict of interest between insiders (managers) and outsiders (shareholders), that exacerbate the well known problem of overinvestment. Building on the seminal contribution of Jensen and Meckling (1976), this literature has stressed that diversification can have a negative impact on firm value if this is the result of managers' desire to: a) increase their compensation (Jensen and Murphy, 1990) and make their human capital more essential to the firm (Shleifer and Vishny, 1990a and 1990b); b) increase their personal perquisites (Jensen, 1986); c) make their result based compensation more stable by reducing the company's cash flow volatility (Amihud and Lev, 1981). In addition to the motivations based on the conflict of interests between managers and shareholders, diversification may also negatively affect the value of a firm by reducing its efficiency, for example introducing expensive additional layers of administrative and corporate control and allocating resources inefficiently across different activities. Clearly, all these problems are even more relevant in the case of financial intermediaries, whose activities are typically less based in hard information, and more opaque and difficult to monitor by external investors (Morgan, 2002).¹

Since the theoretical literature has provided a large number of explanations of why diversification can either increase or decrease the value of a firm, only the empirical analysis should be able to provide the ultimate answer on its actual effects. Unfortunately, also the empirical literature provides a rather mixed picture. The typical exercise compares the value of a conglomerate (e.g., the Tobin's q or its stock price) with the value imputed considering each segment of its activities as a stand-alone firm, using the so called "chop-shop" approach initially proposed by LeBaron and Speidell (1987). Martin and Sayrak (2003) identify three rounds of results. A first group of papers shows that corporate diversification destroys value, reducing Tobin's q (Berger and Ofek, 1995; Rajan et al., 2000; Lamont, 1997), productivity (Maksimovic and Phillips, 2001), and stock market prices around M&A announcements (Bradley et al., 1988). A second round of literature questions the previous findings, showing that the estimated discount is explained by other firm characteristics that are themselves associated with a higher probability that a firm diversifies its activities. In other words, previous analyses were biased by endogeneity problems. Indeed, Lang and Stulz (1994) and Campa and Kedia (2002) show that diversified

¹ See, for example, the literature on the negative effects of functional distance in bank lending (Alessandrini et al., 2009).

firms were poor performers also before diversification. While later analyses carefully controlling for endogeneity still found a diversification discount (Lamont and Polk, 2002), the issue is not yet settled. Finally, a third round of literature has argued that the previous findings were flawed by data problem, because firms erroneously self-report their segments of economic activities. Indeed, using more reliable census information, Villalonga (2004a and 2004b) finds that diversified firms trade at a significant premium, not at a discount.²

In the case of financial companies, the empirical literature has taken a more diverse approach, often studying very specific issues, such as the pros and cons of narrow versus universal banking. Indeed, in most cases the objective was more to understand the effects of bank diversification on risk taking or lending activities, rather than the consequences for shareholder value. For example, in the thriving strand of literature that has originated from the repeal of the Glass-Steagall Act in the U.S. in 1999, the maintained assumption is that commercial banks diversify their activities into investment banking because they find it profitable, while the focus is in ascertaining the presence of conflicts of interest coming from the coexistence of investment and commercial banking activities within the same company (Kroszner and Rajan, 1994; Puri, 1996; Focarelli et al., 2010).³

More interesting results for the debate on focus versus diversification come from the rich strand of empirical literature that has studied the effects of bank M&As, mostly pointing towards a significant diversification discount. Product and geographically focused mergers increase overall efficiency (Cornett et al., 2006; Altunbas and Marqués-Ibanez, 2008) while diversifying deals often have a negative impact. The literature on optimal bank size also found results consistent with this view, with very weak evidence of economies of scale (Amel et al., 2004).⁴ Studies of the stock market reactions of M&A announcements give more mixed results. DeLong (2001 and 2003) and Cornett et al. (2003) find a diversification discount for the U.S., while Cybo-Ottone and Murgia (2000) find positive abnormal returns for the combined performance of M&A bidders and targets, driven by domestic bank to bank deals and by diversification of banks into insurance businesses.

² In a partly related literature, Rowland and Tesar (2004) find that stock returns of multinational corporations significantly shift the investors' domestic portfolio frontier.

³ For a recent survey of this literature, see Drucker and Puri (2006).

⁴ A noticeable exception to these results is Vander Venet (2002), who finds that European conglomerates are more cost efficient than specialized banks.

Only recently, a few papers have studied the link between diversification and the value of firms in the financial sector using the methodology followed by the literature on manufacturing firms. Again, most of the results point towards a discount. Laeven and Levine (2007), using a large set of banks from over 40 countries, find that financial conglomerates engaging in multiple activities have a significantly smaller Tobin's q than less diversified institutions. Schmid and Walter (2009) confirm this result for a large sample of U.S. financial corporations, with the only noticeable exception of investment banks.

Results focusing on European financial markets are more mixed. Baele et al. (2007) find a positive and strong relationship between banks' Tobin's q and measures of income or balance sheet diversification between lending and non-lending activities, and a non-linear relationship between diversification and bank-specific risk, measured by banks' stock market excess returns. Further, studying a sample of European financial corporations, van Lelyveld and Knot (2009) find no evidence of a structural diversification discount, although they present some evidence that the largest conglomerates have more opportunities for inefficient cross-subsidization across different business lines.

A parallel important dimension is geographical diversification. The literature on the effects of plant and cross-border expansion of manufacturing firms is huge, and it has analyzed nearly all possible dimensions of firm's performance. In the recent past a thriving literature has emerged studying these issues within the framework of the incomplete contract theory, providing a sound theoretical background for the empirical analysis.⁵

On the specific issue of firm value, a seminal paper by Morck and Yeung (1991) shows that multinationality has no direct significant impact on a firm's Tobin's q , although it may enhance the positive impact of investment in intangible assets on firm's value. Denis et al. (2002) provide further evidence of a weak effect of internationalization, documenting that globally diversified firms are traded at a discount. Similarly, Moeller and Schlingemann (2005) find worse stock market reactions to M&A announcements of cross-border deals than of domestic acquisitions.

In the case of financial intermediaries, geographical diversification can have rather different motivations than for manufacturing firms. In particular, analyzing the benefits of internalizing existing and new bank-customer relationships (Buckley and Casson, 1976;

⁵ For recent surveys see Caves (1996), Markusen (2004), Barba Navaretti and Venables (2004), and Helpman (2006).

Williams, 1997) is rather complex, due to the confusing effects of regulation, to the value of intangible assets such as reputation, and to the importance of a physical presence for developing the personal relationships that are essential to supply most retail financial services (Rajan, 1998).

Bank geographic diversification has been analyzed thoroughly also for its effects on real economic growth, especially after the passing in 1994 of the Riegle-Neal Interstate Banking and Branching Efficiency Act in the U.S. allowed nationwide banking. In particular, two seminal papers by Jayaratne and Strahan (1996) and Morgan and Strahan (2004) show convincingly that the increase in competition induced by the entry of new players boosted economic growth and reduced output volatility.

The evidence of effects on firms' value seems instead much less conclusive. Rose (1996) and Hughes et al. (1996 and 1999) show that geographic expansion has mixed effects on risk and efficiency of U.S. banks. Zhang (1995) finds that geographical diversification leads to lower risk through a reduction in income variability, but Morgan and Samolyk (2005) find a U-shaped relationship between geographic diversification and risk-adjusted returns.⁶ Moreover, Deng et al. (2007) show that domestically diversified banks both on the assets and on the liabilities side pay lower bond spreads, and Deng and Elyasiani (2008), in a paper more closely related to ours, provide evidence that geographically diversified banks have a higher Tobin's q and a lower stock price variability, but at the same time an increase in distance between the holding company and its branches has instead a negative effect on company's value.

Finally, an important dimension of bank geographical diversification is the international arena. Financial companies have expanded their cross-border activities tremendously in recent years, favored by deregulation in the U.S. and in Europe and, more in general, as part of the widespread process of economic globalization. The empirical literature in this context has studied thoroughly this phenomenon, analyzing the determinants of foreign expansion (Buch, 2003; Focarelli and Pozzolo, 2001), the patterns of internationalization (Buch and DeLong, 2004; Berger et al., 2003 and 2004; Focarelli and Pozzolo, 2005; Claessens and Van Horen, 2007), the specific characteristics of the bidders in international M&As (Caiazza et al., 2009; Correia, 2009) and those of the targets (Caiazza et al., 2010). However, with the exception of few studies finding a negative or null effects of M&A announcements on stock market prices

⁶ Studying a sample of the 50 largest banks in the world between 2003 and 2006, Outreville (2010) also finds a cubic relationship between profitability and international diversification.

(Amihud et al., 2002, Cybo-Ottone and Murgia, 2000, and Campa and Hernando, 2006) the effects of international diversification on firm value have not been analyzed in detail.⁷ In the following, we will begin filling this gap in the literature.

3. Empirical strategy

Our empirical model is designed to test whether bank's excess value is in fact an increasing function of its international diversification. The general specification that we test is the following:

$$Excess\ value_{jt} = \alpha + \beta\ geo\ div_{jt} + \gamma\ controls_{jt} + \varepsilon_{jt}, \quad (1)$$

where the measures of excess value and geographic diversification refer to bank j at time t , the controls include time-varying bank-specific characteristics, time-varying country-specific characteristics, and time and country dummies, and ε_{jt} is an error term. The model is estimated using robust regression techniques, because we are interested in keeping all the sampled values but we want to be sure that our results are not driven by extreme values. In unreported OLS regressions we found qualitatively similar results. In the following we discuss in detail our measures of excess value and geographic diversification, and the controls introduced in our specifications.

Dependent variable: Excess value. For each bank j , excess value is defined as a bank's Tobin's q minus its imputed or adjusted q . As it is common in the literature (see for example Linderberg and Ross (1981) for an early reference), we compute Tobin's q as the ratio of the sum of market value of common stocks, book value of preferential shares and minority interests, and book value of debt, to the book value of total assets.⁸ For the imputed or adjusted q we adapt the methodology of Laeven and Levine (2007) to study geographic diversification.

In the "chop-shop" approach of LeBaron and Speidell (1987), the Tobin's q of each firm is compared with an imputed q obtained if the firm were "chopped" into separate "shops". In our framework, we must therefore compare a bank's q with the imputed q that it would have if it were "chopped" in two into a geographically diversified bank and a domestic, undiversified, bank.

⁷ Amihud et al. (2002) also find no effects of cross-border M&As on bidders' systematic risk, but Focarelli et al. (2008) question this result showing instead that bidders experience a reduction in their beta (the correlation of their returns with stock market returns).

⁸ The use of the book value of debt is quite customary in the empirical literature because of the lack of data on the large share of non-tradable debt, but it is unlikely to affect significantly our estimates: according to Sweeney et al. (2001), who have analyzed 15 manufacturing and financial industry portfolios between 1978 and 1991, the correlation between book value and market value of debt is 0.95.

If we knew the Tobin's q of the geographically diversified bank (that we can call q_1) and of the domestic bank (q_2), the imputed q of a bank with a share ϕ of internationally diversified activities and a share $(1 - \phi)$ of domestic activities would be: $\phi q_1 + (1 - \phi)q_2$. Since in practice we have not a precise measure of the Tobin's q of geographically diversified and domestic banks, we use an approximation. For each bank j , we compute an index of foreign geographical dispersion, defined as $\alpha_j = \frac{n_j}{n_{max}}$, where n_j is the average number of foreign countries where the bank j has a subsidiary during our sample period and n_{max} is the same number for the most internationally diversified bank. We then define Tobin's q of a geographically diversified bank (q_1) as the average of the qs of banks with α_j above a given threshold, and that of a domestic bank (q_2) as the average of the qs of banks with α_j lying at or below the same threshold. Excess value is therefore defined as:

$$Excess \ value = \alpha_j q_1 + (1 - \alpha_j) q_2 \quad (2)$$

Following Laeven and Levine (2007), in our baseline specification we define internationally diversified banks as those having an index of geographical dispersions above a threshold of 70%, but we also verify that our results are confirmed when using thresholds at 60%, 80% or 90%. Unlike plain Tobin's q , this measure built as a deviation from the benchmark of multinational banks permits a better identification of the effects of geographical diversification.

Key independent variable: Geographical diversification. The variables used in conventional empirical studies to measure geographic diversification, for example the number of subsidiaries, or the number of locations or binary variables indicating cross-border presence, fail to capture the level and the intensity of banks' diversification in terms of the geographic dimension (Deng and Elyasiani, 2008). For this reason, we construct three different measures of geographic diversification, each one allowing to position banks over a continuum, with the lower bound corresponding to purely non-diversified (domestic) banks and the upper bound to the most geographically diversified banks (similar to the approach used by Laeven and Levine, 2007, for corporate diversification).

Our first measure, that we label geographical reach, is the index of foreign geographical dispersion defined above, but computed for each bank in each year. Formally, it is given by:

$$\frac{n_{j,t}}{n_{\max,t}} \quad (3)$$

where $n_{j,t}$ is the number of foreign countries where the bank j has a subsidiary in year t , and $n_{\max,t}$ is the maximum number of foreign countries where the most diversified bank has subsidiaries, in year t . Geographic diversity is a stock variable, continuous, and bounded between 0 and 1. Purely domestic banks take the value 0 (i.e., no geographical diversification); values close to 1 indicate more geographically dispersed banks. An advantage of this index is that it normalizes the measure of geographic diversification by accounting for the yearly variation of the most diversified banks.

Our second measure proxies geographic diversification through the share of assets on a country by country basis, taking therefore into consideration the asset dispersion across subsidiaries (similar to Buch and Lipponer, 2007). Formally, this is computed as:

$$1 - \left(\frac{\text{total subsidiaries assets} - \text{foreign subsidiaries assets}}{\text{total subsidiaries assets}} \right) \quad (4)$$

and it is therefore bounded between 0 and 1, with values close to 0 indicating low geographic diversification and values close to 1 indicating high geographic diversification.

Our third measure proxies geographic diversification through a transformed Hirsch-Herfindhal Index (Mercieca et al., 2007) computed for each bank and on a country by country basis.⁹ Formally, the index is:

$$1 - \sum_{j=1}^{n_j} \left(\frac{\text{subsidiary } j \text{ assets}}{\text{total subsidiaries assets}} \right)^2 \quad (5)$$

This measure is again bounded between 0 and 1, with values close 0 indicating low geographic diversification and values close to 1 indicating geographically dispersed banks.

We consider a geographically diversified (global) bank as one for which geographic diversity takes values above a given threshold. In our baseline specification a geographically diversified bank is one for which geographic diversity ($\alpha_j = \frac{n_{j,t}}{n_{\max,t}}$) takes values above 0.7. We test for robustness by specifying alternative thresholds in latter sections of this paper.

⁹ Similar concentration measures can be found in the work of Acharya et al. (2006) and Stiroh and Rumble (2006).

Bank controls. We include a set of time varying bank-specific controls. First, we consider two measures related to bank size: the logarithm of total assets (log assets) and that of total operating income (log income). Larger banks are typically more diversified than smaller institutions, and this has an impact on their value independent of their geographic reach. Moreover, as shown during the recent crisis, size is also a good proxy of the value of the implicit insurance guarantee granted to “too-big-to-fail” institutions, that also has an impact on company value. Moreover, although the value of total assets is the standard measure of size in banking, we also consider total income because it is better suited to capture also the weight of off-balance sheet activities.

Besides size, access to funding can limit geographic diversification. We proxy access to funding with the ratio of deposits to liabilities, since this ratio affects the cost of funding which in turn impacts geographic diversification. In addition, stock market capitalization and profitability could also influence geographic diversification: more capitalized banks are more probable candidates for diversifying across borders; profitable banks seek opportunities abroad to benefit from non-tradable, proprietary knowledge. In addition to these two effects, we also control for how easily banks can access stock market funding, including two dummy variables for companies included in the S&P financial listings and for those listed at the New York Stock Exchange.

To account for the recent findings of the literature on corporate diversification, following Laeven and Levine (2007) and Schmid and Walter (2009), we construct four corporate diversification measures, which stem from the broad taxonomy in which commercial banks’ activities are classified between traditional (taking deposits and making loans) and non-traditional (e.g., security and foreign exchange trading and provision of fee-based services). First, we consider income diversity, computed as:

$$1 - \left| \frac{\text{net interest income} - \text{other operating income}}{\text{total operating income}} \right| \quad (6)$$

where other operating income is the sum of investment income, foreign exchange income, gain (or loss) on sale of securities, trading account income and commissions and fees. This index takes values between 0 and 1. Second, as a control for the previous measure, we consider the ratio of net interest income to total operating income, gauging the mixture of income generating activities carried on by each bank.

Third, we estimate asset diversity, a stock variable measuring diversification across different types of bank assets, computed as:

$$1 - \left| \frac{\text{net loans} - \text{other earning assets}}{\text{total earning assets}} \right| \quad (7)$$

and also taking values between 0 and 1. And fourth, as a control for the previous stock measure, we consider the ratio of loans to total earning assets.

Finally, although bank risk is not crucial for our analysis and, as argued by Laeven and Levine (2007) “one of the advantages of using q is that there is no theoretical reason to adjust for risk or leverage to compare firms”, in a number of robustness checks we also control for a number of measures of bank risk. Our preferred risk measure is the logarithm of the Z-score, that following the banking literature (Laeven and Levine, 2009) we define as the number of standard deviations that a bank’s ROA has to drop below its expected value before equity is depleted and is therefore a negative function of the risk of default (i.e, banks with a higher Z-score are less likely to default). In addition, we also control for the incidence over total assets of loan loss reserves, charge offs and problem loans.

Country controls. Previous studies have found that the characteristics of the country of origin significantly influence a bank’s ability to expand cross-border (Focarelli and Pozzolo, 2001, and Buch, 2003). Following this literature, we include among our controls GDP per capita and the rate of inflation of the home country, using information from the World Bank databases. In addition, as a proxy of all the unobservable characteristics that might affect the ability of the banks in a given country to expand abroad, we include the share of diversified banks in the home country. We use the data from the 577 sampled banks with a known value for geographic diversification and then compute the percentage of banks with foreign subsidiaries in each country of origin, on a yearly basis.

4. Data and sources

4.1. Sources and definitions of variables

We collected bank level data from Bankscope (Fitch Ratings, Bureau van Dijk), considered the most comprehensive database for bank cross-country analyses (see, among others, Claessens et al., 2001; Barros et al., 2007; Laeven and Levine, 2007).

We focus on a particular type of financial institution, commercial banks, that have been found to have compelling reasons to internalize banking activity across borders (Focarelli and Pozzolo, 2005). To assemble our data, we first extracted yearly account and market data for the 2001-2007 period on all listed commercial banks available on Bankscope with total assets in excess of US\$ 100 million. We excluded smaller banks to avoid introducing noise in the sample, as they may face additional challenges in diversifying across borders when compared to large banks. We also excluded banks headquartered in off-shore financial centers such as Bermuda, Gibraltar, the Virgin Islands or the Cayman Islands, as this would hinder comparability across countries. We then populated the missing values from Worldscope and bank websites. We went through a painstaking effort to clean and complement the information downloaded from Bankscope, to avoid incongruent and missing data on crucial account and market variables. Our data assembling exercise yielded a sample of 577 commercial banks and 4,039 bank-year observations. In matching our initial 577 publicly traded banks with yearly data on bank subsidiaries, we ended up with 384 banks headquartered in 56 countries for which time-varying data on subsidiaries is available.¹⁰ The countries with the larger relative number of banks in our sample are the U.S. and Japan with 9.4% and 17.0%, respectively.

In constructing our measures of the dependent and independent variables, including corporate diversification measures, bank- and country-specific controls, we followed the extant literature on diversification and bank internationalization (see, among others, Berger and Ofek, 1995; Rajan et al., 2000; Campa and Kedia, 2002; Lamont and Polk, 2002; Villalonga, 2004a and 2004b; Laeven and Levine, 2007; Focarelli and Pozzolo, 2005).

¹⁰ The 56 countries in our sample are: Australia, Bangladesh, Belgium, Brazil, Canada, China, Colombia, Croatia, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Greece, Hong Kong, India, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Kenya, Rep. of Korea, Kuwait, Lebanon, Lithuania, Malaysia, Netherlands, Oman, Pakistan, Peru, Philippines, Poland, Portugal, Qatar, Romania, Saudi Arabia, Singapore, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, Thailand, Tunisia, Turkey, United Arab Emirates, United Kingdom, United States, Venezuela.

4.2. *Summary statistics*

Summary statistics are presented in Table 1. Our baseline dependent variable, excess value evaluated at the 0.7 (and at the 0.9 thresholds), and the independent variable of interest, geographic diversity, are presented along with various variables that we introduce as controls for country and bank traits in the different econometric specifications presented below. These measures along with the bank and country-specific controls yield high variability for the 4,039 bank-year observations, resulting from the combination of the 577 sampled banks for the seven year period (2001-2007).

Excess value, our dependent variable is smaller than what found in other industries, because in banking the book value of total assets is relatively high when compared to Tobin's q numerator. Nevertheless, our measure exhibits high variability and our data on excess value for the 0.7 and 0.9 thresholds yield a range from -0.75 to $+1.89$, with a marginally positive mean which represents a heterogeneous difference of bank Tobin's q to the imputed q .

The more geographically diversified commercial banks in our sample, with geographic diversity in excess of 0.75, are for example ABN Amro (Netherlands), BNP Paribas and Société Générale (France), Citibank (U.S.) and the HSBC (U.K.). Our sample also includes pure domestic banks, for which geographic diversity is 0, as for example 1st Source Bank, Citizens Bank and City National Bank (U.S.), Banca Italalease (Italy), Canadian Western Bank (Canada), and Howa Bank and Daishi Bank (Japan). When measuring geographic diversification in terms of asset dispersion across subsidiaries, the most geographically dispersed banks are found to be Deutsche Bank (Germany), Unicredit (Italy) and Royal Bank of Scotland (U.K.), while using the modified Hirsch-Hirfindhal Index, the largest values are for BBVA (Spain), ING (Netherlands) and the National Bank (Greece). BNP Paribas, Deutsche Bank, HSBC, ING, Santander (Spain) and UBS (Switzerland) are the largest sampled banks in terms of total assets; on the opposite side of the range lay small banks such as Citizens Bank, Sunwest Bank and First California Bank (U.S.) and Howa Bank (Japan). Using other measures, for example the ratio of deposits to total liabilities, Banca Carige (Italy), BNP Paribas, Deutsche Bank and HSBC, exhibit high values, which correspond to high levels of funding originating from deposit-taking activities. As for corporate diversification, the more diversified banks are Howa Bank and Mitsubishi UFJ (Japan) and BNP Paribas in terms of income sources; and HSBC, Royal Bank of

Canada (Canada) and Commerzbank AG (Germany) in terms of assets. Country controls also exhibit high cross-country dispersion.

Table 2 presents the mean and median differences of the excess values of geographically diversified banks. In the first row of Table 2 the t -statistic of 0.33 and its large p -value of 0.74 do not allow to reject the null hypothesis that the mean excess value for diversified and non-diversified banks is the same, at the 5% level of confidence. As the distribution of excess value is skewed to the right, we present in the second row the results of a non-parametric test for differences in medians, showing that the median excess values for diversified and non-diversified banks are significantly different, at the 1% level. However, sample statistics are not fully informative on the relationship between firm value and diversification, as they could simply reflect spurious correlations. In the following section, we therefore estimate a multivariate empirical model.

5. Empirical findings

5.1. Baseline specification

In our baseline specification we analyze geographical diversification estimating robust regressions (Li, 1985) with excess value as the dependent variable and geographic diversity as the explanatory variable of interest, including country fixed effects to account for differences in the economic environment where banks operate, and year dummies. We use a robust regression technique because we are interested in keeping all the sampled values but we do not want our results to be driven by extreme values.¹¹

The results of Table 3 reveal a geographic diversification premium, both economically and statistically significant, suggesting that the benefits of geographic diversification, such as economies of scale and scope, outweigh the costs, such as organizational complexity and agency problems. The coefficient of our preferred measure of geographic diversification is positive and significantly different from zero in all our specifications. In Panel 1, where we control for size (log assets), returns on assets, and leverage, the coefficient of diversification is 0.027 and significantly different from zero at the 1% level.¹² In Panel 2, where we also control for total income, as an additional measure of size which also captures off-balance sheet activities, the

¹¹ In unreported OLS regressions we found qualitatively similar results.

¹² All specifications also include country and year dummies.

coefficient is 0.025 and it is significantly different from zero at the 5% level. In Panel 3, where we further control for the ratio of deposits to total liabilities, a proxy of the funding structure, the coefficient is 0.060 and also significantly different from zero at the 1% level. The magnitude of the coefficients suggest that an increase of one standard deviation in geographic diversity leads to an increase of 0.004 to 0.010 in excess value, more than duplicating its sample mean value of 0.004, therefore suggesting an economically relevant impact.¹³

Among our additional controls, size measured by total assets has an insignificant effect on excess value. This is not entirely surprising, since our measure of excess value is a deviation from a benchmark, and therefore already accounts for the fact that multinational banks are larger than domestic institutions. Total income has instead a positive and significant effect on excess value, consistent with the role of off-balance sheet activities. However, its inclusion turns the sign of the coefficient of total assets negative and statistically significant. In both cases, the effects on our variable of interest are substantially unchanged. As expected, more profitable banks tend to be more valued by the market, as shown by the positive and statistically significant of ROA, consistently estimated in all our specifications. The coefficient of equity to total assets is instead weakly significant and its sign is inconsistent across the different specifications, suggesting a weak link between banks capitalization and their market value, possibly because of the confounding effects of regulation. Finally, access to funding, proxied by the ratio of bank deposits to total liabilities, has a positive and statistically significant coefficient in all our specifications, consistent with the hypothesis that the market attributes a premium to banks with a large internal funding base.

5.2. *Robustness checks*

Table 4 presents the results of five robustness tests: a) using the alternative measures of geographical diversification described above (each bank's share of foreign assets and the transformed Hirsch-Herfindhal Index calculated for each bank using the country specific share of foreign participations); b) adopting alternative thresholds to build the diversification benchmark (0.9, 0.7, and 0.5); c) excluding influential countries (U.S. and Japan); d) controlling for M&A; e) controlling for corporate diversification (income and asset). The results of these additional specifications confirm and strengthen our previous findings.

¹³ Results are obtained multiplying the coefficients to the sample standard deviation of excess value.

Panels 1 to 4 present the results using two alternative measures of geographic diversification: the share of assets deployed in foreign subsidiaries relative to the total assets of the bank (share) and the concentration of foreign subsidiaries assets proxied by a modified Hirsch–Herfindhal Index. For each measure, we estimate two alternative specifications, including a different set of controls. The results confirm a significant diversification premium, with estimates ranging from 0.010 to 0.030, all statistically significant at the 1% level of confidence.

Panels 5 and 6 present the results using the baseline measure of geographical diversification, but calculated at different thresholds: Panel 5 presents the results using a more demanding 0.9 threshold; Panel 6 those using a lower value of 0.5. We still find a highly statistically significant diversification premium using both alternative thresholds, with estimates of 0.047 and 0.065, respectively.¹⁴

In Panels 7 and 8 we exclude alternatively U.S. and Japan from the sample, as they represent respectively 9.4% and 17.0% of the sampled banks, and maintaining the global benchmark. The results suggest that these countries are not driving our findings. Also in this case geographic diversity is associated with a premium, with estimated coefficients of 0.076 and 0.041, both statistically significant at the 1% level. Further, in Panel 9 we show that the results hold also when excluding both U.S. and Japan at the same time, with coefficient of 0.058, statistically significant at 1% level, despite the smaller sample size available to estimate this specification.¹⁵

Next, we control for major changes in banks' total assets, since these are typically the results of corporate operations, typically M&A that could introduce confounding effects, biasing our results. We therefore computed the rate of change of total assets between years $t-1$ and t , and excluded observations for which the rate of growth exceeds 30%. The results reported in Panel 10 confirm the diversification premium, with a coefficient of 0.076, significant at 1% level.¹⁶

In Panels 11-14 we also present the results controlling for income and asset diversification using the indices developed by Laeven and Levine (2007) and described in more detail in

¹⁴ In unreported regressions we also replicated our results using excess market to book value as a measure of firm value.

¹⁵ In unreported regressions we also studied separately diversification in developed countries and in developing countries, finding no significant differences between the two cases.

¹⁶ In unreported regressions we verified that our results are confirmed excluding observations with a rate of growth of total assets of 40% and 25%, or excluding observations for banks that had been involved in M&As: a) in the previous year, b) in the previous two years and c) in the previous four years; d) in any previous year.

Section 3. Reassuringly, in all four regressions we find a statistically and economically significant premium for geographic diversity, with coefficients ranging from 0.021 to 0.062. The estimates of the measures of asset and income diversification give instead more mixed results, with a discount for the former but a premium for the latter. Since in a number of unreported regressions,¹⁷ where we used the measures of excess value adopted by Laeven and Levine (2007), we also found a statistically significant discount for asset and income diversification, we believe that the differences with respect to their results depend on the different benchmark that we adopt to calculate excess value, since we focus on geographical rather than functional diversification.¹⁸

Finally, we checked that our results are also confirmed using profitability as a measure of bank value. In Table 5 we present the results obtained using excess returns on assets (ROA; the ratio of net income to total assets) and returns on equity (ROE; net income divided by common's stockholders equity), defined in a similar way as excess Tobin's q . The results confirm in both cases the presence of an economically and statistically significant geographic diversification premium.

5.3. *Non linearity*

The link between market value and the degree of geographic diversification of banks might be non-linear, increasing or decreasing with the level of diversification. To test this hypothesis, in Panel 1 of Table 6 we present the results of the estimates splitting our measure of diversification in 6 quantiles (Geographic diversity Geon1 to Geographic diversity Geon6). The results clearly show an inverse U-shaped pattern, with the strongest effect of diversification occurring for the medium ranges. In Panel 2 we aggregate quantiles delivering similar diversification premia, i.e., quantiles 2 and 3 and 4 and 5. In both cases we verify that the linear restriction cannot be rejected at the traditional significance levels. The inverse U-shaped pattern is still confirmed.

These results suggest that the market attributes greater costs to geographic diversity above a certain level, which can be attributed to larger perceived complexity and agency costs that require additional layers of corporate control, thereby reducing firm efficiency, and its value.

¹⁷ Available from the authors upon request.

¹⁸ In unreported regressions we also used an alternative measure of bank size that is less sensitive to the skewness of the distribution of (log) total assets (Dastidar, 2009). We therefore computed a measure of relative size, bounded between 0 and 1, as a ratio of each bank's total assets to those of the largest bank in the sample, on a year-by-year basis (for similar approaches, see Bodnar et al., 1997; Denis et al., 2002; Fauver et al., 2004). Also in this case, we find a diversification premium, with a coefficient of 0.095, significant at the 1% level.

Over-diversifying does not pay as costs grow steadier than benefits do. These results accord with the lower excess values observed for more geographically diversified sampled banks as Deutsche Bank, BNP Paribas and Société Générale as compared to less diversified banks, as Cofitem-Cofimur in France or DAB Bank in Germany.

5.4. *Endogeneity*

As argued in the most recent literature on corporate diversification, the factors underpinning the decision to diversify across-borders can be the same that cause the change in the market value of the bank (Lang and Stulz, 1994; Campa and Kedia, 2002; Deng et al., 2007; Laeven and Levine, 2007). Finding that more diversified banks are more valued by the market than less diversified or domestic banks does not constitute sufficient proof *per se* of the causality effect, as overvaluation could precede diversification (Goddard et al., 2008). In other words, geographic diversification itself may be an endogenous choice, since commercial banks that are more valued by the market, correspondingly with a Tobin's q larger than the benchmark, may be more likely to diversify their activities entering foreign countries. For instance ABN Amro, BBVA, BNP Paribas, CIT Group Inc, Goldman Sachs, and UBS, all exhibit positive excess values and are present in more than 40% of the sampled countries.

To address this endogeneity issue, we re-estimated our baseline specification using the instrumental variables (IV) method. As instruments for our key explanatory variable we use some proxies of how much the institutional environment is favorable to international diversification. First we consider an index of regulatory quality, a dimension of governance broadly defined as the process by which authority in a country is exercised, and it captures governmental policies and regulations underpinning private sector development (Kaufman et al., 2009).¹⁹ For instance, Luxembourg, Singapore, Finland, Hong Kong, Denmark, and U.K. get higher scores of regulatory quality. As expected, our unreported first stage regressions show a positive and statistically significant relationship between regulatory quality and geographical diversification.²⁰ Second we consider an index of economic freedom, proxied by the annual score based on 10 measures of economic openness, regulatory efficiency, the rule of law, and

¹⁹ Regulatory quality is from the World Bank data base (Worldwide Governance Indicators, available at www.worldbank.org/wbi/governance), as in Kaufman et al. (2009) and is averaged from 2002 to 2006 to avoid year specific events. It ranges from -1.094 (Venezuela) to 1.906 (Luxembourg) with a mean of 0.745. Higher values pertain to better governance outcomes.

²⁰ Available from the authors upon request.

competitiveness.²¹ The basic principles of economic freedom emphasized in the score are individual empowerment, equitable treatment, and the promotion of competition. A higher score represents countries with higher economic freedom, where government intervention in the labor, capital and goods market is more limited, as in Hong Kong, Singapore, Ireland, U.S., U.K., Australia, Switzerland, and Luxembourg. And third we include the share of geographically diversified banks in the country, as an indirect evidence of an environment that favors internationalization. Panel 1 of Table 7 presents the results of the instrumental variable estimates that confirm a significant diversification premium.

Finally, we considered an alternative way to address the problem of non-random or self selection of banks into diversification, using a Heckman two-step selection model, as in Campa and Kedia (2002), Laeven and Levine (2007) and Dastidar (2009). In the first step of the Heckman procedure we estimate the probability that a bank is diversified, according to our baseline threshold, using a probit specification. We then calculate the inverse Mill's ratio and include it in our baseline specification estimating the effect of geographic diversification on bank's excess value. In the selection model we include as explanatory variables the same institutional characteristics used as instruments and described above, together with each bank's size, market share and a dummy coded one if the bank is included in the S&P financial index. The results reported in Panel 2 of Table 7 show that the selection parameter *lambda* is negative but it is not statistically significant. Reassuringly, the coefficient of geographic diversification is also in this case positive and statistically significant at the 1% level.

5.5 *Bank risk*

Tobin's *q* already incorporates the market's evaluation of each bank's riskiness. However, as an additional check of the robustness of our results, we also controlled that they are confirmed also explicitly controlling for bank risk. We measured bank risk using the Z-score, that is commonly defined in the banking literature as the number of standard deviations that a bank's ROA has to drop below its expected value before equity is depleted (Laeven and Levine, 2009), and it is

²¹ The source is the Heritage Foundation (<http://www.heritage.org/Index/>). Economic freedom is an average of the scores of ten country indicators: Business Freedom, Trade Freedom, Fiscal Freedom, Government Spending, Monetary Freedom, Investment Freedom, Financial Freedom, Property rights, Freedom from Corruption, Labor Freedom. They are scaled from 0 to 100, where 100 represent the maximum freedom. The sampled values range from 49.77 (Venezuela) to 89.58 (Hong Kong). Again we take the averaged value from 2002 to 2006 to smoothen the effect of year specific events (e.g. Slovakia has experienced significant yearly changes).

therefore a negative function of the risk of default (i.e, banks with a higher Z-score are less likely to default). Reassuringly, the results reported in Table 8 show that the coefficient of geographic diversification is also in this case positive and statistically significant, confirming the existence of a geographic diversification premium also after controlling for risk. The coefficient of the logarithm of the Z-score is negative, although statistically significant only in two cases, suggesting that a lower probability of default is associated with a value discount. Adding additional controls for bank risk taking (loan loss reserves, charge offs and problem loans) does not alter our results.

6. Conclusions

The recent financial crisis has cast massive doubts on the role of large multinational banks, suggesting that they are too risky, too interconnected, and that they pose gigantic moral hazard problems. In other words they are too big. While a mounting political consensus is building around this view (but see Dermine and Schoenmaker, 2010, for an influential opposite perspective), even before the crisis, the economic literature had not analyzed the pros and cons of international bank diversification from the shareholders' point of view. In this paper we have filled this gap providing robust evidence that multinational banks create economic value. Contrary to the recent findings that asset-and income-diversified banks trade at a discount with respect to their more focused peers (Laeven and Levine, 2007, and Schmid and Walter, 2009), we show that internationally diversified banks trade at a premium, similar to the domestically diversified banks in the U.S. (Deng and Elyasiani, 2008). Our estimates of the impact of international diversification on banks' excess value are both economically and statistically significant, and they are robust to the use of different definitions of diversification, to the possible effects of outliers, and to controlling for potential endogeneity problems.

Our findings provide a sound rationale for the momentous process of bank internationalization over the last decades. However, while we show that these operations were value enhancing for the shareholders, we have not the pretence of arguing that this was without consequences. As the recent financial crisis is suggesting, the benefits of geographic diversification might have come from easier access to risk-taking activities that have not been properly appraised by external investors. Although our results are confirmed also controlling for bank risk, a more careful analysis of the links between geographic diversification and risk-taking seems a promising field for future research.

References

- Acharya, Viral V., Iftekhar Hasan, and Anthony Saunders, 2006, Should banks be diversified? Evidence from individual bank loan portfolios, *Journal of Business* 79(3), 1355-1412.
- Alessandrini, Piero, Andrea F. Presbitero, and Alberto Zazzaro, 2009, Banks, distances and firms' financing constraints, *Review of Finance* 13(2), 261-307.
- Altunbas Yener, and David Marqués-Ibanez, 2008, Mergers and acquisitions and bank performance in Europe. The role of strategic similarities, *Journal of Economic Business* 60(3), 204-222.
- Amel, Dean, Colleen Barnes, Fabio Panetta, and Carmelo Salleo, 2004, Consolidation and efficiency in the financial sector: A review of the international evidence, *Journal of Banking and Finance* 28(10), 2493-2519.
- Amihud, Yakov, and Baruch Lev, 1981, Risk reduction as a managerial motive for conglomerate mergers, *The Rand Journal of Economics* 12(2), 605-617.
- Amihud, Yakov, Gayle DeLong, and Anthony Saunders, 2002, The effects of cross-border bank mergers on bank risk and value, *Journal of International Money and Finance* 21(6), 857-877.
- Baele, Lieven, Olivier De Jonghe, and Rudi Vander Vennet, 2007, Does the stock market value bank diversification? *Journal of Banking and Finance* 31(7), 1999-2023.
- Barba Navaretti, Giorgio, and Anthony Venables, 2004, *Multinational Firms in the World Economy* (Princeton University Press).
- Barros, Carlos P., Cândida Ferreira, and Jonathan Williams, 2007, Analyzing the determinants of performance of best and worst European banks: A mixed logit approach, *Journal of Banking and Finance* 31(7), 2189-2203.
- Berger, Philip, and Eli Ofek, 1995, Diversification's effect on firm value, *Journal of Financial Economics* 37(1), 39-65.
- Berger, Allen N., Qinglei Dai, Steven Ongena, and David C. Smith, 2003, To what extent will the banking industry be globalized? A study of bank nationality and reach in 20 European nations, *Journal of Banking and Finance* 27(3) 383-415.
- Berger, Allen N., Claudia Buch, Gayle DeLong, and Robert DeYoung, 2004, Exporting financial institutions management via foreign direct investment mergers and acquisitions, *Journal of International Money and Finance* 23(3), 333-366.
- Bodnar, Gordon M., Charles Tang, and Joseph Weintrop, 1997, Both sides of corporate diversification: The value impacts of geo-graphic and industrial diversification, NBER Working paper no. 6224.
- Bradley, Michael, Anand Desai, and Han Kim, 1988, Synergistic gains from corporate acquisitions and their division between target and acquiring firms, *Journal of Financial Economics* 21(1), 3-40.
- Buch, Claudia M., 2003, Information or regulation: What drives the international activities of commercial banks? *Journal of Money, Credit and Banking* 35(6), 851-869.

- Buch, Claudia M., and Gayle DeLong, 2004, Cross-border bank mergers: What lures the rare animal? *Journal of Banking and Finance* 28(9), 2077-2102.
- Buch, Claudia M., and Alexander Lipponer, 2007, FDI versus exports: Evidence from German banks, *Journal of Banking and Finance* 31(3), 805-826.
- Buckley, Peter J., and Mark C. Casson, 1976, *The future of the multinational enterprise* (London: Homes & Meier).
- Caiazza, Stefano, Alberto F. Pozzolo, and Giovanni Trovato, 2009, Are domestic and cross-border M&As different? Cross-Country evidence from the banking sector, available at SSRN: <http://ssrn.com/abstract=1443919>.
- Caiazza, Stefano, Andrew Clare, and Alberto F. Pozzolo, 2010, What do foreigners want? Evidence from targets in bank cross-border M&As, Unpublished manuscript, Università del Molise, available at SSRN: <http://ssrn.com/abstract=1703524>.
- Campa, Jose M., and Simi Kedia, 2002, Explaining the diversification discount, *Journal of Finance* 57(4), 1731-1762.
- Campa, Jose M., and Ignacio Hernando, 2006, M&As performance in the European financial industry, *Journal of Banking and Finance* 30(12), 3367-3392.
- Caves, Richard E., 1996, *Multinational enterprise and economic analysis* (Cambridge University Press).
- Claessens, Stijn, Asli Demirgüç-Kunt, and Harry Huizinga, 2001, How does foreign entry affect domestic banking markets? *Journal of Banking and Finance* 25(5), 891-911.
- Claessens, Stijn, and Neeltje Van Horen, 2007, Location decisions of foreign banks and competitive advantages, World Bank Working paper no. 4113.
- Cornett, Marcia M, Gayane Hovakimian, Darius Palia, and Hassan Tehranian, 2003, The impact of the manager-shareholder conflict on acquiring bank returns, *Journal of Banking and Finance* 27(1), 103-131.
- Cornett, Marcia M, Jamie J. McNutt, and Hassan Tehranian, 2006, Performance changes around bank mergers: Revenue enhancements versus cost reductions, *Journal of Money, Credit and Banking* 38(4), 1013-1050.
- Correia, Ricardo, 2009, Cross-border bank acquisitions: is there a performance effect? *Journal of Financial Services Research* 36(2), 169-197.
- Cremers, Martin, Rocco Huang, and Zacharias Sautner, 2008, Internal capital markets: The bright side of corporate politics, Yale ICF Working paper no. 08-19.
- Cybo-Ottone, Alberto, and Maurizio Murgia, 2000, Mergers and shareholder wealth in European banking, *Journal of Banking and Finance* 24(6), 831-859.
- Dastidar, Protiti, 2009, International corporate diversification and performance: Does firm self-selection matter? *Journal of International Business Studies* 40(1), 71-85.
- DeLong, Gayle L., 2001, Stockholder Gains from Focusing Versus Diversifying Bank Mergers, *Journal of Financial Economics* 59(2), 221-252.

- DeLong, Gayle L, 2003, Does long-term performance of mergers match market expectations? Evidence from the U.S. banking industry, *Financial Management* 32(2), 5-25.
- Deng, Saying, Elyas Elyasiani, and Connie Mao, 2007, Diversification and the cost of debt of bank holding companies, *Journal of Banking and Finance* 31(12), 2453-2473.
- Deng, Saying, and Elyas Elyasiani, 2008, Geographic diversification, bank holding company value, and risk, *Journal of Money, Credit and Banking* 40(6), 1217-1238.
- Denis, David J., Diane K. Denis, and Keven Yost, 2002, Global diversification, industrial diversification, and firm value, *Journal of Finance* 57(5), 1951-1979.
- Dermine, Jean, and Dirk Schoenmaker, 2010, *In banking, is small beautiful?* (New York University Salomon Center and Wiley Periodicals, Inc.).
- Drucker, Steven D. and Manju Puri, 2006, Banks in capital markets, in Eckbo, B. Espen ed.: *Handbook of corporate finance: empirical corporate finance* (Amsterdam: North Holland).
- Edwards, Corwin D., 1955, Conglomerate bigness as a source of power, in G. Stigler ed.: *Business Concentration and Price Policy*, 331-352 (New Jersey: Princeton University Press).
- Fauver, Larry, Joel F. Houston, and Andy Naranjo, 2004, Cross-country evidence on the value of corporate industrial and international diversification, *Journal of Corporate Finance* 10(5), 729-752.
- Focarelli, Dario, and Alberto F. Pozzolo, 2001, The patterns of cross-border bank mergers and shareholdings in OECD countries, *Journal of Banking and Finance* 25(12), 2305-2337.
- Focarelli, Dario, and Alberto F. Pozzolo, 2005, Where do banks expand abroad? An empirical analysis, *Journal of Business* 78(6), 2435-2463.
- Focarelli, Dario, and Alberto F. Pozzolo, 2008, Cross-border M&As in the financial sector: Is banking different from insurance? *Journal of Banking and Finance* 32(1), 15-29.
- Focarelli, Dario, David Marques-Ibanez, and Alberto F. Pozzolo, 2010, Are universal banks better underwriters? Evidence from the last days of the Glass-Steagall Act, Unpublished manuscript, ECB, available at SSRN: <http://ssrn.com/abstract=1573177>.
- Goddard, John, Donald McKillop, and John S. Wilson, 2008, The diversification and financial performance of US credit unions, *Journal of Banking and Finance* 32(10), 1836-1849.
- Hauswald, Robert, H., and Valentina G. Bruno, 2009, The Real Effect of Foreign Banks, Paolo Baffi Centre Research paper no. 2009-50.
- Helpman, Elhanan, 2006, Trade, FDI, and the organization of firms, Harvard Institute of Economic Research Working paper no. 2118.
- Houston, Joel F., Christopher James, and David Marcus, 1997, Capital market frictions and the role of internal capital markets in banking, *Journal of Financial Economics* 46(2), 135-164.
- Hughes, Joseph P., William W. Lang, Loretta J. Mester, and Choon-Geol Moon, 1996, Efficient banking under interstate branching, *Journal of Money, Credit, and Banking* 28(4), 1045-1071.

- Hughes, Joseph P., William W. Lang, Loretta J. Mester, and Choon-Geol Moon, 1999, The dollar and sense of bank consolidation, *Journal of Banking and Finance* 23(2), 291–324.
- Jayarathne, Jith, and Phil Strahan, 1996, The finance-growth nexus: Evidence from bank branch deregulation, *Quarterly Journal of Economics* 101(3), 639–670.
- Jensen, Michael C., 1986, Agency costs of free cash flow, corporate finance, and takeovers, *American Economic Review Papers and Proceedings* 76(2), 323–329.
- Jensen, Michael C., and William H. Meckling, 1976, Theory of the firm: Managerial behavior, agency costs, and ownership structure, *Journal of Financial Economics* 3(4), 305–360.
- Jensen Michael C., and Kevin J. Murphy, 1990, Performance pay and top management incentives, *Journal of Political Economy* 98(2), 225–264.
- Kaufman, Daniel, Aart Kraay, and Massimo Mastruzzi, 2009, Governance matters VIII: Aggregate and individual governance indicators 1996–2008, World Bank Working paper no. 4978.
- Kroszner, Randall S., and Raghuram Rajan, 1994, Is the Glass–Steagall act justified? A study of the US experience with universal banking before 1933, *American Economic Review* 84(4), 810–832.
- Laeven, Luc, and Ross Levine, 2007, Is there a diversification discount in financial conglomerates? *Journal of Financial Economics* 85(2), 331–367.
- Laeven, Luc, and Ross Levine, 2009, Bank Governance, Regulation and Risk Taking, *Journal of Financial Economics* 93(2), 259–275.
- Lamont, Owen, 1997, Cash flow and investment: Evidence from internal capital markets, *Journal of Finance* 52(1), 83–110.
- Lamont, Owen, and Christopher A. Polk, 2002, Does diversification destroy value? Evidence from the industry shocks, *Journal of Financial Economics* 63(1), 51–77.
- Lang, Larry, and René M. Stulz, 1994, Tobin’s q, corporate diversification, and firm performance, *Journal of Political Economy* 102(6), 1248–1280.
- LeBaron, Dean, and Laurence Speidell, 1987, Why are the parts worth more than the sum? ‘Chop shop,’ a corporate valuation model, in: Browne, L., and E. Rosengren, eds.: *The Merger Boom*, Conference Series no. 31, 78–101 (Boston: Federal Reserve Bank of Boston).
- Lelyveld, Iman van, and Klaas Knot, 2009, Do financial conglomerates create or destroy value? Evidence for the EU, *Journal of Banking and Finance* 33(12), 2312–2321.
- Lewellen, Wilbur G., 1971, A pure financial rationale for the conglomerate merger, *Journal of Finance* 26(2), 521–537.
- Li, Guoying, 1985, Robust regression, in Shaples, D., C. Hoaglin, F. Mosteller, and J.W. Tukey eds.: *Exploring Data Tables, Trends* (Wiley, New York).
- Lindberg, Eric B., and Stephen A. Ross, 1981, Tobin’s q ratio and industrial organization, *Journal of Business* 54(1), 1–32.

- Maksimovic, Vojislav, and Gordon M. Phillips, 2001, The market for corporate assets: who engages in mergers and asset sales and are there efficiency gains? *Journal of Finance* 57(6), 2019-2065.
- Markusen, James R., 2004, *Multinational firms and the theory of international trade* (MIT Press).
- Martin, John D., and Akin Sayrak, 2003, Corporate Diversification and shareholder value: A survey of recent literature, *Journal of Corporate Finance* 9(1), 37-57.
- Mercieca, Steve, Klaus Schaek, and Simon Wolfe, 2007, Small European banks: Benefits from diversification? *Journal of Banking and Finance* 31(7), 1975-1998.
- Moeller, Sara B., and Frederik P. Schlingemann, 2005, Global diversification and bidder gains: A comparison between cross-border and domestic acquisitions, *Journal of Banking and Finance* 29(3), 533-564.
- Montgomery, Cynthia A., 1994, Corporate Diversification, *Journal of Economic Perspectives* 8(3), 163-178.
- Morck, Randall, and Bernard Yeung, 1991, Why investors value multinationality, *Journal of Business* 64(2), 165-187.
- Morgan, Donald P., 2002, Rating banks: Risk and uncertainty in an opaque industry, *American Economic Review* 92(4), 874-888.
- Morgan, Donald P., and Philip E. Strahan, 2004, Foreign bank entry and business volatility: Evidence from U.S. States and other countries, in Ahumada, L.A., and J.R. Fuentes eds.: *Banking Market Structure and Monetary Policy* (Central Bank of Chile, Santiago, Chile).
- Morgan, Donald P., and Katherine Samolyk, 2005, Bigger and Wider. The (neglected) benefits of geographic diversification in banking, Unpublished manuscript, Federal Reserve Bank of New York.
- Outreville, J. François, 2010, Internationalization, Performance and volatility: The world largest financial groups, *Journal of Financial Services Research* 38(2-3), 115-134.
- Petersen, Mitchel A., and Raghuram Rajan, 1994, The benefits of lending relationships: Evidence from small business data, *Journal of Finance* 49(1), 3-37.
- Puri, Manju, 1996, Commercial banks in investment banking: conflicts of interest or certification role, *Journal of Financial Economics* 40(3), 373-401.
- Rajan, Raghuram G., 1992, Insiders and outsiders: the choice between relationship and arms length debt, *Journal of Finance* 47(4), 1367-1400.
- Rajan, Raghuram G., 1998, The past and future of commercial banking viewed through an incomplete contract lens, *Journal of Money Credit and Banking* 30, 524(3)-550.
- Rajan, Raghuram, Henri Servaes, and Luigi Zingales, 2000, The cost of diversity: The diversification discount and inefficient investment, *Journal of Finance* 55(1), 35-80.
- Rose, Peter S., 1996, The diversification and cost effects of interstate banking, *Financial Review* 31(2), 431-452.
- Rowland, Patrick F., and Linda L. Tesar, 2004, Multinationals and the gains from international diversification, *Review of Economic Dynamics* 7(4), 789-826.

- Saunders, Anthony, 1994, Banking and commerce: An overview of the public policy issues, *Journal of Banking and Finance* 18(2), 231-254.
- Schmid, Markus M., and Ingo Walter, 2009, Do financial conglomerates create or destroy economic value? *Journal of Financial Intermediation* 18(2), 193–216.
- Sharpe, Steven A., 1990, Asymmetric Information, bank lending and implicit contracts: A stylized model of customer relationships, *Journal of Finance* 45(4), 1069–87.
- Shleifer, Andrei, and Robert W. Vishny, 1990a, The new theory of the firm. Equilibrium short horizons of investors and firms. *American Economic Review Papers and Proceedings* 80(2), 148-153.
- Shleifer, Andrei, and Robert W. Vishny, 1990b, The takeover wave of the 1980s, *Science* 249(4970), 745-749.
- Stein, Jeremy C., 1997, Internal capital markets and the competition for corporate resources, *Journal of Finance* 52(1), 111-133.
- Stiroh, Kevin J, and Adrienne Rumble, 2006, The dark side of diversification: The case of US financial holding companies, *Journal of Banking and Finance* 30(8), 2131-2161.
- Sweeney, Richard J., Arthur D. Warga, and Drew Winters, 2001, The market value of debt, market value versus book value of debt, and returns to assets, *Financial Management* 26(1), 5-21.
- Vander Venet, Rudi, 2002, Cost and profit efficiency of financial conglomerates and universal banks in Europe, *Journal of Money, Credit and Banking* 34(1), 254–282.
- Villalonga, Belen, 2004a, Diversification discount or premium? New evidence from the business information tracking series, *Journal of Finance* 59(2), 479-506.
- Villalonga, Belen, 2004b, Does diversification cause the diversification discount? *Financial Management* 33(2), 5-27.
- Williams, Barry, 1997, Positive theories of multinational banking: Eclectic theory versus internalisation theory, *Journal of Economic Surveys* 11(1), 71–100.
- Zhang, Hao, 1995, Wealth effects of U.S. bank takeovers, *Applied Financial Economics* 5(5), 329-336.

Table 1
Summary statistics

We use excess value as the dependent to proxy for market value and for bank j it equals its Tobin's q minus its adjusted q . Adjusted $q_j = \alpha_j q_1 + (1 - \alpha_j) q_2$, where q_1 is the average of the q s of above the threshold (highly) geographically diversified multinational commercial banks and q_2 represents the average q s for banks equal or below the threshold (we present statistics for 0.7 and 0.9 thresholds). For bank j α is the index of foreign geographical dispersion, where $\alpha_j = n_j / n_{max}$, n_j is the number of foreign countries where the bank j has a subsidiary, and n_{max} is the maximum number of foreign countries where the most diversified bank has subsidiaries. Geographic diversity is the ratio ratio of $n_{j,t}$ to $n_{max,t}$, where $n_{j,t}$ is the number of foreign countries where the bank j has a subsidiary in year t , and $n_{max,t}$ is the maximum number of foreign countries where the most diversified bank has subsidiaries, in a year t . Two controls for geographic diversification are: (i) the subsidiaries concentration, proxied by a transformed Hirsch-Herfindhal index (HHI): $1 - \sum_j (\text{subsidiary}_j \text{ assets} / \text{total subsidiaries assets})^2$; (ii) the geographic dispersion of subsidiaries (geographic share): $1 - [(\text{total subsidiaries assets} - \text{foreign subsidiaries assets}) / (\text{total subsidiaries assets})]$. Bank controls: (i) the logarithm of total assets (log assets); (ii) the logarithm of total operating income (log income); (iii) access to funding is proxied by deposits to liabilities; (iv) capitalization is proxied by equity to assets; (v) ROA as a proxy for profitability; (vi) a dummy variable for whether the bank is in the S&P financial listings; (vii) a dummy variable for whether the bank is listed in the New York Stock Exchange. Home country controls: (i) size proxied by gross national income per capita; (ii) annual inflation; (iii) share of diversified banks, for which we use the data from the 577 sampled banks with a known value for geographic diversification and then compute the percentage of banks with known foreign subsidiaries in each country of origin, on a yearly basis. We plug-in additional variables to proxy for bank asset and income diversification: (i) asset diversity: $1 - |(\text{net loans} - \text{other earning assets}) / \text{total earning assets}|^{(a)}$; (ii) loans to total earning assets (loans to assets); (iii) income diversity: $1 - |(\text{net interest income} - \text{other operating income}) / \text{total operating income}|^{(b)}$; (iv) net interest income to total operating income. Bank risk controls: (i) logarithm of Z-score; (ii) loan loss reserves; (iii) net charge offs; and (iv) problem loans: ratio of non-performing loans to total loans.

	2001	2002	2003	2004	2005	2006	2007	2001-2007	
Variable	Mean St. Dev	Mean St. Dev	Mean St. Dev	Mean St. Dev	Mean St. Dev	Mean St. Dev	Mean St. Dev	Mean St. Dev	Min. Max.
Excess value 07	-0.02 0.19	-0.04 0.15	-0.02 0.16	0.00 0.17	0.03 0.21	0.02 0.13	0.00 0.12	0.004 0.16	-0.75 1.89
Excess value 09	-0.02 1.94	-0.04 0.15	-0.02 0.16	0.00 0.17	0.03 0.21	0.02 0.13	0.00 0.12	0.004 0.16	-0.75 1.89
Geographic diversity (n / n_{max})	0.10 0.19	0.09 0.17	0.11 0.19	0.11 0.19	0.06 0.14	0.06 0.16	0.04 0.10	0.070 0.16	0.00 1.00
Hirsch-Herfindhal Index (HHI)	0.16 0.25	0.16 0.23	0.17 0.25	0.16 0.24	0.18 0.26	0.17 0.26	0.17 0.24	0.17 0.25	0.00 0.88
Geographic diversification (share)	0.17 0.32	0.18 0.31	0.17 0.30	0.17 0.32	0.18 0.32	0.16 0.30	0.18 0.32	0.17 0.31	0.00 1.00
Log assets	6.73 0.89	6.77 0.88	6.84 0.88	6.90 0.87	6.94 0.85	7.03 0.83	7.13 0.82	6.91 0.87	3.89 9.45
Log income	4.88 0.87	4.95 0.88	5.02 0.86	5.14 0.85	5.22 0.81	5.27 0.82	5.35 0.83	5.14 0.86	1.63 7.56
Deposits to liabilities	0.90 0.15	0.90 0.14	0.90 0.25	0.88 0.14	0.88 0.14	0.87 0.15	0.86 0.15	0.88 0.16	0.00 5.74
Equity to assets	0.08 0.07	0.08 0.06	0.08 0.06	0.09 0.06	0.09 0.07	0.09 0.07	0.09 0.06	0.09 0.06	-0.31 0.77
ROA	0.53 0.50	0.41 0.49	0.38 0.49	0.36 0.48	0.34 0.47	0.30 0.46	0.16 0.37	0.36 0.48	-1.34 1.50
Dummy (S&P listed)	0.69 1.56	0.75 1.63	1.06 1.39	1.09 1.18	1.26 1.31	1.26 1.50	1.12 1.29	1.04 1.42	0.00 1.00
Dummy (NYSE listed)	0.07 0.30	0.10 0.30	0.10 0.30	0.10 0.30	0.10 0.30	0.10 0.30	0.10 0.30	0.10 0.30	0.00 1.00

Table 1 Continued

	2001	2002	2003	2004	2005	2006	2007	2001-2007	
Variable	Mean St. Dev	Mean St. Dev	Mean St. Dev	Mean St. Dev	Mean St. Dev	Mean St. Dev	Mean St. Dev	Mean St. Dev	Min. Max.
Per capita GNI growth	-0.01 0.06	0.09 0.07	0.16 0.07	0.13 0.06	0.08 0.07	0.08 0.08	0.09 0.07	0.09 0.08	-0.42 0.42
Inflation	2.89 6.73	3.26 6.11	3.12 5.36	4.02 4.93	4.31 6.01	4.06 4.56	3.36 3.91	3.58 5.48	-8.00 53.00
Share of diversified banks	0.07 0.19	0.07 0.17	0.07 0.19	0.07 0.19	0.07 0.14	0.07 0.16	0.07 0.10	0.07 0.16	0.00 1.00
Income diversity	0.58 0.28	0.59 0.28	0.61 0.26	0.65 0.25	0.66 0.24	0.67 0.24	0.66 0.24	0.63 0.26	0.00 1.00
Net interest income to total operating income	0.70 2.35	0.47 2.28	0.64 2.15	0.66 1.78	0.56 1.77	0.55 1.71	0.63 1.76	0.60 1.96	-9.70 9.49
Asset diversity	0.58 0.28	0.60 0.28	0.61 0.28	0.61 0.27	0.60 0.25	0.59 0.25	0.58 0.25	0.60 0.26	0.00 1.00
Loans to assets	0.65 0.21	0.64 0.20	0.64 0.20	0.64 0.19	0.64 0.19	0.66 0.18	0.67 0.18	0.65 0.19	0.00 1.00
Log Z-score	0.74 1.23	0.80 1.17	0.86 1.10	0.85 1.05	0.97 0.99	1.01 0.96	0.93 1.04	0.88 1.08	-6.73 2.86
Loan loss reserves	2.32 1.90	2.50 2.14	2.38 2.11	2.12 1.92	1.88 1.77	1.69 1.58	1.45 1.27	2.05 1.87	0.00 12.34
Charge offs	0.39 0.62	0.38 0.60	0.41 0.69	0.31 0.47	0.28 0.51	0.24 0.46	0.20 0.38	0.31 0.54	-0.26 4.16
Problem loans	9.81 13.68	9.62 13.64	8.12 13.32	6.72 12.14	5.47 9.13	4.75 8.08	3.92 6.35	6.84 11.37	0.00 100.0

^(a) Other earning assets include securities and investments.

^(b) Other operating income includes investment income, foreign exchange income, gain (loss) on sale of securities, trading account income, commissions and fees.

Table 2**Excess value differences for diversified and non-diversified commercial banks**

In our base case a geographically diversified bank is one for which $n_{j,t}$ to $n_{max,t}$ is above 0.7, where $n_{j,t}$ is the number of foreign countries where the bank j has a subsidiary in year t , and $n_{max,t}$ is the maximum number of foreign countries where the most diversified bank has subsidiaries, in year t . We use excess value as the dependent to proxy for market value and for bank j it equals its Tobin's q minus its adjusted q . Adjusted $q_j = \alpha_j q_1 + (1 - \alpha_j) q_2$, where q_1 is the average of the q s of above the 0.7 threshold (highly) geographically diversified multinational commercial banks and q_2 represents the average q s for banks equal or below the 0.7 threshold. For bank j α is the index of foreign geographical dispersion, where $\alpha_j = n_j / n_{max}$, n_j is the number of foreign countries where the bank j has a subsidiary, and n_{max} is the maximum number of foreign countries where the most diversified bank has subsidiaries. To compute q we use the ratio of the sum of market value of common stock, book value of preference shares and minority interests, and book value of debt, to the book value of total assets. Significance at the 1 % level is denoted by ***.

Variable			Test for differences	
Mean excess value 07 (t -statistic for mean differences)	Diversified banks	Mean	-0.005	0.0093
	Non-diversified banks	Mean	0.005	(0.33)
Median excess value 07 (p -value for signed-rank test)	Diversified banks	Median	-0.340	4 .825 ***
	Non-diversified banks	Median	0.023	(0.000)

Table 3**Baseline specification for geographic diversity with country and year fixed effects – robust regressions**

We estimate robust regressions with country and year fixed effects for listed commercial banks around the globe for 2001-2007. We use excess value as the dependent to proxy for market value and for bank j it equals its Tobin's q minus its adjusted q . Adjusted $q_j = \alpha_j q_1 + (1 - \alpha_j) q_2$, where q_1 is the average of the q s of above the 0.7 threshold (highly) geographically diversified multinational commercial banks and q_2 represents the average q s for banks equal or below the 0.7 threshold. For bank j α is the index of foreign geographical dispersion, where $\alpha_j = n_j / n_{max}$, n_j is the number of foreign countries where the bank j has a subsidiary, and n_{max} is the maximum number of foreign countries where the most diversified bank has subsidiaries. Geographic diversity is the ratio ratio of $n_{i,t}$ to $n_{max,t}$, where $n_{j,t}$ is the number of foreign countries where the bank j has a subsidiary in year t , and $n_{max,t}$ is the maximum number of foreign countries where the most diversified bank has subsidiaries, in a year t . We plug-in control variables some to proxy for bank characteristics: (i) size: log assets, the logarithm of total assets; (ii) profitability: ROA; (iii) capitalization, proxied by equity to assets (iv) access to funding: deposits to liabilities. The p -values are in parentheses. Significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

dependent: excess value				
	(1)	(2)	(3)	
Geographic diversity	0.027 *** (0.010)	0.025 ** (0.019)	0.060 *** (0.000)	
Log assets	0.002 (0.384)	-0.016 *** (0.000)	-0.016 *** (0.000)	
Log income		0.015 *** (0.000)	0.014 *** (0.000)	
ROA	0.012 *** (0.000)	0.018 *** (0.000)	0.014 *** (0.000)	
Equity to assets	0.067 * (0.087)	-0.075 * (0.097)	0.007 (0.870)	
Deposits to liabilities			0.064 *** (0.000)	
Constant	-0.001 (0.975)	0.119 ** (0.013)	-0.014 (0.768)	
Country effects	Yes	Yes	Yes	
Year effects	Yes	Yes	Yes	
Number of observations	1,522	1,414	1,409	
Adjusted R ²	0.79	0.79	0.79	

Table 4
Robustness tests for geographic diversity

We estimate robust regressions with country and year fixed effects, for the period 2001-2007 and listed commercial banks around the world. We use Tobin's q as the dependent to proxy for market value and for bank j it equals its Tobin's q minus its adjusted q . Adjusted $q_j = \alpha_j q_1 + (1 - \alpha_j) q_2$, where q_1 is the q of above the threshold (highly) geographically diversified multinational commercial banks and q_2 represents the average q of banks below the threshold (in Panels 1-4 and 8-14 we use the 0.7 threshold; in Panel 5 we use the 0.9 threshold; and in Panel 6 the 0.5 threshold). α_j is the ratio of foreign geographical dispersion, where $\alpha_j = n_j / n_{max}$, n_j is the number of foreign countries where the bank j has a subsidiary, and n_{max} is the number of foreign countries where the most diversified bank has subsidiaries. Geographic diversity is the ratio ratio of $n_{i,t}$ to $n_{max,t}$, where $n_{i,t}$ is the number of foreign countries where the bank j has a subsidiary in year t , and $n_{max,t}$ is the maximum number of foreign countries where the most diversified bank has subsidiaries in year t . We use two alternative measures: geographic share and a modified Hirsch-Herfindhal index (geo_HHI). We plug-in control variables: bank characteristics: (i) size: log assets, the logarithm of total assets; (ii) profitability: ROA; (iii) capitalization, proxied by equity to assets; (iv) funding: deposits to liabilities. Columns 11-14 include other corporate diversity controls: (i) income diversity a proxy for diversification of income-based activities is computed as $1 - |(\text{net interest income} - \text{other operating income (investment income, foreign exchange income, gain (loss) on securities, account income, commissions and fees}) / \text{total operating income})|$; (ii) net interest income to total operating income is used as a control variable for income-based activities; (iii) asset diversity a proxy for diversification of asset-based activities is computed as $1 - |(\text{net loan to assets} - \text{other earning assets}) / \text{total earning assets}|$; (iv) (loans to assets) is an activity measure is used as a control variable for diversification of asset-based activities. The p -values are in parentheses. Significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

dependent: excess value												
	Alternative measures of geographic diversification				0.9 threshold	0.5 threshold	without US	without Japan	without US, Japan	excluding M&A	with income	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
Geographic diversity					0.047 *** (0.000)	0.065 *** (0.000)	0.076 *** (0.000)	0.041 *** (0.007)	0.058 *** (0.000)	0.070 *** (0.000)	0.062 *** (0.000)	0.062 *** (0.000)
Geographic share	0.011 ** (0.028)		0.010 * (0.053)									
Geo_HHI		0.029 *** (0.000)		0.030 *** (0.000)								
Log assets	0.009 *** (0.000)	0.005 * (0.071)	0.010 *** (0.000)	0.005 *** (0.000)	0.002 (0.429)	0.002 (0.437)	0.000 (0.945)	0.001 (0.827)	0.002 (0.443)	0.003 (0.223)	0.001 (0.619)	-0.001 (0.988)
ROA	0.0013 *** (0.000)	0.011 *** (0.000)	0.013 *** (0.000)	0.011 *** (0.000)	0.009 *** (0.000)	0.009 *** (0.000)	0.004 *** (0.005)	0.014 *** (0.000)	0.009 *** (0.000)	0.017 *** (0.000)	0.010 * (0.010)	0.001 (0.988)
Equity to assets	-0.092 (0.135)	-0.128 * (0.059)	-0.095 (0.127)	-0.132 * (0.053)	0.122 *** (0.002)	0.122 *** (0.002)	0.231 *** (0.000)	0.093 (0.102)	0.119 *** (0.002)	-0.037 (0.323)	0.095 ** (0.013)	0.001 (0.988)
Deposits to liabilities			0.016 (0.120)	0.027 ** (0.014)	0.063 *** (0.000)	0.062 *** (0.000)	0.055 *** (0.000)	0.062 *** (0.000)	0.062 *** (0.000)	0.061 *** (0.000)	0.050 *** (0.000)	0.001 (0.988)
Income diversity											0.007 (0.108)	0.001 (0.988)

Table 4 Continued

dependent: excess value

	Alternative measures of geographic diversification				0.9 threshold	0.5 threshold	without US	without Japan	without US, Japan	excluding M&A	with income
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Net interest income to operating income											
Asset diversity											
Loans to assets											
Constant	0.046 (0.249)	0.018 (0.673)	-0.130 *** (0.002)	-0.112 ** (0.014)	-0.052 (0.244)	-0.056 (0.214)	-0.038 (0.339)	-0.051 (0.423)	-0.054 (0.232)	-0.048 (0.241)	-0.045 (0.306)
Country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	899	806	895	801	1,516	1,506	1,355	1,160	1,516	1,186	1,500

Table 5
Robustness tests with profitability measures as the dependent

We estimate robust regressions with country and year fixed effects for listed commercial banks around the globe for 2001-2007. We use excess value as the dependent to proxy for market value and for bank j it equals its actual value minus its adjusted value. In panels 1-3 the dependent is excess value of ROA, the Ratio of net income to total assets. Adjusted $ROA_j = \alpha_j ROA_1 + (1 - \alpha_j) ROA_2$, where ROA_1 is the average of the ROAs of above the 0.7 threshold (highly) geographically diversified multinational commercial banks and ROA_2 represents the average ROAs for banks equal or below the 0.7 threshold. In panels 4-6 the dependent is excess value of ROE, the ratio of total earnings to equity. Adjusted $ROE_j = \alpha_j ROE_1 + (1 - \alpha_j) ROE_2$, where ROE_1 is the average of the ROEs of above the 0.7 threshold (highly) geographically diversified multinational commercial banks and ROE_2 represents the average ROEs for banks equal or below the 0.7 threshold. For bank j α is the index of foreign geographical dispersion, where $\alpha_j = n_j / n_{max}$, n_j is the number of foreign countries where the bank j has a subsidiary, and n_{max} is the maximum number of foreign countries where the most diversified bank has subsidiaries. Geographic diversity is the ratio ratio of $n_{i,t}$ to $n_{max,t}$, where $n_{i,t}$ is the number of foreign countries where the bank j has a subsidiary in year t , and $n_{max,t}$ is the maximum number of foreign countries where the most diversified bank has subsidiaries, in a year t . We plug-in control variables some to proxy for bank characteristics: (i) size: log assets, the logarithm of total assets; (ii) profitability: ROA; (iii) capitalization, proxied by equity to assets (iv) access to funding: deposits to liabilities. The p-values are in parentheses. Significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

dependent	excess ROA						excess ROE					
	(1)	(2)	(3)	(4)	(5)	(6)	(4)	(5)	(6)	(4)	(5)	(6)
Geographic diversity	0.480 *** (0.000)	0.482 *** (0.000)	0.508 *** (0.000)	1.927 * (0.052)	2.221 ** (0.027)	2.043 ** (0.043)						
Log assets	0.146 *** (0.000)	0.014 (0.687)	-0.004 (0.906)	1.889 *** (0.000)	1.430 *** (0.000)	1.420 *** (0.000)						
Log income		0.140 *** (0.000)	0.152 *** (0.000)		0.421 (0.164)	0.412 (0.180)						
ROA				8.878 *** (0.000)	8.548 *** (0.000)	8.593 *** (0.000)						
Equity to assets	8.642 *** (0.000)	7.989 *** (0.000)	7.797 *** (0.000)									
Deposits to liabilities			0.132 (0.129)			-0.902 (0.338)						
Constant	-1.310 *** (0.000)	-1.116 *** (0.001)	-1.164 *** (0.001)	-14.383 *** (0.000)	-20.766 *** (0.000)	-11.959 *** (0.003)						
Country effects	Yes	Yes	Yes	Yes	Yes	Yes						
Year effects	Yes	Yes	Yes	Yes	Yes	Yes						
Number of observations	1,146	1,062	1,058	1,132	1,051	1,047						

Table 6

Geographic diversity with country and year fixed effects – non linearity

We estimate robust regressions with country and year fixed effects for listed commercial banks around the globe for 2001-2007. We use excess value as the dependent to proxy for market value and for bank j it equals its Tobin's q minus its adjusted q . Adjusted $q_j = \alpha_j q_1 + (1 - \alpha_j) q_2$, where q_1 is the average of the q s of above the 0.7 threshold (highly) geographically diversified multinational commercial banks and q_2 represents the average q s for banks equal or below the 0.7 threshold. For bank j α is the index of foreign geographical dispersion, where $\alpha_j = n_j / n_{max}$, n_j is the number of foreign countries where the bank j has a subsidiary, and n_{max} is the maximum number of foreign countries where the most diversified bank has subsidiaries. Geographic diversity is the ratio ratio of $n_{i,t}$ to $n_{max,t}$, where n_{jt} is the number of foreign countries where the bank j has a subsidiary in year t , and $n_{max,t}$ is the maximum number of foreign countries where the most diversified bank has subsidiaries, in a year t . We compute six quantiles for geographic diversity. We also include some control variables to proxy for bank characteristics: (i) size: log assets, the logarithm of total assets; (ii) profitability: ROA; and (iii) capitalization, proxied by equity to assets. The p -values are in parentheses. Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

dependent: excess value					
	(1)			(2)	
Geographic diversity Geon1			Geographic diversity Geon1		
Geographic diversity Geon2	0.313		Geographic diversity Geon23	0.012	
	(0.185)			(0.935)	
Geographic diversity Geon3	-0.091				
	(0.602)				
Geographic diversity Geon4	0.216	***	Geographic diversity Geon45	0.154	***
	(0.005)			(0.000)	
Geographic diversity Geon5	0.162	***			
	(0.000)				
Geographic diversity Geon6	0.038	***	Geographic diversity Geon6	0.034	***
	(0.001)			(0.002)	
Log assets	-0.002		Log assets	-0.001	
	(0.475)			(0.650)	
ROA	0.012	***	ROA	0.011	***
	(0.000)			(0.000)	
Equity to assets	0.059		Equity to assets	0.069	*
	(0.132)			(0.080)	
Constant	0.023		Constant	0.019	
	(0.610)			(0.678)	
Country effects	Yes			Yes	
Year effects	Yes			Yes	
Number of observations	1,522			1,522	

Table 7

Geographic diversity – controlling for endogeneity with instrumental variables and Heckman selection model

We run instrumental variables regressions to control for the endogeneity of the diversification decision with year fixed effects, for listed commercial banks around the globe for 2001-2007. We use excess value as the dependent to proxy for market value and for bank j it equals its Tobin's q minus its adjusted q . Adjusted $q_j = \alpha_j q_1 + (1 - \alpha_j) q_2$, where q_1 is the average of the q s of above the 0.7 threshold (highly) geographically diversified multinational commercial banks and q_2 represents the average q s for banks equal or below the 0.7 threshold. For bank j α is the index of foreign geographical dispersion, where $\alpha_j = n_j / n_{max}$, n_j is the number of foreign countries where the bank j has a subsidiary, and n_{max} is the maximum number of foreign countries where the most diversified bank has subsidiaries. Geographic diversity is the ratio ratio of $n_{i,t}$ to $n_{max,t}$, where n_{jt} is the number of foreign countries where the bank j has a subsidiary in year t , and $n_{max,t}$ is the maximum number of foreign countries where the most diversified bank has subsidiaries, in a year t . We use regulatory quality, economic freedom and the share of diversified banks in the country as instruments in Panel 1. In Panel 2 we present the results of a Heckman selection model to control for the self-selection, using as selecting variables the same instruments of the IV regression and each bank's logarithm of total assets, its market share and a dummy coded one if the commercial bank is included in the S&P financial index. The p -values are in parentheses. Significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

dependent: excess value				
	(1)		(2)	
Geographic diversity	0.492	***	0.060	***
	(0.003)		(0.000)	
Log assets	-0.106	***	-0.070	
	(0.000)		(0.262)	
Log income	0.031	**	0.071	*
	(0.034)		(0.099)	
ROA	0.050	***	-0.007	
	(0.000)		(0.389)	
Equity to assets	-0.266		0.106	
	(0.134)		(0.795)	
Lambda (λ)			-0.007	
			(0.717)	
Constant	0.543	***	0.046	
	(0.001)		(0.905)	
Country effects	No		Yes	
Year effects	Yes		Yes	
Number of observations	1,396		2,761	
Adjusted R ²	0.03			

Table 8

Robustness tests for geographic diversity with bank risk measures

We estimate robust regressions with country and year fixed effects, for the period 2001-2007 and listed commercial banks around the world. We use the dependent variable as the dependent to proxy for market value and for bank j it equals its Tobin's q minus its adjusted q . Adjusted $q_j = \alpha_j q_1 + (1 - \alpha_j) q_2$, where q_1 is the q s of above the 0.7 threshold (highly) geographically diversified multinational commercial banks and q_2 represents the average q s of below the 0.7 threshold. For bank j α is the index of foreign geographical dispersion, where $\alpha_j = n_j / n_{max}$, n_j is the number of foreign countries where the bank j has a subsidiary, and n_{max} is the maximum number of foreign countries where the most diversified bank has subsidiaries. Geographic diversity is proxied by the number of foreign countries where the bank j has a subsidiary in year t , and $n_{max,t}$ is the maximum number of foreign countries where the most diversified bank has subsidiaries, in a year t . We plug-in control variables some to proxy for bank characteristics: (i) size: log assets and log income, the logarithm of total operating income; (ii) profitability: ROA; (iii) capitalization, proxied by equity to assets; and (iv) liquidity: deposits to liabilities. We include alternative bank risk measures: (i) log Z-score, the logarithm of Z-score, equaling $\log[(ROA + \text{loan loss reserves}) / \text{charge offs}]$; (ii) loan loss reserves; (iii) charge offs; and (iv) problem loans to total loans. The p -values are in parentheses. Significance at the 1%, 5%, and 10% level is denoted by ***, **, and * respectively.

dependent excess value	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Geographic diversity	0.029 *** (0.009)	0.027 ** (0.025)	0.053 *** (0.000)	0.019 * (0.098)	0.015 (0.240)	0.061 *** (0.000)	0.030 * (0.009)
Log assets	0.009 *** (0.002)	0.002 (0.690)	0.001 (0.878)	0.009 *** (0.003)	0.007 (0.198)	0.004 (0.428)	0.010 * (0.001)
Log income		0.005 (0.148)	0.006 * (0.067)		0.003 (0.448)	0.004 (0.229)	
ROA	0.028 *** (0.000)	0.025 *** (0.000)	0.023 *** (0.000)	0.043 *** (0.000)	0.043 *** (0.000)	0.039 *** (0.000)	0.028 * (0.000)
Equity to assets	-0.173 *** (0.003)	-0.165 ** (0.010)	-0.102 (0.109)	-0.333 *** (0.000)	-0.309 *** (0.000)	-0.195 *** (0.003)	-0.151 * (0.012)
Deposits to liabilities			0.066 *** (0.000)			0.079 *** (0.000)	
Log Z-score	-0.003 * (0.050)	-0.002 (0.316)	-0.002 (0.276)	-0.002 (0.208)	-0.001 (0.547)	-0.002 (0.357)	-0.003 * (0.047)
Loan loss reserves							0.001 (0.579)
Charge offs				0.003 (0.304)	0.004 (0.315)	0.007 * (0.074)	

Table 7 Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Problem loans	-0.000 (0.308)	-0.000 (0.247)	-0.000 (0.565)	0.000 (0.155)	0.000 (0.141)	0.000 * (0.086)	-0.000 (0.236)
Constant	-0.117 *** (0.003)	-0.089 ** (0.039)	-0.149 ** (0.001)	-0.219 *** (0.000)	-0.010 (0.811)	-0.074 * (0.086)	-0.223 * (0.000)
Country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	963	908	908	761	718	718	937

Were multinational banks taking excessive risks before the recent financial crisis? *

Mohamed Azzim Gulamhussen
(University Institute of Lisbon)

Carlos Pinheiro
(Caixa Geral de Depósitos)

Alberto Franco Pozzolo**
(Università degli Studi del Molise, MoFiR and Centro Studi Luca D'Aglia)

Abstract

The recent financial crisis has clearly shown that the relationship between bank internationalization and risk is complex. Previous scholars have argued that multinational banks benefit from portfolio diversification because it reduces their overall riskiness. However, researchers have radically questioned this argument on the grounds that these banks face perverse incentives, which lead them to take excessive risks. Because both theses are grounded on solid theoretical arguments, the true risks level of bank internationalization is an empirical issue. In this paper, we study the relationship between bank internationalization and risk in the period prior to the recent financial crisis. We consider market-based, forward-looking indicators (i.e., expected default frequency (EDF), credit default swaps (CDS), the Sharpe ratio, and the implied volatility of option prices on bank stock) and balance-sheet-based backward-looking measures (i.e., Z-score and earnings volatility) of excess risk for a sample of 384 listed banks from 56 countries from 2001 to 2007 and relate them to the degree of internationalization of the banks' activities. We find robust evidence that international diversification increases bank risk.

JEL classification: G21; G32; F23; F36; L22

Keywords: Banks; Risk; Multinational banking; Economic integration; Market structure

* We acknowledge financial support from FCT (PTDC7EGE-ECO/114977/2009). We thank Ines Chaieb, Roberta De Filippis, Geoffrey Jones, Mara Faccio, Phil Molyneux, Luca Papi, Nikolaos Papanikolaou, Alberto Sorrentino, Larry Wall and the participants at the Bangor Banking Seminar Series, the 51st annual meeting of the Italian Economic Association, the XIX International Tor Vergata Conference on Money, Banking and Finance, the 8th Paris December 2010 Finance Meeting, the 60th Midwest Finance Association 2011 Conference, the International Finance and Banking Society 2011 Conference, and the International Economic Association 2011 Conference for their comments and suggestions on our companion paper. Their feedback significantly improved this paper.

**Address for correspondence: Alberto Franco Pozzolo Università degli Studi del Molise, Dipartimento di Scienze Economiche Gestionali e Sociali, Via De Sanctis 86100 Campobasso, Italy. Phone +390874404338, Fax +39087498043. E-mail addresses: magn@iscte.pt (M. A. Gulamhussen); carlos.manuel.pinheiro@cgd.pt (C. Pinheiro); pozzolo@unimol.it (A. F. Pozzolo).

Introduction

Scholars have traditionally viewed bank internationalization more favorably than regulators and policymakers. On the one hand, opening the banking market to foreign players will result in larger economies of scope and scale, increased competition, and better risk diversification. On the other hand, bank internationalization may induce multinational players to hinder the development of local banks, cherry-pick the best clientele, bypass regulations, and in general, become less prone to follow the directives of local policymakers.

At first sight, one may classify this debate as a standard discussion between those in favor of free markets and those who believe that certain economic sectors, such as the financial markets, need to be strictly regulated. The recent financial crisis has clearly shown that market forces, especially in the financial sector, are not always capable of driving the economic system to the first best equilibrium. The call for stricter regulation of financial activities has been strong, with particular attention being paid to the role of the so-called systemically important financial institutions (SIFIs). Many scholars have argued that SIFIs consist exclusively of large multinational banks.

A key issue that has emerged during the recent financial crisis is that multinational banks are too risky. Because they are large and operate in many different countries, a default is likely to generate substantial spillover effects to the rest of the system. Additionally, their complex corporate structures may trigger perverse incentives and excessive risk-taking behavior. An emerging view is that the higher complexity and excessive agency problems associated with multinational banks outweigh the benefits of diversifying the idiosyncratic risks. Because both of these theses are grounded on solid theoretical arguments, whether multinational banks are more or less risky than domestic institutions is, in fact, an empirical issue.

A vast number of empirical studies have analyzed the determinants of bank risk taking (Vander Venet et al., 2002; Boyd et al., 2006), but the relationship between international diversification and individual bank risk-taking behavior has received much less attention. In this paper, we contribute to this literature by studying the relationship between international diversification and risk in a sample of 384 listed banks headquartered in 56 different countries. Our sample includes both internationally diversified and purely domestic banks. We cover the 7 years before the financial crisis, a period during which the riskiness of banks and financial markets increased

substantially. This risk-taking behavior eventually led to the worst collapse since the Great Depression. We follow the modified “chop-shop” approach proposed by Laeven and Levine (2007) and adopted in our companion paper (Gulamhussen et al., 2010). In this approach, each bank’s excess risk is calculated as the difference between its actual risk and the imputed risk level of a bank with a similar level of international diversification. With regard to the risk measures, we consider four market-based, forward-looking indices that are widely used in the literature: the expected default frequency (EDF), the credit default swap spread (CDS), the Sharpe ratio, and the implied volatility of option prices on bank stock. Additionally, we employ three balance-sheet-based, backward-looking measures: the Z-score, earnings volatility, and the coefficient of variation of earnings.

Our work is related to two major streams of the literature. First, we contribute to the analysis of the determinants of bank risk taking by considering a specific type of corporate structure, the multinational company, which is most likely to be affected by all of the problems that standard agency theories have shown to be major causes of corporate risk taking (Jensen and Meckling, 1976; John et al., 2008). Second, we contribute more specifically to the literature by analyzing the characteristics of international banks (Buch and DeLong, 2010; Pozzolo, 2009).

Our results show that internationally diversified banks are significantly riskier than domestically oriented banks. Thus, the positive effects of loan and asset diversification in reducing bank risk are outweighed by the negative effects caused by the perverse incentives and complexity associated with large multinational corporations.

The rest of the paper is organized as follows. Section 2 relates our research to the previous literature on bank risk taking. Section 3 describes our empirical strategy. Section 4 presents the sources of our information and describes the measures of risk and geographic diversification used in the empirical analyses. Section 5 presents the results. Section 6 concludes this paper.

2. Related Literature

The benefits from the diversification of idiosyncratic risk are among the best understood concepts in the economic literature (Cochrane, 2005). From this perspective, the geographic diversification of banks should dampen the effects of idiosyncratic shocks and, therefore, reduce their overall riskiness. Although the potential gains from international portfolio diversification are still an object of current research in the

finance literature,¹ Buch et al. (2010) recently showed that bank asset portfolios exhibit a significant home bias. According to this view, geographic diversification should reduce aggregate bank risk.

However, multinational banks typically have access to a much larger set of strategies that can increase their risky activities than domestic banks. Additionally, these activities may be hidden from the view of local regulators. Incentive problems lie at the root of these choices. Although international diversification may prove to be a suboptimal decision once one accounts for the costs of increased management complexity, insiders may still support the acquisition of foreign participations if doing so allows them to obtain private benefits (Jensen and Meckling, 1976; Jensen, 1986). For example, the increased asset liquidity associated with international operations might provide bank managers with more possibilities to trade against the bank's interest (Myers and Rajan, 1998). In this case, geographic diversification may cause an increase in bank risk. In fact, the relevance of incentive problems was confirmed in a recent study by Laeven and Levine (2009), who showed that control problems have a first-order impact on corporate decisions and that banks with less dispersed shareholders are generally riskier.

As we argued above, determining the net effect of these two opposing forces is mainly an empirical issue. However, the results in this case are rather mixed. Some studies show that geographic diversification increases bank risk. Studying the effects of U.S. branching deregulation, Hughes et al. (1996) showed that an increase in the number of U.S. States in which a bank holding company operates increases insolvency risk, whereas a rise in the number of branches per se had the opposite effect. De Nicolò et al. (2004) found that large conglomerate corporations did not exhibit higher levels of risk-taking behavior than average banks in 1995 but did so in 2000. However, other studies found the opposite results. Analyzing US mergers and acquisitions, Zhang (1995) showed that geographical diversification leads to lower risk by reducing income variability. Deng et al. (2007) showed that banks that are domestically diversified on both the assets and the liabilities sides pay lower bond spreads, which provide indirect evidence of lower risk. Similarly, Deng and Elyasiani (2008) find that geographically diversified banks have lower stock price variability. With regard to international diversification, Amihud et al. (2002) found that cross-border mergers and acquisitions

¹ See Karolyi and Stulz (2001) and Stiroh (2009) for a survey of this literature.

(M&As) have no effects on bidders' systematic risk levels, although this result was questioned by Focarelli et al. (2008) who showed instead that bidders experience a reduction in their beta (i.e., the correlation of their returns with stock market returns).²

3. Empirical strategy

3.1. Econometric model

Our test of whether a bank's excess risk is a function of its degree of international diversification is based on the following empirical model:

$$\text{Excess risk}_{jt} = \alpha + \beta \text{geo div}_{jt} + \gamma \text{controls}_{jt} + \varepsilon_{jt}, \quad (1)$$

where the measures of excess risk and geographic diversification refer to bank j at time t ; the controls include time-varying bank-specific characteristics as well as time and country dummies; and ε_{jt} is an error term. To account for the large values of the coefficients of skewness and kurtosis of our dependent variables, we trim our data by excluding observations below the 5th percentile and above the 95th percentile in our preferred specification, and we estimate the model with robust regression techniques (Li, 1985). Moreover, we include country and year fixed effects. However, as a robustness check, we also present the results that we obtained with standard OLS regressions. In the following, we discuss in detail our measures of excess risk taking and geographic diversification as well as the controls introduced in our specifications.

3.2. Measures of excess risk

For each bank j , we measure excess risk by comparing the bank's measure of its actual risk taking with the imputed measure that it would have if it were "chopped" into two banks: a geographically diversified bank and a domestic, undiversified bank. If we could measure the actual risk taking behaviors of the geographically diversified bank ($risk_1$) and the domestic bank ($risk_2$), then the imputed $risk$ of a bank with a share φ of internationally diversified activities and a share $(1 - \varphi)$ of domestic activities would be $\varphi risk_1 + (1 - \varphi) risk_2$. Because we cannot precisely measure the risk taking behaviors of the geographically diversified and the domestic arms of the banks, for each bank j , we

² Our research is also related to the analyses of the risk effects of the diversification of banking activities. The results of these analyses are also mixed. Baele et al. (2007) show that a larger share of noninterest income is associated with higher systematic risk, which is measured by the market beta. Demirgüç-Kunt and Huizinga (2010) also confirm this result with regard to the Z-score.

compute an index of foreign geographical dispersion as follows: $\alpha_j = \frac{n_j}{n_{max}}$, where n_j is

the average number of foreign countries in which bank j has a subsidiary during our sample period, and n_{max} measures the same number for the most internationally diversified bank. We then define the *excess risk* of a geographically diversified bank (*Excess risk*) as the difference between its actual risk and the weighted average value of the risk levels of banks with α_j above a given threshold ($risk_1$) and the risk levels of a domestic bank ($risk_2$), where the weight itself is determined by the bank's degree of international diversification α_j . Formally, we define *excess risk* as the following:

$$Excess \ risk = risk_j - [\alpha_j risk_1 + (1 - \alpha_j) risk_2] \quad (2)$$

Following Laeven and Levine (2007), we define diversified banks as those banks that have an index of geographical dispersion above a threshold of 70% in our baseline specification.

The empirical literature has proposed a large number of measures of bank risk taking.³ In our analysis, we use seven alternative measures, including market-based, forward-looking indices (i.e., the expected default frequency (EDF) based on Black and Sholes (1973) and Merton (1974), the spread on credit default swaps (CDS), the Sharpe ratio, and the implied volatility of option prices on bank stock) and three accounting measures (i.e., the Z-score, earnings volatility, and the coefficient of variation of earnings).

Our first measure, the expected default measure, is the bank's 5-year ahead cumulative EDF provided by Moody's KMV, which is based on the Vasicek-Kealhofer model, as explained in detail by Kealhofer (2003).

The second measure relates to the CDS. CDS are contracts that provide insurance against the risk of default of a financial asset in which an insurance buyer pays the insurer a fixed amount (i.e., a defined CDS premium) at regular time intervals until the end of the contract or until the default event occurs. In the event of default, the insurer refunds the CDS holder for the nominal value of the defaulted asset. Our measure of risk is the annual average of daily spreads for the 5-year CDS contract, which is the most liquid in the market. This annual average is expressed in basis points

³ For example, see Berger and De Young (1997), Williams (2004), Garlappi et al. (2006), De Nicolò and Loukoianova (2007), Laeven and Levine (2009), Altunbas et al. (2010), Buch and DeLong (2010), Chiamonte and Casu (2010), Fiordelisi et al. (2010), Hull (2010), and De Haan, and Poghosyan (2011).

(bp). We obtained our data from Markit, a commercial data provider (see also Jorion and Zhang, 2007).

The third measure is the Sharpe ratio, which we compute by calculating the ratio of the mean value of weekly price returns over their volatility, as measured by the annualized standard deviation of the weekly price returns. The Sharpe ratio is a measure of the return per unit of risk (Vander Vennet, 2004; Demirgüç-Kunt and Huizinga, 2010).

Our fourth measure of bank risk is the volatility implied by the prices of the exchange-traded options on the bank stock. This implied volatility is also a forward-looking measure of expected future volatility. Swidler and Wilcox (2002) contend that the implied volatility provides a better forecast of the volatilities of shares prices than historical volatilities because the former reflect how the market views the volatility of the bank stock's market value and responds rapidly to any innovation in the distribution of share prices. In other words, the market forms views about the volatility of a stock price by incorporating both past and present information. The implied volatility is a function of these views. Changes in the implied volatility can be interpreted as the market's response to events affecting the future volatility of the underlying share price (Mayhew, 1995). We collected weekly prices of the call options and put options on the bank stocks from Bloomberg for the period of analysis and averaged the corresponding data (see, for example, Swidler and Wilcox 2002, and DeMiguel et al., 2010).⁴

The next three measures are based on accounting data. Following Laeven and Levine (2009), we compute the Z-score as $\frac{CAR + EQT}{\sigma(ROA)}$, where CAR is the capital-to-total-assets ratio, EQT is the equity-to-total-assets ratio, and $\sigma(ROA)$ is the standard deviation of the return on assets (ROA) in the previous 3 years. The Z-score measures the number of standard deviations that a bank's ROA has to drop below its expected value before the equity is entirely depleted. Because the Z-score is a negative function of the risk of default (i.e., banks with a higher Z-score are less likely to default), in our estimates, we use the symmetric of the Z-score, which we call Z' -score, such that the sign of its coefficient is comparable with that of our other measures of bank risk.

⁴ We used the following from Bloomberg: 'Implied volatility for underlying securities calculated from a weighted average of the volatilities of the two closest options. For all securities, the contract used is the closest pricing contract month that is expiring at least in 20 business days'.

The sixth measure is earnings volatility, which is the standard deviation of the total earnings before taxes and the ratio of loan loss provisions to average total assets. We collected data from 1999 to 2007 on a week-by-week basis and compute the average standard deviation of the earnings for three rolling years (De Nicolò and Loukianova, 2007).

Finally, we computed the earnings volatility based on the coefficient of variation. This coefficient quantifies the dispersion of earnings, which is measured by the yearly standard deviation, in relation to their expected return, which is measured by the average return. The coefficient of variation (i.e., standard deviation / average return) is a measure of the relative risk, and the smaller the returns for the same level of dispersion, the greater the risk is. In this sense, the coefficient of variation is a relative measure. This metric more accurately measures risk than the previous measure of earnings volatility, which was based solely on dispersion, because the coefficient of variation enables one to compare investments of different sizes.

3.3. *Measures of geographic diversification*

Most conventional empirical studies measure geographic diversification by considering the number of subsidiaries in a corporation or the number of locations in which the corporation is present. Some studies simply use a binary variable indicating whether the corporation is present in a given area (i.e., typically a foreign country). However, these measures do not precisely assess the level and the intensity of banks' geographic diversification and do not account for the trend in international diversification that characterized the banking sector before the recent crisis (Pozzolo, 2009). Therefore, following Gulamhussen et al. (2010), we compute three alternative measures of geographic diversification. Each measure positions the banks over a continuum, with the lower bound corresponding to purely non-diversified (domestic) banks and the upper bound corresponding to the most geographically diversified banks.

Our first measure is a proxy for *geographic reach* and is formally estimated by the following:

$$geographic\ reach = \frac{n_{j,t}}{n_{max,t}} \quad (3)$$

where $n_{j,t}$ is the number of foreign countries in which the bank j has a subsidiary in year t , and $n_{max,t}$ is the maximum number of foreign countries in which the most diversified bank has subsidiaries in year t . Clearly, *geographic reach* is a stock variable, continuous, and bounded between 0 and 1. Purely domestic banks assume a value of 0, and values close to 1 indicate more geographically dispersed banks. This index normalizes the measure of geographic diversification by accounting for the yearly variation of the most diversified banks.

Our second measure, *geographic share*, computes the share of assets on a country-by-country basis by considering a bank's asset dispersion across its subsidiaries (similar to Buch and Lipponer, 2007). We compute the difference between the total assets and the foreign assets of the bank's subsidiaries. We then scale this difference by the assets deployed in all of the bank's subsidiaries. Formally, we estimate our index by calculating the following:

$$geographic\ share = 1 - \left(\frac{\text{total subsidiaries assets} - \text{foreign subsidiaries assets}}{\text{total subsidiaries assets}} \right) \quad (4)$$

Geographic share is bounded between 0 and 1, with values close to 0 indicating low geographic diversification and values close to 1 indicating high geographic diversification.

Compared with *geographic reach*, *geographic share* is superior in that it considers the incidence of foreign participations in a banking group's aggregate activities. In fact, the geographic reach of a bank that has 4 foreign subsidiaries, each of which accounts for just 2% of its total assets, will be identical to that of a group that spreads its activities equally across different countries and that has 5 subsidiaries, each of which represents 20% of the total assets.

However, *geographic share* is disadvantageous in that a bank with just one foreign subsidiary that represents 50% of its activities is identical to a bank with foreign subsidiaries in 10 different countries, each of which represents 5% of this bank's total assets. To account for both the number of foreign countries in which a bank is present and the weight of each activity, we calculated our third measure of diversification, *geographic concentration*, as a transformed Hirsch-Herfindhal Index (Mercieca et al., 2007). We compute this index based on the total assets of a banking group's foreign

participations in each subsidiary in the various foreign countries.⁵ Formally, we define the index as follows:

$$\text{geographic concentration} = 1 - \sum_{j=1}^{n_j} \left(\frac{\text{subsidiary}_j \text{ assets}}{\text{total subsidiaries assets}} \right)^2 \quad (5)$$

Geographic concentration is bounded between 0 and 1, with values close to 0 indicating low geographic diversification and values close to 1 indicating geographically dispersed banks.

We define a bank as geographically diversified if its diversity index assumes a value above a given threshold. In our baseline specification, a geographically diversified bank is one whose geographic diversity ($\alpha_j = \frac{n_{j,t}}{n_{\max,t}}$) takes a value above 0.7.

3.4. *Other bank characteristics*

Bank risk taking is also related to other bank specific characteristics. For example, during the recent financial crisis, scholars have forcefully argued that large banks have excessively high risk attitudes because they discount the fact that in cases of distress, the government will bail them out using public money (i.e., they are too large to fail). At the same time, it is well known that larger banks are more likely to be internationally diversified. Because we are interested in measuring only the direct effect of geographic diversification on risk, neglecting to control for size might introduce a bias in favor of finding a positive relationship between these two variables because larger banks are riskier and more international at the same time. To account for these and other bank characteristics that might potentially bias our results, we include a number of time varying bank-specific controls in our specification.

First, we considered two measures related to bank size: the logarithm of total assets and that of total operating income. In addition to the too-big-to-fail argument, the asset and loan portfolios and the activities of larger banks are typically far more diversified than those of smaller institutions. This difference obviously impacts the degree of risk that banks take on independently of their degree of international diversification. In addition, we also include total income because it better captures the weight of the banks' off-balance sheet activities. In addition to size, profitability is also

⁵ Similar concentration measures can be found in the works of Acharya et al. (2006) and Stiroh and Rumble (2006).

correlated with both international diversification and risk. According to the standard mean-variance portfolio model, higher profitability entails higher variability (i.e., higher risk). At the same time, it is well known that more profitable banks are more likely to be internationally diversified (Focarelli and Pozzolo, 2001). Similarly, a bank with a high franchise value might be less prone to engaging in risky activities because of the larger losses that it would incur in case of a default. Therefore, we control for profitability by including the value of the returns on assets (ROA), a proxy for the total returns on bank investments. Finally, we also control for the share of retail deposits over total liabilities because the funding composition is likely to affect the banks' lending and investing strategies.

3.5. Country controls

Country characteristics are most likely to have a strong impact on bank strategies depending on, for example, the strictness of the regulatory environment. However, because our main focus is on the effect of geographic diversification on bank risk taking, we control for all country characteristics by introducing country dummies.

4. Data and sources

4.1. Sources

We focused on commercial banks, a homogeneous group of financial institutions that has been found to have compelling reasons to internalize their banking activities across borders (Focarelli and Pozzolo, 2005; Barba et al., 2010). To assemble our data, we first extracted the yearly account and market data from 2001-2007 on all of the listed commercial banks on Bankscope with total assets in excess of US\$ 100 million. We excluded smaller banks to avoid confounding effects, as these banks may face additional challenges and costs in diversifying across borders compared with large banks. We also excluded banks headquartered in off-shore hubs, such as Bermuda, Gibraltar, the Virgin Islands or the Cayman Islands, because these hubs would hinder our ability to make cross-country comparisons. We then integrated the missing information with Worldscope, Datastream and individual bank websites. We undertook a painstaking effort to clean and complement the information downloaded from Bankscope and to avoid incongruent and missing data on crucial account and market variables. Our data-assembling exercise yielded a sample of 577 commercial banks and 4,039 bank-year observations.

By matching our initial sample of 577 publicly traded banks with the yearly data on the banks' subsidiaries, we generated a final sample of 384 banks headquartered in 56 countries for which time-varying data on the subsidiaries are available.⁶ The U.S. and Japan have the largest number of banks in our sample, with 9.4% and 17.0% of the total number of banks, respectively.

We obtained our data on bank risk from three different commercial data providers: Moody's KMV for the expected default frequencies (EDF), Markit for the CDS spreads and Bankscope for the balance sheet information needed to calculate the Z'-score. We obtained our data on the implied volatility and the earnings volatility from Bloomberg. In the case of implied volatility, we used the weighted average of the volatilities of the two closest options to determine the puts and calls on the banks' stocks.

When merging our balance sheet information with the risk measures, the number of banks in our sample falls to slightly less than 250 banks, depending on the measure of risk that we used. In contrast, the CDS spreads were available for only 75 banks⁷.

4.2. *Summary statistics*

Table 1 presents the summary statistics. We present the three measures of excess risk value that were evaluated at the 0.7 threshold and the key independent variable, geographic diversification. Additionally, we introduce several variables to control for the country and bank traits. Our data set comprises 384 banks from 56 countries pertaining to the seven-year period from 2001-2007.

All three alternative measures of excess risk are positive for the 2001-2007 average period and exhibit great variability. In addition, geographic reach shows substantial variability. The more geographically diversified commercial banks in our sample exhibit a geographic reach in excess of 0.75. Examples of these banks include ABN Amro (Netherlands), BNP Paribas (France), Société Générale (France), Citibank (U.S.) and the HSBC (U.K.). We also included purely domestic banks that have no foreign subsidiaries. These banks have a geographic reach of 0 and include 1st Source

⁶ The 56 countries in our sample are the following: Australia, Bangladesh, Belgium, Brazil, Canada, China, Colombia, Croatia, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Greece, Hong Kong, India, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Kenya, Rep. of Korea, Kuwait, Lebanon, Lithuania, Malaysia, the Netherlands, Oman, Pakistan, Peru, Philippines, Poland, Portugal, Qatar, Romania, Saudi Arabia, Singapore, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, Thailand, Tunisia, Turkey, United Arab Emirates, United Kingdom, United States, and Venezuela.

⁷ Demirgüç-Kunt et al. (2010) faced a similar lack of data regarding CDS spreads when they analyzed the link between bank risk and capital. They restricted their sample to the 33 internationally active banks for which data were available.

Bank (U.S.), Citizens Bank (U.S.), City National Bank (U.S.), Banca Italalease (Italy), Canadian Western Bank (Canada), Howa Bank (Japan), and Daishi Bank (Japan). When measuring geographic diversification in terms of geographic share (i.e., the weight of foreign subsidiaries' assets in subsidiaries' total assets), we found that the most geographically dispersed banks are Deutsche Bank (Germany), Unicredit (Italy) and the Royal Bank of Scotland (U.K.). When using the modified Hirsch-Hirfindhal Index as a measure of bank geographic concentration, we found that the most diversified banks are BBVA (Spain), ING (Netherlands) and the National Bank (Greece). Our sample yields high variability in terms of bank size, which previous scholars have found to be an important factor in bank diversification, with the larger banks being more diversified (see, for example, De Haan and Poghosyan, 2011). In our sample, BNP Paribas (France), Deutsche Bank (Germany), HSBC (U.K.), ING (The Netherlands), Santander (Spain) and UBS (Switzerland) were the largest banks in terms of total assets, but our sample also included small financial intermediaries, such as Citizens Bank, Sunwest Bank, First California Bank (U.S.) and Howa Bank (Japan).

Table 2 presents the mean and median differences of the excess risk values of the geographically diversified banks. In the first row of Table 2, we test the null hypothesis, which states that the mean excess risk values for the diversified and non-diversified banks are the same. With the exclusion of the EDFs, the Sharpe ratio, the implied volatility and the realized earnings volatility (i.e., five out of the seven panels), the values of the statistics of the t -test do not allow us to reject the hypothesis of equality of means. Because the distribution of excess risk is mostly skewed to the right, we present in the second row of Table 2 the results of a non-parametric test for the differences in the medians. In this case, we cannot reject the hypothesis of equality of medians for four out of seven of our risk measures because only the Sharpe ratio and the two measures of earnings vitality yield statistically significant tests. However, the sample statistics do not fully explain the relationship between bank risk and diversification because they may simply reflect spurious correlations. In the following sections, we present the results of a finer-grained analysis, which we obtained using a set of multivariate econometric models.

5. Econometric analysis

5.1. Baseline specification

Table 3 reports the results of our baseline specification. We included the country and year fixed effects that pertain to the alternative measures of excess risk in Panels 1 to 7. We trimmed the excess risk data at the 5% and 95% percentiles.

Panel 1 reports the estimates that use the excess EDF as a measure of bank risk and *geographic reach* as our measure of diversification. We also included the time-varying bank characteristics described in this study.

The coefficient of *geographic reach* is 0.282 and significantly different from zero at the 1% level. This finding indicates that a positive, statistically and economically significant relationship exists between geographic diversification and bank risk. Therefore, more geographically diversified banks have a significantly higher probability of default than similar banks with more geographically focused activities.

The coefficients of the other control variables provide additional insight into the determinants of bank risk. Measured by the logarithm of its total assets, bank size had no impact on the probability of default. This result is consistent with the findings of Demirgüç-Kunt and Huizinga (2010). In contrast, we found that banks with higher total incomes for a given total of assets have a lower probability of default. Additionally, we found that banks with higher franchise values, which we proxy with the level of returns on assets, also have a lower probability of default. Finally, the incidence of deposits on total liabilities had no effect on bank risk. We confirmed these results while controlling for leverage, which also had a statistically insignificant effect on bank risk.

Panel 2 presents the results from measuring risk using excess CDS spreads. Although the number of observations in this case is much smaller than in the case of EDF (CDS contracts are only available for few large banks), the coefficient of bank reach is 0.094, positive and statistically significant at the 1% level. Therefore, both forward-looking, market-based measures of bank risk provide the same picture: internationally diversified banks are riskier than domestically focused financial intermediaries. Bank-specific characteristics seem to have a slightly different impact on bank risk when we measure them using CDS spreads. Banks that were larger in terms of total assets were less risky, while income had no significant effect in this case. Profitability, our proxy for bank franchise value, had a negative effect on risk in this

case. Interestingly, we found that financial intermediaries with a larger share of deposits over total liabilities also have lower excess CDS spreads.

Panel 3 reports the results for the excess Sharpe ratio. Although the coefficient of geographic share is positive, it is not significantly different from zero. The Sharpe ratio suffers from the disadvantage of working well for normally distributed earnings, which was not the case for the data in our sample during the entire period of analysis.

In Panel 4, the dependent variable is the excess implied volatility. The results are similar to those of Panels 1 and 2 in that the variable of interest, geographic reach, is positive and significant at the 1% level of significance.

Panel 5 reports the results when we measured risk using a backward-looking, balance-sheet-based measure: the symmetric of the Z-score. In this case, the coefficient of bank reach was 1.413 and once again statistically significant at the 1% level. This finding provides further support for the previous evidence. As to the other bank-specific characteristics, we found that banks that were larger (in terms of total assets), more profitable and have a larger share of deposits over total liabilities are less risky.

Panels 6 and 7 show the results of measuring bank risk with excess earnings volatility in a three-year rolling window and with the coefficient of variation, respectively. The results confirm that banks with broader geographic footprints are riskier because the coefficients in both panels are positive and significantly different from zero at the 1% level of significance.

Thus, the overall picture emerging from our baseline specification clearly shows that internationally diversified banks are riskier than their peers. In the following, we present the results of a number of additional regressions that test the robustness of our findings to the use of alternative econometric techniques.

5.2. *Alternative econometric specifications*

We performed both econometric and economic robustness checks. In terms of econometric checks, we employed two different estimation techniques.⁸ First, because we had a non-normal population, we fit a quantile regression model with bootstrap standard errors using the median regression option. We estimated the median of the dependent variable, excess risk, conditional on the values of the explanatory variables. An algebraically median regression found the regression plane that minimizes the sum

⁸ In unreported regressions, we also run interquartile regressions. The results show that there are no differences between the coefficients of the variable of interest for the 25th and 75th percentiles.

of the absolute residuals (Cameron and Trivedi, 2009). Developed by Efron (1979), bootstrapping is a form of random sampling that uses the sample itself to infer the characteristics of the sampling distribution parameters (i.e., in this case, standard errors) instead of external theoretical results. We chose 100 bootstrap replications to estimate robust standard errors in accordance with the criteria defined by Efron and Tibshirani (1993). We trimmed the data at the 5th and 95th percentiles of excess risk.

Table 4 presents the result of the estimation of our baseline specification using median regressions. When we measured bank risk using two forward-looking measures, excess EDF and excess CDS spreads, the estimated coefficients of *geographic reach* are, in both cases, positive, statistically significant (although the case of CDS is only significant at the 10% level) and of a size comparable with that obtained using the robust regression technique. In the case of the excess Sharpe ratio, the results were similar to those of the baseline specification. This finding suggests that a positive but statistically insignificant link exists between diversification and risk. The *geographic share* coefficient for excess implied volatility is similar to the one presented in the baseline specification, although the significance of the former is at the 5% significance level instead of 1% for the baseline model. With regard to the (symmetric of the) Z-score, the estimated coefficient was positive but not statistically significant. In later regressions, we verified that this result was due to the fact that the effect of geographic dispersion on risk, which is measured by the Z-score, was highly non-linear. That is, the effect is stronger for low levels of the symmetric of the Z-score (i.e., for less risky banks) and becomes insignificant for higher levels of risk. Similar analyses showed that in the case of excess EDF and excess CDS spreads, there was no evidence of significant non-linearities with regard to the effect of geographic diversification on risk. The estimates of the additional bank specific controls were broadly similar to those obtained using robust regressions, although the coefficients were statistically significant in fewer cases.

The last two panels pertaining to earnings volatility (Panels 6 and 7) yield results comparable with the baseline formulation: the size coefficients are similar to those of the baseline model and significant at the 1% level.

We also present the results of Table 5, which we obtained using standard OLS regressions with robust standard errors and by trimming excess risk at the 5th and 95th percentiles. Once again, the findings are consistent with those obtained using the robust regression technique. That is, the coefficient of *geographic reach* was positive for all

seven measures of risk. The coefficient was statistically significant for excess EDF, the symmetric of the Z-score, and excess earnings volatility (measured by the coefficient of variation) at the 1% level. The coefficient was statistically significant for CDS at the 5% level and for the Sharpe ratio at the 10% significance level. The variable of interest was not statistically significant for earnings volatility measured in a three-year rolling window, probably because of the non-linearity of this measure, as described in later sections of this paper.

5.3. *Alternative measures of geographic diversification*

Tables 6 and 7 present the results of our estimates using the two alternative measures of geographic diversification (i.e., *geographic share* (equation 4) and *geographic concentration* (equation 5)), as described in section 3. When we measured diversification by utilizing *geographic share* (i.e., a function of the share of the foreign subsidiaries' assets over the total value of bank assets), we found a positive but insignificant effect in four out of seven cases. The estimated coefficient was statistically significant at the 1% level only when we measured risk using excess CDS spreads, excess implied volatility, and both measures of earnings volatility. This finding suggests that instead of the incidence of foreign activities, a bank's dispersion across a large number of foreign countries increases its risk level. When we measured diversification using *geographic concentration* (Table 7), which weighs the number of foreign countries in which a bank is present by the size of the foreign activities, the results reinforced the argument that dispersion entails more risk, despite the smaller number of observations available for some panels. In this case, the coefficient of *bank concentration* was positive and statistically significant at the 1% level when risk was measured by excess CDS spreads, at the 5% level when risk was measured by the (symmetric of the) Z-score, and at the 10% level when risk was measured by excess earnings volatility in a rolling window.

5.4. *Non-linear effects of geographic diversification*

In our companion paper (Gulamhussen et al., 2010), we present empirical evidence suggesting that geographic diversification has an inverse U-shaped effect on bank value. In other words, if a bank is operating in a small number of countries, then international diversification causes the bank's value to increase, but once the bank reaches a given threshold, further expansion abroad has a negative effect instead. In that paper, we

argued that this finding might be due to the high costs and the excessive complexity of managing large multinational banks. One possible reason is that the management of large multinational banks might entail considerable risks.

To test this hypothesis, we replaced our measure of *geographic reach* with 6 dummies: one for the values of *geographic reach* that are equal to zero and the other 5 for each quintile of the strictly positive support of the distribution of *geographic reach*. Panels 1-7 of Table 8 report the results for our seven different measures of risk. The key finding is that the relationship between geographic diversification and bank risk increases with the level of diversification. In particular, when we measured risk using excess EDF, excess implied volatility or excess earnings volatility, only the coefficient of the dummy for the most geographically diversified banks was statistically significant, with values of *geographic reach* above 0.39 (i.e. a presence in 39% of the foreign countries in which the most diversified bank of the sample has subsidiaries). When we measured risk using excess CDS spreads, geographic diversification was associated with higher risk in five out of six cases, but the coefficients were again larger (and increasing) for the last two quintiles, with values of *geographic reach* above 0.12.⁹ Finally, in the case of the symmetric of the Z-score, the evidence of a non-linear relationship was weaker, although in this case, the two largest coefficients were also those of the dummies for the 4th and 5th quintile. In all of the specifications, the coefficients of the other bank-specific controls were in line with the findings of the baseline specifications.

Therefore, our evidence is consistent with the hypothesis that high levels of international diversification entail substantial agency costs and management complexity, which hinder corporate control, increase the banks' opaqueness and ultimately, augment their riskiness.

5.5. *Exclusion of influential countries*

In Panels 4 to 6 of Table 8, we excluded the U.S. from the baseline specification. In Panels 7 to 9, we adopted the same procedure for Japan because these two countries represent 9.4% and 17.0% of the sampled cases, respectively.

⁹ The only statistically insignificant coefficient is that of the dummy for the second quintile, which refers to only 16 observations in the sample for which CDS spreads are available.

Our previous results of the baseline specification remain economically and statistically unchanged. This finding provides evidence suggesting that geographic diversification entails an increase in risk for multinational commercial banks.

6. Conclusions

Although capable of addressing the many fallacies uncovered by the recent financial crisis, the definition of the new regulatory framework requires a precise understanding of the characteristics of the different business models of banks and of their riskiness. One of the issues that has captured much attention from regulators and policymakers is the international dimension of the financial markets, particularly the role of multinational players.

In a companion paper, we provided evidence suggesting that international diversification increases corporate value. In this paper, we go one step further by showing that this increased value comes at the cost of higher riskiness. We find that internationally diversified banks, especially the largest players that have subsidiaries all over the world, have a higher expected probability of default, as measured by EDFs. Additionally, these banks have higher CDS spreads, implied volatilities, earnings volatilities and Z-scores. In sum, geographically diversified banks are riskier. Several robustness tests do not indicate that our findings are biased in any way.

Because there are no grounds to exclude the benefits from the diversification of the idiosyncratic shocks to the asset and loan portfolios, we can conclude that higher riskiness is due to the business model chosen by multinational banks. In particular, incentive problems lie at the root of this higher riskiness. Multinational banks are not riskier per se, but they can take on more risk if the management decides to do so. A regulatory framework that increases the costs of holding cross-border activities and participations might have a negative adverse-selection effect such that only those who are ready to assume high levels of risk will diversify internationally. As recently argued by Diamond and Rajan (2009), a better approach would be to directly adjust the mechanism behind the incentives that lead multinational banks to take on excessive levels of risk.

References

- Acharya, V.V., I. Hasan and A. Saunders, 2006, Should banks be diversified? Evidence from individual bank loan portfolios, *Journal of Business* 79(3), 1355-1412.
- Amihud, Y., G. DeLong and A. Saunders, 2002, The effects of cross-border bank mergers on bank risk and value, *Journal of International Money and Finance* 21(6), 857– 877.
- Altunbas, Y., L. Gambacorta and D. Marques-Ibanez, 2010, Does monetary policy affect bank risk-taking? ECB Working Paper no. 1166/10.
- Baele, L., O. De Jonghe and R. Vander Venet, 2007, Does the stock market value bank diversification? *Journal of Banking and Finance* 31(7), 1999-2023.
- Barba, N., G.G. Ferrarini, G. Calzolari and A.F. Pozzolo, 2010, Multinational banks and European financial integration: Lessons for supervision and regulation, available at <http://ssrn.com/abstract=1596737>.
- Berger, A.N. and R. De Young, 1997, Problem loans and cost efficiency in commercial banking, *Journal of Banking and Finance* 21(6), 849-870.
- Black, F. and M. Scholes, 1973, The pricing of options and corporate liabilities, *Journal of Political Economy* 81(4), 637-659.
- Boyd, J.H., G. De Nicolò and A.M. Jalal, 2006, Bank risk-taking and competition revisited: New theory and new evidence, IMF Working Paper no. 06/297.
- Buch, C.M. and A. Lipponer, 2007, FDI versus exports: Evidence from German banks, *Journal of Banking and Finance* 31(3), 805-826.
- Buch, C.M. and G.L. DeLong, 2009, Banking globalization: international consolidation and mergers in banking, in Berger, A.N., P. Molyneux, and J.O. Wilson eds.: *The Oxford Book of Banking*, Oxford University Press.
- Buch, C.M., J.C. Driscoll and C. Ostergaard, 2010, Cross-Border Diversification in Bank Asset Portfolios, *International Finance* 13(1), 79-108.
- Cameron, A.C. and P.K. Trivedi, 2009, *Microeconometrics using Stata*, Stata Press USA.
- Chiaramonte, L. and B. Casu, 2010, Are CDS spreads a good proxy of bank risk? Evidence from the financial crisis, Working paper no. 05/10.
- Cochrane, J., 2005, The risk and return of venture capital, *Journal of Financial Economics* 75(1), 3-52.

- De Haan, J. and T. Poghosyan, 2011, Bank size, market concentration, and bank earnings volatility in the U.S., DNB Working paper no. 282.
- DeMiguel, V., Y. Plyakha, R. Uppal and G. Vilkov, 2010, Improving portfolio selection using option-implied volatility and skewness, Centre for Economic Policy Research Discussion Paper no. 7686.
- De Nicolò, G.D., P. Bartholomew, J. Zaman and M. Zephirin, 2004, Bank consolidation, internationalization, and conglomeration: trends and implications for financial risk, *Financial Markets, Institutions and Instruments* 13, 173-217.
- De Nicolò, G. and E. Loukoianova, 2007, Bank ownership, market structure and risk, IMF Working paper no. 215.
- Demirgüç-Kunt, A., E. Detragiache and O. Merrouche, 2010, Bank capital: lessons from the financial crisis, The World Bank Policy Research Working Paper no. 5473/10.
- Demirgüç-Kunt A. and H. Huizinga, 2010, Bank activity and funding strategies: The impact on risk and returns, *Journal of Financial Economics* 98(3), 626-650.
- Deng, S., E. Elyasiani and C. Mao, 2007, Diversification and the cost of debt of bank holding companies, *Journal of Banking and Finance* 31(12), 2453-2473.
- Deng, S. and E. Elyasiani, 2008, Geographic diversification, bank holding company value, and risk, *Journal of Money, Credit and Banking* 40(6), 1217-1238.
- Diamond W. D. and R. Rajan, 2009, The credit crisis: Conjectures about causes and remedies, NBER Working Paper no. 14739.
- Efron B., 1979, Bootstrapping methods: Another look at the jackknife, *Annals of Statistics* 7(1), 1-26.
- Efron B. and R.J. Tibshirani, 1993, An introduction to the bootstrap, New York, Chapman and Hall.
- Fiordelisi, F., D. Marques-Ibanez and P. Molyneux, 2010, Efficiency and risk in European banking, ECB Working paper no. 1211.
- Focarelli, D. and A.F. Pozzolo, 2001, The patterns of cross-border bank mergers and shareholdings in OECD countries, *Journal of Banking and Finance* 25(12), 2305-2337.
- Focarelli, D. and A.F. Pozzolo, 2005, Where do banks expand abroad? An empirical analysis, *Journal of Business* 78(6), 2435-2463.
- Focarelli D., A.F. Pozzolo and C. Salleo, 2008, Do M&As in the financial industry modify systematic risk?, mimeo.

- Garlappi, L., T. Shu and H. Yan, 2006, Default risk, shareholder advantage, and stock returns, *The Review of Financial Studies* 21(6), 2743-2778.
- Gulamhussen, M.A., C. Pinheiro and A.F. Pozzolo, 2010, Do multinational banks create or destroy economic value? MoFiR Working Paper no. 36.
- Hughes, J. P., W. Lang, L. J. Mester and C. Moon, 1996, Efficient banking under interstate branching, *Journal of Money, Credit and Banking* 28(4), 1045-1071.
- Jensen, M.C., 1986, Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review* 76(2) Papers and Proceedings, 323-329.
- Jensen M.C. and W.H. Meckling, 1976, Theory of the firm: Managerial behavior, agency costs, and ownership structure, *Journal of Financial Economics* 3(4), 305-360.
- John, K., L. Litov and B. Yeung, 2008, Corporate governance and managerial risk taking: Theory and evidence,” *Journal of Finance* 63(4), 1679-1728.
- Jorion, P. and G. Zhang, 2007, Good and bad credit contagion: Evidence from credit default swaps, *Journal of Banking and Finance* 84(3), 860-883.
- Karolyi, G.A. and R.M. Stulz. (2002), Are financial assets priced locally or globally? in G. Constantinides, M. Harris, and R. M. Stulz eds.: *Handbook of the Economics of Finance*, North-Holland.
- Kealhofer, S., 2003, Quantifying credit risk II: debt valuation, *Financial Analysts Journal* 59(3), 30-44.
- Laeven, L. and R. Levine, 2007, Is there a diversification discount in financial conglomerates? *Journal of Financial Economics* 85(2), 331-367.
- Laeven, L. and R. Levine, 2009, Bank governance, regulation and risk taking, *Journal of Financial Economics* 93(2), 259-275.
- Li, G., 1985, Robust regression, in Shapes, D., C. Hoaglin, F. Mosteller, and J.W. Tukey eds.: *Exploring Data Tables, Trends*, Wiley, New York.
- Mayhew, S., 1995. Implied volatility. *Financial Analysts Journal* 51(4), 8-20.
- Mercieca, S., K. Schaek and S. Wolfe, 2007, Small European banks: Benefits from diversification? *Journal of Banking and Finance* 31(7), 1975-1998.
- Merton, R.C., 1974, On the pricing of corporate debt: the risk structure of interest rates, *Journal of Finance* 29(2), 449-470.
- Myers, S.C. and R. Rajan, 1998, The paradox of liquidity, *Quarterly Journal of Economics* 113(3), 733-771.

- Pozzolo, A.F., 2009, Bank cross-border mergers and acquisitions (causes, consequences and recent trends) in Alessandrini, P., M. Fratianni, M., and A. Zazzaro eds.: *The Changing Geography of Banking and Finance*, Norwell, Springer.
- Stiroh, K.J., 2009, Diversification in banking, Berger, A.N., P. Molyneux, and J.O. Wilson eds.: *The Oxford Book of Banking*, Oxford University Press.
- Stiroh, K.J, and A. Rumble, 2006, The dark side of diversification: The case of U.S. financial holding companies, *Journal of Banking and Finance* 30(8), 2131-2161.
- Swidler, S., and J.A. Wilcox, 2002. Information about bank risk in options prices. *Journal of Banking and Finance* 26(5), 1033-1057.
- Vander Vennet, R., 2002, Cost and profit efficiency of financial conglomerates and universal banks in Europe, *Journal of Money, Credit and Banking* 34(1), 254-282.
- Vander Vennet, R., O. De Jonghe and L. Baele, 2004, Bank Risks and the Business Cycle, University of Ghent Working Paper no. 04/264.
- Williams, J., 2004, Determining management behaviour in European banking, *Journal of Banking and Finance* 28(10), 2427-2460.
- Zhang, H., 1995, Wealth effects of U.S. bank takeovers, *Applied Financial Economics* 5(5), 329-336.

Table 1. Summary statistics

Excess value is defined as the difference between the actual risk level of bank_{*j*} and its adjusted risk, as our proxy for risk. $Adjusted\ Risk = \alpha_j Risk_1 + (1 - \alpha_j) Risk_2$, where $Risk_1$ is the average *Risk* level of the banks with international diversification levels above the 70% threshold (i.e., highly diversified multinational commercial banks), and $Risk_2$ represents the average *Risk* level of the banks equal to or below the threshold. We computed the excess values of the following risk measures: (i) the 5-year expected default frequency (EDF), which proxies the likelihood to default; (ii) 5-year spreads of credit default swaps (CDS), which proxies the market's perception of a bank's default risk; (iii) the Sharpe ratio, which is the average of the weekly stock returns divided by the their annualized volatility; (iv) the implied volatility of option prices on bank stocks; (v) a transformed Z'-score, which is the symmetric value of $(CAR + EQT) / \sigma(ROA)$ that gauges the proximity to default, where CAR is the capital asset ratio, EQT is the equity-to-assets ratio, and $\sigma(ROA)$ is the volatility of assets; (vi) the earnings volatility, which is computed with a three-year rolling widow; and (vii) the earnings volatility, which is computed as the coefficient of variation (standard deviation / average return). For bank *j*, α_j is the index of geographical dispersion in foreign countries, where $\alpha_j = n_j / n_{max}$, n_j is the number of foreign countries in which bank *j* has a subsidiary, and n_{max} is the maximum number of foreign countries in which the most diversified bank has subsidiaries. Geographic diversity is the ratio of $n_{j,t}$ to $n_{max,t}$, where $n_{j,t}$ is the number of foreign countries in which bank *j* has a subsidiary in year *t*, and $n_{max,t}$ is the maximum number of foreign countries in which the most diversified bank has subsidiaries in year *t*. Two other measures of geographic diversification include the following: the geographic dispersion of subsidiaries (geographic share), which is estimated by $1 - [(total\ subsidiaries\ assets - foreign\ subsidiaries\ assets) / (total\ subsidiaries\ assets)]$; and the subsidiaries concentration, which is proxied by a transformed Hirsch-Herfindhal index (HHI) $(1 - \sum_j (subsidary_j\ assets / total\ subsidiaries\ assets)^2)$. The bank controls include the following: (i) the logarithm of total assets (log assets); (ii) the logarithm of total operating income (log income); (iii) ROA as a proxy for profitability; and (iv) access to funding, which is proxied by the ratio of deposits to liabilities. In the robustness tests, we used three alternative risk measures for which we computed excess values: (i); (ii); and (iii).

	2001	2002	2003	2004	2005	2006	2007	2001-2007		
Variable	Mean St. Dev.	Mean St. Dev.	Mean St. Dev.	Mean St. Dev.	Mean St. Dev.	Mean St. Dev.	Mean St. Dev.	Mean St. Dev.	Min.	Max.
<i>Baseline</i>										
excess EDF	0.73 2.37	0.62 1.85	0.50 1.32	0.31 1.01	0.06 0.79	-0.07 0.70	-0.03 0.76	0.29 1.38	-0.52	18.68
excess CDS	0.57 0.36	0.66 0.54	0.41 0.37	0.32 0.66	0.20 0.29	0.19 0.30	0.40 0.39	0.32 0.46	0.00	5.37
excess Sharpe ratio	-0.01 0.06	-0.01 0.05	0.02 0.04	0.01 0.06	0.01 0.03	0.00 0.03	-0.01 0.03	0.00 0.04	-0.51	0.50
excess implied volatility	0.93 8.17	-7.31 7.36	-8.31 4.78	-5.80 8.32	-0.05 10.82	2.50 12.89	-4.33 5.15	-2.89 9.51	-14.96	33.03
excess Z'-score	0.34 3.79	0.16 3.77	-0.24 3.52	-0.16 3.35	-0.29 3.24	-0.49 3.29	-0.36 3.32	-0.16 3.47	-13.67	6.15
excess earnings volatility (rolling window)	-0.59 0.54	-0.56 0.62	-0.53 0.66	-0.44 0.75	-0.58 0.53	-0.56 0.57	-0.53 0.59	-0.55 0.60	-0.97	2.66
excess earnings volatility (coeff. variation)	-0.53 0.15	-0.48 0.18	-0.54 0.13	-0.50 0.16	-0.52 0.13	-0.52 0.14	-0.50 0.16	0.05 0.49	-0.47	2.02
geographic reach (n/n _{max})	0.10 0.19	0.09 0.17	0.11 0.19	0.11 0.19	0.06 0.14	0.06 0.16	0.04 0.10	0.07 0.16	0.00	1.00
geographic share	0.17 0.32	0.18 0.31	0.17 0.30	0.17 0.32	0.18 0.32	0.16 0.30	0.18 0.32	0.17 0.31	0.00	1.00
geographic concentration (HHI)	0.16 0.25	0.16 0.23	0.17 0.25	0.16 0.24	0.18 0.26	0.17 0.26	0.17 0.24	0.17 0.25	0.00	0.88
log assets	6,73 0,89	6,77 0,88	6,84 0,88	6,9 0,87	6,94 0,85	7,03 0,83	7,13 0,82	6,91 0,87	3,89	9,45
log income	4,88 0,87	4,95 0,88	5,02 0,86	5,14 0,85	5,22 0,81	5,27 0,82	5,35 0,83	5,14 0,86	1,63	7,56
ROA	0,53 0,5	0,41 0,49	0,38 0,49	0,36 0,48	0,34 0,47	0,3 0,46	0,16 0,37	0,36 0,48	-1,34	1,5
deposits to liabilities	0,9 0,15	0,9 0,14	0,9 0,25	0,88 0,14	0,88 0,14	0,87 0,15	0,86 0,15	0,88 0,16	0	5,74

Table 2. Excess risk for diversified banks

Excess risk is defined as the difference between the actual risk level of bank and its adjusted risk level, as our proxy for risk. $Adjusted\ Risk = \alpha_j Risk_1 + (1 - \alpha_j) Risk_2$, where $Risk_1$ is the average *Risk* level of the banks with international diversification levels above the 70% threshold (i.e., highly diversified multinational commercial banks), and $Risk_2$ represents the average *Risk* level of the banks equal to or below the threshold. We computed the excess values of the following risk measures: (i) the 5-year expected default frequency (EDF), which proxies the likelihood to default; (ii) 5-year spreads of credit default swaps (CDS), which proxies the market's perception of a bank's default risk; (iii) the Sharpe ratio, which is the average of the weekly stock returns divided by their annualized volatility; (iv) the implied volatility of option prices on bank stocks; (v) a transformed Z'-score, which is equal to the symmetric value of $(CAR + EQT) / \sigma(ROA)$ that gauges the proximity to default, where CAR is the capital asset ratio, EQT is the equity-to-assets ratio, and $\sigma(ROA)$ is the volatility of assets; (vi) the earnings volatility, which is computed with a three-year rolling widow; and (vii) the earnings volatility, which is computed as the coefficient of variation (standard deviation / average return). We trimmed excess risk at the 5th and 95th percentiles. Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
dependent	excess EDF		excess CDS		excess Sharpe ratio		excess implied volatility		excess Z'-score		excess earnings volatility (rolling window)		excess earnings volatility (coeff. variation)	
	Estim.	Test for differences	Estim.	Test for differences	Estim.	Test for differences	Estim.	Test for differences	Estim.	Test for differences	Estim.	Test for differences	Estim.	Test for differences
Mean excess value (<i>t</i> -statistic for mean differences)														
Diversified Banks	0.561	0.433 ***	0.233	-0.103	0.006	-0.005	** -1.056	-4.340 *	-0.226	-0.118	0.309	-0.444 *	-0.537	0.054 ***
Non-diversified banks	0.127	(5.584)	0.335	(-1.645)	0.001	(2.259)	3.328	(-1.304)	-0.108	(-0.686)	-0.135	(1.855)	-0.483	(-3.373)
Median excess value (<i>p</i> -value for median differences)														
Diversified banks	-0.102	0.018	0.170	0.081	0.003	6.143	** -3.692	1.499	0.446	0.600	-0.851	17.447 ***	-0.628	30.815 ***
Non-diversified banks	-0.108	(0.893)	0.186	(0.776)	-0.001	(0.013)	-4.915	(0.221)	0.630	(0.438)	-0.780	(0.000)	-0.594	(0.000)

Table 3. Impact of geographic reach on bank risk: a baseline specification

The results are from robust regressions. Excess risk, our dependent variable, is defined as the difference between the actual risk level of bank j and its adjusted risk level. Adjusted Risk = α_j Risk + $(1 - \alpha_j)$ Risk2, where Risk1 is the average Risk level of the banks with international diversification levels above the 70% threshold (i.e., highly diversified multinational commercial banks), and Risk2 represents the average Risk level of the banks equal to or below the threshold. We computed the excess values of the following risk measures: (i) the 5-year expected default frequency (EDF), which proxies the likelihood to default; (ii) 5-year spreads of credit default swaps (CDS), which proxies the market's perception of a bank's default risk; (iii) the Sharpe ratio, which is the average of the weekly stock returns divided by the their annualized volatility; (iv) the implied volatility of option prices on bank stocks; (v) a transformed Z'-score, which is the symmetric value of $(CAR + EQT)/\sigma(ROA)$ that gauges the proximity to default, where CAR is the capital asset ratio, EQT is the equity-to-assets ratio, and $\sigma(ROA)$ is the volatility of assets; (vi) the earnings volatility, which is computed with a three-year rolling widow; and (vii) the earnings volatility, which is computed as the coefficient of variation (standard deviation / average return). For bank j , α_j is the index of geographical dispersion in foreign countries, where $\alpha_j = n_j / n_{max}$, n_j is the number of foreign countries in which bank j has a subsidiary, and n_{max} is the maximum number of foreign countries in which the most diversified bank has subsidiaries. Geographic reach is the ratio of $n_{j,t}$ to $n_{max,t}$, where n is the number of foreign countries in which bank j has a subsidiary in year t , and $n_{max,t}$ is the maximum number of foreign countries in which the most diversified bank has subsidiaries in year t . The bank controls consist of the following: (i) the logarithm of total assets (log assets); (ii) the logarithm of total operating income (log income); (iii) ROA as a proxy for profitability; and (iv) access to funding, which is proxied by the ratio of deposits to liabilities. We included but do not report the country and year fixed effects. We trimmed excess risk at the 5th and 95th percentiles. The p-values are in parentheses. Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
dependent	excess EDF		excess CDS		excess Sharpe ratio		excess implied volatility		excess Z'-score		excess earnings volatility (rolling window)		excess earnings volatility (coeff. variation)	
geographic reach	0.282	***	0.094	***	0.007		10.606	***	1.413	***	0.449	***	0.626	***
	(0.000)		(0.005)		(0.178)		(0.000)		(0.009)		(0.000)		(0.000)	
log of assets	-0.042		-0.039	**	-0.000		2.684		-0.449	**	0.019		0.029	*
	(0.175)		(0.021)		(0.918)		(0.158)		(0.033)		(0.261)		(0.071)	
log of income	-0.054	**	-0.008		0.001		-0.665		0.112		-0.019		-0.027	**
	(0.032)		(0.555)		(0.548)		(0.668)		(0.511)		(0.140)		(0.039)	
ROA	-0.052	***	-0.030	***	0.001	*	-1.808	*	-1.327	***	-0.010		-0.002	
	(0.000)		(0.001)		(0.284)		(0.092)		(0.000)		(0.194)		(0.735)	
deposits to liabilities	-0.050		-0.154	***	-0.005		-0.969		-0.522		0.065		-0.070	**
	(0.529)		(0.000)		(0.371)		(0.727)		(0.298)		(0.222)		(0.102)	
constant	0.337		0.643	***	0.002		-16.89	*	8.034	***	-0.925	***	-0.519	***
	(0.258)		(0.000)		(0.929)		(0.060)		(0.000)		(0.000)		(0.000)	
Country effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Year effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Number of observations	718		231		829		196		842		447		414	

Table 4. Robustness test of the impact of geographic reach on bank risk: median regressions

The results are from quantile regressions with bootstrapping using the median algorithm, which predicts the median of the dependent. Excess risk, our dependent variable, is defined as the difference between the actual risk level of bank j and its adjusted risk level. Adjusted Risk = α_j Risk + $(1 - \alpha_j)$ Risk2, where Risk1 is the average Risk level of the banks with international diversification levels above the 70% threshold (i.e., highly diversified multinational commercial banks), and Risk2 represents the average Risk level of banks equal to or below the threshold. We computed the excess values of the following risk measures: (i) the 5-year expected default frequency (EDF), which proxies the likelihood to default; (ii) 5-year spreads of credit default swaps (CDS), which proxies the market's perception of a bank's default risk; (iii) the Sharpe ratio, which is the average of the weekly stock returns divided by the their annualized volatility; (iv) the implied volatility of option prices on bank stocks; (v) a transformed Z' -score, which is the symmetric value of $(CAR + EQT)/\sigma(ROA)$ that gauges the proximity to default, where CAR is the capital asset ratio, EQT is the equity-to-assets ratio, and $\sigma(ROA)$ is the volatility of assets; (vi) the earnings volatility, which is computed with a three-year rolling widow; and (vii) the earnings volatility, which is computed as the coefficient of variation (standard deviation / average return). For bank j , α is the index of geographical dispersion in foreign countries, where $\alpha_j = n_j / n_{max}$, n_j is the number of foreign countries in which bank j has a subsidiary, and n_{max} is the maximum number of foreign countries in which the most diversified bank has subsidiaries. Geographic reach is the ratio of $n_{j,t}$ to $n_{max,t}$, where n is the number of foreign countries in which bank j has a subsidiary in year t , and $n_{max,t}$ is the maximum number of foreign countries in which the most diversified bank has subsidiaries in year t . The bank controls consist of the following: (i) the logarithm of total assets (log assets); (ii) the logarithm of total operating income (log income); (iii) ROA as a proxy for profitability; and (iv) access to funding, which is proxied by the ratio of deposits to liabilities. We include but do not report the country and year fixed effects. We trimmed excess risk at the 5th and 95th percentiles. The p-values are in parentheses. Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
dependent	excess EDF		excess CDS		excess Sharpe ratio		excess implied volatility		excess Z' -score		excess earnings volatility (rolling window)		excess earnings volatility (coeff. variation)	
geographic reach	0.296	***	0.097	*	0.011		11.367	**	1.016		0.500	***	0.602	***
	(0.000)		(0.091)		(0.146)		(0.015)		(0.137)		(0.000)		(0.000)	
log of assets	-0.050		-0.057	*	0.000		2.868		-0.602	**	0.058		0.024	
	(0.226)		(0.083)		(0.854)		(0.305)		(0.042)		(0.245)		(0.354)	
log of income	-0.048		0.007	***	0.000		-0.995		0.109		-0.056		-0.022	
	(0.155)		(0.754)		(0.876)		(0.665)		(0.513)		(0.271)		(0.272)	
ROA	-0.075	**	-0.056		0.001		-1.456		-1.104	***	-0.014		-0.002	
	(0.013)		(0.105)		(0.211)		(0.300)		(0.000)		(0.325)		(0.818)	
deposits to liabilities	0.031		-0.217		-0.006		-3.627		-0.776		0.110		-0.080	
	(0.760)		(0.004)		(0.494)		(0.427)		(0.218)		(0.266)		(0.357)	
Constant	1.130	***	0.876	***	-0.009		-6.196		6.504	***	2.395		0.497	***
	(0.005)		(0.000)		(0.562)		(0.698)		(0.001)		(0.136)		(0.002)	
Country effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Year effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Number of observations	718		231		829		196		842		567		414	

Table 5. Robustness test of the impact of geographic reach on bank risk:OLS regressions

The results are from OLS linear regressions. Excess risk, our dependent variable, is defined as the difference between the actual risk level of bank j and its adjusted risk level. Adjusted Risk = α_j Risk + (1 - α_j) Risk2, where Risk1 is the average Risk level of the banks with international diversification levels above the 70% threshold (i.e., highly diversified multinational commercial banks), and Risk2 represents the average Risk level of the banks equal to or below the threshold. We computed the excess values of the following risk measures: (i) the 5-year expected default frequency (EDF), which proxies the likelihood to default; (ii) 5-year spreads of credit default swaps (CDS), which proxies the market's perception of a bank's default risk; (iii) the Sharpe ratio, which is the average of the weekly stock returns divided by the their annualized volatility; (iv) the implied volatility of option prices on bank stocks; (v) a transformed Z'-score, which is the symmetric value of $(CAR + EQT)/\sigma(ROA)$ that gauges the proximity to default, where CAR is the capital asset ratio, EQT is the equity-to-assets ratio, and $\sigma(ROA)$ is the volatility of assets; (vi) the earnings volatility, which is computed with a three-year rolling widow; and (vii) the earnings volatility, which is computed as the coefficient of variation (standard deviation / average return). For bank j , α_j is the index of geographical dispersion in foreign countries, where $\alpha_j = n_j / n_{max}$, n_j is the number of foreign countries in which bank j has a subsidiary, and n_{max} is the maximum number of foreign countries in which the most diversified bank has subsidiaries. Geographic reach is the ratio of $n_{j,t}$ to $n_{max,t}$, where n is the number of foreign countries in which bank j has a subsidiary in year t , and $n_{max,t}$ is the maximum number of foreign countries in which the most diversified bank has subsidiaries in year t . The bank controls consist of the following: (i) the logarithm of total assets (log assets); (ii) the logarithm of total operating income (log income); (iii) ROA as a proxy for profitability; and (iv) access to funding, which is proxied by the ratio of deposits to liabilities. We included but do not report the country and year fixed effects. We trimmed excess risk at the 5th and 95th percentiles. The p-values are in parentheses. Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
dependent	excess EDF		excess CDS		excess Sharpe ratio		excess implied volatility		excess Z'-score		excess earnings volatility (rolling window)		excess earnings volatility (coeff. variation)	
geographic reach	0.377	***	0.116	**	0.007	*	18.856		1.771	***	0.155		0.488	***
	(0.004)		(0.037)		(0.098)		(0.000)		(0.001)		(0.317)		(0.000)	
log of assets	-0.068		-0.105	***	0.000		-1.350		-0.952	***	0.204	**	0.029	
	(0.245)		(0.003)		(0.857)		(0.653)		(0.000)		(0.022)		(0.339)	
log of income	-0.043		0.053		0.001		1.171		0.033		-0.172	***	-0.040	
	(0.343)		(0.107)		(0.637)		(0.610)		(0.844)		(0.008)		(0.113)	
ROA	-0.071	***	-0.086	***	0.001		-0.563		-0.522	***	-0.014		-0.009	
	(0.001)		(0.001)		(0.273)		(0.718)		(0.001)		(0.673)		(0.258)	
deposits to liabilities	-0.154		-0.211	**	-0.005		2.910		-0.957	*	0.059		-0.138	**
	(0.375)		(0.012)		(0.310)		(0.439)		(0.062)		(0.705)		(0.023)	
constant	0.624	*	0.968	***	-0.000		-6.204		10.500	***	-1.308	***	-0.353	***
	(0.085)		(0.000)		(0.996)		(0.685)		(0.000)		(0.000)		(0.002)	
Country effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Year effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Number of observations	718		231		829		196		842		567		414	

Table 6. Robustness test of the impact of geographic share on bank risk: geographic share

The results are from robust regressions. Excess risk, our dependent variable, is defined as the difference between the actual risk level of bank j and its adjusted risk level. Adjusted Risk = α_j Risk + $(1 - \alpha_j)$ Risk2, where Risk1 is the average Risk level of the banks with international diversification levels above the 70% threshold (i.e., highly diversified multinational commercial banks), and Risk2 represents the average Risk level of the banks equal to or below the threshold. We computed the excess values of the following risk measures: (i) the 5-year expected default frequency (EDF), which proxies the likelihood to default; (ii) 5-year spreads of credit default swaps (CDS), which proxies the market's perception of a bank's default risk; (iii) the Sharpe ratio, which is the average of the weekly stock returns divided by the their annualized volatility; (iv) the implied volatility of option prices on bank stocks; (v) a transformed Z'-score, which is the symmetric value of $(CAR + EQT) / \sigma(ROA)$ that gauges the proximity to default, where CAR is the capital asset ratio, EQT is the equity-to-assets ratio, and $\sigma(ROA)$ is the volatility of assets; (vi) the earnings volatility, which is computed with a three-year rolling widow; and (vii) the earnings volatility, which is computed as the coefficient of variation (standard deviation / average return). Geographic share is $1 - [(total\ subsidiaries\ assets - foreign\ subsidiaries\ assets) / (total\ subsidiaries\ assets)]$. The bank controls include the following: (i) the logarithm of total assets (log assets); (ii) the logarithm of total operating income (log income); (iii) ROA as a proxy for profitability; (iv) access to funding, which is proxied by the ratio of deposits to liabilities. We included but do not report the country and year fixed effects. We trimmed excess risk at the 5th and 95th percentiles. The p-values are in parentheses. Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
dependent	excess EDF	excess CDS	excess Sharpe ratio	excess implied volatility	excess Z'-score	excess earnings volatility (rolling window)	excess earnings volatility (coeff. variation)
geographic share	-0.034 (0.485)	0.050 *** (0.004)	0.001 (0.591)	10.606 *** (0.000)	0.193 (0.572)	0.449 *** (0.000)	0.626 *** (0.000)
log of assets	0.022 (0.518)	-0.040 * (0.069)	-0.003 * (0.083)	2.684 (0.158)	0.339 (0.175)	0.019 (0.261)	0.029 * (0.071)
log of income	-0.065 ** (0.019)	0.015 (0.463)	0.004 ** (0.034)	-0.665 (0.668)	-0.064 (0.739)	-0.019 (0.140)	-0.027 ** (0.039)
ROA	-0.146 *** (0.000)	-0.014 (0.214)	0.001 (0.336)	-1.808 * (0.092)	-1.775 *** (0.000)	-0.010 (0.194)	-0.002 (0.735)
deposits to liabilities	0.046 (0.627)	-0.198 *** (0.000)	-0.002 (0.410)	-969 (0.727)	-0.220 (0.741)	0.065 (0.222)	-0.070 (0.102)
constant	1.926 *** (0.000)	0.596 *** (0.000)	0.005 (0.799)	-16.893 * (0.060)	1.524 (0.465)	-0.925 *** (0.000)	-0.519 *** (0.000)
Country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	586	161	637	196	539	565	414

Table 7. Robustness test of the impact of geographic concentration on bank risk: geographic concentration (HHI)

The results are from robust regressions. Excess risk, our dependent variable, is defined as the difference between the actual risk level of bank *j* and its adjusted risk level. Adjusted Risk = α_j Risk + (1 - α_j) Risk2, where Risk1 is the average Risk level of the banks with international diversification levels above the 70% threshold (i.e., highly diversified multinational commercial banks), and Risk2 represents the average Risk level of the banks equal to or below the threshold. We computed the excess values of the following risk measures: (i) the 5-year expected default frequency (EDF), which proxies the likelihood to default; (ii) 5-year spreads of credit default swaps (CDS), which proxies the market's perception of a bank's default risk; (iii) the Sharpe ratio, which is the average of the weekly stock returns divided by the their annualized volatility; (iv) the implied volatility of option prices on bank stocks; (v) a transformed Z'-score, which is the symmetric value of $(CAR + EQT)/\sigma(ROA)$ that gauges the proximity to default, where CAR is the capital asset ratio, EQT the equity-to-assets ratio, and $\sigma(ROA)$ the volatility of assets; (vi) the earnings volatility, which is computed with a three-year rolling widow; and (vii) the earnings volatility, which is computed as the coefficient of variation (standard deviation / average return). Geographic concentration (HHI) is a transformed Hirsch-Herfindhal Index (HHI) that is computed in terms of the subsidiaries' assets. The bank controls consist of the following: (i) the logarithm of total assets (log assets); (ii) the logarithm of total operating income (log income); (iii) ROA as a proxy for profitability; (iv) access to funding, which is proxied by the ratio of deposits to liabilities. We included but do not report the country and year fixed effects. We trimmed excess risk at the 5th and 95th percentiles. The p-values are in parentheses. Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
dependent	excess EDF	excess CDS	excess Sharpe ratio	excess implied volatility	excess Z'-score	excess earnings volatility (rolling window)	excess earnings volatility (coeff.variation)
geographic concentration (HHI)	0.107 (0.107)	0.083 (0.001)	*** (0.854)	0.001 (0.680)	-1.103 (0.019)	0.893 (0.100)	** (0.198)
log of assets	-0.005 (0.889)	-0.029 (0.125)	-0.003 (0.1209)	2.528 (0.223)	-0.014 (0.953)	-0.005 (0.799)	0.021 (0.235)
log of income	-0.056 (0.043)	** (0.743)	-0.005 (0.097)	0.003 (0.699)	-0.658 (0.595)	0.099 (0.172)	-0.019 (0.200)
ROA	-0.134 (0.000)	*** (0.001)	-0.033 (0.515)	0.001 (0.022)	-3.208 (0.000)	*** (0.007)	-0.018 (0.016)
deposits to liabilities	-0.055 (0.546)	-0.181 (0.000)	*** (0.413)	-0.002 (0.035)	-7.674 (0.391)	** (0.001)	-0.025 (0.655)
constant	0.416 (0.192)	0.600 (0.000)	*** (0.683)	0.008 (0.171)	17.834 (0.158)	2.541 (0.026)	-3.354 (0.000)
Country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	515	166	558	128	561	351	234

Table 8. Robustness test of the impact of geographic reach on bank risk: non-linearity

We split geographic reach to generate 6 dummies: one for the values that are equal to zero and the other 5 for the quintiles of the distribution of the positive support of its distribution. Excess risk, our dependent variable, is defined as the difference between the actual risk level of bank j and its adjusted risk level. Adjusted Risk = α_j Risk + (1 - α_j) Risk2, where Risk1 is the average Risk level of the banks with international diversification levels above the 70% threshold (i.e., highly diversified multinational commercial banks), and Risk2 represents the average Risk level of the banks equal to or below the threshold. We computed the excess values of the following risk measures: (i) the 5-year expected default frequency (EDF), which proxies the likelihood to default; (ii) 5-year spreads of credit default swaps (CDS), which proxies the market's perception of a bank's default risk; (iii) the Sharpe ratio, which is the average of the weekly stock returns divided by their annualized volatility; (iv) the implied volatility of option prices on bank stocks; (v) a transformed Z'-score, which is the symmetric value of $(CAR + EQT)/\sigma(ROA)$ that gauges the proximity to default, where CAR is the capital asset ratio, EQT is the equity-to-assets ratio, and $\sigma(ROA)$ is the volatility of assets; (vi) the earnings volatility, which is computed with a three-year rolling widow; and (vii) the earnings volatility, which is computed as the coefficient of variation (standard deviation / average return). Geographic concentration (HHI) is a transformed Hirsch-Herfindhal Index (HHI), which is computed in terms of the subsidiaries' assets. For bank j , α_j is the index of geographical dispersion in foreign countries, where $\alpha_j = n_j / n_{max}$, n_j is the number of foreign countries in which bank j has a subsidiary, and n_{max} is the maximum number of foreign countries in which the most diversified bank has subsidiaries. Geographic reach is the ratio of $n_{j,t}$ to $n_{max,t}$, where n is the number of foreign countries in which bank j has a subsidiary in year t , and $n_{max,t}$ is the maximum number of foreign countries in which the most diversified bank has subsidiaries in year t . The bank controls consist of the following: (i) the logarithm of total assets (log assets); (ii) the logarithm of total operating income (log income); (iii) ROA as a proxy for profitability; (iv) access to funding, which is proxied by the ratio of deposits to liabilities. We included but do not report the country and year fixed effects. We trimmed excess risk at the 5th and 95th percentiles. The p-values are in parentheses. Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)
dependent	excess EDF		excess CDS		excess Sharpe ratio		excess implied volatility		excess Z'-score		excess earnings volatility (rolling window)		excess earnings volatility (coeff. variation)
geographic reach – Geon1	-0.014 (0.705)		0.033 (0.090)	*	0.003 (0.306)		-1.216 (0.690)		0.867 (0.002)	***	-0.042 (0.184)		-0.050 (0.136)
geographic reach – Geon2	-0.011 (0.801)		0.013 (0.576)		0.003 (0.415)		-1.894 (0.445)		0.608 (0.059)	*	-0.025 (0.500)		0.030 (0.497)
geographic reach – Geon3	-0.054 (0.243)		0.035 (0.085)	*	0.002 (0.592)		-4.315 (0.153)		0.637 (0.053)	*	0.020 (0.600)		0.015 (0.683)
geographic reach – Geon4	0.041 (0.433)		0.063 (0.007)	***	0.001 (0.705)		-1.427 (0.644)		0.998 (0.007)	***	0.035 (0.384)		0.079 (0.043)
geographic reach – Geon5	0.163 (0.007)	***	0.133 (0.000)	***	0.005 (0.255)		4.683 (0.146)		1.030 (0.017)	**	0.229 (0.000)	***	0.390 (0.000)
log of assets	-0.003 (0.929)		-0.060 (0.013)	**	-0.001 (0.733)		10.717 (0.004)	***	-0.253 (0.350)		0.006 (0.826)		-0.060 (0.094)
log of income	-0.066 (0.013)	**	-0.021 (0.283)		0.001 (0.507)		-5.771 (0.037)	**	0.023 (0.905)		-0.007 (0.712)		0.016 (0.507)
ROA	-0.106 (0.000)	***	-0.023 (0.061)	*	0.003 (0.090)	*	1.288 (0.456)		-1.486 (0.000)	***	-0.005 (0.725)		-0.018 (0.226)

Table 8. Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	excess EDF	excess CDS	excess Sharpe ratio	excess implied volatility	excess Z'-score	excess earnings volatility (rolling window)	excess earnings volatility (coeff. variation)
deposits to liabilities	0.037 (0.665)	-0.118 *** (0.004)	-0.013 * (0.090)	-5.559 (0.204)	-0.732 (0.220)	0.057 (0.509)	-0.122 (0.143)
constant	0.226 (0.467)	0.836 *** (0.000)	0.009 (0.668)	-58.502 *** (0.000)	5.719 ** (0.010)	-0.146 (0.516)	-0.104 (0.626)
Country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	663	162	570	126	607	371	256

Table 9. Robustness tests of the impact of geographic reach on bank risk: the exclusion of the influential country the U.S.

The results are from robust regressions. Excess risk, our dependent variable, is defined as the difference between the actual risk level of bank j and its adjusted risk level. Adjusted Risk = α_j Risk₁ + (1 - α_j) Risk₂, where Risk₁ is the average Risk level of the banks with international diversification levels above the 70% threshold (i.e., highly diversified multinational commercial banks), and Risk₂ represents the average Risk level of the banks equal to or below the threshold. We computed the excess values of the following risk measures: (i) the 5-year expected default frequency (EDF), which proxies the likelihood to default; (ii) 5-year spreads of credit default swaps (CDS), which proxies the market's perception of a bank's default risk; (iii) the Sharpe ratio, which is the average of the weekly stock returns divided by the their annualized volatility; (iv) the implied volatility of option prices on bank stocks; (v) a transformed Z'-score, which is the symmetric value of $(CAR + EQT)/\sigma(ROA)$ that gauges the proximity to default, where CAR is the capital asset ratio, EQT is the equity-to-assets ratio, and $\sigma(ROA)$ is the volatility of assets; (vi) the earnings volatility, which is computed with a three-year rolling widow; and (vii) the earnings volatility, which is computed as the coefficient of variation (standard deviation / average return). For bank j , α_j is the index of geographical dispersion in foreign countries, where $\alpha_j = n_j / n_{max}$, n_j is the number of foreign countries in which bank j has a subsidiary, and n_{max} is the maximum number of foreign countries in which the most diversified bank has subsidiaries. Geographic reach is the ratio of $n_{j,t}$ to $n_{max,t}$, where n is the number of foreign countries in which bank j has a subsidiary in year t , and $n_{max,t}$ is the maximum number of foreign countries in which the most diversified bank has subsidiaries in year t . The bank controls consist of the following: (i) the logarithm of total assets (log assets); (ii) the logarithm of total operating income (log income); (iii) ROA as a proxy for profitability; and (iv) access to funding, which is proxied by the ratio of deposits to liabilities. We included but do not report the country and year fixed effects. We trimmed excess risk at the 5th and 95th percentiles. The p-values are in parentheses. Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

without the U.S.														
	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
dependent	excess EDF		excess CDS		excess Sharpe ratio		excess implied volatility		excess Z'-score		excess earnings volatility (rolling window)		excess earnings volatility (coeff.variation)	
geographic reach	0.240	**	0.091	**	0.008	10.984	**	1.611	0.505	***	0.129	*		
	(0.024)		(0.020)		(0.205)	(0.014)		(0.187)	(0.000)		(0.058)			
log of assets	-0.030		-0.030	*	0.000	1.644		0.459	-0.006		0.048	**		
	(0.397)		(0.083)		(0.966)	(0.545)		(0.427)	(0.789)		(0.036)			
log of income	-0.047		-0.011		0.001	1.054		-0.137	-0.013		-0.031	*		
	(0.104)		(0.383)		(0.635)	(0.623)		(0.741)	(0.441)		(0.088)			
ROA	-0.050	***	-0.024	***	0.001	-0.762		-1.290	***	-0.008	-0.002			
	(0.000)		(0.006)		(0.372)	(0.688)		(0.000)	(0.397)		(0.821)			
deposits to liabilities	-0.007		-0.170	***	-0.006	-9.124	**	-3.158	**	-0.015	0.235	**		
	(0.945)		(0.000)		(0.297)	(0.028)		(0.010)	(0.870)		(0.014)			
constant	0.158		0.598	***	-0.008	-15.752		2.020	2.716	***	-0.926	***		
	(0.631)		(0.000)		(0.673)	(0.281)		(0.502)	(0.000)		(0.000)			
Country effects	Yes		Yes		Yes	Yes		Yes	Yes		Yes			
Year effects	Yes		Yes		Yes	Yes		Yes	Yes		Yes			
Number of observations	631		206		704	120		171	429		291			

Table 10. Robustness tests of the impact of geographic reach on bank risk: the exclusion of the influential country Japan

The results are from robust regressions. Excess risk, our dependent variable, is defined as the difference between the actual risk level of bank j and its adjusted risk level. Adjusted Risk = α_j Risk₁ + (1 - α_j) Risk₂, where Risk₁ is the average Risk level of the banks with international diversification levels above the 70% threshold (i.e., highly diversified multinational commercial banks), and Risk₂ represents the average Risk level of the banks equal to or below the threshold. We computed the excess values of the following risk measures: (i) the 5-year expected default frequency (EDF), which proxies the likelihood to default; (ii) 5-year spreads of credit default swaps (CDS), which proxies the market's perception of a bank's default risk; (iii) the Sharpe ratio, which is the average of the weekly stock returns divided by their annualized volatility; (iv) the implied volatility of option prices on bank stocks; (v) a transformed Z'-score, which is the symmetric value of $(CAR + EQT)/\sigma(ROA)$ that gauges the proximity to default, where CAR is the capital asset ratio, EQT is the equity-to-assets ratio, and $\sigma(ROA)$ is the volatility of assets; (vi) the earnings volatility, which is computed with a three-year rolling widow; and (vii) the earnings volatility, which is computed as the coefficient of variation (standard deviation / average return). For bank j , α_j is the index of geographical dispersion in foreign countries, where $\alpha_j = n_j / n_{max}$, n_j is the number of foreign countries in which bank j has a subsidiary, and n_{max} is the maximum number of foreign countries in which the most diversified bank has subsidiaries. Geographic reach is the ratio of $n_{j,t}$ to $n_{max,t}$, where n is the number of foreign countries in which bank j has a subsidiary in year t , and $n_{max,t}$ is the maximum number of foreign countries in which the most diversified bank has subsidiaries in a year t . The bank controls consist of the following: (i) the logarithm of total assets (log assets); (ii) the logarithm of total operating income (log income); (iii) ROA as a proxy for profitability; (iv) access to funding, which is proxied by the ratio of deposits to liabilities. We included but do not report the country and year fixed effects. We trimmed excess risk at the 5th and 95th percentiles. The p-values are in parentheses. Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

Without Japan														
	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
dependent	excess EDF		excess CDS		excess Sharpe ratio		excess implied volatility		excess Z'-score		excess earnings volatility (rolling window)		excess earnings volatility (coeff.variation)	
geographic concentration (HHI)	0.325	***	0.106	***	0.011	**	11.640	***	1.738	***	0.454	***	0.642	***
	(0.000)		(0.002)		(0.040)		(0.000)		(0.002)		(0.000)		(0.000)	
log of assets	-0.026		-0.037	*	-0.003		2.040		-0.054		0.117	***	0.037	***
	(0.480)		(0.065)		(0.153)		(0.316)		(0.835)		(0.000)		(0.009)	
log of income	-0.079	**	-0.021		0.002		-0.506		-0.353		-0.099	***	-0.024	**
	(0.020)		(0.169)		(0.285)		(0.771)		(0.140)		(0.000)		(0.047)	
ROA	-0.042	***	-0.025	***	-0.000		-1.682		-1.379	***	-0.004		0.000	
	(0.002)		(0.005)		(0.802)		(0.131)		(0.000)		(0.575)		(0.927)	
deposits to liabilities	-0.006		-0.150	***	-0.003		-0.225		-0.579		0.021		-0.924	***
	(0.928)		(0.000)		(0.631)		(0.938)		(0.244)		(0.691)		(0.003)	
constant	1.109		0.680	***	0.019		0.927		4.996	**	2.159	***	-0.678	***
	(0.000)		(0.000)		(0.307)		(0.924)		(0.011)		(0.000)		(0.000)	
Country effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Year effects	Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Number of observations	511		198		640		186		641		396		312	

Does Distance Still Matter? The Information Revolution in Small Business Lending

MITCHELL A. PETERSEN and RAGHURAM G. RAJAN*

ABSTRACT

The distance between small firms and their lenders is increasing, and they are communicating in more impersonal ways. After documenting these systematic changes, we demonstrate they do not arise from small firms locating differently, consolidation in the banking industry, or biases in the sample. Instead, improvements in lender productivity appear to explain our findings. We also find distant firms no longer have to be the highest quality credits, indicating they have greater access to credit. The evidence indicates there has been substantial development of the financial sector, even in areas such as small business lending.

SMALL BUSINESS LENDING HAS HISTORICALLY been very costly, because of the paucity of information about small firms and the high costs of the personnel required to obtain even that information. Information about small businesses is thought to be “soft,” and has to be collected by lenders over time through relationships with firms (see Berger and Udell (1995), Petersen and Rajan (1994)).¹ If these descriptions of small businesses are accurate, they have a number of implications.

First, if a lender has to have direct contact with the small business to collect information about it, it has to have a local presence. If, in addition,

* Petersen is from the Kellogg Graduate School of Management at Northwestern University; Rajan is from the University of Chicago's Graduate School of Business. Petersen thanks the Banking Research Center at Northwestern University's Kellogg School of Management; Rajan was visiting M.I.T.'s Sloan School as the Fischer Black Visiting Chair during part of this research. Rajan also thanks the Center for Research in Security Prices and the Center for the Study of the Economy and the State at The University of Chicago, as well as the National Science Foundation, for additional support. The research assistance of Spencer Chen, Iris Geisler, Helene Liss, and Jan Zasowski is greatly appreciated. We also thank the contributions of seminar participants at the American Finance Association; Carnegie Mellon University; Journal of Financial Intermediation Symposium; National Bureau of Economic Research; New York University; Northwestern University; the Norwegian School of Management; the Utah Winter Finance Conference; and the Universities of Arizona, Chicago, Georgetown, Kentucky, Maryland, Missouri, North Carolina, and Oklahoma.

¹ By soft information, we mean something similar to what is termed “tacit” information (see Polanyi (1958))—information that is hard to communicate to others, let alone capture in written documents. For example, the lending officer, through prior dealings with the firm manager, may learn to tell from the latter's behavior when a loan request is justified and when it is not (Uzzi (1999)).

much of this information is soft and difficult to communicate, the decision to offer credit has to be made very close to where the information is gathered. Typically, this would increase the cost of having large scale, geographically spread-out lending operations, implying strong diseconomies of scale in lending to small businesses. Concerns may then be raised when banks merge and centralize operations, for that would imply a fall-off of credit to small businesses (see Berger et al. (1998), Strahan and Weston (1998), and Berger and DeYoung (2000)). Moreover, if lenders have to be local, then the concentration of lenders in the local geographic area is the measure antitrust authorities should be concerned about in making decisions about which mergers to allow. Finally, if lending markets are local, small firms are much more likely to be affected by changes in the financial health of their local lenders. Local economic shocks could persist for a long time because they will be amplified by the demise of local financial institutions, and outside institutions cannot step in to take their place. This implies a greater need for regulators to be vigilant and responsive to local shocks, and not to just focus on aggregate economy-wide ones.

In this paper, we document two facts: First, the physical distance between small firms and their lenders has grown steadily in the United States over the period 1973 to 1993. Second, not only are borrowers growing physically more distant from lenders with whom they start a relationship, they are also communicating less and less in person. This effect is not just concentrated in recent years, a period of significant structural and technological change; it shows up as a steady trend throughout our sample. Conversations with industry experts and evidence in recent studies suggest that, if anything, the trend has accelerated since 1993.

The finding that the physical distance between small firms and their lenders has increased and that their interaction has become more impersonal is, to the best of our knowledge, new. What explains it? Perhaps all that is going on is that lenders have merged and closed branches. With fewer lending offices around, it is obvious that borrowers will have to go further to get to a lender. This explanation is easily ruled out. Much of the consolidation among lenders began in the mid-1980s, but our trend exists even earlier. Moreover, the number of branches for the most important type of lender to small firms, banks, actually grew over the period of our analysis. Another possibility is that credit standards have become more lax, so that lenders are willing to provide credit to more distant borrowers without conducting the appropriate due diligence or monitoring. If this were the case, we should see a corresponding increase in lender loan losses over time. We do not see such a trend in the data. Finally, we explore whether the nature of firms had changed over time. Perhaps firms had increasingly located in rural areas far from any lenders. We show changes in firm characteristics do not explain our findings of increasing distance and less personal interaction.

We suggest a different explanation. Increases in labor productivity, as measured by the increase in loans per bank employee or total regional output per bank employee, empirically account for the trend in distance. This ex-

planation suggests that increasing capital intensity of lending due to the greater usage of tools such as computers and communication equipment has altered the way loans are made, which, in turn, could account for the growing distance.

The channel through which these changes in technology affect small business lending is, however, not obvious. These tools do not make soft information about the borrower easier to collect at a distance. Soft information is, by definition, hard to put down on paper or store electronically (see, e.g., Stein (2002), Uzzi (2000)). Instead, we believe more hard information about the borrower, such as whether he is current on his trade credit payments and to whom he has applied for credit, is now available even to lenders at a distance. As a result, even if lenders do not have the rich soft information they obtained from infrequent, but close, contact with the borrower, they now have far more timely hard information about their creditworthiness. This enables them to lend at a distance knowing they can intervene quickly and foreclose or refuse loan renewal if conditions deteriorate. Thus, new technology permits more, and different, information to be gathered, stored, and distributed. It changes the nature of lending from an emphasis on strict ex ante screening and costly ex post monitoring, to frequent ex post monitoring and quick intervention.

If our conjecture is true, it suggests a final test. The kind of firms that could borrow at a distance in the past must have been of unimpeachable quality since the technology enabling early intervention simply did not exist, and the costs of physical monitoring were prohibitive. However, firms that borrow at the same distance in more recent years can be of lower credit quality because early intervention technology allows lenders to make loans to them with less fear of great loss. We therefore examine whether the distance firms are from their lender is a good predictor of credit quality, and whether distance has become a less useful predictor of credit quality over time. The evidence is consistent with both predictions.

We surmise therefore that technology is slowly breaking the tyranny of distance, at least in small business lending. The implications are then far reaching. Our findings suggest an explanation for why banks have been restructuring and consolidating recently, not simply because of deregulation or overcapacity in banking, but because technological change has eased the ability to lend at a distance and reduced the need for the decisions to be made where the information is collected. Our findings also suggests that the natural credit market faced by small firms may be growing steadily in size, and this should be taken into account by antitrust authorities. Finally, our findings suggest an explanation for the willingness of state legislators to open their states to more bank competition, especially in deposit taking (Kroszner and Strahan (1999)). With rents whittled away by more distant lenders who took away business even without having local branches, the need to maintain restrictions on branching in the local area became moot. This is consistent with the view that financial liberalization is often spurred by outside competition driving down incumbents' rents, which reduces in-

cumbents' incentives to defend archaic regulations protecting those rents (Rajan and Zingales (2000)).

The rest of the paper is organized as follows. We document the growing distance between borrowers and lenders in Section I. In Section II, we examine plausible, but relatively mechanical, explanations of the changes we document. In Section III, we outline an explanation based on the changing availability of information and its effect on lending practice. We examine evidence that such changes may, in fact, be occurring. We conclude in Section IV.

I. Changes in the Small Business Lending Market: Empirical Evidence

A. Data Description

Our data sample is drawn from the 1993 National Survey of Small Business Finance (NSSBF). This is a stratified random sample of small firms that was collected by the Board of Governors of the Federal Reserve System and the Small Business Administration. In addition to financial information about the firm (balance sheet and income statement information), the data set contains a thorough documentation of the firm's relationship with financial institutions. To be in the sample, the firm must be a for-profit firm with fewer than 500 employees. Consequently, the firms in our sample are small. The firms have a mean 1992 sales revenue of \$3.6M (median \$400,000) and a mean book value of assets of \$1.7M (median \$153,000). The Federal Reserve also conducted a 1988 version of the survey. Many of the variables we need are not in the 1988 sample, but whenever possible, we supplement the 1993 data with data from the 1988 survey.

Firms in the survey were asked for an exhaustive list of the financial institutions with whom they have a business relationship. The relationship can be a credit relationship (they borrow from the institution), a service relationship (they purchase financial services from the institution), or a deposit relationship (they have a checking or savings account with the institution). From this information, we can build a picture of how the lending relationship or environment for small firms has changed over time. For each institution with whom the firm has a relationship, the firm is asked how long they have been doing business with the institution. From this, we calculate the calendar year in which the business relationship between the firm and the lender began.

To examine the change in the small business lending market, we focus on two measures of how close firms are to their lenders. The firms are asked how far the lending institution is from the firm. This is the distance measured in miles from the main office of the firm to the office or branch of the lender that the firm uses most frequently. We also know the predominant way in which the firm and the lender conduct business (in person, by phone, or by mail). These variables will be the focus of our analysis.

Table I
Firm's Lending Relationship

The table is based on data from the 1993 National Survey of Small Business Finance. Each observation represents a firm/lender/loan type pair. Firms that borrow from multiple lenders or that borrow from a given lender but through multiple loan types (e.g., a line of credit and a mortgage) will generate multiple observations. The sample contains 5,981 pairs, which were begun between 1973 and 1993. Panel A contains the distance between a firm and its lender classified by lender type and the year the relationship began. The first entry in each cell is the mean distance, the second entry is the median distance, and the third entry is the 75th percentile. The far right column contains the sample average by lender types, and the bottom row contains the sample average by decade. Distance is measured from the main office of the firm to the office or branch of the lender which the firm uses most frequently and is reported in miles. Banks include commercial banks, savings banks, and credit unions. Nonbanks include finance companies, insurance companies, brokerage firms, leasing companies, mortgage banks, and venture capitalists. Panel B contains data on the predominant method of communication between the firm and its lender. The communication can be in person (1), by phone (2) or by mail (3). The first number is the fraction of firm-lender pairs that communicate predominantly in person. The second number is the average value of the method of communication variable. Higher values are associated with less personal communication.

Lender type	Year Lending Relationship Began			Total
	1973–1979	1980–1989	1990–1993	
Panel A: Distance to a Firm's Lender by Lender Type and Time				
Banks	15.8	34.0	67.8	42.5
	2.0	4.0	5.0	4.0
	6.0	12.0	20.0	14.0
Nonbanks	235.9	222.1	280.5	251.6
	15.5	42.0	54.0	45.0
	71.0	215.5	332.0	255.0
Nonfinancial firms	117.3	165.9	209.2	182.5
	17.5	29.0	32.0	30.5
	60.0	141.5	235.0	164.0
Total	51.2	92.6	161.3	114.7
	3.0	7.0	15.0	9.0
	10.0	33.0	91.5	42.0
Panel B: Method of Communication to a Firm's Lender by Lender Type and Time				
Banks	0.77	0.67	0.54	0.64
	1.3	1.5	1.7	1.5
Nonbanks	0.27	0.12	0.09	0.11
	2.2	2.5	2.6	2.6
Nonfinancial firms	0.35	0.20	0.18	0.20
	2.2	2.4	2.4	2.4
Total	0.68	0.49	0.34	0.46
	1.5	1.8	2.1	1.9

From the 1993 National Survey of Small Business Finance, we generate a data set of lender-borrower pairs. The firms in our data set may borrow from multiple lenders or they may borrow from a given lender in multiple ways (a line of credit and a mortgage). Since the type of loan and the lender

Table II
Determinants of Distance to the Firm's Lenders

The table contains regressions where the dependent variable is the log of one plus the distance to the firm's lender. The sample includes only relationships beginning since 1973. Dummy variables are included for whether the lender is a bank or a nonfinancial firm. The missing category is nonbank financial lenders. Each observation represents a firm-lender pair. Firms that borrow from multiple lenders or that borrow from a given lender but through multiple loan types (e.g., a line of credit and a mortgage) will generate multiple observations. The data are taken from the 1993 National Survey of Small Business Finance only in column I. We include data from the 1988 National Survey of Small Business Finance in the remaining columns. The models are described as follows: I. Basic regression model. II. Expanded sample. Sample includes observations from the 1993 and the 1988 National Survey of Small Business Finance. III. Expanded sample. These estimates are based on a weighted least squares, where the population weights from the surveys are used. IV. Expanded sample. Sample includes only observations for firms where the first reported lending relationship is within five years of the firm's birth. V. Expanded sample. Lines of credit: The regression includes both a dummy variable for whether the loan is a line of credit and an interaction between the line of credit dummy and the year the relationship started. This allows the slope on year to vary by whether the loan is a line of credit or not.

Independent Variables	Models				
	I	II	III	IV	V
Firm's age	0.001 (0.002)	0.003 ¹⁰ (0.001)	-0.001 (0.002)	-0.005 (0.004)	0.002 ¹⁰ (0.001)
Year relation started	0.034 ¹ (0.005)	0.038 ¹ (0.004)	0.033 ¹ (0.004)	0.045 ¹ (0.005)	0.041 ¹ (0.005)
Lender is bank	-1.173 ¹ (0.062)	-1.176 ¹ (0.050)	-1.310 ¹ (0.047)	-1.190 ¹ (0.061)	-1.192 ¹ (0.050)
Lender is a nonfinancial firm	-0.369 ¹ (0.097)	-0.357 ¹ (0.077)	-0.493 ¹ (0.073)	-0.421 ¹ (0.090)	-0.347 ¹ (0.077)
Lender provides a checking account	-1.062 ¹ (0.060)	-0.990 ¹ (0.047)	-1.057 ¹ (0.043)	-1.031 ¹ (0.057)	-1.043 ¹ (0.048)
Lender is firm's first lender	-0.163 ¹ (0.049)	-0.203 ¹ (0.039)	-0.198 ¹ (0.038)	-0.190 ¹ (0.054)	-0.200 ¹ (0.039)
Loan is collateralized	0.081 (0.062)	0.132 ¹ (0.049)	0.041 (0.045)	0.081 (0.058)	0.256 ¹ (0.054)
Observation from 1993 sample		-0.097 ⁵ (0.039)	0.018 (0.037)	-0.044 (0.046)	-0.123 ¹ (0.040)
LOC					0.369 ¹ (0.098)
LOC * year relation started					-0.011 (0.007)
R^2	0.308	0.296	0.335	0.307	0.298
Number of observations	5,981	9,385	9,385	6,681	9,385

¹⁰, ⁵, ¹ Significance at the 10%, 5%, and 1% levels, respectively.

may affect the nature of the relationship (physical distance and method of communication), we generate a data set where each observation represents a lender-borrower-loan type pair. There are, on average, just over two lender-borrower pairs per firm.

B. Distance from Lender

The mean distance between a firm and its lender is 115 miles, the median distance is 9 miles (see Table I, Panel A). These numbers have increased over time. The distance between small firms and their lenders has grown from an average of 51 miles for lending relationships that began in the 1970s to 161 miles for relationships that began in the 1990s, an increase of over 200 percent. A similar pattern can be seen in the medians and 75th percentiles and across different kinds of lenders (see Table I).²

The distance to a firm's lender is, not surprisingly, a skewed distribution. Moreover, from an economic perspective, there is a large difference between a firm being 5 miles from its lender rather than 100 miles from its lender, while there is probably little difference between it being 1,005 miles instead of 1,100 miles from its lender. Both the skewness and the likely nonlinearity of the economic impact of distance suggests using the log of one plus the distance between a firm and its lending institution as our favored measure of distance. Taking logs, the distribution moves closer to a symmetric distribution. The mean of log distance is 2.6, the median is 2.3.

The increase in distance reported in Table I does not control for any changes in the firms or markets over time. To estimate the growth in distance between small firms and their lender controlling for other factors which affect distance, we regress the log of one plus the distance in miles on the characteristics of the borrower, the lender, and the loan. The results are reported in Table II. The coefficient on the year the relationship started measures changes in distance independent of these controls. We find that the distance between the firm and its lenders has grown at 3.4 percent per year ($t = 7.4$). Thus, holding the controls constant, a firm that began borrowing from its lender in 1993 is 34 percent further away from the lender than an otherwise identical firm that first borrowed from its lender in 1983 (Table II, column I). This is the paper's central finding.

C. Alternative Explanations for Expanding Distance

The fact that the distance between firms and their lenders is increasing may have some obvious explanations. At the very least, we want to control for other factors that influence distance to verify that they are not responsible for our finding that the distance between firms and lenders is growing.

C.1. Changing Distribution of Lenders

We begin with the characteristics of the lender. The external sources of funds in our sample can be divided into banks (69 percent of external debt), nonbank financial lenders (25 percent), and nonfinancial lenders such as

² The 1993 survey oversamples large firms. So, we also calculate mean distance, weighting each observation by its weight in the population. In this case, distance rises from 30 miles for relationships that started in the 1970s to 145 miles for relationships that started in the 1990s.

suppliers (5 percent).³ We want to add controls for the type of lender because their function may affect their distance. One of the primary functions of banks is their role as a monitor (see Diamond (1984), Fama (1985), James (1987)). This role includes an initial evaluation of the borrower's type as well as continuous monitoring of the actions of the borrower. Moreover, banks are intimately involved in processing transactions. These roles may explain the closeness of banks that we find in Table I.

The identity of the firm's lender strongly correlates with how far away the lender is. Nonbanks are significantly further from the firm than banks—117 percent further on average (see Table II, column I). If physical monitoring is more difficult across greater distances and, therefore, less likely to be done by nonbanks, then this is consistent with banks being more active physical monitors. We will argue in the conclusion that this may also reflect comparative advantage in relationships that require close, personal ties.

The frequency with which a firm has to transact with a lender can also determine how close that lender is. Banks that provide their borrowers with a checking account are significantly closer. Based on the results in Table II column I, the distance doubles with each step as a firm moves from a bank where it has a checking account to a bank without a checking account and, finally, to a nonbank.⁴ We surmise this is because checking accounts presumably imply more frequent transactions, and the need to visit the lender on a more frequent basis to deposit or withdraw cash may necessitate the lender being closer.

The importance of controlling for the lender type and checking account can be seen by comparing the estimated growth in distance reported in Table II to the univariate growth in distance. The annual growth in distance more than doubles from 3.4 percent per year to 8.9 percent per year when we exclude all controls from the regression ($t = 17.8$; regression not reported). This implies that, over time, new lending relationships are moving from

³ The lenders in our sample can be classified into five basic categories—two internal and three external sources. Internal sources include loans from the owners (16 percent of debt) and loans from family and friends (6 percent of debt). Government loans comprise a very small fraction of the firms' borrowing (less than 1 percent). Although this is external debt, we do not include it in the following analysis as we want to focus on the firm's development of relationships with private, for-profit lenders. The remaining 78 percent of debt comes from external sources (banks, nonbank financial lenders, and nonfinancial lenders). Banks include depository institutions such as commercial banks, savings banks, and credit unions. Nonbanks include finance companies, insurance companies, brokerage firms, leasing companies, mortgage banks, and venture capitalists. Less than half a percent of the firm's debt is from venture capitalists.

⁴ In our sample, over 99 percent of checking accounts are provided by banks. The few nonbank providers of "checking accounts" are almost exclusively brokerage firms. We also examined the effect on distance of other services the firm may obtain from the lender. Firms that obtain additional financial services are further from their lenders on average. The magnitude of the effect depends upon the type of service the lender provides: Transaction services (making change, processing credit cards, and executing wire transfers) are 11 percent further away ($t = 1.7$), cash management services are 43 percent further away ($t = 5.3$), and credit-related services (such as bankers acceptance and sales financing) are 26 percent further away ($t = 3.1$).

lenders that are close (banks with checking accounts) to lenders that are more distant (nonbanks without checking accounts). However, controlling for lender type, we find that both banks and nonbanks are becoming more distant from their borrowers.⁵

C.2. Sample Selection Biases

The data set we use is a synthetic panel. Data on the year a firm began a relationship with a given lender helps us describe a firm's borrowing patterns over time. However, the data set is conditioned on the firm existing in 1993. Firms that do not survive will obviously not be included in our sample. If this selection mechanism is correlated with distance, then our estimated coefficient will be biased. In addition to requiring that the firm survives, observations appear in our sample only if the firm–lender pair also survives. If the type of firm–lender pairs that drop out is correlated with distance, our coefficient estimates will again be biased.

We first describe some of the possible selection processes that must be at work for a survival bias to generate our results and then examine the empirical evidence to determine their validity. We examine firm survival first. The literature on relationship lending suggests that close lenders are good at looking into informationally opaque firms and determining their true quality. They may also be more willing and able to bail out their good borrowers when they experience temporary financial difficulties. If lenders are further from firms, bailouts may become more costly and less common. If firms whose lenders are further away are less likely to be rescued, they will be less likely to survive. This would imply that surviving firms will be closer on average than the full sample of firms that begin relationships with lenders. This may be a problem for our results since a firm that starts a relation in 1991 need survive only 2 years to be in our sample, while a firm that begins a relation in 1981 must survive 12 years. Thus, sample selection could induce a positive coefficient on the calendar time variable even if there is no change in the initial distribution of how far firms are from their lenders.⁶

To test for the importance of this sample selection bias, we supplemented our 1993 sample with data from the 1988 NSSBF. This allows us to directly examine how firm survival affects our estimates. In the expanded data set, we can examine two firms that both began borrowing from their first lender in 1985, for example, when they were both five years old. The one from the 1993 sample had to survive eight years to be included in the sample while the one in the 1988 sample needed to survive only three years to be included in the sample. If the selection mechanism we described is working, we will see that, controlling for the year the relationship started, observations in

⁵ When we estimate different year slopes for banks and nonbanks, we find that distance is growing slightly faster for nonbanks than banks (4.2 percent versus 3.0 percent per year), but the difference is not statistically significant ($\rho = 0.28$; regression not reported).

⁶ If instead, firms that start closer to their lenders are riskier and are more likely to die, then the coefficient on the calendar year variable is understated and firms are moving away from their lenders faster than our estimates suggest.

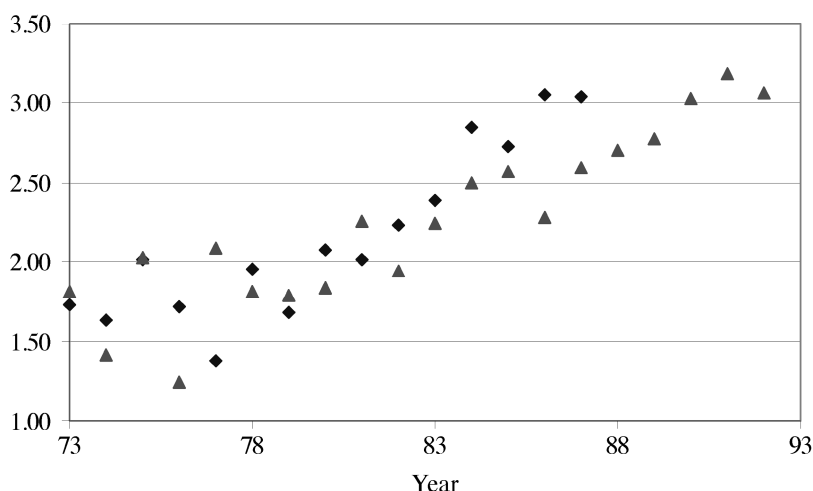


Figure 1. Changes in the average distance to lender over time by sample. The figure graphs the unconditional average log distance between a firm and its lender against the year the relationship began. Data from the 1993 National Survey of Small Business Finance is graphed as triangles, while data from the 1988 survey is graphed as diamonds.

the 1993 sample are closer as they have had to survive longer to remain in the sample. The results are displayed in column II of Table II. Firms in the 1993 sample are 10 percent closer and the coefficient is statistically significant ($t = 2.5$). This is consistent with the sample selection hypothesis, but also with any other difference between the two samples.

The sampling design of the 1993 sample was slightly different from that of the 1988 sample, as large firms were oversampled. To correct for this, the survey provides the weights each observation in the survey should have in the true population. To test the robustness of our findings, we reestimated the regression in column II of Table II using the population weights from the two samples (see Table II, column III). The coefficient on the year the relationship started shrinks slightly to 3.3 percent per year ($t = 8.8$). Interestingly, the coefficient on the indicator for the 1993 sample turns positive and insignificant ($\beta = 0.017$, $t = 0.4$), suggesting that differences in the sample surveys, rather than sample selection, were responsible for the negative coefficient in column II. We also allow different slopes and different intercepts for both samples. It turns out that the rate of growth in distance is not statistically different across samples.

Finally, if sample selection is truly responsible for our results, once we control for it, the coefficient on calendar year should fall. Instead, it rises slightly to 3.8 percent per year. Our initial estimate was biased downward. The lack of significant sample selection is also apparent when we graph the raw data (see Figure 1). The upward slope in distance is apparent in both the 1988 and the 1993 sample, and there is not a large systematic difference between the two samples relative to the change in distance over time.

As firms in our sample age and grow, they become better known. This might expand the geographic market in which they can borrow. We see evidence of this in Table II. If we measured firm age as of the date the relationship with the institution began, we find that firms do move away from their lenders as the firm ages. The magnitude of this effect, however, is tiny (see Table II, column I). However, distance to a lender increases as the firm expands its circle of lenders. A firm's first lender is about 16 percent closer than its subsequent lenders (see Table II, column I).⁷

The fact that firms move from close to more distant lenders as they age will create a second selection bias if the firms drop their original lenders as they age.⁸ However, once we include the firm's age in the regression, the firm's age and not calendar year should measure this effect. That the coefficient on firm age is small and the coefficient on calendar year is still important after including firm age suggests this source of bias is not significant.

We can also directly test the importance of this bias. First relationships are likely to start soon after a firm is founded. So if we include only firms whose first relationship begins soon after the firm was born, we will have a sample that is less sensitive to the alleged selection bias. When we cut the sample down to firms whose first observed lending relationship starts during their first five years of life, the coefficient on calendar year rises, rather than falls. Even for the firms where we are least likely to miss the first lending relationship, the distance between firms and their lenders is growing at 4.5 percent per year (Table II, column IV).

C.3. Changing Distribution of Loan Types

A third possible explanation of increasing distance is a change in the way in which firms borrow. The firms in our sample borrow through lines of credit, leases, motor vehicle loans, mortgages, equipment loans, and other loans. The distribution of loan types changes over time (Cole, Wolken, and Woodburn (1996)). If borrowing patterns have changed from loans that require proximity and personal monitoring to those that do not, this may generate our result. However, even when we include controls for loan type and whether the loan is collateralized, the coefficient on year barely changes ($\beta = 0.033$; regression not reported).

Some economists have argued that lines of credit are unique in that they are more relationship based, and, as such, these lenders may be less likely to move away from their borrowers (Berger and Udell (1995)). Consistent

⁷ We also tried including a variable which takes the value 1 for the firm's first lender, 2 for its second, and so forth, as well as the dummy for the firm's first lender. Based on these results, as the firm moves from its first to second lender, distance increases 29 percent, while each incremental lender is an additional 10 percent further away ($t = 6.2$; regression not reported). The coefficient on calendar year rises to 3.9 percent.

⁸ We define the firm's first lender as the lender with whom the firm has been conducting business the longest. If the firm began its relationship with multiple institutions in that year, we classify all such lenders as the "first" lender. Financial institutions with which the firm has no interaction at the time of the survey (no credit, deposit, or service relationship) would not appear in our sample, although they may have been the firm's first lender.

with this intuition, lines of credit are 82 percent closer than other loans as long as we do not control for any other factors. However, once we control for other factors, lines of credit are actually slightly further away (see Table II, column V). If we allow the intercept and the coefficient on the year a relationship started to vary between lines of credit and other loans, we find that lines of credit are about 37 percent further away at the beginning of our sample. This gap has been shrinking as lines of credit have been moving away more slowly than other loans (3.0 percent per year compared to 4.1 percent per year). Although lines of credit are moving away more slowly than other loans, the difference in rates is neither large nor statistically significant.

To test the robustness of our finding that distance between firms and lenders is growing, we estimated separate regressions for each type of loan in the sample. Lenders are becoming more distant from borrowers regardless of loan type, and the rate of increase ranges from 2.8 percent to 5.5 percent per year (see Table III).

C.4. Firm Characteristics and Informational Transparency

As a final control, we include firm characteristics in our regressions. Different firms have varying potential for moral hazard and thus a different need to be monitored. They also have different degrees of informational transparency. If the distribution of firms has changed over time from informationally opaque to informationally transparent, this could generate our result. By controlling for firm characteristics, we can verify this is not driving our finding. In addition, by determining which firm characteristics are correlated with distance, we can get a sense of what might make a firm more informationally transparent and thus able to borrow at a greater distance.

We examine firm characteristics in two steps. First, we include controls for the firm's industry and for the firm itself. Including controls for the firm's industry (two-digit SIC) does increase the explanatory power of the model ($F(58,5916) = 3.0, p < 0.01$), but it does not change the coefficient on the year the relationship started (see Table IV, column I). We also exploit the panel structure of our data by including a control for each firm. This dramatically raises the explanatory power of the model (the R^2 rises from 0.308 to 0.711). This implies that firm characteristics are an important determinant of distance, and we return to this below. Adding firm controls to the regression, however, raises the coefficient on the year the relationship began from 3.4 percent per year to 4.0 percent per year (compare Table II, column I, to Table IV, column II). In addition to a fixed-effects estimation, we also estimate the growth in distance based on between firm variation (variables are defined as the mean for each firm). The estimated coefficient on the year the relationship started is essentially the same (see Table IV, column III).

The next step is to include characteristics of the firm that may be correlated with distance. We examine both the density of firms as well as vari-

Table III
Determinants of Distance to the Firm's Lenders by Loan Type

The table contains regressions where the dependent variable is the log of one plus the distance to the firm's lender. A separate regression was run for each of the six loan types in the sample: lines of credit (column I), leases (column II), mortgages (column III), motor vehicle loans (column IV), equipment loans (column V), and other loans (column VI). The sample includes only relationships beginning since 1973. Dummy variables are included for whether the lender is a bank or a nonfinancial firm. The missing category is nonbank financial lenders. Each observation represents a firm–lender pair. Firms that borrow from multiple lenders or that borrow from a given lender but through multiple loan types (e.g., a line of credit and a mortgage) will generate multiple observations. The data are taken from the 1988 and 1993 National Survey of Small Business Finance.

Independent Variables	I	II	III	IV	V	VI
Firm's age	0.001 (0.002)	0.005 (0.004)	0.011 ⁵ (0.005)	−0.005 (0.003)	0.002 (0.004)	0.007 (0.005)
Year relation started	0.028 ¹ (0.009)	0.055 ¹ (0.015)	0.042 ¹ (0.011)	0.035 ¹ (0.008)	0.035 ¹ (0.011)	0.037 ¹⁰ (0.019)
Lender is bank	−1.410 ¹ (0.132)	−0.870 ¹ (0.189)	−1.472 ¹ (0.182)	−0.954 ¹ (0.079)	−1.083 ¹ (0.138)	−1.210 ¹ (0.202)
Lender is a nonfinancial firm	−0.250 (0.242)	−0.491 ¹ (0.172)	−0.548 (0.369)	−0.055 (0.198)	−0.763 ¹ (0.149)	−0.661 ⁵ (0.261)
Lender provides a checking account	−1.019 ¹ (0.088)	−1.238 ¹ (0.245)	−0.662 ¹ (0.115)	−0.910 ¹ (0.088)	−1.538 ¹ (0.133)	−1.371 ¹ (0.147)
Lender is firm's first lender	−0.175 ⁵ (0.070)	−0.240 ⁵ (0.117)	−0.385 ¹ (0.125)	−0.080 (0.071)	−0.213 ⁵ (0.101)	−0.182 (0.145)
Loan is collateralized	0.248 (0.139)					−0.015 (0.300)
Year relation started if loan is collateralized	0.005 (0.011)					0.018 (0.024)
Observation from 1993 sample	−0.154 ⁵ (0.068)	−0.210 (0.138)	−0.257 ⁵ (0.113)	−0.187 ¹ (0.073)	−0.035 (0.105)	0.040 (0.144)
R^2	0.233	0.138	0.211	0.246	0.349	0.311
Number of observations	2,559	1,329	976	2,309	1,481	731
Median distance	5.0	41.0	6.0	11.0	11.0	6.0

¹⁰, ⁵, ¹ Significance at the 10%, 5%, and 1% levels, respectively.

ables that measure their transparency. If the location of firms is moving over time from urban areas to rural areas, where distances are greater, this could explain our finding. This is not the case. First, the fixed-effects estimates imply that distance is growing even for the same firm, so shifting location cannot be the whole story. In addition, we know whether the firm is in a Standard Metropolitan Statistical Area (urban) or not (rural). Rural firms are 13 percent further from their lenders (see Table IV, column IV), but this control does not change the rate at which firms are moving away from their lenders. We also estimate the growth in distance separately for firms located in rural or urban areas. The coefficient is not statistically different across the two samples (regression not reported).

Informational transparency, or the ability to evaluate the firm's credit quality at low cost at a distance, should allow the average distance between

Table IV
Determinants of Distance to the Firm's Lenders: Measuring the Informational Transparency of Firms

The table contains regressions where the dependent variable is the log of one plus the distance to the firm's lender. The sample includes only relationships beginning since 1973. Each observation represents a firm-lender pair. Firms that borrow from multiple lenders or that borrow from a given lender but through multiple loan types (e.g., a line of credit and a mortgage) will generate multiple observations. The data are taken from the 1993 National Survey of Small Business Finance, except for column V, which also includes data from the 1988 National Survey of Small Business Finance. Models are described as follows: I. Industry controls. The regression includes dummy variables to control for differences across the 59 two-digit industries in the sample. II. Within estimates. A dummy variable is included for every firm. Thus, the coefficients are estimates based on variation from firm specific means. The R^2 includes the explanatory power of the firm effects. Without including the explanatory power of the firm effects, the R^2 would be 0.307. III. Between estimates. The coefficients are estimated based on variation between firm specific means. Each observation represents the mean value for a given firm. Thus, the sample size is reduced to the number of unique firms in our sample. IV. Firm-specific variables. This model includes additional controls for firm-specific characteristics. V. Expanded sample. This model includes data from both the 1988 and 1993 National Survey of Small Business Finance. Only variables that are available in both surveys are included in the regression. VI. Firm-specific variables. This model also includes the log of the firm's total assets.

Independent Variables	Models					
	I	II	III	IV	V	VI
Firm's age	0.001 (0.002)		0.000 (0.002)	0.000 (0.002)	0.002 (0.001)	-0.000 (0.002)
Year relation started	0.033 ¹ (0.005)	0.040 ¹ (0.011)	0.035 ¹ (0.006)	0.037 ¹ (0.005)	0.040 ¹ (0.004)	0.042 ¹ (0.005)
Lender is bank	-1.164 ¹ (0.062)	-1.121 ¹ (0.085)	-1.102 ¹ (0.089)	-1.152 ¹ (0.062)	-1.163 ¹ (0.050)	-1.140 ¹ (0.062)
Lender is a nonfinancial firm	-0.329 ¹ (0.096)	-0.124 (0.132)	-0.472 ¹ (0.139)	-0.373 ¹ (0.096)	-0.354 ¹ (0.077)	-0.356 ¹ (0.096)
Lender provides a checking account	-1.079 ¹ (0.059)	-1.063 ¹ (0.083)	-1.116 ¹ (0.081)	-1.106 ¹ (0.060)	-1.017 ¹ (0.047)	-1.137 ¹ (0.060)
Lender is firm's first lender	-0.143 ¹ (0.048)	-0.026 (0.077)	-0.258 ¹ (0.085)	-0.133 ¹ (0.049)	-0.166 ¹ (0.039)	-0.095 ¹⁰ (0.049)
Loan is collateralized	0.028 (0.062)	0.011 (0.088)	0.022 (0.081)	0.059 (0.062)	0.118 ⁵ (0.049)	0.037 (0.062)
Firm had records for filling out survey				0.091 ⁵ (0.042)	0.131 ¹ (0.034)	0.054 ⁵ (0.043)

Firm has credit card	0.003 (0.043)	-0.000 (0.042)
Ownership share of largest owner (%)	-0.255 ¹ (0.076)	-0.151 ¹⁰ (0.076)
Corporation (1 = yes)	0.066 (0.052)	0.195 ¹ (0.038)
Franchise (1 = yes)	0.290 ¹ (0.091)	0.242 ¹ (0.091)
Owner managed	-0.044 (0.050)	-0.076 ¹⁰ (0.044)
Owner's age when relation began	0.000 (0.003)	0.000 (0.003)
Owner's experience when relation began	-0.003 (0.003)	-0.006 (0.003)
Sales area regional (1 = yes)	0.073 (0.047)	0.040 (0.047)
Sales area national (1 = yes)	0.359 ¹ (0.060)	0.292 ¹ (0.061)
Firm in MSA (1 = yes)	-0.127 ⁵ (0.056)	-0.137 ⁵ (0.055)
Herfindahl Index > 1,800	0.046 (0.045)	0.036 (0.045)
Observation from 1993 sample		0.037 (0.045)
Log(firm assets)		-0.080 ¹⁰ (0.041)
Industry controls <i>F</i> -statistics (<i>p</i> -value)	2.993 (0.000)	0.069 ¹ (0.013)
Firm controls <i>F</i> -statistics (<i>p</i> -value)	1.502 (0.000)	
<i>R</i> ²	0.327	0.301
Number of observations	5,981	5,974

¹⁰, ⁵, ¹ Significance at the 10%, 5%, and 1% levels, respectively.

firms and lenders to increase. We measure information transparency four ways. First, we identify firms that have a business credit card. Since these are usually granted based on a credit report, this implies the external credit market knows a sufficient amount about the firm to grant it credit based on information in computer files. Thirty-two percent of the firms in the sample have a business credit card. The NSSBF survey also asks whether the person answering the income statement and balance sheet questions had records such as tax forms and/or financial statements to help in answering these questions. The existence of such records suggests greater transparency to outside investors. We also include an indicator of whether the firm is a franchise. A franchise is likely to have a more systematized reporting structure in order to measure franchise fees. The final measures of record keeping we use are from the governance structure of the firm. We use the fraction of the equity owned by the largest shareholder as an (inverse) measure of shareholder dispersion. The more dispersed the shareholders, the greater the need for the firm to systematize its reporting function and make information easily accessible to outside investors (alternatively, the firm attracts dispersed shareholders only when reporting is systematic).

The expanded regressions with the additional firm characteristics are reported in Table IV, column IV. These results are based on the 1993 sample, since many of these variables are only available in this sample.⁹ The presence of a credit card has no effect on the distance to the firm's lenders. This may be because credit cards are freely available, or because they depend on the personal history of the owner rather than that of the business. However, the remaining firm characteristics are important. Firms that have financial records detailing their financials do borrow further from their lenders. The difference is nine percent and is statistically significant (see Table IV, column IV). Firms that are franchises, and are thus expected to be more transparent, borrow 29 percent further away ($t = 3.2$). The ownership structure has a large and statistically significant impact on distance. Expanding the largest shareholder's stake from zero (a completely diffuse ownership structure) to 100 percent lowers the distance to a firm's lender by 26 percent ($t = 3.4$).

We examine the characteristics of the manager to determine whether older and more experienced managers borrow from institutions that are further from the firm. Both the age and years of business experience of the current manager are measured in the year the relationship started. Neither variable has a significant effect on the distance between borrower and lender. Whether the firm is managed by a nonowner does not appear to matter.¹⁰

⁹ We also estimated the model on the expanded sample (1988 and 1993 surveys), including only those firm characteristics which exist in both surveys. The results are reported in column V of Table IV.

¹⁰ Since we only have a measure of firm size in the year of the survey, and thus the variable is likely to be endogenous, we exclude it from most of our specifications. However, as a robustness check, we included the log of firm size (see Table IV, column VI). As expected, larger firms are more likely to borrow from more distant lenders. However, the inclusion of firm size does not change the coefficient on year significantly.

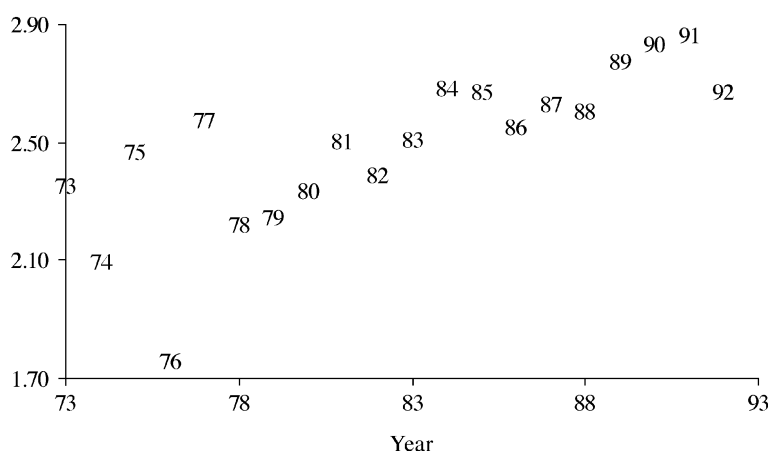


Figure 2. Changes in the estimated distance to lender over time. Estimated log distance between a firm and its lender across time is based on the estimates from Table IV (column IV). All variables except the year in which the relationship began are set equal to the sample mean. In the regression, the year variable is replaced by a set of year dummy variables. This allows the functional form of the relationship between distance and year to have any shape.

The final set of firm characteristics we examine is the sales region of the firm. The larger the firm's sales region, the more likely distant lenders will know about the firm. In the survey, the firms are asked if their sales region is local, regional, or national. As the firm's sales region expands, so does the distance between the firm's headquarters and its lender. Most of the increase, however, occurs when the firm shifts from a regional sales region to a national sales region. The distance to the lender increases by an additional 29 percent in this case ($t = 4.9$).

It is useful to check that, after the inclusion of all these other variables, observations from no single year drive the results. So, in Figure 2, we graph distance against the year the relationship started (where distance is predicted using the estimates from Table IV, column I, after replacing the "year relationship started" variable with year dummies and setting all explanatory variables to their sample mean). While the estimates in early years are quite variable, there is clearly a discernible trend.

D. Method of Communicating with Lender

To make sure our conjecture that lending is becoming more impersonal is correct, we replicate our results by examining the most frequent method by which the firm and the lender conduct business at the time of the survey. Firms can conduct business with their lender in person (46 percent of the firm-lender pairs), by phone (19 percent), or by mail (35 percent; see Table I, Panel B). Based on the simple means, we find that 68 percent of relationships started in 1973 to 1979 are still conducted in person today, while only

34 percent of relationships started in 1990 to 1993 are conducted in person today. Controlling for firm and lender characteristics reveals the same trend. The probability that a firm will communicate with its lender in person drops from 59 percent for relationships that started in 1973 to 36 percent for relationships that started in 1993 (see Table V, column I and Figure 3). All other variables are set equal to their sample means, when probabilities are calculated. The coefficient on the year the relationship started is also statistically significant ($t = 7.3$).

Although the shift from communicating in person to communicating by the mail is related to the shift to more distant lenders, the two effects are distinct. To demonstrate this, we include the distance to a firm's lender as an explanatory variable. As expected, firms whose lenders are further away are less likely to communicate in person (see Table V, column II), because distance raises the cost of personal communication. Raising the log distance from the 25th percentile to the 75th percentile lowers the probability of communicating in person from 58 percent to 30 percent ($t = 23.3$). Including distance in our model reduces the coefficient on calendar year from 0.046 to 0.031. The fact that the coefficient on the year the relationship started is still positive and statistically significant ($t = 4.6$) implies that the systematic change in how firms communicate with their lenders is more than just the effect of increased physical distance. Holding the distance to a firm's lender constant, there has still been a change in the way firms communicate, away from face-to-face communication and toward communication by phone or through the mail. The probability of communicating in person now drops from 52 percent for a relationship started in 1973 to 37 percent for a relationship started in 1993. The decline is 66 percent of our estimate when distance is not included and is still quite large.

There may not be much of a difference between communicating with a lender by phone or by mail. Both are impersonal. Therefore, in column III, we also try a specification where the method used to communicate is coded one if it is in person, and zero otherwise. The fit of this binomial specification in column III is higher than the fit for the multinomial specification in column I and, therefore, we will use this specification in what follows.

As with the distance regressions, we have included firm and lender characteristics as controls. Many of the results are similar to those obtained earlier. Consistent with bank lending being more relationship based and thus more reliant on information obtained through personal contact, borrowers deal more with their banks in person, even after correcting for the existence of a checking account, or even the distance the bank is from the borrower.

Firms we expect to be more informationally transparent are more likely to use arm's length communication (phone and mail). The probability of communicating in person drops for firms that used records to answer the financial statement questions in the survey, have credit cards, have diffuse ownership structures, and have a national sales region. The last finding is particularly interesting. It suggests that firms with a national reach do not borrow from lenders remote from the head office simply because the firm

Table V
Determinants of the Method Used to Communicate
with Lender: In Person, by Phone, or by Mail

The table contains estimates from an ordered logit model. The dependent variable denotes the predominant method for communicating with the lender. The sample includes only relationships beginning since 1973. Each observation represents a firm-lender pair. Firms that borrow from multiple lenders or that borrow from a given lender but through multiple loan types (e.g., a line of credit and a mortgage) will generate multiple observations. The data are taken from the 1993 National Survey of Small Business Finance. Models are described as follows: I. The dependent variable is coded one if in person, two if by phone, and three if by mail. Estimation is multinomial ordered logit. II. The log of one plus distance (the dependent variable in Table II) is added as an explanatory variable to the specification in column I. Estimation is multinomial ordered logit. III. The dependent variable is coded zero if in person and one otherwise. Estimation is logit.

Independent Variables	Models		
	I	II	III
Firm's age	0.005 ⁵ (0.002)	0.005 ⁵ (0.002)	0.006 ⁵ (0.003)
Year relation started	0.046 ¹ (0.007)	0.031 ¹ (0.007)	0.043 ¹ (0.007)
Lender is bank	-1.226 ¹ (0.079)	-0.875 ¹ (0.083)	-1.583 ¹ (0.099)
Lender is a nonfinancial firm	-0.432 ¹ (0.122)	-0.303 ⁵ (0.126)	-0.624 ¹ (0.161)
Lender provides a checking account	-1.637 ¹ (0.077)	-1.243 ¹ (0.081)	-1.403 ¹ (0.082)
Lender is firm's first lender	-0.215 ¹ (0.064)	-0.189 ¹ (0.066)	-0.290 ¹ (0.075)
Loan is collateralized	0.306 ¹ (0.087)	0.312 ¹ (0.091)	0.279 ¹ (0.094)
Firm had records for filling out survey	0.088 (0.057)	0.051 (0.059)	0.116 ¹⁰ (0.066)
Firm has credit card	0.048 (0.057)	0.032 (0.059)	0.128 ¹⁰ (0.067)
Ownership share of largest owner (%)	-0.214 ⁵ (0.101)	-0.107 (0.105)	-0.507 ¹ (0.119)
Corporation (1 = yes)	0.093 (0.072)	0.078 (0.075)	0.172 ⁵ (0.082)
Franchise (1 = yes)	-0.028 (0.120)	-0.187 (0.127)	0.076 (0.142)
Owner managed	-0.017 (0.067)	0.006 (0.069)	-0.134 ¹⁰ (0.079)
Owner's age when relation began	0.004 (0.004)	0.005 (0.004)	0.006 (0.004)
Owner's experience when relation began	-0.003 (0.004)	-0.003 (0.004)	-0.005 (0.004)
Sales area regional (1 = yes)	-0.024 (0.064)	-0.062 (0.066)	0.089 (0.073)
Sales area national (1 = yes)	0.382 ¹ (0.079)	0.202 ⁵ (0.082)	0.740 ¹ (0.094)
Firm in MSA (1 = yes)	0.302 ¹ (0.076)	0.441 ¹ (0.080)	0.317 ¹ (0.086)
Herfindahl index > 1,800	-0.076 (0.060)	-0.097 (0.062)	-0.162 ⁵ (0.070)
Log(1 + distance from lender)		0.436 ¹ (0.019)	
Pseudo R^2	0.216	0.265	0.284
Number of observations	5,945	5,945	5,945

¹⁰, ⁵, ¹ Significance at the 10%, 5%, and 1% levels, respectively.

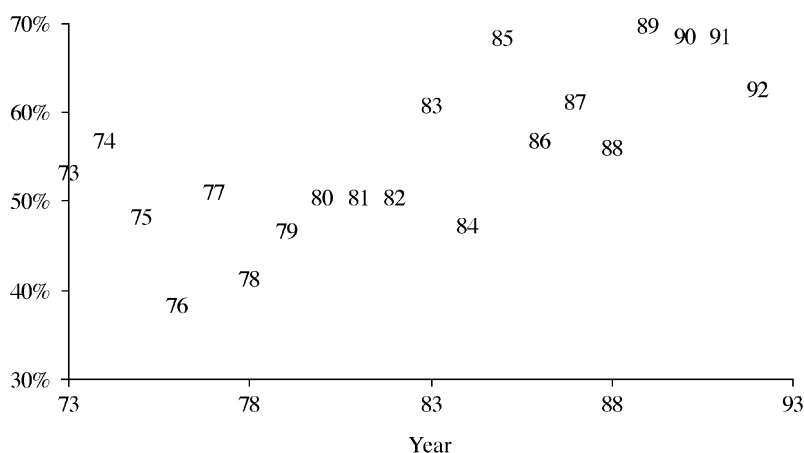


Figure 3. Changes in the estimated method of communicating with lender over time. The estimated probability of using nonpersonal communication (phone or mail) as the most frequent method of communicating with a lender as a function of the year the lending relationship started is graphed. The alternative method of communication is in person. The probability is calculated for a new firm that was both borrowing and had a checking account from a bank. The probabilities are based on the multinomial logit model (see Table V, column III), except the year the relationship started variable was replaced with a series of year dummy variables.

has local branches near the lender. In fact, lenders do indeed appear far from such firms because the method of communication is by phone or mail (see Table V). A national sales region seems to expand the pool of lenders the firm can borrow from because the firm has a national image and is thus more transparent.

Firms are more likely to use personal communication with their first lender and then move away from personal communication with later lenders. Thus, as firms become better known, they rely less on personal communication. Such firms are more likely to have a documented track record, just the type of hard information which makes personal communication less necessary. Unlike our distance regressions, we find an independent role for firm age. Firms that are older when they begin a relationship with a lender are less likely to communicate in person, although the magnitude of the effect is small. A firm that is five years old when it begins borrowing from its lender is one percent less likely to communicate in person than a start-up. Another difference in coefficients from the distance regression is the coefficient for the MSA indicator. Firms in urban areas are more likely to use arm's length methods of communication, even though we saw earlier that they were physically closer. This may reflect different social mores and is worthy of deeper study.

II. Possible Causes of the Changes in the Lending Environment

By including a time trend, we have been able to characterize the changing environment in which small firms and their lenders operate. We have not

directly identified the source of this change, however, other than by showing it is not simply a change in firm, loan, or lender characteristics, nor is it because of sample selection. In this section, we explore several changes in the small business lending environment that may explain our results.

A. Bank Consolidation

One of the major trends in banking has been the consolidation of the industry. The number of banks in the United States has declined by about 30 percent in the last decade (Berger, Demsetz, and Strahan, (1999)). Much of this decline has been in the form of mergers (Rhoades (1996), Berger et al. (1997)). The existence of fewer banks could explain the trend we find toward greater distance between firms and their lenders.

To control for differences in bank density across regions and across time, we include a measure of bank density in our model. We do not know the exact location of each firm. We only know in which of nine census regions the firm resides. Thus, our bank density variable (log of banks per 1,000 square miles) varies across time (the year a relationship started) and area (the nine census regions). We also calculate branch density (log of branches per 1,000 square miles), since it is the number of physical locations that most directly affects where and how firms build their lending relationships.

Bank density is correlated with the average distance between firm and lender (see Table VI, column I). Every 10 percent increase in the density of banks lowers the average distance by 0.8 percent ($t = 3.7$).¹¹ The effect of bank density on the method of communication is similar (see Table VII, column I). The coefficient on branch density is smaller economically and less statistically significant (see Table VI, column II). Each 10 percent increase in branch density lowers distance by 0.4 percent. Based on the magnitude of these coefficients, changes in bank or branch density do not explain the growing distance between firms and their lenders. The increase in distance attributable to the change in density over the sample period is only 4 percent, a small fraction of the actual increase. Moreover, the coefficient estimate on the year the relationship started does not change significantly.

Although there has been a significant loss of banks, the effect on the distance from lender and method of communication has been minimal. A simple explanation of this finding can be found in Figure 4. The decline in banks has been dramatic, but only starts in the mid-1980s. The effects we document begin much earlier (see Figures 1–3). This is one reason the inclusion of bank density does not change the coefficient on calendar year. More importantly, the number of branches, the physical locations that firms use to conduct their business, and the primary determinant of distance has not fallen (see Figure 4). The number of bank branches has risen about four percent per year. Much of the growth in the last decade has come from

¹¹ The dependent variable in these regressions is the distance between the firm and its lender, which may or may not be a bank. To check the robustness of our results, we reestimated the regression in column I of Table VI using only firm–bank pairs. The coefficient on bank density shrinks slightly in magnitude from -0.084 to -0.076 (regression not reported).

Table VI
Determinants of Distance to the Firm's Lenders: Includes Changes in the Lending Environment

The table contains regressions where the dependent variable is the log of one plus the distance to the firm's lender. The regression contains all the variables from Table IV, although only a subset is reported. In most cases, the variables in the table vary across both time and census region. The sample includes only relationships beginning since 1973. Each observation represents a firm-lender pair. Firms that borrow from multiple lenders or that borrow from a given lender but through multiple loan types (e.g., a line of credit and a mortgage) will generate multiple observations. The data are taken from the 1993 National Survey of Small Business Finance. Column V is based only on observations where the lender is a bank.

Independent Variables	Models						
	I	II	III	IV	V	VI	VII
Log(banks/1,000 square miles)	-0.084 ¹ (0.023)						
Log(branches/1,000 square miles)		-0.037 ¹⁰ (0.020)		-0.008 (0.027)	-0.004 (0.031)	-0.018 (0.031)	-0.007 (0.027)
Loan losses/total loans (%)			-0.004 (0.044)				
Log(bank employees/real loans)				-0.165 (0.125)	-0.155 (0.133)		-0.189 (0.131)
Log(bank employees/real GDP)				-0.474 ¹ (0.181)	-0.483 ⁵ (0.201)		-0.504 ¹ (0.185)
Log(bank employees/real loans) (based on national numbers)							0.215 (0.472)
Log(bank employees/real GDP) (based on national numbers)							0.605 (0.885)
Log(bank employees)						-0.531 ⁵ (0.276)	
Log(real GDP)						0.457 ¹ (0.183)	
Log(real loans)						0.116 (0.144)	
Year relation started	0.036 ¹ (0.005)	0.038 ¹ (0.005)	0.037 ¹ (0.006)	0.014 (0.011)	0.003 (0.012)	0.016 (0.011)	0.043 (0.037)
R ²	0.320	0.318	0.318	0.314	0.166	0.314	0.314
Number of observations	5,974	5,974	5,974	5,662	3,542	5,974	5,662

¹⁰, ⁵, ¹ Significance at the 10%, 5%, and 1% levels, respectively.

Table VII
Determinants of the Method Used to Communicate with Lender: Includes Changes in the Lending Environment

Estimates are from a logit model. The dependent variable denotes the predominant method for communicating with the lender (zero if in person and one if by phone or by mail). The models contain the variables from Table V, although only a subset is reported. Each observation represents a firm–lender pair. Firms that borrow from multiple lenders or that borrow from a given lender but through multiple loan types (e.g., line of credit and mortgage) will generate multiple observations. The data are taken from the 1993 National Survey of Small Business Finance. Column V is based only on observations where the lender is a bank.

Independent Variables	Models						
	I	II	III	IV	V	VI	VII
Log(banks/1,000 square miles)	−0.100 ¹ (0.036)						
Log(branches/1,000 square miles)		0.007 (0.031)		0.037 (0.042)	0.052 (0.049)	−0.001 (0.048)	0.035 (0.043)
Loan losses/total loans			−0.038 (0.059)				
Log(bank employees/real loans)				−0.641 ¹ (0.196)	−0.536 ⁵ (0.225)		−0.681 ¹ (0.203)
Log(bank employees/real GDP)				−0.913 ¹ (0.284)	−0.857 ¹ (0.332)		−0.928 ¹ (0.285)
Log(bank employees/real loans) (based on national numbers)							0.456 (0.866)
Log(bank employees/real GDP) (based on national numbers)							0.394 (2.287)
Log(bank employees)						−1.130 ¹ (0.432)	
Log(real GDP)						0.843 ¹ (0.245)	
Log(real loans)						0.453 ⁵ (0.225)	
Year relation started	0.042 ¹ (0.007)	0.043 ¹ (0.007)	0.049 ¹ (0.008)	−0.002 (0.017)	−0.002 (0.019)	0.008 (0.018)	0.037 (0.140)
R ²	0.285	0.284	0.216	0.289	0.143	0.289	0.289
Number of observations	5,945	5,945	5,945	5,633	3,517	5,633	5,633

⁵ and ¹ Significance at the 5% and 1% levels, respectively.

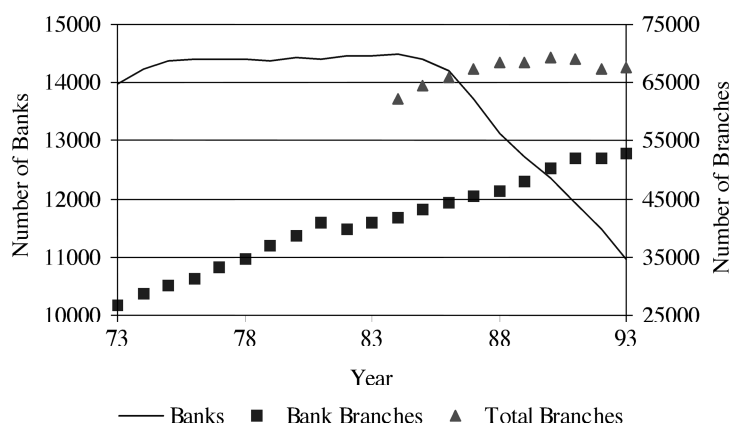


Figure 4. Number of banks and bank branches. The number of banks and bank branches is taken from the Federal Deposit Insurance Corporation (FDIC) web site. The number of banks is graphed along the left axis as a line and is stable until 1984 when it begins to decline. The number of branches is graphed along the right axis. The graph contains both the number of bank branches and the number of bank plus S&L (total) branches. The data on S&L branches is available only since 1984.

banks acquiring savings and loans. Thus, counting both sources, the total number of branches has remained static since the mid-1980s (see Figure 4 and Berger et al. (1999)). Finally, recall that we even find the distance between nonbanks and their borrowers is increasing. Since it is not clear that nonbanks are consolidating to the same extent as banks, we have to find a better explanation.

B. Changes in the Deposit Market

Another possible explanation has to do with the removal of intrastate and interstate branching restrictions over the 1970s and 1980s (see, e.g., Kroszner and Strahan (1999)), which permitted greater competition from more distant banks in local deposit markets. Most firms use deposit accounts, and if they have had greater freedom to deposit in more distant banks over time, they may have naturally proceeded to also borrow from them. If there are natural synergies for the firm between deposits and borrowing (see Nakamura (1989), Mester, Nakamura, and Renault (1998)), then we may be seeing the consequences of liberalization of the deposit market rather than any change in lending. However, this explanation is not fully consistent with the evidence. First, deposit market deregulation really took off in the 1980s, even though the trend we have noted in the growing distance between borrowers and lenders existed earlier. Second, the distance between firms and where they deposit has been growing only at about 40 percent of the rate at which the distance between firms and their lenders has been growing. To document this, we constructed a

data set that mirrors our borrower–lender pairs data set. In the new data set, each observation represents a firm–checking account provider pair. When we run a regression with log of one plus the distance to the branch where the firm has a checking account as the dependent variable and the calendar year in which the relationship started as an explanatory variable, we find that firms are also moving away from their checking accounts providers, but at a much slower rate than from their lenders. The rate of movement is only 1.4 percent per year ($t = 4.0$) versus 3.4 percent per year.

It should not come as a surprise that the growing distance in deposit markets is insufficient to explain the growing distance in the loan market. After all, the distance between firms and nonbank lenders has also been growing, and these lenders typically do not offer deposit accounts. Thus, it is unlikely that the increasing ability to deposit at a distance explains why firms borrow increasingly at a distance. In fact, the causality could well go in the opposite direction.

C. Changes in Credit Quality

Another possibility is that lenders have simply thrown caution to the winds and have reduced their credit standards and monitoring. A loan can easily be made at a distance if the lender is less concerned about recovery. To test this idea, we include loan losses expressed as a percent of total loans in the regression. In both the distance and the method of communication models, loan losses have little explanatory power and are statistically insignificant (see Tables VI and VII, column III). Loan losses have risen and fallen over the business cycle, but there has not been a secular increase in loan losses over our sample period that would explain the changes in the lending market which we document. We now offer a hypothesis about the causes of the phenomenon we have found.

III. Greater Use of Information Technology and the Declining Importance of Distance

Unlike large firms, the information available about small and private firms has historically been limited and difficult to access. With the exception of some high growth industries, which are a very small portion of our sample, analysts do not follow these firms. Since small firms do not raise capital in public markets, they are not required to disclose much information. The firm's lenders clearly know about the firms, but these lenders are few in number and did not readily share information in the past. Since information about the firm was not compiled, stored, and distributed by a central bureau, but instead resided in the minds of the firm's lenders, much of it tended to be soft, whether the firm's managers were of good character and reliable, for example, rather than hard information specifying when and to whom it had, or had not, made payments in the past.

A. Growing Use of Information Technology

The use of information and communications technology, by which we mean everything from hardware like computers and phones to software like credit scoring and client profitability programs, has transformed the financial sector over the last three decades (Mishkin and Strahan, (1999)). Three aspects are particularly significant to us. First, the ability to collect, store, process, and communicate large amounts of information has expanded tremendously. Second, this has resulted in the expansion of the activities of infomediaries whose sole purpose is to make available this information to paying customers. Third, the availability of hard, processed information lends itself to cost-effective credit appraisal and monitoring techniques that do not require close and personal contact. Since the first aspect is fairly uncontroversial, let us examine the latter two in more detail.

A.1. Expansion of the Activities of Infomediaries

Technological change has resulted in the expansion of the activities of infomediaries such as rating agencies and credit bureaus. For example, Dun and Bradstreet (D&B) collects information about firms from millions of on-site and telephone contacts with business owners and managers, as well as from government filings, the firm's banking and trade partners, and public news sources. Over our sample period (1973 to 1993), the number of firms on which D&B has records has grown 6.3 percent per year, a rate over two and a half times the real growth of the economy. Specialized infomediaries like D&B can save on duplication and amortize the costs of information collection over a larger number of customers than could lenders in the past. As a result, they can distribute more information than ever before to lenders and do so in a timely manner that does not depend upon geographic proximity.

A.2. More Efficient Appraisal and Monitoring

The increased availability of systematic reliable information has allowed loan officers to cut down on their own monitoring. While, undoubtedly, some soft information that is hard to collect and communicate is no longer captured when the loan officer ceases to make regular visits to the firm, it may be more than compensated by the sheer volume and timeliness of hard information that is now available. Moreover, because it is hard, the information can now be automatically processed, eliminating many tedious and costly transactions. For example, credit scoring, a process by which a loan applicant's credit history and characteristics are summarized in a credit score which forms the basis for loan approval, is increasingly used by large lenders such as Wells Fargo to make lending decisions even for small businesses (Mishkin and Strahan (1999), Berger and Udell (2000)). By using financial histories, credit reports, and scoring methods, lenders can dramatically lower the time their loan officers spend on a given application and thus the cost (Mester (1997), Padhi, Srinivasan, and Woosley (1999)).

Small firms gain substantially from reductions in the fixed costs of loan origination and information collection (Frame, Srinivasan, and Woosley (2001)). Firms in the survey were asked the total fee (not including interest) that they paid to obtain their loan. The level of the fee is uncorrelated with the size of the loan across the sample (correlation = 0.001). Thus, fees as a fraction of the loan size declined with the size of the loan. Given these costs are largely fixed, their reduction should produce the largest gain for the smallest firms. The average loan in the survey is approximately \$18,000. Additionally, if transactions costs drop sufficiently, the number of lenders that are willing to lend may expand. This has the possibility of not only expanding the supply of finance to small firms, but also, to the extent that geographically larger markets are more competitive, reducing the cost of financing.

In addition, when information is timely, the lender can reduce the potential loss from borrower moral hazard. If a borrower, either because of incompetence or malevolence, takes improper actions, the lender can act quickly to stop further lending and demand repayment. By contrast, if the lender acquires information after a long lag, the borrower's assets may have deteriorated under poor management, and other lenders may have seized anything of value. Timely information reduces the costs of lending. Thus, the growing use of information technology could explain both the growth in lending at a distance, and the fact that credit losses have not increased as a result. Let us now explore ways of testing this hypothesis.

A.3. An Empirical Test

Our finding that the physical distance between lender and borrower has expanded and that the interaction between the two has become less personal is consistent with the intuition that information technology is replacing the traditional role of the loan officer. In this section, we see if our results can be explained by measures of information technology use.

The use of credit scoring models is an example of the classic substitution of capital for labor. Previously, loan officers would read the application material from the borrower, talk with the borrower, maybe interview references and then make a decision, a very labor intensive process, but the nature of the information upon which the decision was based demanded such time (Mester (1997)). Credit decisions based on credit reports (computerized data) and analytic decision rules (computerized logic), however, require less of the loan officer's time. It is not that personal intervention has been eliminated, it has just been focused on the most marginal decisions. Loan originations involve fewer people and more computers. While fully automated credit scoring has only recently been implemented by some lenders, the process of automating the lending and monitoring decision has been going on for some time.

To see if this explains our findings, we collected data on bank employment. The ideal measure is the number of loan originations per loan officer,

as this is a measure of labor productivity and should rise systematically as information technology supplements the efforts of the loan officers. In the absence of these data, the empirical challenge is to find the correct normalization. Bank employment has grown over the last two decades. However, when normalized by either total lending or the size of the local economy (measured in real dollars), bank employment is shrinking (see Figure 5).

To test the hypothesis that changes we find in the lending market are due to the greater use of information technology, we include in our regressions the log of bank employees in the region standardized by total real loan volume or by the size of the economy (total real regional output). The results are reported in Table VI, column IV. Fewer employees are associated with a greater distance between lender and borrower. However, only when we standardize number of employees by the total output is the coefficient statistically significant ($t = 2.6$). In this case, every 10 percent decrease in the number of employees to gross regional product raises the distance to a firm's lender by 4.7 percent. This explains a large fraction of the increase in distance over the last two decades. Based on the decline in employees between 1977 and 1993 and the coefficients on bank productivity, the predicted increase in distance is 58 percent of that implied by the coefficient on the year the relationship started in Table II. Consistent with this intuition, the coefficient on the year the relationship started drops significantly and is no longer statistically different from zero ($p = 0.20$, see Table VI, column IV). Increases in bank productivity correlate strongly with growing distance.¹²

The results for method of communication are qualitatively similar (see Table VII, column IV). As the number of employees standardized by real total loan volume or real gross regional product has declined, personal communication has decreased. Both measures of productivity are now statistically significant ($t = -3.3$ and -3.2). As with distance, these variables explain a large fraction of shift away from personal communication. The coefficient on year the relationship originated is no longer statistically significant ($p = 0.90$). The explanatory power of the time trend has been absorbed by the bank productivity measures.

Given the regression results and Figures 1–3, there may be concern that any trending variable will explain the shift in distance and method of communication that we document. This is not correct. The data are able to distinguish between a simple time trend (the year variable) and the standardized bank employees variable, with only the latter being statistically significant. However, to demonstrate our point more strongly, we ran an additional test. We created a new variable which is the log of bank employees standardized by total loans and by total output, not for the region in which the firm is located, but for the United States as a whole. This variable has time-series

¹² The dependent variable is the distance between a firm and its lender, which may or may not be a bank. To check the robustness of our results, we reran the regression on only firm–bank pairs and the results are qualitatively unchanged (see Table VI, compare columns IV and V).

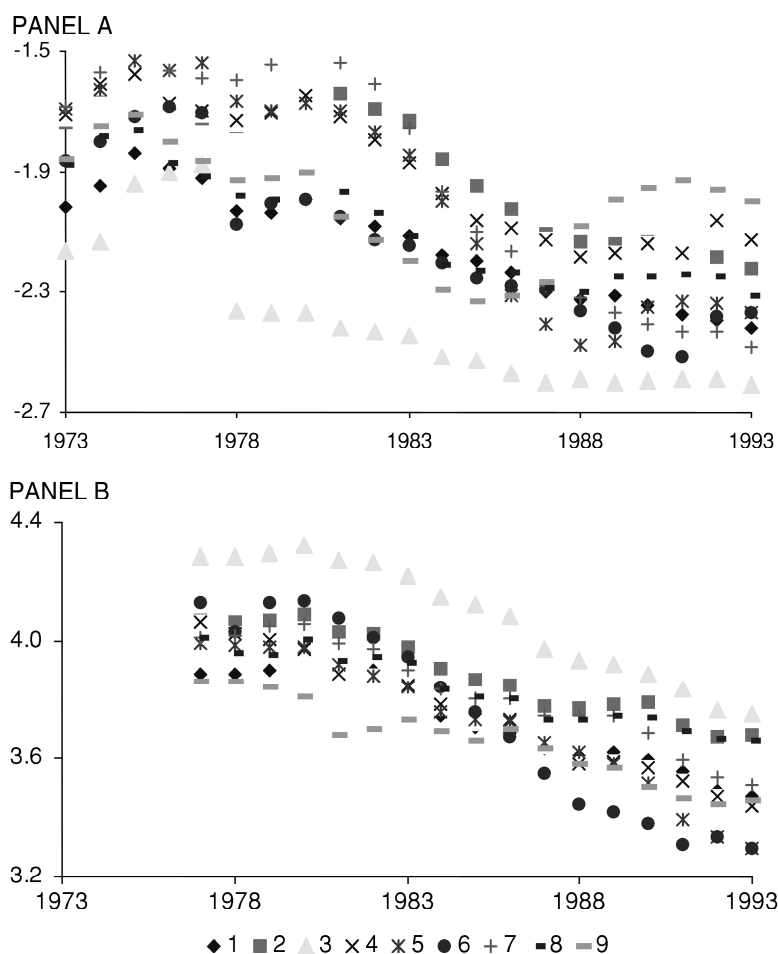


Figure 5. Total bank employment relative to total real bank lending and total bank employment relative to real gross region product. Panel A is the graph by census region (1–9) and year of the log of total bank employment divided by total real bank lending (in \$1,000s) against time. Both numbers are from the Federal Deposit Insurance Corporation (FDIC). Regional numbers are the sum of the numbers for each state in the region. Panel B is the graph by census region and year of the log of total bank employment divided by real gross region product. Gross state product data is from the Bureau of Economic Analysis (BEA), Commerce Department. (The FDIC numbers are from <http://www2.fdic.gov.hsob/> and the Commerce department numbers are from <http://www.bea.doc.gov/bea/regional/gsp/gsplist.htm>.) Gross state product is only available since 1977 and is reported in millions of dollars. Regional numbers are the sum of the numbers for each state in the region.

variation, but no cross regional variation, by construction. It is correlated with the region variable, but not perfectly ($\rho = 0.74$). When we include both the region-specific employee variables and the aggregate (U.S.) employee variables, the national variables are statistically insignificant both singly

and jointly (see Tables VI and VII, column VII). The distance between a firm and its lender is correlated with the use of more productive techniques by banks in the firm's region, but not with more productive techniques in the country at large.

B. Consequences of Growing Distance

We have argued that lenders may be willing to go further because they expect to get information for the purposes of monitoring and controlling firms more easily and quickly at a distance than in the past. Credit reports from centralized bureaus may be one source of this additional information. If new technologies permit better monitoring and control at a distance, we should see that the ability to borrow at a distance is no longer such a strong signal of the intrinsic credit quality of the firm. In the past, only those with unimpeachable credit histories could borrow at a distance because there was no way for a distant lender to anticipate when a weaker borrower would get into trouble, and it was very costly to resolve distress at a distance when the borrower was in trouble. More recently, however, lower quality borrowers should be able to get credit at the same distance because information costs are lower and timely intervention is now possible.

We have two immediate problems in implementing this test. First, we do not have a measure of the credit quality of the borrower when the relationship started. However, we do know the rate on the last loan the firm obtained, as well as whether the firm's last loan application was approved or rejected. This gives us two measures of recent credit quality. A second problem is that distance is, by itself, not a perfect measure of a firm's intrinsic ability to tap into a wider pool of lenders. Lenders can be at a distance because information about the firm's quality is widespread (i.e., it is informationally transparent). A firm can also be at a distance from its lenders simply because there are no nearby lenders (firms in rural areas are 13 percent further from their lenders, see Table IV). Thus, all components of actual distance need not convey information about credit quality. We can, however, extract the ability to borrow at a distance that is correlated with public information. This is distance predicted using the regression coefficients in Table IV and is a measure of the transparency of the firm.¹³

If firms with poorer credit histories can borrow at a distance now, while they could not in the past, predicted distance from lending relationships which were established in recent years should be a weaker signal of credit

¹³ We use the coefficient estimates from Table IV, column IV, to predict distance and estimates from Table V, column III, to predict method of communication. We only use those variables which we think measure the firm's informational transparency in our predicted distance and method. These include whether the firm uses records, whether the firm has a business credit card, the ownership share of the largest shareholder, whether the firm is a corporation, whether the firm is a franchise, whether the firm is owner managed, the age and experience of the owner, and the sales region of the firm. We omitted variables such as lender type, as this is part of the firm's choice set and not a characteristic of the firm.

Table VIII
Determinants of Interest Rate on Firm's Most Recent Loan

The dependent variable is the rate on the most recent loan. The estimates in columns III and VI are identical to those in columns II and V, except the standard errors have been estimated by bootstrapping (1,000 repetitions). The models also include a dummy variable for whether the firm is a corporation, whether the loan is collateralized, and whether the firm or the firm's owner has had a delinquency in the last three years. The data are taken from the 1993 National Survey of Small Business Finance.

Independent Variables	Models					
	I	II	III	IV	V	VI
Maturity matched treasury rate	0.367 ¹ (0.029)	0.367 ¹ (0.029)	0.367 ¹ (0.029)	0.369 ¹ (0.029)	0.370 ¹ (0.029)	0.370 ¹ (0.029)
Log(firm's assets)	-0.243 ¹ (0.021)	-0.243 ¹ (0.021)	-0.243 ¹ (0.021)	-0.242 ¹ (0.021)	-0.242 ¹ (0.021)	-0.242 ¹ (0.022)
Outside debt/assets	-0.107 (0.067)	-0.107 (0.067)	-0.107 (0.080)	-0.104 (0.067)	-0.103 (0.067)	-0.104 (0.079)
Log(1 + firm age)	-0.024 (0.044)	-0.032 (0.048)	-0.032 (0.049)	-0.015 (0.044)	-0.012 (0.047)	-0.012 (0.050)
Loan has floating rate (1 = yes)	0.030 (0.074)	0.030 (0.075)	0.030 (0.071)	0.032 (0.075)	0.032 (0.075)	0.032 (0.072)
Lender is a bank (1 = yes)	-0.565 ¹ (0.099)	-0.567 ¹ (0.099)	-0.567 ¹ (0.148)	-0.557 ¹ (0.099)	-0.556 ¹ (0.099)	-0.556 ¹ (0.150)
Lender is nonfinancial firm	-0.460 ⁵ (0.230)	-0.459 ⁵ (0.230)	-0.459 (0.485)	-0.443 ⁵ (0.230)	-0.444 ⁵ (0.230)	-0.444 (0.484)
Number of financial lenders	0.075 ¹ (0.021)	0.076 ¹ (0.021)	0.076 ¹ (0.018)	0.073 ¹ (0.021)	0.073 ¹ (0.021)	0.073 ¹ (0.018)
Predicted distance from lender	-0.546 ¹ (0.179)	-0.528 ¹ (0.184)	-0.528 ⁵ (0.217)			
Predicted distance * year relation started		-0.001 (0.004)	-0.001 (0.003)			
Predicted method used to communicate with lender				-1.328 ¹ (0.418)	-1.398 ¹ (0.542)	-1.398 ¹ (0.546)
Predicted method * year relation started					0.005 (0.024)	0.005 (0.021)
R ²	0.174	0.175	0.175	0.175	0.175	0.175
Number of observations	3,523	3,523	3,523	3,523	3,523	3,523

⁵ and ¹ Significance at the 5% and 1% levels, respectively.

quality than distance from relationships set up in the distant past. We examine the effect of predicted distance on the price and availability of credit in Tables VIII and IX, both by itself and when interacted with time. This allows us to see the effect on informational transparency on the cost and availability of finance and how this has changed over our sample period.

In Table VIII, we regress the rate a firm obtains on its most recent loan against predicted distance as well as other controls from Petersen and Rajan (1995). Predicted distance has a negative and significant effect on the rate (see column I). An increase in predicted distance of 50 percent lowers the cost of borrowing by 25 basis points. This is twice the effect of a 50 percent increase in the size of the firm. Thus, the ability to borrow at a distance,

Table IX
Probability of Loan Approval on Most Recent Loan

The table contains estimates from a logit model. The independent variable is one if the firm was approved for a loan and zero otherwise. The sample includes both those firms that applied for a loan as well as those firms that did not apply for a loan because they expected to be turned down. The last group is coded as being turned down for a loan. Only loans that were applied for (or considered) in the last three years are included. The estimates in columns III and VI are identical to those in columns II and V, but the standard errors have been estimated by bootstrapping (1,000 repetitions). The models also include a dummy variable for whether the firm is a corporation, whether the loan is collateralized, and whether the firm or the firm's owner has had a delinquency in the last three years. The data are taken from the 1993 National Survey of Small Business Finance.

Independent Variables	Models					
	I	II	III	IV	V	VI
Log(firm's assets)	0.350 ¹ (0.026)	0.349 ¹ (0.026)	0.349 ¹ (0.026)	0.352 ¹ (0.026)	0.349 ¹ (0.026)	0.349 ¹ (0.025)
Return on assets (profits/assets)	0.375 ¹ (0.080)	0.386 ¹ (0.080)	0.386 ¹ (0.080)	0.382 ¹ (0.079)	0.381 ¹ (0.080)	0.381 ¹ (0.080)
Outside debt/assets	0.005 (0.015)	0.005 (0.015)	0.005 (0.020)	0.004 (0.015)	0.004 (0.015)	0.004 (0.021)
Corporation (1 = yes)	-0.034 (0.104)	-0.028 (0.104)	-0.028 (0.115)	-0.037 (0.105)	-0.036 (0.105)	-0.036 (0.111)
Firm age	0.008 (0.006)	0.008 (0.006)	0.008 (0.005)	0.007 (0.005)	0.007 (0.005)	0.007 (0.005)
Length of longest relationship	0.012 (0.009)	0.004 (0.010)	0.004 (0.010)	0.012 (0.009)	0.004 (0.010)	0.004 (0.010)
Debt from financial service provider (%)	1.590 ¹ (0.107)	1.563 ¹ (0.108)	1.563 ¹ (0.115)	1.584 ¹ (0.107)	1.554 ¹ (0.108)	1.554 ¹ (0.113)
Number of financial lenders	0.021 (0.029)	0.028 (0.029)	0.028 (0.029)	0.020 (0.029)	0.029 (0.029)	0.029 (0.030)
Herfindahl index > 1,800	0.187 ⁵ (0.080)	0.184 ⁵ (0.080)	0.184 ⁵ (0.078)	0.191 ⁵ (0.080)	0.187 ⁵ (0.080)	0.187 ⁵ (0.079)
Predicted distance from lender	0.680 ¹ (0.257)	0.824 ¹ (0.269)	0.824 ¹ (0.297)			
Predicted distance * year relation started		-0.010 ¹⁰ (0.006)	-0.010 ¹⁰ (0.006)			
Predicted method used to communicate with lender				1.614 ¹ (0.638)	2.927 ¹ (0.928)	2.927 ¹ (0.967)
Predicted method * year relation started					-0.084 ⁵ (0.024)	-0.084 ⁵ (0.043)
Pseudo R^2	0.172	0.173	0.173	0.172	0.173	0.173
Number of observations	4,548	4,548	4,548	4,548	4,548	4,548

¹⁰, ⁵, ¹ Significance at the 10%, 5%, and 1% levels, respectively.

predicted by measures of the firm's informational transparency, seems to be a good signal about the credit quality of the firm.

When we include an interaction between the year the relationship started and distance, however, the coefficient for the interaction is not significantly different from zero (see column II). Although predicted distance has a large effect on the cost of capital, this effect does not appear to have changed over

time. In column III, we estimate standard errors by bootstrapping, and this does not significantly change the statistical power of our results.¹⁴ When we used predicted method of communication instead of predicted distance as a measure of transparency, we obtain exactly the same qualitative results. If a lender is willing to deal with the firm by mail or phone, the firm gets a lower rate on its most recent loan, but the coefficient on the interaction between predicted method and year is insignificant.

The absence of time effects may reflect the fact that the rate for small loans is often determined by standard boilerplates, based on standard information such as firm size and industry (Petersen and Rajan (1994)). This is especially likely when loans are made by branches of large banks (see Brickley, Linck, and Smith (2000), and Stein (2002)). Petersen and Rajan find that while the rate charged on a loan is not sensitive to measures of the information that is generated about a borrower (such as the duration of the relationship with the lender), the availability of credit is. So if information is more widely available over time, the reduced effectiveness of distance as a signal of credit quality over time will not be seen in the rate but in the availability of credit. As we will now argue, this is indeed the case.

A direct measure of whether credit is available for a firm is whether the firm's last application for a loan is approved. Of course, a loan can be approved only if it was applied for. The firm will apply for credit if it needs funds and it thinks approval is sufficiently likely, and not otherwise. However, those who need funds but do not apply because they think their application will be refused should also be thought of as rationed. Therefore, a firm is included in the regression below if it either applied for a loan, or needed financing but did not apply for a loan because it felt it would be denied. The dependent variable for the regressions reported in Table IX is whether a firm's loan application was approved. Firms whose loan application was approved are coded as one. Those who needed funds but did not apply are considered equivalent to those who needed funds and were rejected, and are coded as zero.

Together with controls for availability taken from Petersen and Rajan (1994), we include predicted distance as an explanatory variable in Table IX. Predicted distance is indeed a measure of intrinsic credit quality of the firm. Higher predicted distance is strongly positively correlated with greater availability of funding (column I). Increasing predicted distance from the 25th to the 75th percentile raises the probability a loan will be approved by 21 percentage points. Unlike the results for the interest rate (Table VIII), however, the inclusion of an interaction between the year the relationship was started

¹⁴ The reported standard errors in column II are OLS standard errors. This is a problem since predicted distance and predicted distance interacted with the year the relationship started are predicted regressors. We estimated standard errors by bootstrapping the model. A sample with replacement was drawn. We then estimated the first stage, created the predicted distance variables given those estimates, and then estimated the second stage (the model in Table VIII, column II). This gave us a single estimate of the coefficients. This was done 1,000 times, and the standard error of this distribution of estimates is reported in column III.

and predicted distance has a statistically significant negative coefficient (column II) that persists even after we compute boot strapped standard errors (column III). This suggests that the distance at which a firm is able to borrow has become less significant in distinguishing its credit quality in recent times. The coefficient estimates imply that the role of predicted distance on the firm's access to capital is approximately 25 percent less in 1993 as compared with 1973. As before, the results are similar when we use predicted method of transacting instead of predicted distance.¹⁵

In summary, firms that are informationally more transparent (have greater predicted distance and lower probability of personal communication) face less credit rationing and are charged lower interest rates. However, the relation between predicted distance and credit availability is weakening over time. If predicted distance is no longer such a strong signal of credit quality, the implication is that riskier credits are being financed at a greater distance. Since loan losses have not steadily risen over this period and have no strong correlation with distance, we are left to conclude that a more distant and less creditworthy set of borrowers have become viable to lenders because improvements in technology allow cheaper screening, monitoring, and control, at a distance. Our results are consistent with the information and communications revolution making distance less important.

IV. Conclusion and Discussion

We have documented a trend in the distance between small firms and their lenders in the United States. Firms are choosing more distant lenders and are also communicating with them in more impersonal ways. The evidence suggests the trend correlates well with the increases in the productivity of lenders. One explanation for why financial institutions are doing more distant lending without making poorer decisions is that advances in computing and communications have increased the availability and timeliness of hard information, thus allowing for more impersonal and distant lending. Our finding that distant firms are no longer only the highest quality credits is consistent with this hypothesis. The important implication is that credit availability for small firms as well as the competition they face in the credit markets, has increased.

The paper makes a number of contributions. For one, it focuses on new metrics for informational closeness: physical distance and method of communication. Others have used distance as a proxy for informational asymmetry (e.g., see Coval and Moskowitz (1999), Garmaise and Moskowitz (1999), and Grinblatt and Keloharju (2001)). To the best of our knowledge, however, we have not seen this correlated with the nature of the institution or with

¹⁵ It turns out that actual distance is, indeed, a noisy estimate of what we are trying to measure. When we reran the regressions in Tables VIII and IX using actual, rather than predicted distance, the coefficients on distance are an order of magnitude smaller than we report in Tables VIII and IX, and are only statistically significant in the approval regressions.

credit availability and price. We find that informationally opaque firms have closer lenders, and that banks are closer than other lenders (even correcting for the fact that banks offer transaction accounts). Also, correcting for distance and the existence of transaction accounts, bank transactions are more likely to be conducted in person than transactions with other lenders. All this suggests that banks are indeed closer, and their loans are more relationship based than nonbank lenders.

While banking theory has indeed suggested that bank loans are more likely to be relationship based (see Fama (1985) and Diamond and Rajan (2001)), the empirical literature has not found much difference between the stock price reactions to bank loan announcements and announcements of loans by nonbanks (see Billett, Flannery, and Garfinkel (1995)). Our paper, by contrast, suggests an extremely strong empirical difference between bank lending and nonbank lending. Perhaps our sample of small firms is more amenable to identifying these differences than the typical sample used in the past, which, because of the focus on publicly recorded loan announcements, is restricted to large firms. Perhaps, also, our measure of physical and personal distance may be more informative than stock price reactions to loan announcements, especially because there may be biases in which loans are announced. But there is also a chance that our findings are purely mechanical.

One possible argument is that since banks can offer checking accounts, they have a lower cost of maintaining a branch network (the fixed costs are amortized over both loans and checking accounts). Thus, for a given size of loan portfolio, a bank is likely to be able to access closer clients through its branch network than a similar sized nonbank. The closeness of banks may simply be because of their branch network, rather than any superiority in monitoring of the kind that requires physical proximity.¹⁶ We do not, however, think this accounts for our results. The reason is that our comparison is not between the average distance of a bank's loan portfolio from the bank and the average distance of a nonbank's portfolio from the nonbank. Instead, it is the distance of a firm from its bank or nonbank lender. This distinction is important.

To see why, let us conduct two thought experiments. In the first, let there be a cost to a firm of going further away to borrow, but no cost differential between going to a bank branch and a nonbank if they are at the same distance. The firm would then pick the nearest lender, regardless of whether it is a bank branch or a nonbank. If firms, bank branches, and nonbanks are distributed randomly across the country, this would imply that firms would be *equally* close to bank branches and nonbanks. Of course, the fraction of loans firms have from bank branches and nonbanks would reflect their relative number in the population, but this would have no effect on the distance between a firm and a particular lender.

¹⁶ While theory does suggest that banks' ability to offer deposits and their ability to make relationship-intensive loans are related (see Diamond and Rajan (2001)), the reasons are quite different from those suggested above.

In the second thought experiment, let there be no additional cost to the firm of going further away to borrow. In this case, the firm would simply pick at random from the population of bank branches and nonbanks. Again, assuming both types of institutions are placed randomly, there would be no difference in distance between a firm and a particular lender type.

Finally, perhaps banks are nearer only because the firm has deposits with them. We have shown that even banks where the firm does not have deposits are near. Perhaps the firm once had deposits with these banks and does not at the time of the survey. To check this, we examine the first relationship for young firms (those less than five years old). This is a subsample where deposit accounts are likely to be present if they existed at all, so "bank" is less likely to proxy for the former existence of deposit transactions. It turns out that firms which borrow from nonbanks are 124 percent further from their lender than firms which borrow from banks (using the specification in Table II, column I), approximately the same as in the overall sample (117 percent).

In sum, the difference in distance between banks and nonbanks is unlikely to be due to the bank's branching network. It must reflect a difference in comparative advantage. Perhaps the nonbank is better at monitoring loans at a distance; perhaps the bank is better at the kind of monitoring that requires a physical presence. We cannot discern what the source of comparative advantage is, only that it seems to exist. The evidence does seem suggestive that banks are physically close lenders because the nature of the lending functions they perform is different.

Our findings have policy implications. If information technology can increase the services provided to, and competition in, the sector that has historically been viewed as the most informationally sensitive and thus most local, that is, small business lending, then the relevant size of the market for antitrust policy will have to be revised upwards over time. Of course, antitrust authorities may have other markets than just small business lending in mind, and some of these markets, such as the market for transaction deposits, are growing more slowly (Woosley, King, and Padhi, (2000)). The growth in size of all these markets nevertheless implies that the regulatory authority monitoring stability in local markets should become less willing over time to intervene to bail out regional financial institutions since the services they provide can be provided from outside the region.

Our findings also have implications for other areas of research. The increased availability of finance to small firms could also have an influence on macroeconomic policy. For example, Gertler and Gilchrist (1994) suggest that small firms account for a disproportionate share of the manufacturing decline that follows monetary tightening. If the access of small firms to credit has improved, then it may well be that monetary policy will have much less effect than in the past.

There has been a debate about whether institutional lending, especially bank lending, is in secular decline because of the greater availability of information to arm's length financial markets today (see Boyd and Gertler

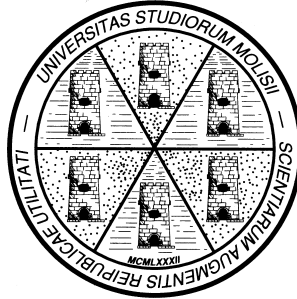
(1994) and Gorton and Rosen (1995) for two contrasting views). Our evidence suggests that institutional lending also seems to have benefitted from the greater availability of information. This greater availability of hard information has enabled institutions to lend to more distant clients whom they would have shunned in the past. Thus, instead of driving financial institutions such as banks out of the business, technological change may also create new sources of comparative advantage for some of them (Merton (1995)).

Finally, there is an ongoing debate about whether the effects of the improvements in information technology result in improvements in productivity (e.g., see Gordon (1999)). Our evidence, while not directly addressing this issue, suggests that at least in the financial sector, the nature of transactions is changing in a direction consistent with greater information availability and reduced costs of processing it. When combined with evidence that these changes are correlated with improvements in bank productivity, this should strengthen our belief that information technology does indeed increase productivity. More research is needed to put these conclusions on stronger ground.

REFERENCES

- Berger, Allen, Rebecca Demsetz, and Philip Strahan, 1999, The consolidation of the financial services industry: Cause, consequences, and implications for the future, *Journal of Banking and Finance* 23, 137–194.
- Berger, Allen, and Robert DeYoung, 2000, The effects of geographic expansion on bank efficiency, Working paper 2000-14, Federal Reserve Board.
- Berger, Allen, Anthony Saunders, Joseph Scalise, and Gregory Udell, 1998, The effects of bank mergers and acquisitions on small business lending, *Journal of Financial Economics* 50, 187–229.
- Berger, Allen N., and Gregory F. Udell, 1995, Small firms, commercial lines of credit, and collateral, *Journal of Business* 68, 351–382.
- Berger, Allen, and Gregory Udell, 2000, Small business and debt finance, in Zoltan J. Acs and David B. Audretsch, eds.: *Handbook of Entrepreneurship*, forthcoming.
- Billett, M., M. Flannery, and J. Garfinkel, 1995, The effect of lender identity on a borrowing firm's equity return, *Journal of Finance* 50, 699–718.
- Boyd, J., and M. Gertler, 1994, Are banks dead? Or are the reports greatly exaggerated? *Federal Reserve Bank of Minneapolis Quarterly Review* 18, 2–23.
- Brickley, J., J. Linck, and C. Smith, 2000, Boundaries of the firm: Evidence from the banking industry, Working paper, University of Rochester.
- Cole, Rebel, John Wolken, and Louise Woodburn, 1996, Bank and nonbank competition for small business credit: Evidence from the 1987 and 1993 National Surveys of Small Business Finances, *Federal Reserve Bulletin* 82, 983–995.
- Coval, Joshua D., and Tobias J. Moskowitz, 1999, Home bias at home: Local equity preference in domestic portfolios, *Journal of Finance* 54, 2045–2073.
- Diamond, Douglas, 1984, Financial intermediation and delegated monitoring, *Review of Economic Studies* LI, 393–414.
- Diamond, Douglas, and Raghuram Rajan, 2001, Liquidity risk, liquidity creation, and financial fragility: A theory of banking, *Journal of Political Economy* 109, 287–327.
- Fama, Eugene, 1985, What's different about banks? *Journal of Monetary Economics* 15, 29–36.
- Frame, Scott, Aruna Srinivasan, and Lynn Woosley, 2001, The effect of credit scoring on small business lending, *Journal of Money, Credit, and Banking* 33, 813–825.

- Garmaise, Mark, and Tobias Moskowitz, 1999, Confronting information asymmetries: Evidence from real estate markets, Working paper 507, University of Chicago.
- Gertler, Mark, and Simon Gilchrist, 1994, Monetary policy, business cycles, and the behavior of small manufacturing firms, *Quarterly Journal of Economics* 109, 309–341.
- Gordon, Robert J., 1999, Has the new economy rendered the productivity slowdown obsolete? Working paper, Northwestern University.
- Gorton, Gary, and Richard Rosen, 1995, Corporate control, portfolio choice, and the decline of banking, *Journal of Finance* 50, 1377–1420.
- Grinblatt, Mark, and Matti Keloharju, 2001, Distance, language, and culture bias: The role of investor sophistication, *Journal of Finance* 56, 1053–1073.
- James, Christopher, 1987, Some evidence on the uniqueness of bank loans, *Journal of Financial Economics* 19, 217–235.
- Kroszner, R., and P. Strahan, 1999, What drives deregulation? Economics and politics of the relaxation of bank branching restrictions, *Quarterly Journal of Economics* 114, 1437–1467.
- Merton, R., 1995, Financial innovation and the management and regulation of financial institutions, *Journal of Banking and Finance* 19, 461–482.
- Mester, Loretta, 1997, What's the point of credit scoring, *Business Review* (Federal Reserve Bank of Philadelphia) 124, 3–16.
- Mester, Loretta, Leonard Nakamura, and Micheline Renault, 1998, Checking accounts and bank monitoring, Working paper, Federal Reserve Bank of Philadelphia.
- Mishkin, Frederic S., and Philip E. Strahan, 1999, What will technology do to financial structure? in Robert Litan and Anthony Santomero, eds.: *The Effect of Technology on the Financial Sector* (Brookings Institutions Press, Washington, DC).
- Nakamura, Leonard, 1989, Loan workouts and commercial bank information: Why banks are special, Working paper 89-11, Federal Reserve Bank of Philadelphia.
- Padhi, Michael, Aruna Srinivasan, and Lynn Woosley, 1999, Credit scoring and small business lending in low and moderate income communities, Working paper, Federal Reserve Bank of Atlanta.
- Petersen, Mitchell, and Raghuram G. Rajan, 1994, The benefits of lending relationships, *Journal of Finance* 49, 3–37.
- Petersen, Mitchell, and Raghuram G. Rajan, 1995, The effect of credit market competition on firm-creditor relationships, *Quarterly Journal of Economics* 110, 407–443.
- Polanyi, Michael, 1958, *Personal Knowledge: Towards a Post-Critical Philosophy* (University of Chicago Press, Chicago, IL).
- Rajan, Raghuram G., and Luigi Zingales, 2000, The great reversals: The politics of financial development in the twentieth century, Working paper, University of Chicago.
- Rhoades, Stephen, 1996, Bank mergers and industrywide structure 1980–1994, Staff Study 169, Federal Reserve Board.
- Stein, Jeremy, 2002, Information production and capital allocation: Decentralized versus hierarchical firms, *Journal of Finance* 57, 1891–1921.
- Strahan, Philip, and James Weston, 1998, Small business lending and the changing structure of the banking industry, *Journal of Banking and Finance* 22, 821–845.
- Uzzi, Brian, 1999, Social relations and networks in the making of financial capital, *American Sociological Review* 64, 481–505.
- Uzzi, Brian, 2000, Getting the best deal: The governance benefits of social networks in business lending, Working paper, Northwestern University.
- Woosley, Lynn, Frank King, and Michael Padhi, 2000, Is commercial banking a distinct line of business? *Economic Review* 4th Quarter, 39–58.



ECONOMICS & STATISTICS DISCUSSION PAPER
No. 08/48

**Bank cross-border mergers and acquisitions
(Causes, consequences and recent trends)**

by

Alberto Franco Pozzolo
University of Molise, Dept. SEGeS

Bank cross-border mergers and acquisitions (Causes, consequences and recent trends)

Alberto Franco Pozzolo^{*}
Università degli Studi del Molise

Abstract

In the past fifteen years, cross-border mergers and acquisitions have had an ever increasing role in the process of bank internationalization. Although a consensus view has developed on the determinants of a bank's decision to expand abroad and on the determinants of the patterns of expansion, the debate on the consequences of foreign bank presence is still open. The aim of this chapter is twofold. Firstly, it discusses the major results of the empirical literature studying the determinants, the patterns, and the consequences of bank foreign expansion. Secondly, it studies whether the determinants of bank foreign expansions have changed through time, estimating an econometric model of the patterns of cross-border bank M&As between 1990 and 2006.

JEL-classification: E30, G21, F21, F23.

keywords: international banking, foreign direct investment

^{*} I would like to thank Dario Focarelli, and Piero Alessandrini, Michele Fratianni and Alberto Zazzaro, the editors of the volume, for comments and suggestions on a previous version on the paper. Of course, all remaining errors and omissions are my only responsibility.

1 Introduction

International banking has grown substantially in recent years, as part of the ongoing process of the globalization of economic activities. Historically, it is not the first time that the banking sector has experienced an acceleration in its internationalization process. At the end of the XIX century, for example, foreign banks were already deeply involved in large investments abroad, in particular towards colonies. After nearly fifty years of quiescence, the surge in sovereign lending fostered again international banking activities, starting from the beginning of the 1960s and progressively gaining momentum. However, between 2001 and 2003 cross-border bank M&As witnessed a striking drop. Although this evolution has mainly mirrored that of national M&As in the financial as well as the manufacturing sector, some observers have suggested that this might have determined a change in the model of bank cross-border expansion.

Based on these stylized facts, this chapter has two main objectives. Firstly, it discusses the major results of the literature studying the determinants and the patterns of bank foreign expansion. Secondly, it tests if the traditional explanations of the patterns of bank internationalization are capable of explaining also the most recent evolutions, estimating an econometric model of the patterns of cross-border bank M&As between 1990 and 2006.

The empirical analysis concentrates on cross border M&As, the expansion strategy that gained most relevance in recent years. Indeed, as pointed out by Goldberg and Saunders (1981), banks can follow a number of different ways in order to extend their activities abroad,¹ but in recent years cross border banking activities have taken more and more the form of international acquisitions, especially by part of large and strong institutions in more developed countries towards the less developed economies. While from about the beginning of the 1960's to the mid 1980's the number of banks' foreign branches in the developed countries increased rapidly, in the following years foreign branching became less and less popular, determining for example a

¹ Banks can provide services to foreign counterparts, directly or through representative offices or agencies, open a foreign branch, open a brand new bank abroad or acquire shareholdings in a foreign bank (subsidiary). Direct lending is typically offered to large-scale borrowers, often in the form of syndicated loans which can be managed directly from abroad or through representative offices or agencies. Foreign branches can offer a broad range of banking services, although traditionally their activity is primarily concentrated in the wholesale market. Subsidiaries have the same banking powers as domestic banks, and are typically used to access the foreign retail markets.

reduction in the number of foreign institutions directly operating in New York from 323 at the end of 1985 to 205 in 1998 (Brealey and Kaplanis, 1996), and the number of cross-border mergers and acquisitions increased sharply (Berger et al., 2000). In the following years, the process of bank internationalization has gathered further speed, especially towards developing countries. The entry of foreign banks has been especially prominent, but again the pattern has not been geographically uniform. In some Latin-American and Central- and Eastern-European countries (CEECs), over 50 percent of total banking assets are now foreign-controlled. In the case of the CEECs, foreign entry has been favoured by the process of nationalization of the public financial institutions that has taken place as a move towards more market oriented economies (Papi and Revoltella, 2000). In Asia, Africa, the Middle East and the former Soviet Union progress has been slower, possibly due to stronger formal and informal entry barriers and because the overall process of integration has been less pronounced, but the trend has been remarkable also in these countries. Overall, according to Claessens and Lee (2002), in 2002 foreign banks accounted for about 7 per cent of total bank assets in low-income countries, up from 3 per cent of 7 years prior.

The surge in international banking activities has attracted the interest of the academic community, which has intensively analyzed the phenomenon, especially from an empirical point of view. The large number of studies produced in recent years have helped to reach a broad consensus on many questions related to bank internationalization, such as which banks expand abroad, where they go and what institutional form they adopt when entering foreign markets. On the contrary, to date the available evidence is less conclusive on whether entry is beneficial to the host country.

The rest of the paper is organized as follows. Section 2 discusses the available evidence on the patterns of bank internationalization, focusing on which banks are more likely to internationalize, where do they invest and which institutional form they choose to expand abroad. Section 3 describes the most recent trends in bank cross-border M&As and presents the results of the estimation of the econometric model on the determinants of bank cross-border M&As, aiming at verifying whether the acceleration of the last years follows different patterns from before. Section 4 discusses the effects of bank internationalization. The final section discusses what implications can be drawn from the available evidence and discusses some open questions.

2 Evidence on bank internationalization

2.1 Which banks expand abroad?

As mentioned in the introduction, the pattern of bank internationalization, although widespread, is unevenly distributed with respect to a wide number of characteristics: size of the banks involved, geographical patterns of foreign presence, institutional form of the presence abroad. The first step that I take in order to understand the overall process is therefore to describe the characteristics of the banks that are most likely to expand abroad.

A widely accepted result of the empirical literature is that banks with foreign asset participations are typically larger and better run, that they are located in countries more open to international trade and with a more developed banking system. Tschoegel (1983), Ursacky and Vertinsky (1999) and Focarelli and Pozzolo (2001), for example, found a positive correlation between the size of a bank and the probability that it has foreign participations, a fact that might be related to the presence of fixed costs in bank internationalization, to a stronger incentive for asset diversification, and to the fact that larger banks have larger clients who are more likely to benefit from having their home country bank follow them abroad². Focarelli and Pozzolo (2001) also found that banks with higher profitability and a larger share of non-interest over total income are more likely to hold foreign participations. More recently, Tschoegel (2002) has pointed to the fact that multinational banks are typically the larger in their country of origin, suggesting that the decision to expand abroad is related to the diminishing opportunities of expansion within the national borders, possibly also for antitrust reasons. Most important for the implications on the effects of the presence of foreign banks for the hosting economy, banks with a stronger propensity to internationalize have on average higher returns on assets, a higher share of non interest income and lower overhead costs.

Also the characteristics of the country of origin affect the probability that banks expand abroad. Grosse and Goldberg (1991), Magri and Rossi (2005) and Focarelli and Pozzolo (2001 and 2007) found that banks from countries with a more developed banking sector are more likely to be

² See also Ball and Tschoegl (1982), Tschoegl (1983), Williams (1996), Williams (1998), De Felice and Revoltella (2003), Focarelli and Pozzolo (2005), Piscitello and Pozzolo (2006).

present in foreign markets. Further, Focarelli and Pozzolo (2001) found a positive effect of the average country level profitability in the banking sector and of the incidence of non-traditional banking activities, and Magri et al. (2005) show that foreign banks in Italy are more likely to come from countries where the cost of provision is lower. The effect of the development of the stock market seems instead to depend on the sample of countries analyzed and on the measure of bank internationalization adopted (Focarelli and Pozzolo, 2001 and 2007). This is not too surprising since a more developed stock market is typically associated with more efficient financial institutions, but it can also provide wider profit opportunities to local banks, that therefore have lower incentive to expand abroad. Finally, ter Wengel (1995), Buch and DeLong (2004) and Berger et al. (2004) found that banks from countries with higher total GDP are more likely to be present in foreign markets, but in the specification adopted by Focarelli and Pozzolo (2007) this result is not confirmed.

Summarizing, the available evidence seems to suggest that foreign banks are likely to be among the most efficient in their country of origin and to come from the most developed banking markets. However, as pointed out by Chang et al. (1998) and confirmed by Berger et al.'s (2000) study of foreign subsidiaries in France, Germany, Spain, United Kingdom and United States, this might not be sufficient to make them more efficient than their local competitors when they operate abroad.

2.2 Where do banks expand abroad?

The obvious next step is to try to explain the patterns of expansion. A large number of empirical studies has addressed this issue, identifying, with a reasonable degree of consensus, a set of major determinants. One way of presenting them is to distinguish between measures of bilateral integration and characteristics of the host countries.

The literature has measured the degree of economic integration between home and destination countries in a number of different ways, ranging from geographical distance, to the

volume of bilateral trade flows and bilateral foreign direct investment, always finding very relevant effects.³

More recently, the empirical research has focused on the role of cultural and institutional proximity (e.g., sharing the same language or the same legal system), and of similarities in the degree of economic development. Berger et al. (2004), Buch and DeLong (2004) and Focarelli and Pozzolo (2007) show that countries sharing the same legal system and the same language are more likely to have cross-border bank M&As. Berger et al. (2004) also show that country pairs with similar levels of total and per-capita GDP are more likely to have cross-border bank participations, but this result is not robust to adopting the specification of Focarelli and Pozzolo (2007). Further, Focarelli and Pozzolo (2007) found a negative effect of the similarities between home and host countries development of the banking sector. Participation to a currency area also increases the probability of bank cross-border participations (Allen and Song, 2005; Focarelli and Pozzolo, 2005). Finally, a recent paper by Claessens and van Horen (2007) has extended this line of research, showing that banks located in countries with a high institutional framework are more likely to expand towards countries where institutional quality is also high, while banks located where institutions are weak have a competitive advantage to expand towards countries with a relatively low institutional environment.

With regard to host country characteristics, the high degree of correlation between the explanatory variables, and the differences in the measures of internationalization adopted (e.g., flow measures such as M&As, as opposed to stock measures, such as foreign shareholdings) and in the countries included in the sample, weaken the robustness of the results. Berger et al. (2004) found a negative effect of realized GDP growth on the probability that a country is the destination of foreign acquisitions. Buch and DeLong (2004) show that targets are more likely to be hosted by countries with higher total GDP, while the evidence on the effect of per capita GDP is less neat. Focarelli and Pozzolo (2005) suggested instead that banks are more likely to be present in countries with higher expected economic growth, and argue that this happens when *per-capita*

³ A non exhaustive list includes Goldberg and Saunders (1980 and 1981), Ball and Tschoegl (1982), Nigh, et al. (1986), Goldberg and Johnson (1990), Grosse and Goldberg (1991), Sagari (1992), ter Wengel (1995), Brealey and Kaplanis (1996), Miller and Parkhe (1998), Yamori (1998), Williams (1998), Berger et al. (2003), Buch (2000 and

GDP is lower (and therefore the convergence hypothesis suggests that growth is going to be faster), the level of education is higher, credit and financial markets are larger and the rate of inflation is lower. Finally, in their interesting analysis on European data presented in chapter 10, Affinito and Piazza (2008) show that regions hosting linguistic minorities and in which the average size of manufacturing firms is smaller have a higher incidence of local banks.

A set of studies suggest that banks prefer to expand towards countries where the degree of competition with domestic banks is lower, for example because local banks are less efficient (Focarelli and Pozzolo, 2005), and where the institutional framework is more favourable to banking activities, because there is a high quality legal and institutional set-up, low regulatory restrictions and higher disclosure requirements on banking activities (Berger et al., 2004), and more reliable supervisory authorities. Indeed, Focarelli and Pozzolo (2007) provide evidence consistent with the hypothesis that not only explicit regulatory and competition barriers, but also implicit government barriers affect the patterns of bank internationalization. Furthermore, Berger (2007) argues that the presence of implicit government barriers to entry, together with the comparative disadvantages found by Berger et al. (2000), are likely to be the most important reasons for the low presence of foreign banks in developed countries.

This evidence confirms that the choice to expand abroad can be motivated by a reasonably large number of possibly interlinked reasons. In some cases it seems clear that banks simply follow their clients operating abroad and set up branches in order to offer them services to support their operations in the foreign country, as shown by the relevance of the level of bilateral trade. At the same time there are instances when the bank's expansion depends purely on the possibility it has to exploit a competitive advantage with respect to the local competitors, as is likely to be the case for the entry of foreign banks in the transition economies of Eastern Europe.

2.3 How do banks expand abroad?

As discussed by Goldberg and Saunders (1981), banks can choose a number of different ways to access foreign markets. Within the two most common forms, branching is less organizationally

2003), Buch and Delong (2004), Berger et al. (2003 and 2004), Magri et al. (2005), Focarelli and Pozzolo (2005 and 2007).

demanding, but allows the bank to run a limited set of operations in the foreign country and makes the holding institution liable with the entirety of its capital. Instead, by setting up a foreign subsidiary, an international bank has complete access to the host country market and has a liability limited to the capital of the foreign corporation; as a downside, it normally incurs far higher set up costs. The choice between foreign expansion through branches or subsidiaries is therefore the result of a trade-off between these two major factors, as well as a number of other institutional characteristics.

Focarelli and Pozzolo (2005), for example, suggested that branches are more often used to provide financial services to local clients when they operate abroad, especially in financial centres, while subsidiaries are more often chosen in order to operate with local clients⁴. Studying this issue in more detail, a recent contribution by Cerutti et al. (2007) shows that branches are more likely to be set up when foreign operations are smaller in size and are wholesale oriented, and in countries that are poorer and have higher corporate taxes, possibly because in this case it is easier to shift profits where taxation is less severe. Subsidiaries are more common in countries where macroeconomic risk is high, because they ensure limited liability to the parent company. However, when risks come from the possibility of government interventions, foreign banks prefer to expand using branches, because their financial assets are far less easy to confiscate.

The broad picture of the patterns of bank internationalization provided above has pointed to a number of explanations on which a consensus has been reached, showing however that the role of other factors is not yet well understood. Indeed, the characteristics of the process of bank internationalization are unlikely to remain unchanged through time. In the following, I will try to provide some evidence on the most recent evolutions in international banking.

⁴ In a recent contribution, available only in Italian, Piscitello and Pozzolo (2006) showed that bank specific characteristics, and size in particular, have a stronger explanatory power with respect to the patterns of internationalization through branches and subsidiaries, less in the case of representative offices, and that longer distance and sharing a common language increase the probability that banks choose to expand abroad using more complex organizational structures.

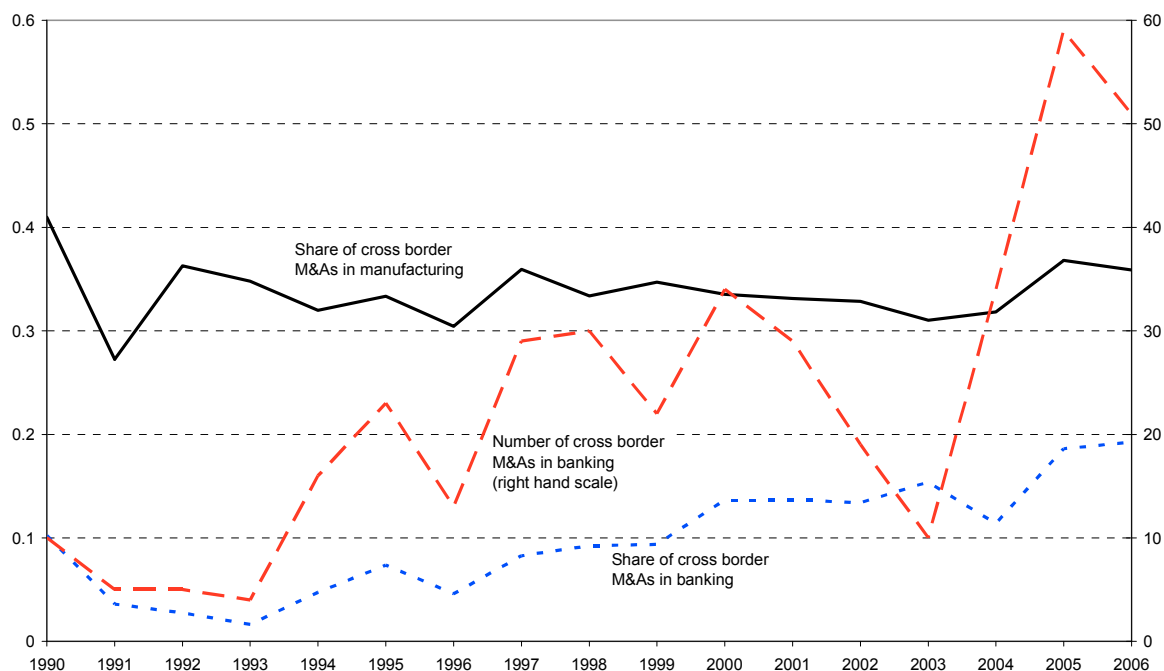
3 Recent trends in international banking

As argued in the introduction, in recent years international banking has expanded rapidly, both in developed and in developing countries. As shown by Figure 1, there has been a substantial rise in the number of cross-border M&As in banking between 1990 and 2000. Moreover, although between 2001 and 2003 a number of factors have determined a drop in the number of cross-border M&As, in the following three years bank cross-border expansion has returned to the previous trend of growth.

The increase in the number of cross-border M&As is not only due to a more intense merger activity, but it is also due to a stronger degree of internationalization. The share of cross border M&As has nearly doubled between 1990 and 2006. Also, the collapse in the number of cross-border M&As in the 2001-2003 period was not mirrored in a drop in the share of cross-border over total M&As, but was instead the result of the reduction in the overall number of M&As.

Figure 1

Cross border M&As in the banking and manufacturing sectors
(numbers and percentage values)



In order to better understand the most recent evolution of bank cross-border M&As and to verify if its resurgence in the last three years has happened along new patterns than in the past or it is simply the continuation of the previous process, in the rest of the section I take two steps. First, I analyze in more detail the descriptive evidence on the patterns of bank international expansion, also in comparison with manufacturing. Second, I estimate a simple model of their determinants and verify whether the empirical specification is robust to estimation across different time periods.

3.1 Stylized facts

Although bank internationalization has increased in recent years, it has still been far slower than that in the manufacturing sector. According to figures reported by Focarelli and Pozzolo (2001), in the 1990's, the average share of mergers and acquisitions involving a foreign counterpart was 12.9 per cent in the banking industry, as opposed to 29.6 per cent in the entire non-financial sector, and 35.3 per cent in the manufacturing sector, which is the most international according to such an indicator. However, Figure 1 shows that the lower degree of internationalization in the banking sector relative to the non financial sector has decreased through time, while the share of cross border M&As in the manufacturing sector remained substantially constant during the same period, although at a significantly higher level. This evidence suggests that impediments to cross-border M&As decreased substantially in the financial sector, although they remain indeed higher than in manufacturing.

Many reasons can be found to explain such a pattern. Focarelli and Pozzolo (2001) point to two major factors: the far greater importance of information asymmetries in banking relationships than in other transactions and the presence of stronger regulatory restrictions in banking than elsewhere in the economy. Relative to the first issue, it is clearly much more difficult to judge the value of a bank than that of a manufacturing firm, because bank assets typically include loans to small firms that can be very difficult to evaluate (Morgan, 2002).⁵ With respect to the second issue, in addition to the much tighter formal regulation that characterizes the banking and financial

⁵ Indeed, this difficulty is confirmed by the financial crisis that took motion from the surge in US subprime mortgage defaults in the summer 2007 and evolved as investors realized that it may be very difficult to assess the exposition of banks towards risky assets.

sectors as opposed to the manufacturing sector, it is widely recognized that regulatory agencies sometime use various means, ranging from moral suasion to other stronger discretionary powers, in order to create additional barriers to the entry of foreign actors. Such behaviour, which seems quite common all over the world, is often justified on the assumption that banking is a strategic sector and that the access of foreign players may be harmful for the hosting economy.

The degree of integration in the market for corporate control in the banking sector shows different patterns depending on the geographical areas considered. The share of bank cross-border M&As within G10 countries is much lower than the average value all over the world, confirming that these nations raise higher explicit and implicit barriers to foreign entry, as argued in Focarelli and Pozzolo (2007). The same share is higher and it is increasing faster when considering operations within OECD countries. Within EMU, despite a much higher variability, the share is substantially higher, although on average still lower than that calculated considering operations all over the world. Banks from G10 countries, OECD countries and, especially, from the EMU are much more likely to do cross border M&As with banks in less developed countries than within themselves. Moreover, this share is higher and it is increasing faster for OECD than for G10 countries.

Figure 2

Share of cross border M&As in the banking sector by geographical areas
(percentage values)

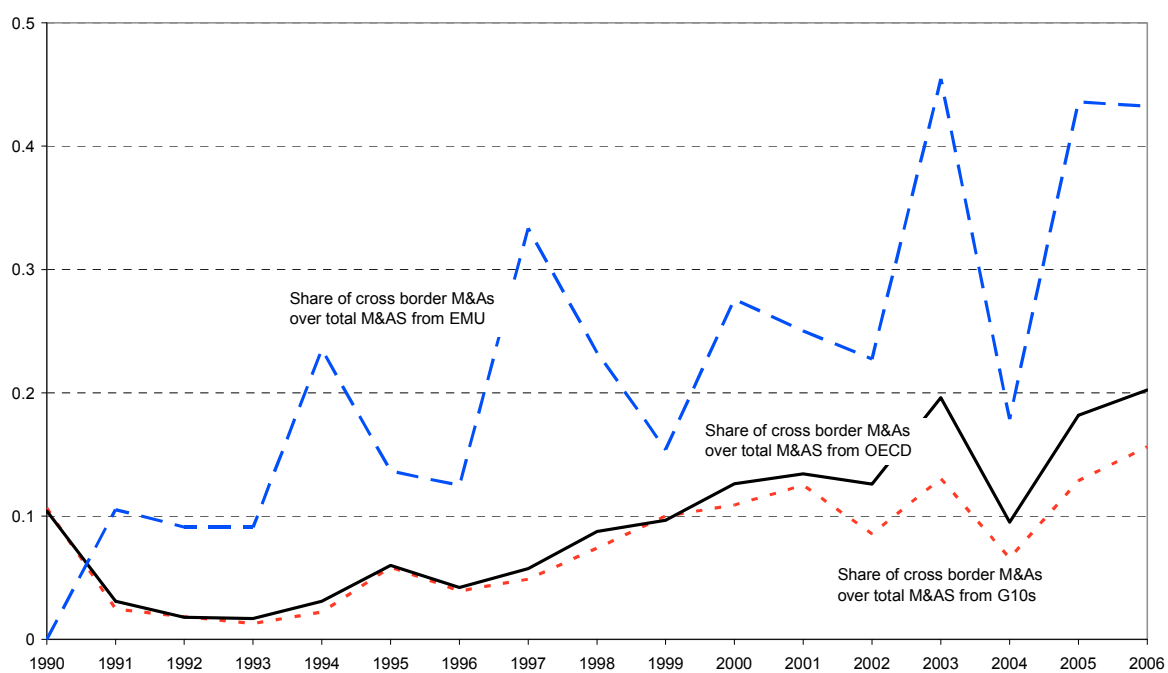
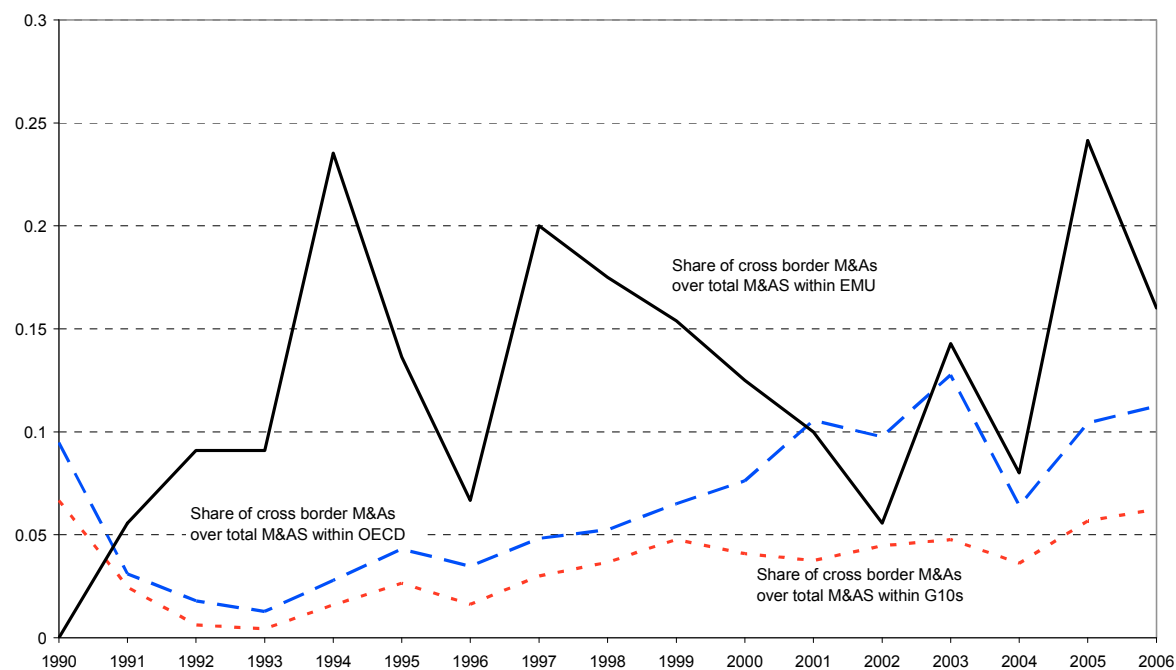
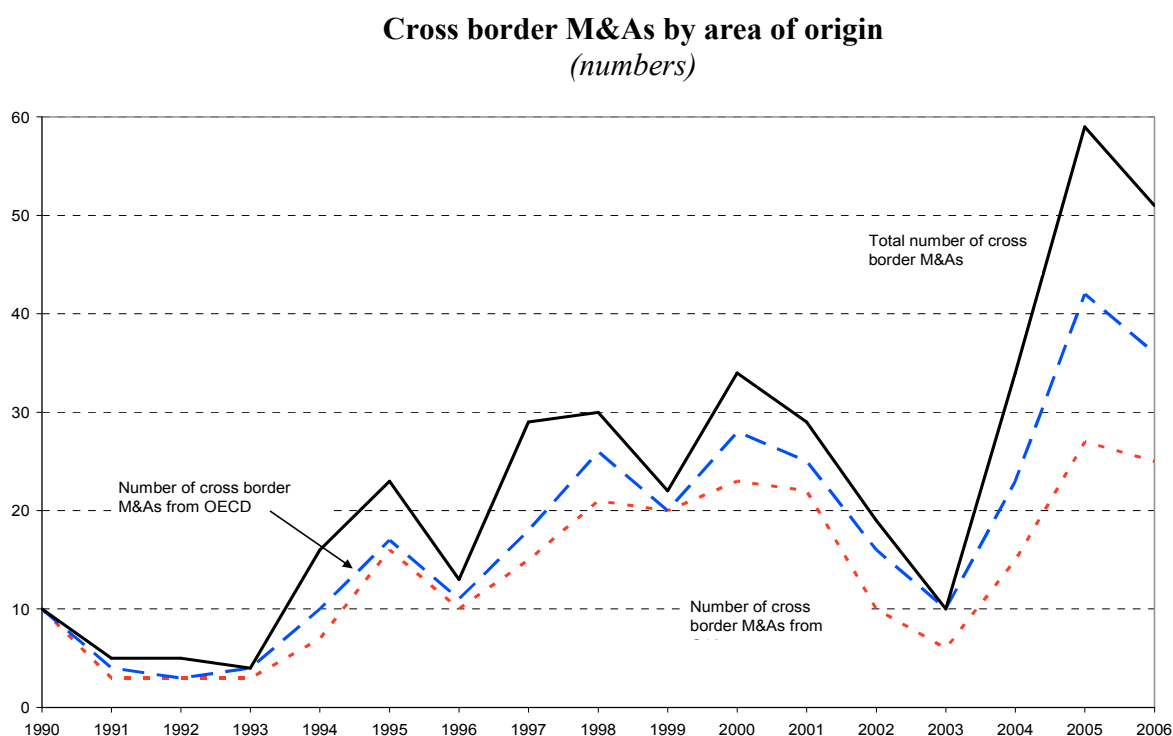


Figure 3 shows that the number of cross border M&As has followed a similar pattern for operations generated in different geographical areas, although it has been increasing faster for less developed countries than for G10 and OECD members.

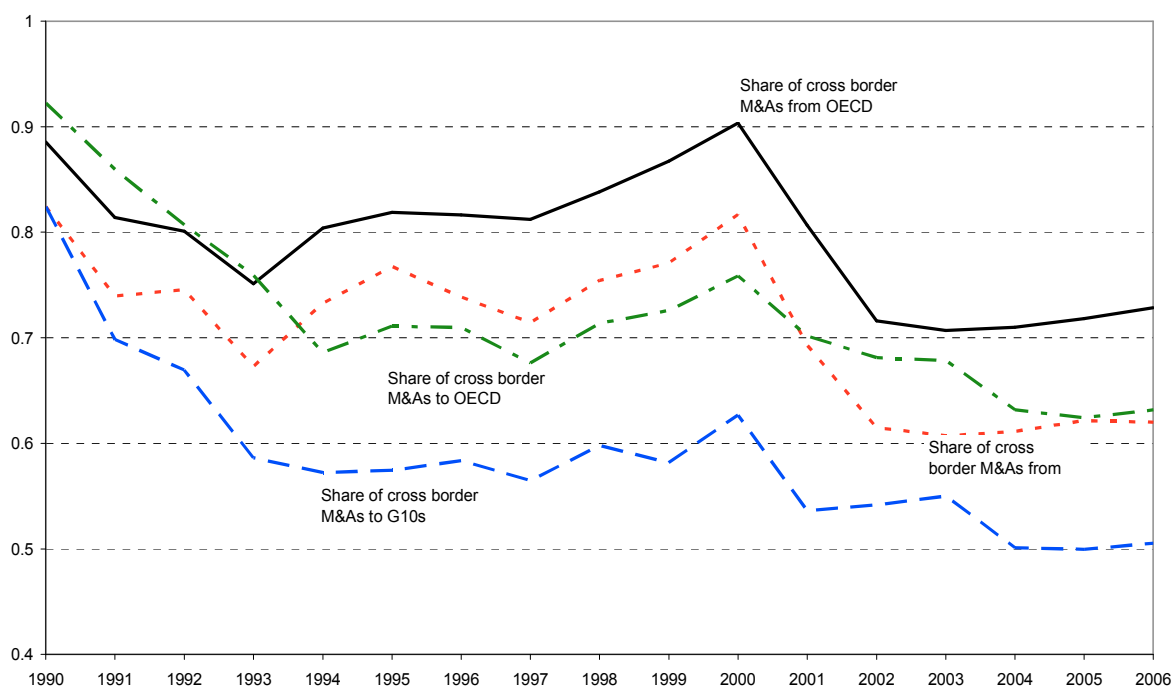
Figure 3



At the same time, Figure 4 shows that the share of cross-border M&As from and to G10 and OECD member states had reached a peak in 2000, to decrease substantially in the following years. The drop has been stronger when considering operations from more developed countries, leaving more space to less developed countries in the international market for bank corporate control.

Figure 4

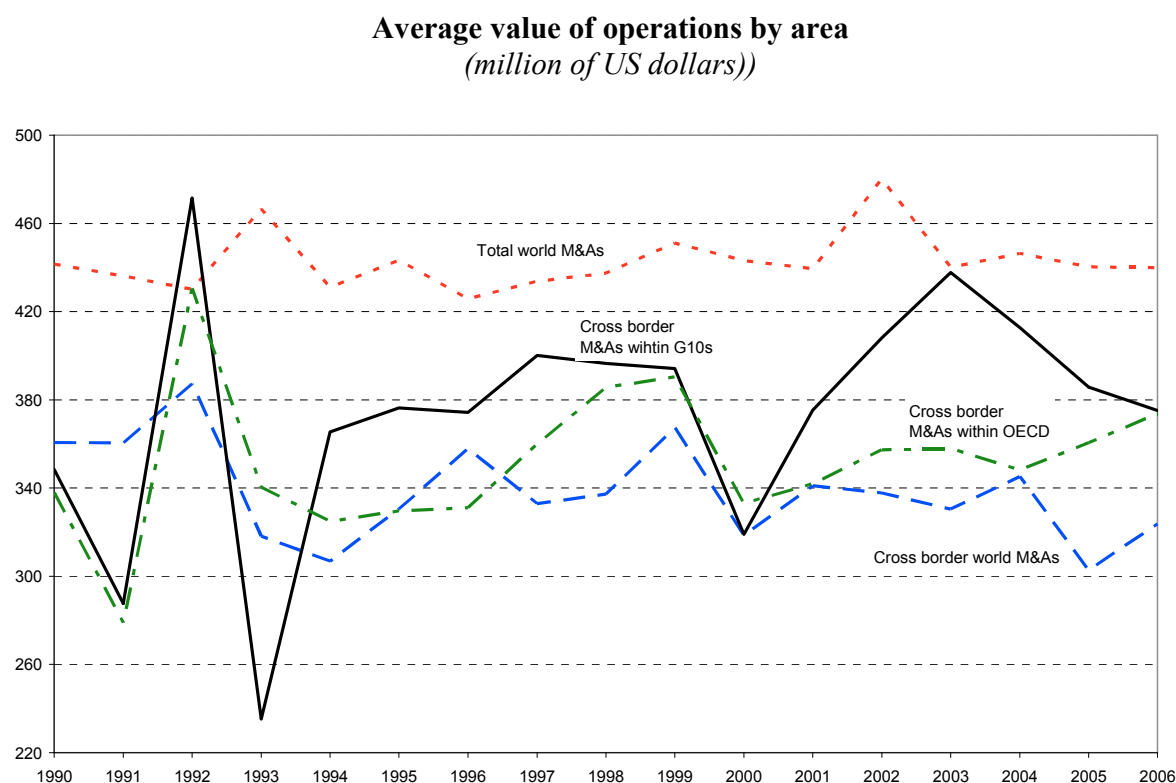
Share of cross border M&As by area of origin
(percentage values)



Finally, and most interesting, the average nominal value of bank M&As has remained substantially constant in the last 16 years, therefore decreasing quite substantially in real terms. This evidence is consistent with the hypothesis that fixed costs in cross-border M&As has reduced, making also operations of smaller size profitable.

The average value of cross-border operations is surprisingly smaller than that of national operations, suggesting that the limits to acquisition of foreign control are an increasing function of the size of the operation, consistent with an explanation based on implicit barriers to substantial foreign entry. As expected, the value of operations originating within G10s and the OECD is larger than the world average, because banks in these countries are typically larger than in less developed countries.

Figure 5



The evidence presented so far suggests that some changes took place in the pattern of bank cross-border expansion, although apparently only the drop in the share of cross-border M&As from and within the most developed countries seems to be linked, at least chronologically, with the reduction in merger activities that took place at the beginning of the century. Whether this evolution calls for a new empirical model of the determinants of bank cross-border expansion will be discussed more in detail in the following section.

3.2 The determinants of cross-border M&As across time: an empirical investigation

In order to verify if the determinants of bank cross border M&As have changed through time I borrow the empirical framework proposed by Berger et al. (2004), who consider as potential explanatory factors both similarities and differences between the home and host countries. The rationale for this setting can be found on the extension to the analysis of FDIs of the traditional

Ricardian theory of comparative advantages, on one side, and of the new trade theory, on the other (Markusen and Venables, 1998).

As it is well known, according to the Ricardian view, firms in one country will produce and export the goods for which they have comparative advantages over firms in other countries. Extending this idea to FDIs in the credit sector, banks should therefore find it more profitable to expand towards countries that are fairly dissimilar from their home country, because in this case they are more likely to have a comparative advantage in providing financial services. The new trade theory, on the contrary, emphasizes the importance of trade among similar areas. According to this view, one should therefore expect that bank expand their activities towards countries that are similar to their home nation. Broadly, the empirical predictions of the two theories are therefore that firms operating in countries with more developed banking and financial systems should acquire firms in financially less developed countries (Ricardian advantage theory) and countries with similar national characteristics should be more likely to have cross-border M&As (new trade theory).

In order to test these alternative hypothesis, I adopt an empirical specification similar to that in Focarelli and Pozzolo (2007), but expanding the time dimension. In particular, instead of collapsing all information to a cross-section specification, I exploit the panel dimension of the data, spanning the period from 1990 to 2006. With respect to the set of explanatory variables, I include both time invariant and time varying information. In particular, I proxy comparative advantages in the banking and financial activities by stock market capitalization, and credit to the private sector. Moreover, I introduce in the specification the interaction between these two measures, in order to capture non-linear effects. Further, I include total and per capita GDP in the origin and destination countries, because banks operating in larger and richer countries are more likely to have the size required to expand abroad, to be backed by the political endorsement which is necessary in order to acquire a foreign bank, on one side, or to avoid foreign entry, on the other.⁶ According to the Ricardian view, banks from countries with a higher ratio of credit to the private

⁶ The concept of political endorsement is quite difficult to define from a theoretical viewpoint or to measure empirically. It is nonetheless highly relevant, as is proved for example by the harsh debate on the contestability of European corporations in many so-called strategic sectors of economic activity (e.g., the cases ENEL/Gaz de France

sector and stock market capitalization over GDP, and with higher total and per capita GDP should be more likely to expand towards countries in the opposite condition. Positive coefficients on these variables would therefore provide support to the theory.

The degree of similarity is measured by an index analogous to that in Berger et al. (2004),⁷ calculated with reference to the same characteristics used to measure comparative advantages: the development of banking and financial markets and the levels of total and per capita GDP. Positive coefficients on these variables can be interpreted as evidence in favour of the new trade theory.

Finally, as it is customary in the literature, the degree of geographic, economic and cultural integration between the origin and destination countries is measured by the geographical distance, the volume of real bilateral trade and dummies for countries sharing a common language and for those sharing a border. However, as argued by Berger et al. (2004), positive coefficients on measures of bilateral integration are consistent with the Ricardian as well as with the new trade theory, because they proxy for the costs of foreign expansion.

3.2.1 The econometric setup

As in Focarelli and Pozzolo (2007), the choice of the econometric setup is different from that of Berger et al. (2004) and follows instead the empirical literature on FDIs (e.g., Blonigen, 1997), setting as dependent variable the number of M&As from country i to country j and adopting a negative binomial specification, in order to account for variance over dispersion.⁸

The dependent variable Y_{ijt} , is defined as the number of cross-border M&As between country i of the bidder company and country j of the target company in year t . I therefore estimate the following model:

$$Pr(Y_{ijt} = y_{ijt}) = \frac{e^{-v_{ijt}\mu_{ijt}} (v_{ijt}\mu_{ijt})^{y_{ijt}}}{\Gamma(y_{ijt} + 1)} \quad y_{ijt} = 0, 1, 2, \dots, \quad (1)$$

and:

for energy, Financial Times, February 27th, 2006; ABN Amro/Antonveneta for banking, Financial Times, April 15th, 2005; Abertis/Autostrade for services, Financial Times, May 16th, 2006).

⁷ For a generic characteristic x , measured in countries i and j , the index is equal to: $1 - [\text{abs}(x_i - x_j) / \max(x_i, x_j)]$; it has a maximum value of 1 when the two countries are identical with respect to that characteristic and declines toward zero as they become more and more dissimilar.

⁸ See Cameron and Trivedi (1986) and, for a textbook description, Wooldridge (2001).

$$\mu_{ij} = e^{\beta' x_{ijt}} \quad (2)$$

where $\Gamma(y_{ijt} + 1)$ is a Gamma distribution with mean 1 and variance α ; x_{ijt} is a matrix that includes vectors of characteristics, at time t , of the bilateral relationship between country i and country j , of the country of the bidder company, i , and of the country of the target company, j . The product of the number of countries of origin, the number of potential countries of destination of the M&As and the number of years gives the number of observations used in the estimation.

To test for the differences between the determinants of internationalization across time, I also estimate a unified model introducing dummies to allow for the effects of each variable to differ across the three periods considered.⁹

3.2.2 Data and summary statistics

Data on M&As

Data on M&As are from the Platinum Worldwide Mergers and Acquisitions Database of the Security Data Corporation (SDC). They include information about the target and acquiring firms, such as their country of residence and SIC code of primary economic activity, and, if conditions and terms of the transactions are disclosed, about the value of the deal, the effective date of realization and the percentage acquired by the bidder. In the analysis I include all the completed transactions reported in SDC for which information is disclosed and that involve significant acquisition of value (“acquisition of a major interest”) or change in control (“an acquisition that increases the stake of the acquiring institution from less than 50 per cent to 50 per cent or more of the ownership shares of the target institution”).

I consider deals between 1990 and 2006, restricting the sample of countries that I consider to those where at least one deal took place between 1990 and 2006. In total, I have over 80,000 possible potential year, home- and host-country combinations. Finally, I define a deal as cross-border when the nationalities of the target and the acquiring firms are different.¹⁰

⁹ In practice, I pool the data and include the vector of right-hand-side arguments three times, multiplied by a dummy that equals one for each time period.

¹⁰ The definition does not coincide with that of SDC, which refers to the nationality of the ultimate parent firm of the bidder institution.

Data on countries

Data on GDP are from the Penn World Tables, version 6.2 (Heston et al., 2006). Data on bank credit and stock market capitalization are from the World Bank database. Data on geographical distance, bilateral trade (the logarithm of the volume of bilateral trade) and common language are from Andrew Rose's web site.¹¹

3.2.3 Econometric results

Table 1 presents the results of the estimates of the empirical model described by equations (1) and (2). Panel A reports the marginal elasticities of the total number of bilateral cross-border M&As in the financial sector with respect to a change in each dependent variable, including time dummies; panel B presents the result of a specification excluding time dummies and including a linear trend.¹² Standard errors are calculated using the delta method.

The results of panel B confirm the existence of a positive and significant trend in the number of cross-border M&As, despite the drop registered at the beginning of the century. Moreover, the exclusion of the time dummies has left all other coefficients substantially unchanged. I will therefore concentrate my comment on this second specification.

Financial sector M&As are more common between countries that are geographically closer and have stronger economic and cultural relationships. Cross-border M&As are more likely when the geographical distance between the countries is smaller (with an elasticity of -0.46), trade relationships are stronger (0.64), the same language is spoken (0.12). The effect of sharing a common border is positive but not significantly different from zero. These findings confirm the results of Focarelli and Pozzolo (2007) and are in line with those of Berger et al. (2004). Clearly, they do not enable us to discriminate between the traditional Ricardian theory of comparative advantages and the new trade theory, because both theories share the same implications with respect to measures of bilateral integration.

¹¹ Missing observations on bilateral trade are replaced by the most recent available information.

¹² The marginal elasticities measure the percentage change in the number of cross-border M&As caused by 1 percentage-point change in the level of the dependent variable considered, all else being equal. As is customary in the literature, when the dependent variable only takes values zero and one, the elasticity is calculated with respect to a discrete change.

The next set of variables is related to tests of the new trade theory, suggesting that cross-border M&As should be more likely within countries sharing similar characteristics in terms of financial and economic development. The results reported in column B provide some support to this view. Countries with similar level of GDP (with an elasticity of 0.26) and banking sector development (0.29) are more likely to be involved in cross-border M&As. Similarities in per-capita GDP and the development of the stock market have also a positive effects, but the coefficient is not significantly different from zero. The overall evidence is therefore mildly supportive of the new trade theory.

Turning to the set of variables related to the Ricardian theory, which suggests that cross-border M&As are determined by the comparative advantages (disadvantages) of the bidders (targets), I find that banks of countries with higher total GDP are less likely to acquire foreign credit institutions, while the effect of per-capita GDP is not statistically significant. This result is consistent with the explanation of Tschoegel (2004), suggesting that the decision to expand abroad is related to the diminishing opportunities of expansion within the national borders. A higher level of development of the origin country banking sector is associated with a higher probability that banks acquire foreign institutions, although the negative coefficient of the interaction term between bank and stock market development shows that the effect is decreasing as the stock market gets larger, consistent with the hypothesis that a more developed stock market offers larger opportunities of expansion within national borders, reducing the benefits to go abroad. Similarly, banks coming from countries with a more developed stock market are more likely to expand abroad, possibly because they have a comparative advantage in a broad range of financial activities, but again this effect is decreasing in the development of the banking sector.

Additional evidence consistent with the Ricardian theory is provided by the characteristics of the destination countries. Having a lower total and per capita GDP increases the probability of being a target of foreign acquisitions (with an elasticity of -0.38 and -0.41, respectively), as well as having a less developed banking sector and stock market.

The number of cross-border M&As is also significantly affected by the number of domestic operations in the country of origin and in that of destination. The former is a push factor, suggesting that domestic and cross-border M&As share to some extent common determinants, such as the availability of financial resources to expand or favourable stock market conditions. The

effect of a more active domestic market is indeed positive, although the elasticity is significantly smaller than one (0.38). The total number of domestic M&As in the destination country is a pull factor and it can be seen as a proxy for the degree of contestability in corporate ownership. It has also in this case a positive effect, with a marginal effect of 0.66, significantly different from unity, as it would be the case if contestability had no asymmetric effects for domestic and foreign acquirers (see also Focarelli and Pozzolo, 2007).

Table 2 presents the results of the estimates of the same model, conducted on sub samples restricted to three different periods, 1990-2000, 2001-2003 and 2004-2006, and including time dummies. The three sub periods have been chosen with the intent to test the hypothesis that the drop in the number of cross-border M&As registered between 2001 and 2003 has determined a change in the model of bank cross-border expansion.¹³ Although the coefficients estimated using the smaller samples tend to be less significant than those of the longer time span, the overall evidence shows some interesting patterns. As expected, the coefficients of the estimates on the first sub sample (1990-2000) are very similar to those obtained from the entire sample, with the only major exception of the effect of distance.

Turning to the differences within the three sub samples, the effects of the measures of bilateral integration seems to have changed through time. After the beginning of the century, the effect of geographical distance has become particularly strong, with no significant differences in the two sub periods considered, while that of sharing the same language has become irrelevant. Similarly, the effect of bilateral trade has reduced in the last sub period. Surprisingly, sharing a common border seems to have had a negative impact on the number of cross-border M&As between 2001 and 2003, although the marginal effect is negligible. In the following period the effect has become once again positive, but insignificantly different from zero.

¹³ The first sub period is much longer than the following two. Although cross-border M&As have grown at a fairly constant rate between 1990 and 2000, it is still possible that their determinants have changed during this longer time span. Moreover, from a strictly statistical point of view, coefficients estimated on a larger number of observations have smaller standard errors and are therefore more likely to be significantly different from zero. In order to verify the possible impact of considering this longer sub-period, I have also estimated the model on a first sub period of the same length of the following two (1998-2000), finding results qualitatively identical to those reported in table 3. I thank Dario Focarelli for suggesting me this control.

Coming to the variables related to the new trade theory, with the turn of the century the effect of the similarities in total GDP has become insignificant. The similarities between the degree of development of the credit market had no effects on the number of M&As between 2001 and 2003, but their positive impact has been the same both before and after that period.

The effect of the variables related to the Ricardian theory has changed substantially through time. The negative effect of a higher total GDP in the origin country has become insignificant between 2001 and 2003, to turn positive between 2004 and 2006. Similarly, starting from 2001, banks in countries with a higher per capita GDP has become more likely to acquire foreign credit institutions. At the same time, the effect of the development of the banking sector and of the stock market has become insignificant from 2001. Banks from G10s had a comparative advantage in expanding abroad in the first part of the period analyzed, but this effect has also become insignificant. Finally, in the last period, the effect of domestic bank M&As is insignificant, suggesting that internationalization has become a strategic choice per se, and not simply as one of the possible ways of realizing corporate deals.

Looking at the characteristics of the destination country, the effect of total and per-capita GDP has become progressively insignificant, while that of the development of the financial markets has slightly decreased. Finally, also the effect of the number of domestic M&As in the country of destination has become insignificant.

Overall the evidence seems to point to a general reduction in the ability of the model to explain the patterns of cross-border M&As, as if the role of bilateral linkages and of comparative advantages at the country level was becoming less relevant. In a more progressively and integrated world, it is likely that cross-border M&As are better explained by firm-specific opportunities, than by country level characteristics.

4 What are the effects of bank internationalization?

The effects of bank internationalization can be assessed from at least three different points of view: of the acquirer, of the acquired and, more in general, of the hosting country. In the following I will discuss the major findings of the literature according to each of them.

4.1 Effects of internationalization for acquiring banks

With respect to the first issue, which has not been analyzed thoroughly in the literature, the empirical research has focused almost exclusively on the effects on the stock price returns of bidder banks in cross-border M&As. Amihud et al. (2002) and Cybo-Ottone and Murgia (2000) found weak evidence of significant positive effects of cross-border M&As on the value and risk of the acquiring bank. Campa and Hernando (2006), on the contrary, found that cross-border deals within European countries have nearly no effects on the acquirer's excess returns. Amihud et al. (2002) also found that total and systematic risk, measured by the variance of bank stock returns and their β coefficient, are substantially unchanged after the merger. This result is partly confirmed by Focarelli et al. (2008), who show that the acquirers' systematic risk increases as a result of mergers, but less so for cross-border operations. On a similar ground, Choi et al. (2007) found that bondholders perceive bank internationalization as a risk-increasing activity, as shown by the significant increase in bond yield spreads after the announcement of a cross-border M&A.

While mixed, these results are slightly different from the findings of the studies focusing on domestic deals, that normally show that in an M&A the bidder suffers a loss, that is typically offset by the target's gain (Amel et al., 2004), and from those showing that geographically diversifying mergers within the US do not create value (DeLong, 2001) or have negative returns (Cornett et al., 2003), and produce worse performance gains (Cornett et al., 2006).

4.2 Effects of internationalization for acquired banks

The effects on acquired banks have been studied more in detail. Campa and Hernando (2006) found slightly negative short run excess returns for target banks in the case of cross-border deals, and significantly negative excess returns in the longer run. The evidence is more favourable when considering balance sheet measures of bank performance. The case study in Latin American by Crystal et al. (2001) shows that foreign banks are sounder and have higher loan growth than their domestic counterparts. Claessens et al. (2000 and 2001) and Claessens and Lee (2002) showed that foreign banks operating in developing countries are more profitable and have lower costs than domestic banks. Berger et al. (2004), studying a sample of Argentinian banks, found weak evidence of performance improvements for targets of cross-border M&As, and Micco et al. (2007),

studying a larger sample, found that in developing countries targets of cross-border M&As have on average lower return on assets, but after the acquisition tend to reduce their costs relative to their domestic counterparts, with a positive albeit insignificant effect on profitability. Interestingly, they found a negative effect on profitability when the target is in an industrial country. Lastly, Altunbas and Ibanez (2004) studied the change in total profitability of cross-border bank mergers within European countries, finding that it is higher in the case of cross-border mergers within banks that are less similar with respect to loss provision policy and the weight of loans in their balance sheets, and more similar in capitalisation and in their attitude towards financial and technological innovation.

Overall, although some more research is needed on this issue, there is no clear evidence that cross-border consolidation in the financial sector is beneficial for either acquiring or acquired banks, a result which is not surprising to the extent that no such evidence has been also in the case of domestic consolidation (Amel et al., 2004).

4.3 Effects of internationalization for countries hosting foreign banks

Summarizing the empirical findings discussed above and in the previous sections, it is clear that banks expanding abroad are typically more efficient, come from countries with a more developed banking systems and typically expand in countries with an overall less efficient banking system. In other words, better banks tend to expand to countries with worse banks. Coming to the effects of foreign banks for the hosting country, one therefore expects that the efficiency of the host country's financial system and its overall performance should improve as a result of the entry of foreign banks. Indeed, the position that foreign banks are beneficial for the host economy, recently advocated also by Focarelli and Pozzolo (2005) and Goldberg (2007), is at odd with the traditional view, blatantly against the access of foreign banks.¹⁴ Historically, policy makers have been patently hostile towards foreign banks, fearing that they might worsen the allocation of credit with respect to the autarchy equilibrium and increase the risk of financial crisis and the business-cycle sensitivity of lending.

¹⁴ It is to notice that, until recently, many economists and policy makers had a negative attitude also towards foreign direct investment inflows in the manufacturing sector.

The available empirical evidence is not definitive. Cross-section analyses show that foreign bank entry has positive effects on developing country economies. Claessens et al. (2000 and 2001), Claessens and Lee (2002) and Bayraktar and Wang (2005) showed that foreign entry helps to improve the efficiency of local banks, determining a reduction in profitability, in interest margins and in overhead costs.¹⁵ Given the causal link between a country's financial sector development and its rate of real economic growth, found largely in the empirical literature, inflows of foreign bank direct investment are likely to be welfare enhancing for the host economy. Bayraktar and Wang (2006) provided indeed some evidence that foreign bank presence causes higher per capita GDP growth.

One of the major criticisms that has been aimed at foreign banks is that they typically focus on larger clients, reducing the availability of credit to small and medium enterprises. The evidence on this issue is not definitive. Recent empirical analysis, found evidence both in favour and against this view. Crystal et al. (2001), show that foreign banks in Latin America in the second half of the nineties have stronger loan growth and a greater ability to absorb losses than their national counterparts. Clarke et al. (2002), studying a large sample of over 2,000 firms in 38 developing countries, found that the presence of foreign banks improves the amount of credit available and reduces the prices for firms of all sizes, although the effect is indeed stronger for larger firms. Similarly, Martinez-Peria and Mody (2004) found that foreign banks typically charge lower interest rate spreads than domestic banks. Calyes and Hainz (2007) distinguished between internationalization through acquisitions and through greenfield investment, finding that the presence of foreign banks is typically associated with lower average lending rates, but that only newly set banks charge lower interest rates than average. On a related ground, Bonin and Abel (2000) found strong empirical evidence of the positive effect of foreign banks operating in Hungary, showing that their presence also forced the only major bank without foreign shareholders to develop new products and better services, and Giannetti and Ongena (2007) showed that the presence of foreign banks in Eastern European countries has favoured firm sales, asset growth and

¹⁵ Similar results are found in a number of country studies, for example by Barajas et al. (2000), Clarke et al. (1999) and Unite and Sullivan (2001). Yeyati and Micco (2007) found instead evidence that foreign banks in Latin American counties tend to be more risky and to have higher market power than local banks.

entry and exit from the market, although these effects are indeed weaker in the case of smaller firms.

Despite this evidence pointing to a positive role of foreign banks for the hosting economy, a less positive picture emerges from a recent influential paper by Mian (2006), based on detailed information on bank-firm relationships. Quoting the author's own words, "informational and agency costs related to cultural and geographical differences can lead foreign banks to shy away from lending to soft information firms", even if they are potentially sound. Consistent with this result, Berger et al. (2007) found that foreign banks tend to serve as the main bank especially for transparent firms.

Another strand of criticisms aimed at the presence of foreign banks comes from their supposedly propensity to leave the country in cases of financial distress, thus increasing the risk of financial crisis. However, Demirguc-Kunt et al. (1998) and Levine (1999) found that, if anything, the presence of foreign banks reduces the probability of banking crises, a result that is consistent with the findings of Goldberg (2002), who showed that U.S. foreign banks do not reduce their lending during period of crises, and those of Goldberg et al. (2002), who found that foreign bank presence does not increase the business-cycle sensitivity of lending. Furthermore, Cull and Martinez-Peria (2007) showed that the share of domestic credit granted by foreign banks increases after a banking crisis. Lastly, Arena et al. (2007) analyzed a large sample of banks from Asian and Latin American countries showing that the lending policies of foreign subsidiaries are less sensitive to the host country's monetary conditions, and that while during financial crises their deposit and lending rates growth are not different from those of domestic banks, the reaction of their interest rates tends to be less pronounced.

Although this is still an open area of research, the evidence so far available is therefore unsupportive of the traditional view that the presence of foreign banks is harmful for the financial stability and hosting country and for its overall economic performance.

5 Conclusions

In recent years, the lower degree of internationalization in the banking sector relative to the non financial sector has progressively decreased. At the same time, some changes took place in the pattern of bank cross-border expansion: the share of bank cross-border M&As within G10 countries has decreased, while that within OECD countries has increased. Moreover, banks from G10 countries, OECD countries and, especially, from the EMU are increasingly more likely to do cross border M&As with banks in less developed countries than within themselves.

Standard empirical models of the determinants of cross-border bank M&As show a decreasing ability to explain the patterns of the most recent years as if, in a more progressively more integrated world, the role of bilateral linkages and of comparative advantages at the country level was becoming less relevant relative to firm specific characteristics.

The available empirical literature suggests that typically it is better banks from more developed countries that acquire worse banks, in less financially developed countries, suggesting a positive effect of foreign banks in the host country. But this picture may look too favourable to foreign banks. Indeed there are a large number of issues that are still open and need to be addressed carefully. One of the major problems is that local authorities need to adapt the regulatory and institutional framework to the changed environment, once foreign banks become important players in the country's financial market. The reluctance of local authorities to change their regulatory framework and the fear to see their moral suasion powers substantially lessened is probably one of the major reasons why policy makers, and especially supervisory authorities, are unwilling to see foreign banks entering their markets. As suggested by Garber (2000), local regulators are often unready to control the operations of the more sophisticated foreign banks. Although this is an occasion for the growth of local institutions, it is at the same time a challenge that, if lost, might create problems in the functioning of the financial markets.

A second issue is the possibility that a rapid entry of foreign banks might cause a loss of potential profit opportunities for local entrepreneurs. This is an infant-industry-protection argument. The trade off facing policy makers is in this case between a slower development in the

financial sector, with its consequences for the growth of the real economy, and the loss of future profit opportunities.

Finally, a word of caution on the long-term prospects for globalization of the banking sector. As argued by Stulz (2005), on theoretical basis, and already clear from the evidence in Berger et al. (2003), country attributes are still so critical to financial decision making, that the extent of globalization may remain limited. As Boot (2008) points out in chapter 7, “the nature of the banking activity may be such that banks may face more favourable competitive conditions in their home market”.

References

- Affinito, M. and M. Piazza (2006), "What borders are (likely) made of? An analysis of barriers to European banking integration", chapter 10, this volume.
- Allen, F. and W.L. Song (2005), "Financial integration and EMU", *European Financial Management*, 11, 7-24.
- Amel, D., C. Barnes, F. Panetta and C. Salleo (2004) "Consolidation and efficiency in the financial sector: A review of the international evidence", *Journal of Banking and Finance*, 28, 2493–2519.
- Amihud, Y., G.L. DeLong and A. Saunders (2002), "The effects of cross-border bank mergers on bank risk and value", *Journal of International Money and Finance*, 21, 857-877.
- Altunbas, Y. and D. M. Ibanez (2004), "Mergers and Acquisitions and Bank Performance in Europe: The Role of Strategic Similarities", Working paper series 398, European Central Bank.
- Arena, M., C. M. Reinhart and F. Vazquez, (2007) "The Lending Channel in Emerging Economies: Are Foreign Banks Different?", IMF Working Paper No. 07/48, available at SSRN: <http://ssrn.com/abstract=969862>.
- Ball, C. A. and A. E. Tschoegl (1982), "The Decision to Establish a Foreign Branch or Subsidiary: An Application of Binary Classification Procedures", *Journal of Financial and Quantitative Analysis*, 17, 411-24.
- Barajas, Adolfo, Roberto Steiner, and Natalia Salazar (2000), "The Impact of Liberalization and Foreign Investment in Colombia's Financial Sector", *Journal of Development Economics*, 63, 157-96.
- Bayraktar, N. and Y. Wang (2005), "Foreign Bank Entry and Domestic Banks' Performance: Evidence Using Bank-Level Data", mimeo., Penn State University and World Bank.
- Bayraktar, N. and Y. Wang (2006), "Foreign Bank Entry, Performance of Domestic Banks and the Sequence of Financial Liberalization", World Bank policy Research Working Paper 4019.
- Berger, A. N (2007), "Obstacles to a Global Banking System: "Old Europe" versus "New Europe"', *Journal of Banking and Finance*, 31, 1955-1973.
- Berger, A.N., C.M. Buch, G. DeLong and R. DeYoung (2004), "Exporting financial institutions management via foreign direct investment mergers and acquisitions" *Journal of International Money and Finance*, 23, 333-366.
- Berger, A. N., G.R.G. Clarke, R. Cull, L. Klapper and G. F. Udell (2005), "Corporate governance and bank performance: A joint analysis of the static, selection, and dynamic effects of domestic, foreign, and state ownership", *Journal of Banking and Finance*, 29, 2179–2221.

- Berger, A.N., Q. Dai, S. Ongena and D.C. Smith (2003), "To what extent will the banking industry be globalized? A study of bank nationality and reach in 20 European nations", *Journal of Banking and Finance*, 27, 383-415.
- Berger, A. N., R. DeYoung, H. Genay, and G. F. Udell (2000), "The Globalization of Financial Institutions: Evidence from a Cross-Border Banking Performance", *Brookings-Wharton Paper on Financial Service* 2000, 23-120.
- Berger, A.N., L.F. Klapper, M.S. Martinez Peria and R. Zaidi (2007), "Bank ownership type and banking relationships", *Journal of Financial Intermediation*, in press.
- Blonigen, B. A. (1997), "Firm specific Assets and the Link between Exchange Rates and Foreign Direct Investment", *American Economic Review*, 87, 447-465.
- Bonin, J. and I. Abel (2000), "Retail Banking in Hungary: A Foreign Affair?", *William Davidson Institute working paper* no. 356.
- Boot, A. (2008), "The evolving landscape of banking", chapter 7, this volume.
- Brealey, R. A. and E. C. Kaplanis (1996), "The Determination of Foreign Banking Location", *Journal of International Money and Finance*, 15, 577-597.
- Buch, C. M. (2000), "Why Do Banks Go Abroad? Evidence from German Data", *Journal of Financial Markets, Instruments and Institutions*, 9, 33-67.
- Buch, C. M. (2003), "Information or Regulation: What Drives the International Activities of Commercial Banks?", *Journal of Money Credit and Banking*, 35, 851-869.
- Buch, C.M. and G. DeLong (2004), "Cross-border bank mergers: What lures the rare animal?", *Journal of Banking and Finance*, 28, 2077-2102.
- Cameron and Trivedi (1998), *Regression Analysis of Count Data*, Cambridge University Press.
- Clayes, S. and C. Hainz (2007), "Acquisition versus Greenfield: The Impact of the Mode of Foreign Bank Entry on Information and Bank Lending Rates", *ECB Working Paper* No. 653, available at SSRN: <http://ssrn.com/abstract=913324>.
- Campa, J.M. and I. Hernando (2006), "M&As performance in the European financial industry", *Journal of Banking and Finance*, 30, 3367-3392.
- Cerutti, E., G. Dell'Ariccia and M. S. Martinez Peria (2007), "How Banks Go Abroad: Branches or Subsidiaries?", *Journal of banking and finance*, 31, 1669-1692.
- Chang, C. E., I. Hasan and W. C. Hunter (1998), "Efficiency of multinational banks: an empirical investigation", *Applied Financial Economics*, 8, 689-696.
- Claessens, S., A. Demirgüç-Kunt, and H. Huizinga (2000), "The Role of Foreign Banks in Domestic Banking Systems", in S. Claessens and M. Jansen, (eds.), *The Internationalization of Financial Services: Issues and Lessons for Developing Countries*, Boston, MA, Kluwer Academic Press.

- Claessens, S., A. Demirgüç-Kunt and H. Huizinga (2001), "How does Foreign Entry Affect Domestic Credit Market", *Journal of Banking and Finance*, 25, 891-911.
- Claessens, S. and J. K. Lee (2002), "Foreign Banks in Low-Income Countries: Recent Developments and Impacts", mimeo, The World Bank.
- Claessens, S. and N. van Horen (2007), "Location Decisions of Foreign Banks and Competitive Advantage", available at SSRN: <http://ssrn.com/abstract=904332>.
- Clarke, George, Robert Cull, Laura D'Amato, and Andrea Molinari. 1999. "The Effect of Foreign Entry on Argentina's Banking System." In *The Internationalization of Financial Services: Issues and Lessons for Developing Countries*, edited by Stijn Claessens and Marion Jansen. (Dordrecht, The Netherlands: Kluwer Academic).
- Clarke, G., R. Cull and M.S. Martinez Peria (2002), "Does Foreign Bank Penetration Reduce Access to Credit in Developing Countries? Evidence from Asking Borrowers", mimeo, World Bank.
- Cornett, M.M., G. Hovakimian, D. Palia and H. Tehranian (2003) "The impact of the manager-shareholder conflict on acquiring bank returns", *Journal of Banking and Finance*, 27, 103-131.
- Cornett, M.M., J.J. McNutt, H. Tehranian (2006), "Performance Changes Around Bank Mergers: Revenue Enhancements versus Cost Reductions", *Journal of Money, Credit, and Banking*, 38, 1013-1050.
- Crystal, J., B. G. Dages and L. Goldberg (2001), "Does Foreign Ownership Contribute to Sounder Banks? The Latin American Experience." in *Open Doors: Foreign Participation in Financial Systems in Developing Countries*, edited by R. Litan, P. Masson and M. Pomerleano, Washington DC, Brookings Institution and the World Bank.
- Cull, R. and M. S. Martinez-Peria (2007), "Foreign Bank Participation and Crises in Developing Countries", World Bank Policy Research Working Paper 4128.
- Cybo-Ottone, A. and M. Murgia (2000), "Mergers and shareholder wealth in European banking", *Journal of Banking and Finance*, 24, 831-859.
- De Felice, G. and Revoltella, D. (2003), "Towards a multinational bank? European banks' growth strategies", *Banque and Marches*.
- De Long, G.L. (2001), "Stockholder gains from focusing versus diversifying bank mergers", *Journal of Financial Economics*, 59, 221-252.
- Demirguc-Kunt, Asli, Ross Levine, and Hong-Ghi Min (1998), "Opening to Foreign Banks: Issues of Stability, Efficiency, and Growth." In Seongtae Lee, ed., *The Implications of Globalization of World Financial Markets*. (Seoul: Bank of Korea).
- Focarelli D. and A.F. Pozzolo (2001), "The Patterns of Cross-Border Bank Mergers and Shareholdings in the OECD Countries", *Journal of Banking and Finance*, 25, 2305-2337.
- Focarelli D. and A.F. Pozzolo (2005), "Where Do Banks Expand Abroad? An Empirical Analysis", *Journal of Business*, 78, 2435-2463.

- Focarelli D. and A.F. Pozzolo (2008), "Cross-Border M&As in the Financial Sector: Is Banking Different from Insurance?", *Journal of Banking and Finance*, 32, 15-29.
- Focarelli D., A.F. Pozzolo and C. Salleo (2008), "Do M&As In The Financial Industry Modify Systematic Risk?", mimeo.
- Garber, P. (2000), "What you see vs. what you get: Derivatives in International Capital Flows" in *Managing Financial and Corporate Distress: Lessons from Asia*, edited by C. Adams, R.E. Litan, Michael Pomerleano, Washington DC, Brookings Institution.
- Giannetti M. and S. Ongena (2007), "Financial integration and entrepreneurial activity: Evidence from foreign bank entry in emerging markets", *Review of Finance*, forthcoming.
- Goldberg, L. G. and D. Johnson (1990), "The Determinants of U.S. Banking Activity Abroad", *Journal of International Money and Finance*, 9, 123-37.
- Goldberg, L. G. and A. Saunders (1980), "The Causes of U.S. Bank Expansion Overseas: The Case of Great Britain", *Journal of Money Credit and Banking*, 12, 630-43.
- Goldberg, L. G. and A. Saunders (1981), "The Growth and Organizational Form of Foreign Banks in the U. S.", *Journal of Money Credit and Banking*, 13, 365-74.
- Goldberg, Linda. 2002. "When Is Foreign Bank Lending to Emerging Markets Volatile?" in *Preventing Currency Crises in Emerging Markets*, edited by Sebastian Edwards and Jeffrey Frankel (NBER and University of Chicago Press).
- Goldberg, Linda, B. Gerard Dages, and Jennifer Crystal (2002), "The Lending Cycles of Banks in Emerging Markets: Foreign and Domestic Owners Compared". mimeo, Federal Reserve Bank of New York.
- Goldberg, L. (2004), "Financial-Sector FDI and Host Countries: New And Old Lessons", NBER Working Paper n. 10441.
- Grosse, R. and L. G. Goldberg (1991), "Foreign Bank Activity in the United States: an analysis by Country of Origin", *Journal of Banking and Finance*, 15, 1092-112.
- Heston, H., R. Summers and B. Aten (2006), "Penn World Table Version 6.2", Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania.
- Levine, R. (1999), "Foreign Bank Entry and Capital Control Liberalization: Effects on Growth and Stability", mimeo, University of Minnesota.
- Magri, S., A. Mori and P. Rossi (2004), "The entry and the activity level of foreign banks in Italy: An analysis of the determinants", *Journal of Banking and Finance*, 29, 1295-1310.
- Markusen, J.R. and A.J. Venables (1998), "Multinational firms and the new trade theory", *Journal of International Economics*, 46, 183-203
- Martinez Peria, M.S. and A. Mody (2004), "How Foreign Participation and Market Concentration Impact Bank Spreads: Evidence from Latin America", mimeo, The World Bank.

- Mian, A. (2006), "Distance Constraints: The Limits of Foreign Lending in Poor Economies, *Journal of Finance*, 61, 1465-1505.
- Micco, A., U. Panizza and M. Yanez (2007), "Bank ownership and performance. Does politics matter?", *Journal of Banking and Finance*, 31, 219-241.
- Miller, S.R., and A. Parkhe (1998), "Patterns in the Expansion of U.S. Banks' Foreign Operations", *Journal of International Business Studies*, 29, 359-390.
- Morgan, D. (2002), "Rating Banks: Risk and Uncertainty in an Opaque Industry", *American Economic Review*, 92, 874-888.
- Nigh, D., K.R. Cho, and S. Krishnan (1986), "The Role of Location-Related Factors in U.S. Banking Involvement Abroad: An Empirical Analysis", *Journal of International Business Studies*, 59-72.
- Papi, L. and D. Revoltella (2000), "Foreign Direct Investment in the Banking Sector: A Transitional Economy Perspective", in S. Claessens and M. Jansen, (eds.), *The Internationalization of Financial Services: Issues and Lessons for Developing Countries*, Boston, MA, Kluwer Academic Press.
- Piscitello, L. and A. F. Pozzolo (2006), "Tendenze di internazionalizzazione del sistema bancario italiano nel contesto europeo", in Onida, Fabrizio (eds.), *Internazionalizzazione e servizi finanziari per le imprese*, Bancaria Editore.
- Sagari, S. B. (1992), "United States Foreign Direct Investment in the Banking Industry", *Transnational Corporations*, 93-123.
- Stulz, R. M. (2005), "The Limits of Financial Globalization", *Journal of Finance*, 2005, 60, 1595-1638.
- ter Wengel (1995), "International Trade in Banking Services", *Journal of International Money and Finance*, 14, 47-64.
- Tschoegl, A. E. (1982), "Concentration among International Banks", *Journal of Banking and Finance*, 6, 567-78.
- Tschoegl, A. E. (1983), "Size, Growth, and Transnationality among the World's Largest Banks", *Journal of Business*, 187-201.
- Tschoegl, A. E. (2004), "Who owns the major US subsidiaries of foreign banks? A note", *International Financial Markets, Institutions and Money*, 14, 255-266.
- Unite, Angelo and Michael Sullivan (2001), "The Impact of Liberalization of Foreign Bank Entry on the Philippine Domestic Banking Market" Philippine Institute PASCN discussion paper no. 2001-08.
- Ursacki, T. and I. Vertinsky (1992), "Choice of Entry Timing and Scale by Foreign Banks in Japan and Korea", *Journal of Banking and Finance*, 16, 405-21.
- Williams, B. (1996), "Determinants of the Performance of Japanese Financial Institutions in Australia 1987-1992", *Applied Economics*, 28, 1153- 65.

- Williams, B. (1997), "Positive Theories of Multinational Banking: Eclectic Theory versus Internalisation Theory", *Journal of Economic Surveys*, 11, 71-100.
- Williams, B. (1998), "Factors Affecting the Performance of Foreign-Owned Banks in Australia: a Cross-Sectional Study", *Journal of Banking and Finance*, 22, 197-219.
- Wooldridge (2001), *Econometric analysis of cross section and panel data*, MIT Press.
- Yamori, N. (1998), "A Note on the Location Choice of Multinational Banks: the Case of Japanese Financial Institutions", *Journal of Banking and Finance*, 22, 109-20.
- Yeyati, E.L. and A. Micco (2007), "Concentration and foreign penetration in Latin American banking sectors: Impact on competition and risk", *Journal of Banking and Finance*, 31, 1633-1647.

Table 1

The Determinants of Cross-border M&As

Marginal effects calculated from a negative binomial estimation of the empirical model in equations (1) and (2). The dependent variable is the number of cross-border M&As in the banking sector between each country pair where at least one merger have taken place in the sample period (1990-2006). Data on GDP are from the Penn World Tables, version 6.2 (Heston et al., 2006). Data on bank credit and stock market capitalization are from the World Bank database. Data on geographical distance, bilateral trade (the logarithm of the volume of bilateral trade) and common language are from Andrew Rose's web site. For each a generic variable x , measured in countries i and j , the similarity index is calculated as: $1 - [\text{abs}(x_i - x_j) / \max(x_i, x_j)]$. Estimates in Panel A also includes unreported time dummies. Standard errors are corrected for heteroskedasticity using the White (1980) procedure and are reported in parenthesis. The symbol *** indicates a significance level of 1% or less; ** between 1 and 5%; * between 5 and 10%.

VARIABLES	Panel A: Time dummies		Panel B: Time trend	
	Marginal effect (Standard error)	Significance	Marginal effect (Standard error)	Significance
<u>Bilateral characteristics</u>				
Common language (dummy)	0.10 (0.02)	***	0.12 (0.02)	***
Common border (dummy)	-0.01 (0.01)		0.00 (0.01)	
Bilateral trade	0.62 (0.07)	***	0.64 (0.08)	***
Distance	-0.60 (0.11)	***	-0.46 (0.12)	***
Similarity in GDP	0.25 (0.07)	***	0.26 (0.07)	***
Similarity in GDP per capita	0.13 (0.12)		0.02 (0.15)	
Similarità in credit/GDP	0.21 (0.13)		0.29 (0.14)	**
Similarità in stock market capitalization/GDP	0.08 (0.10)		0.09 (0.11)	
<u>Origin country characteristics</u>				
GDP	-0.14 (0.08)	*	-0.27 (0.09)	***
GDP per-capita	0.07 (0.11)		-0.12 (0.14)	
Credit/GDP	0.70 (0.16)	***	0.54 (0.18)	***
Stock market capitalization/GDP	0.72 (0.13)	***	0.62 (0.15)	***
Credit and Stock market capitalization (interaction term)	-0.54 (0.09)	***	-0.44 (0.10)	***
Domestic bank M&As	0.39 (0.07)	***	0.38 (0.07)	***
<u>Destination country characteristics</u>				
GDP	-0.45 (0.07)	***	-0.38 (0.08)	***
GDP per capita	-0.42 (0.10)	***	-0.41 (0.13)	***
Credit/GDP	-0.57 (0.20)	***	-0.62 (0.21)	***
Stock market capitalization/GDP	-0.83 (0.20)	***	-0.73 (0.21)	***
Credit and Stock market capitalization (interaction term)	0.47 (0.15)	***	0.45 (0.15)	***
Domestic bank M&As	0.73 (0.08)	***	0.67 (0.08)	***
Time trend			0.84 (0.15)	***
Years 2001-2003 (dummy)			-0.12 (0.04)	***
Wald test of joint significance of the parameters (<i>p-value</i>)	4998.03	(0.00)	5026.77	(0.00)
Number of observations	84,006		84,006	

Table 2

The Determinants of Cross-border M&As

Marginal effects calculated from a negative binomial estimation of the empirical model in equations (1) and (2). The dependent variable is the number of cross-border M&As in the banking sector between each country pair where at least one merger have taken place in the sample period (1990-2006). Data on GDP are from the Penn World Tables, version 6.2 (Heston et al., 2006). Data on bank credit and stock market capitalization are from the World Bank database. Data on geographical distance, bilateral trade (the logarithm of the volume of bilateral trade) and common language are from Andrew Rose's web site. For each a generic variable x , measured in countries i and j , the difference is measured by a similarity index calculated as: $1 - [\text{abs}(x_i - x_j) / \max(x_i, x_j)]$. Estimates in Panel A also includes unreported time dummies. Standard errors are corrected for heteroskedasticity using the White (1980) procedure and are reported in parenthesis. The symbol *** indicates a significance level of 1% or less; ** between 1 and 5%; * between 5 and 10%. The difference tests test that the null hypothesis that the coefficients in the sub periods are identical, i.e., that the differences are significantly different from zero; *** indicates that the probability of incorrectly rejecting the null cannot be rejected at the 1 per cent level or less; ** between 1 and 5 per cent; * between 5 and 10 per cent.

VARIABLES	Sample period						Difference tests			
	1990-2000		2001-2003		2004-2006		(a) = (b)	(b) = (c)	(a) = (c)	(a) = (b) (b) = (c)
	(a)		(b)		(c)					
	Coefficient (Std. err.)	Significance	Coefficient (Std. err.)	Significance	Coefficient (Std. err.)	Significance				
<u>Bilateral characteristics</u>										
Common language (dummy)	0.10 (0.02)	***	0.02 (0.01)		0.01 (0.01)				***	**
Common border (dummy)	0.00 (0.00)		-0.01 (0.00)	***	0.00 (0.00)		***	***		**
Bilateral trade	0.87 (0.11)	***	0.74 (0.18)	***	0.25 (0.11)	**		**	***	***
Distance	-0.07 (0.17)		-0.68 (0.27)	**	-0.90 (0.18)	***	*		***	***
Similarities in GDP	0.23 (0.05)	***	0.05 (0.04)		0.02 (0.03)				**	*
Similarities in GDP per capita	0.07 (0.10)		0.10 (0.12)		-0.10 (0.07)					
Similarities in credit/GDP	0.24 (0.12)	**	-0.06 (0.10)		0.11 (0.05)	**				
Sim. in stock market cap./GDP	0.01 (0.09)		0.03 (0.06)		0.06 (0.04)					
<u>Origin country characteristics</u>										
GDP	-0.44 (0.13)	***	0.01 (0.29)		0.50 (0.20)	**			***	**
GDP per capita	0.04 (0.22)		1.68 (1.01)	*	0.86 (0.42)	**	**	**		*
Credit/GDP	0.24 (0.16)		-0.06 (0.15)		0.02 (0.08)					
Stock market cap./GDP	0.30 (0.10)	***	0.06 (0.08)		0.02 (0.10)					
Credit & Stock market cap. (int.)	-0.19 (0.07)	***	-0.05 (0.06)		-0.02 (0.06)					
G10 country	0.08 (0.03)	**	-0.01 (0.02)		0.00 (0.01)		*			
OECD country	0.07 (0.07)		0.07 (0.07)		-0.04 (0.04)					
Domestic bank M&As	0.27 (0.10)	***	0.38 (0.20)	*	-0.01 (0.16)					
<u>Destination country characteristics</u>										
GDP	-0.44 (0.12)	***	-0.43 (0.26)		0.21 (0.16)				*	
GDP per capita	-0.37 (0.16)	**	-0.54 (0.59)		0.45 (0.37)					
Credit/GDP	-0.42 (0.18)	**	-0.24 (0.15)		-0.16 (0.09)	*				
Stock market cap./GDP	-0.36 (0.16)	**	-0.64 (0.21)	***	-0.30 (0.10)	***	**	*		
Credit & Stock market cap. (int.)	0.17 (0.12)		0.42 (0.14)	***	0.22 (0.07)	***	**	*		*
G10 country	-0.01 (0.03)		-0.03 (0.03)		0.00 (0.02)					
OECD country	-0.02 (0.07)		0.13 (0.06)	**	-0.07 (0.04)	*	**	**		*
Eastern country	0.02 (0.01)		0.00 (0.01)		0.01 (0.01)					
Domestic bank M&As (log)	0.59 (0.10)	***	0.49 (0.29)	*	0.17 (0.18)					
Time trend	0.48 (0.15)	***	-0.93 (0.63)		0.68 (0.46)		**			*
Wald test (<i>p</i> -value)	985.07 (0.00)		451.99 (0.00)		395.91 (0.00)					
Number of observations	44,797		19,475		19,734					

