



北京师范大学经济与工商管理学院
工作论文（working paper）系列
经济类 No. 56

Tony Fang、Carl Lin:
Minimum Wages and Employment in China

2013 年 12 月

Minimum Wages and Employment in China

Tony Fang^{*} and Carl Lin[†]

Abstract

Since China promulgated new minimum wage regulations in 2004, the magnitude and frequency of changes in the minimum wage have been substantial, both over time and across jurisdictions. This paper uses county-level minimum wage panel data and a longitudinal household survey from 16 representative provinces to estimate the employment effects of minimum wage changes in China over the period of 2004 to 2009. In contrast to the mixed results of previous studies using provincial-level data, we present evidence that minimum wage changes have significant adverse effects on employment in the Eastern and Central regions of China, and result in disemployment for females, young adults, and low-skilled workers.

Keywords: Minimum Wage, China, Employment

JEL Classifications: J38

^{*} Tony Fang is an Associate Professor of Human Resource Management & Employment Relations at Monash University and the University of Toronto and a Research Fellow of the Institute for the Study of Labor (IZA).

[†] Carl Lin is an Assistant Professor at the Department of Economics of Beijing Normal University and a Research Fellow of the Institute for the Study of Labor (IZA).

Financial supports from IDRC Canada and Shi Li are gratefully acknowledged. We thank Linxiang Ye and Jianwei Xu for their help in collecting data. We are grateful to James Alm, Jason Barr, Otávio Bartalotti, John Bonin, Michael Darden, Jim Davies, Ira Gang, Morley Gunderson, Abigail Hornstein, Desheng Lai, Matthew Larsen, Lance Lochner, Peter Loeb, Vlad Manole, Nirav Mehta, Chris Robinson, Julia Schwenkenberg, Yue Shen, Terry Sicular, Mariana Spatareanu, Jing Wang, and Myeong-Su Yun for helpful comments and seminar participants at Tulane University, Rutgers University-Newark, Wesleyan University, Rutgers University-New Brunswick, the University of Toronto, the University of Western Ontario, the 5th Transition and Economic Development Conference (TED) at Fudan University, and the 13th Young Chinese Scholar Forum in Beijing.

Correspondence: Carl Lin, Room 1720, Rear Main Building, No. 19 Xijiekou Outer St., Haidian Dist., Beijing, P.R. China. Tel: +86-188-106-33343; Fax: +86-105-880-1867; E-mail: csmlin@bnu.edu.cn.

1. Introduction

Since China issued its new minimum wage regulations in 2004, minimum wages have sparked intense debate in the country. There is little doubt that employees generally welcome the minimum wage. However, there is considerably less agreement regarding whether the minimum wage is effective at attaining its goals. The issue, from the time of its introduction, has been highly controversial among scholars and policy-makers.¹

The contentious nature of the minimum wage policy in scholarly work does not allow for its impact to be easily understood. However, the initial evidence seems to show that the magnitude and frequency of minimum wage changes have been substantial both over time and across different jurisdictions, especially after the year 2003. For example, in January 2004, China promulgated new minimum wage regulations that required local governments introduce a minimum wage increase at least once every two years, extended coverage to self-employed and part-time workers, and quintupled the penalties for violation or noncompliance. The new regulations were put into effect in March 2004, leading to frequent and substantial increases in minimum wages in the subsequent years.

[Figure 1 about here]

Figure 1 shows the nominal and real minimum wage (monthly average) in China from 1995 to 2012 as well as those of the corresponding provinces that raised the minimum wage standards

¹ In China, supporters of minimum wages advocate them as a way to assist individuals or families to achieve self-sufficiency, to protect workers in low-paid occupations (Zhang and Deng, 2005; Sun, 2006), to help reduce inequality and to serve as an important safety net by providing a wage floor (Zhang, 2007; Jia and Zhang, 2013). In addition, the higher labor cost may promote managerial efficiency and labor productivity, inducing employers to invest in productivity-improving technology (Cooke, 2005). Along these lines, many Chinese scholars have argued in favor of the more proactive increase of minimum wages (Du and Wang, 2008; Ding, 2009; Han and Wei, 2011). On the other hand, opponents argue that raising the minimum wage can undermine enterprises' dividend policies, reduce China's comparative advantage given the abundance of low-wage labor (Cheung, 2004, 2010), decrease the employment opportunities of low-wage workers, and lead to reduction in the compensation package (Xue, 2004; Ping, 2005; Gong, 2009). Furthermore, rural-urban migrant workers tend to have very low pay and may accept jobs which pay less than the current minimum wage, making it exist in name only (Chan, 2001; Ye, 2005).

for each year and its moving average over the same period. Between 1995 and 2003, the average nominal minimum wage increased steadily from 169 RMB to 301 RMB, amounting to a 78 percent growth in 9 years. However, since China issued the new minimum wage regulations in 2004, the nominal minimum wage has increased rapidly by more than 200 percent, reaching 944 RMB in 2012.² The real minimum wage grew at a slower pace before 2004 and began to rise thereafter. Furthermore, as shown by the moving average curve in Figure 1, there is an apparent rise in the number of provinces that raised the minimum wage standards in 2004, indicating that the minimum wage adjustment had become more frequent since that year.

How had this regulatory environment affected the labor market outcomes in China? More specifically, did changes in the minimum wages have any impact on employment in the Chinese labor market? Despite the enormous literature documenting numerous aspects of minimum wages and their role in the labor market, there is no consensus on the magnitude of an “average” effect of minimum wages on employment.

Empirically speaking, there are at least three challenges involved in measuring the effect. First, because provinces and municipalities in China have considerable flexibility in setting their minimum wage according to local conditions, there are often at least 3 or 4 levels of minimum wage standards applicable to various counties in most provinces, meaning that county- or city-level minimum wage data containing the relevant information on the dates and the extent of minimum wage increase are not readily available.³ Second, omitted variables and endogeneity

² The growth rates of average nominal wage are 155 and 194 percent for the periods of 1995-2003 and 2004-2012, respectively (National Bureau of Statistics of China, 2012).

³ The implementation date of a new minimum wage standard of a county can also differ across geographically contiguous neighbors within the same province. For example, Liaoning Province has the most complicated minimum wage scheme, in which 14 jurisdictions may enact their own standards on different dates. For instance, in 2007, Shenyang, Benxi, Dandong, and Panjin cities did not increase their minimum wages. In contrast, Dalian and Anshan cities increased their minimum wages from 600 RMB to 700 RMB on December 20th, on which day Jinzhou and Liaoyang cities increased their minimum wages from 480 RMB to 580 RMB and Chaoyang city increased its minimum wage from 350 RMB to 530 RMB. Furthermore, the minimum wages of Fushun and

issues (such as the decision regarding the adjustment of minimum wage standards) make it difficult to separate causal effects from effects due to other unobserved confounding factors. Third, it is difficult to find microdata that can be plausibly representative of the population and may be influenced by the minimum wage increases. Furthermore, some provinces, such as Beijing and Shanghai, do not include social security payments and housing provident funds as part of wages when calculating the minimum wage, making their “official” minimum wage virtually higher.⁴

In the paper, we first assess whether and the extent to which minimum wage changes affected the Chinese labor market by measuring the average effect of the minimum wage on employment. To do so, we begin by analyzing the labor market reaction to changes in minimum wage standards using panel data regressions. The most distinctive feature of our data—crucial for our research design—is the combination of a large county-level panel, which includes all counties in China and contains relevant information on minimum wages, with a longitudinal household survey of 16 representative provinces between 2002 and 2009. The use of county data allows a reasonable representation and more variation in detecting the effects of minimum wages on employment in China.⁵ In particular, this feature allows us to directly evaluate the effects on subgroups of the population, especially those who are at risk of being affected by a minimum wage increase, such as young adults, female workers, low-skilled workers, and rural migrant workers.

Huludao cities increased from 400 RMB to 480 RMB on January 1st, whereas that of Yingkou city increased from 380 RMB to 480 RMB, that of Fuxin city increased from 350 RMB to 420 RMB, and that of Tieling city increased from 380 RMB to 420 RMB the following year.

⁴ In other words, with or without accounting for this issue, the difference can be substantial. For instance, the mean monthly minimum wages in Beijing and Shanghai were 651 RMB and 767 RMB in 2004-2009; however, the average expenses of both social security payments and housing provident funds in Beijing and Shanghai are as high as 376 RMB and 452 RMB over the same period, amounting to 58 percent and 59 percent of the nominal minimum wages, respectively. We discuss how we address this issue in Section 3.1.

⁵ There are 31 administrative units at the provincial level in China, including 22 provinces, 5 autonomous regions, and 4 municipalities; as of 2012, there are 2,862 county-level administrative units.

Our panel data regressions reveal significant disemployment effects of minimum wages on young adults (age 15-29) between 2004 and 2009 over the country—a 10 percent increase in the current and previous year’s minimum wages led to a statistically significant .88 percent and 1.36 to 1.56 percent reduction in employment, respectively. Furthermore, we find that the minimum wage has the largest lagged adverse effect on the employment of at-risk groups (defined as workers whose monthly wages are between the old and new minimum wage standards), showing that the elasticities are in the range of -.265 to -.340 for the entire sample over the same period.

To further substantiate our findings, we re-estimate the effects for three different time periods—pre-2004, 2004-2007, and 2008-2009 (the global financial crisis)—by viewing the promulgation of new minimum wage regulations in 2004 as a quasi-experiment. The evidence supporting our panel data regression estimates is compelling: we find that minimum wages have adverse employment effects on both young adults and at-risk groups in the post-2004 period, indicating that a 10 percent increase in the current minimum wage led to a statistically significant 3.59 percent reduction in the employment of at-risk groups during 2004-2007 and a lagged effect of 1.03 percent reduction for young adults during 2008-2009. In contrast, we do not find a significant effect in the pre-2004 period.

Several studies on the employment effects of minimum wages in China find mixed results, and the results for different regions are often opposite to one another. For example, Ni, Wang, and Yao (2011) focus on all employees and find some negative effects in the more prosperous and rapidly growing East and some positive effects in the developing Central and less developed Western regions over the 2000-2005 period. In contrast, Wang and Gunderson (2011) use 2000-2007 data on rural migrants and find no adverse effects and indeed a positive employment effect in state-owned enterprises in the East and negative effects in the Central and Western regions.

The discrepancies between these studies may be explained in part by the fact that the employment effects on different target groups tend to differ. Indeed, by examining the effects on several subgroups, our estimates seem to reconcile the results of previous studies—we find that, similar to Ni, Wang, and Yao (2011), the minimum wage has a significantly negative effect on all employees in the East and a lagged positive (though statistically insignificant) effect in the Western region in 2004-2009. In contrast, using rural migrants as the target group, we find that the minimum wage has an adverse and significant effect in the West and a positive (though statistically insignificant) effect in the East over the same period studied in Wang and Gunderson (2011).

Finally, we investigate the impact of the minimum wage on the employment of workers by skill level. In theory, low-skilled workers are relatively vulnerable when facing minimum wage increases. As anticipated, our panel data regression results show that the minimum wage has an adverse, though perhaps mild, effect on the employment of low-skilled workers (defined as high school graduates or below), a 10 percent increase in the current minimum wage results in statistically significant reductions in employment of .54 to .80 percent for the entire sample, .70 percent for the East, and .71 to .77 percent for the Central region. In contrast, we do not find a statistically significant effect for the Western region or for those workers who have at least a college degree.

The remainder of the paper is organized as follows. We provide a review of the development of minimum wages in China in Section 2. Section 3 provides details pertaining to the data and research design of the paper. In Section 4, we present and discuss the empirical results. Section 5 presents the paper's conclusions.

2. Minimum Wages in China

Prior to 1994, China had no minimum wage law. In 1984, the country simply acknowledged the 1928 “Minimum Wage Treaty” of the International Labour Organization (ILO) (Su, 1993; Wang and Gunderson, 2011, 2012). Due to the sluggish wage growth and high inflation in the late 1980s, Zhuhai of Guangdong Province first implemented its local minimum wage regulations, followed by Shenzhen, Guangzhou, and Jiangmen in 1989. It was not until the eruption of private enterprises in 1992 when labor disputes became frequent that the Chinese Central Government began to consider the minimum wage legislation (Yang, 2006). In 1993, China issued its first national minimum wage regulations, and in July 1994, they were written into China’s new version of the Labor Law.

The 1994 legislation required that all employers comply with wages no less than the local minimum wages. All provincial, autonomous-region, and municipality governments should set their minimum wages according to five principles and report them to the State Council of the Central Government. More specifically, the five principles indicated that the setting and adjustment of the local minimum wage should synthetically consider the lowest living expenses of workers and the average number of dependents they support, local average wages, labor productivity, local employment, and levels of economic development among regions. These conditions provided considerable flexibility for provinces and municipalities in setting minimum wage standards, with the economic development principle giving them the flexibility to restrain minimum wages to attract foreign investment (Frost, 2002; Wang and Gunderson, 2011). By December 1994, 7 of 31 provinces and municipalities had set their own minimum wages. By the end of 1995, the number increased to 24.

In the early 2000s, the slow increase of the minimum wage along with growing concerns for uncovered/disadvantaged workers began to draw government’s attention to consider new

regulations of the minimum wage. In December 2003, the Ministry of Labour and Social Security passed "The Minimum Wage Regulations" and promulgated the new law in January 2004. The main features of this law involved extending coverage to state-owned and private enterprises, employees in self-employed businesses, and private non-enterprise units. In particular, the new law established two types of minimum wages: a monthly minimum wage applied to fulltime workers and an hourly minimum wage applied to non-fulltime employees. Importantly, the minimum wage standards were set and adjusted jointly by the local government, trade union, and enterprise confederation of each province/autonomous region/municipality. The draft would then be submitted to the Ministry of Labour and Social Security for review, and the Ministry would ask for opinions from the All China Federation of Trade Unions and the China Enterprise Confederation. The Ministry of Labour and Social Security can request a revision within 14 days after receiving the proposed draft. If no revision is brought up after the 14-day period, the proposed new minimum wage program is considered to be passed.

In addition, the new regulation required local governments to renew the minimum wage standards at least once every two years, and penalties for violation were increased from 20 percent to 100 percent of the owed wage to 100 percent to 500 percent of the owed wage. Employers cannot include subsidies such as overtime pay or canteen and traveling supplements as part of the wage when calculating minimum wages. The new regulations were put into effect on March 1st, 2004 and led to substantial increases in minimum wages.

3. Data and Research Design

The data collection and research design were motivated by a desire to estimate the average effect of minimum wages on employment and to attempt to address some of the aforementioned challenges. In collecting the data, the goal was to obtain information on the minimum wage at

the county or city level over a long time span, with a panel structure allowing for the use of fixed time and county effects to eliminate omitted variable bias arising from unobserved variables that are constant over time and those that are constant across counties. The wage sample needed to be a longitudinal microdata sample to allow the distribution of minimum wage workers—in each geographic region, age cohort, skill level, and industry—to be estimated. For these reasons, and because the paper also aimed to examine how the 2008 global financial crisis influenced our results, we sought to collect information on provinces that were potentially affected over as many years as possible.

3.1. *Data*

Our study primarily uses two data sources: the annual Urban Household Survey (UHS) from 2002 to 2009 and minimum wage data collected at the county level between 1994 and 2012. The UHS is a continuous, large-scale social-economic survey conducted by the National Bureau of Statistics of China aiming to study the conditions and standard of living of urban households, which include agricultural and non-agricultural residents or non-residents who live in the city for at least six months and some migrant households with local residency.⁶ With the use of sampling techniques and daily accounting methods, the survey collects data from households in different cities and counties over all 31 provinces, municipalities, and autonomous regions in Mainland China. It contains household information, such as income and consumption expenditure; demographic characteristics; work and employment; housing; and other family-related matters.

[Figure 2 about here]

Figure 2 depicts the 16 representative provinces/municipalities used to study the impact of minimum wages on the Chinese labor market. We divide the 31 jurisdictions into three regions

⁶ In 2009, the UHS has a sample size of 66,060 households.

as in Wang and Gundersen (2011): the more prosperous and rapidly growing East, the developing Central region and the less developed and more slowly growing West. As shown in Figure 2, the data for the Eastern region are represented by darker areas, which include two major municipalities, Beijing and Shanghai, and four economically important provinces, Guangdong, Jiangsu, Shandong, and Liaoning. The Central region includes six developing provinces, namely, Henan, Anhui, Hubei, Jiangxi, and Shanxi, which are where most migrants come from. Finally, the Western region covers the only municipality in the West, Chongqing, and three less developed provinces: Gansu, Sichuan, and Yunnan. Collectively, our 16-province sample contains 65 percent of the total population in China, covering 60 percent of the counties in the country (National Bureau of Statistics of China, 2010).

Our primary objective was to thoroughly and accurately acquire relevant information on the minimum wage for each county. In China, provinces and municipalities have considerable flexibility in setting their minimum wage standards according to local economic conditions, resulting in several levels of standards across counties/cities within the same province. Moreover, the adjustment date of a county's new minimum wage standard can also differ from its geographically contiguous neighbors within the same province, making the estimation of minimum wage effects more challenging. To effectively address this issue, we collected our minimum wage data from every local government website and carefully recorded the minimum wage information for approximately 2,000 counties every year from 1994 to 2012. As such, our data contain monthly minimum wages for full-time employees, hourly minimum wages for part-time employees, the effective dates of the minimum wage standards and the extent to which social security payments and/or housing provident funds were included as part of the minimum wage calculations.

[Table 1 about here]

We then merge the minimum wage data into the UHS, a 16-province panel dataset that contains individual/household socio-economic information over the 2002-2009 period. We present a brief summary of the minimum wage data used in our main analysis for the post new minimum wage regulations (2004) period in Table 1. For example, columns (1), (2), and (3) correspond to the mean of the monthly minimum wages, the standard deviation, and the number of counties for the three regions as well as the 16 provinces/municipalities in 2004, respectively.⁷ When calculating the mean minimum wages, we use the time-weighted method, as suggested in Rama (2001), to address the issue of different adjustment dates among counties within a province within a year. The last row reports the mean of the minimum wages of all provinces, its standard deviation, and the total number of counties for each year.

Table 1 reveals several important patterns. First, calculated at the county level, the mean nominal minimum wage increased by 80 percent (from 310 RMB to 562 RMB) between 2004 and 2009 for all counties as a whole.⁸ Second, the East region has the highest minimum wage, with an average of 522 RMB per month in this period, followed by the West (436 RMB) and the Central region (424 RMB). Surprisingly, minimum wages of the three regions have similar annual growth rates of 13 percent.⁹ Third, raising the minimum wage standards sometimes occurred more than once in a year. For example, Beijing increased its minimum wages in January and July of 2004, and Jiangsu raised its standards in April and July of 2008.

[Table 2 about here]

⁷ Note that there was no minimum wage increase in 2009 because of the global financial crisis. The mean minimum wages have been adjusted for inflation and converted into 2005 RMB.

⁸ In fact, the average real minimum wage has also grown at a similar rate.

⁹ The average annual growth rate of the minimum wage is 12.7 percent in the Eastern region, 13.2 percent in the Central region, and 12.5 percent in the Western region over the 2004-2009 period.

We restrict the analysis to working-age population between the ages of 15 and 64 who are employed in the civilian labor force, report positive annual earnings, are not self-employed, and not enrolled in school. Individuals who work in the agricultural production or services, farming, forestry, fishing, and ranching industries are also excluded (Neumark and Wascher, 1992). Table 2 presents summary statistics of the two key variables, minimum-to-average wage ratio and employment-to-population ratio, from 2004 to 2009. The second and third rows of the table show that male workers have approximately 10 percentage points lower minimum-to-average-wage ratios and 15 percentage points higher employment-to-population ratios than females, meaning that Chinese female workers are comparatively disadvantaged in the labor market relative to their male counterparts. As anticipated, this result shows that the more prosperous Eastern region has the lowest minimum-to-average-wage ratio (.276) and the highest employment-to-population ratio (.607) of the three regions.¹⁰

Mounting evidence from minimum wage studies has consistently found that minimum wages have a greater impact on young and low-skilled workers, especially teenagers. Compared to their senior counterparts, young workers, who are often equipped with less human capital, are more likely to earn the minimum wage. Table 2 also shows the two key variables by age cohort and by educational attainment over the 2004-2009 period. Indeed, we find that young Chinese workers aged 15 to 29 have the highest minimum-to-average-wage ratio (.392), at least 10 percentage points higher than that of other age cohorts. For workers with different skills, the evidence demonstrates that as the skill level increases, the minimum-to-average-wage ratio

¹⁰ The minimum-to-average wage ratios in Table 2 account for the fact that some provinces include social security payments and/or housing provident funds as part of the wage when calculating minimum wages. The minimum wages in Beijing, Shanghai and Jiangxi do not include social security payments and housing provident funds, and the minimum wages in Jiangsu began to include only social security payments (but not housing provident funds) on November 1st, 2005.

decreases quickly—dropping continuously from .593 for elementary school or below to .183 for college or above.

Table 2 also presents the minimum-to-average-wage ratio by industry. The manufacturing sector contains the largest share (21.6 percent) of workers in our sample; the public service sector is the second largest (13.9 percent); and the third and the fourth sectors are wholesales and retail sales trade (9.9 percent) and housekeeping (9.6 percent), respectively. Looking at the minimum-to-average-wage ratios, unsurprisingly, we find that the housekeeping sector has the highest ratio (.509) among all industries, followed by the hotel and restaurant sector (.498) and wholesales and retail sales trade (.471).

[Table 3 about here]

We also provide a summary of the characteristics of workers who earn the minimum wage as well as less/more than the minimum wage over 2004-2009 in Table 3. The first row of Table 3 shows that approximately 5.62 percent of all workers earned less than the minimum wage and 3.28 percent earned just the minimum, meaning that a combined 8.90 percent of Chinese employees are minimum wage workers over the 2004-2009 period. Among those who earned the minimum wage exactly and less than the minimum wage, 63.84 percent and 61.52 percent are females, respectively. Furthermore, the minimum-to-average-wage ratio of workers receiving less than the minimum wage is 2.52, meaning that these disadvantaged workers earn a wage that is only approximately one-quarter of the official standard.

For different age cohorts, Table 3 shows that young adults (age 15-29) are more likely to be minimum wage workers. With increase age, the percentage decreases. Similarly, we find the same decreasing pattern in the skill panel. Looking at the characteristics of workers by industry, Table 3 shows that the housekeeping sector has the largest share of minimum wage workers:

approximately 20.21 percent of housekeepers earn less than or equal to the minimum wage. Wholesales and retail sales as well as hotel and restaurant sectors also have 16.76 percent and 16.50 percent of workers earning below or equal to the minimum wage, respectively.

3.2. *Research Design*

Our objective is to assess the impact of minimum wages on the employment of potentially affected workers. As noted in Section 1, nearly all existing studies on minimum wages in China use pooled time-series/cross-section data at the provincial level and tend to find mixed results, implying that a "consensus" of employment effects remains to be established. Thus, our study attempts to reconcile the existing findings using more sophisticated minimum wage data, which permit the use of a panel structure analysis of minimum wage effects, exploiting the greater variation in relative minimum wages at the county level and avoiding the measurement error caused by using a uniform provincial minimum wage. Moreover, unlike previous studies that use aggregate published statistics, our study used household survey microdata, which allows us to calculate the dependent variable—the employment-to-population ratio—at the county level, which contains more variation and information on local conditions. Ideally, this feature should yield more reliable estimates of the employment effects of minimum wages in China.

Specifically, our panel data allow us to estimate a prespecified equation of the form proposed in Neumark (2001) and used in Campolieti, Gunderson, and Riddell (2006) and Wang and Gunderson (2011). Before the data analysis, the methodology involves precluding running alternative specifications until preferred results are obtained. Our estimation equation is

$$E_{i,t} = \alpha_0 + \alpha_1 MW_{i,t} + \alpha_2 MW_{i,t-1} + X_{i,t}\beta + Y_t\gamma + C_i\delta + \epsilon_{i,t}, \quad (1)$$

where $E_{i,t}$ is the log of employment variable (employment-to-population ratio) of county i in year t ; $MW_{i,t}$ and $MW_{i,t-1}$ are the log of minimum wage index variables (minimum-to-average-

wage ratio) of county i in year t and year $t-1$, respectively; X is a set of control variables to capture aggregate business cycle effects; Y_t is a set of fixed year effects; and C_i is a set of fixed county effects. The disturbance term ε is assumed to be serially uncorrelated and orthogonal to the independent variables.

To address the bias from the specification error and the potential endogeneity problem, we include several control variables in estimating the equation. First, the county GDP per capita and CPI (city level) capture aggregate business cycle effects and controls for the global financial crisis of 2008. Second, the county foreign direct investment (FDI) is used to control for that provinces may restrain the minimum wage to attract foreign investors (Frost, 2002). Because the decisions of whether to increase minimum wages are determined by government officials, who often must consider local economic conditions, we collectively include these controls to address this issue.

4. Empirical Results and Discussion

4.1. *Minimum Wage Effects Across Regions*

We first present the estimation results for young adults, at-risk groups, and the entire sample for the East, Central, West, and all regions in Table 4. In each region, we estimate Eq. (1) using the fixed-effects model with both fixed year and county effects. All regressions are appropriately weighted by the size of the labor force in each county. We report the results of two estimation equations for each of the three groups: the first equation uses the minimum wage variable of the current year t ($MW_{i,t}$) and the previous year $t-1$ ($MW_{i,t-1}$) only, while the second equation further controls for CPI (city level), county GDP per capita, and county FDI. The signs of the regression coefficients on the independent variables are generally identical and are

consistent with the theoretical expectations. Nevertheless, there are some significant differences in the magnitude of the coefficients.

[Table 4 about here]

The first and second columns of Table 4 report the estimates with cluster-robust standard errors in parentheses for young adults and at-risk groups across different regions using Eq. (1), while in the third column, we report the estimates of the entire sample for comparison. The significance of our results is compelling: over the country, we find negative effects of the current and lagged minimum wages on employment. A 10 percent increase in the current and previous year's minimum wage led to a statistically significant .88 percent and 1.36 to 1.56 percent reduction in young adults' employment, respectively. A 10 percent increase in the current and previous year's minimum wage led to a statistically significant 2.13 percent and 2.65 to 3.40 percent reduction in at-risk groups' employment, respectively. For the entire sample, a 10 percent increase in the current and previous year's minimum wage led to a statistically significant .45 to .55 percent and .28 to .31 percent reduction in employment, respectively.

In the more developed and prosperous East China, which has a large population residing in large cities, such as Beijing, Shanghai, and Guangzhou, the minimum wage has been an important policy tool as China makes the critical transition into a market economy. Consequently, the magnitude and frequency of minimum wage increases are relatively high in the regions in which the impact of minimum wages on employment could be evident. Indeed, consistent with the evidence in Table 4, our estimates indicate that minimum wage increases in the Eastern region have a statistically significant adverse impact on employment with elasticities ranging from -.154 to -.234 and a lagged adverse effect with an elasticity of -.100 for young adults. Furthermore, we find a large and negative lagged minimum wage effect on the

employment of at-risk groups—a 10 percent increase in the minimum wage led to a statistically significant 3.10 to 3.22 percent reduction in employment. The current minimum wage effects are negative; however, they are not statistically significant.

In the developing Central region, we also find all lagged minimum wages to have a strong negative employment effect on young adults, at-risk groups, and the entire working population. The minimum wage has an adverse lagged employment effect with an elasticity of $-.216$ for young adults and $-.310$ to $-.336$ for at-risk groups. For the entire working population in the Central, the elasticity is in the range of $-.041$ to $-.042$. The estimates of the current minimum wage variable are negative; however, they are not statistically significant.

Finally, in the less developed West, we do not find an effect of the minimum wage on employment. Nevertheless, without controlling for local economic conditions, our empirical results show positive (not statistically significant) coefficients for the current and the lagged minimum wages of young adults and at-risk groups. When economic conditions are controlled, we find positive but insignificant estimates for the current and the lagged minimum wages for at-risk groups.

4.2. *Gender and Age Cohort*

An enormous number of minimum wage studies have reported that young workers are most likely to be affected by minimum wage increases, and the disemployment effect seems especially strong for teenagers. Female workers are particularly vulnerable in the labor market. In the case of China, we examine the effects of minimum wages on employment by separating the sample into four age subgroups: 15 to 29, 30 to 39, 40 to 49, and 50 to 64.¹¹ In each age group, we estimate Eq. (1) using the fixed-effects model separately for males and females and report the

¹¹ Because the number of workers aged 15-19 is relatively small in our sample, we use the group of workers aged 15-29 to represent young workers.

results in Table 5. Because panel data regression with both fixed year and county effects has the advantage of eliminating omitted variable bias arising from unobserved variables that are constant over time and those that are constant across counties, we focus on the results of this specification. The signs of the regression coefficients of the independent variables are generally consistent with the theoretical expectations.

[Table 5 about here]

We present the estimates for all regions in panel A. The results show that the current minimum wage has an adverse effect on the employment of female young workers (age 15-29): a 10 percent increase in the minimum wage results in a statistically significant 1.48 percent reduction in employment and a minor lagged effect with an elasticity of -.061. Furthermore, we find that the negative effects on females decrease as the age cohort moves up, showing that the elasticity of the current effect is -.068 for females aged 30-39 and that of the lagged effect is -.040 for females aged 40-49. In contrast, we do not find a significant effect of minimum wages on females aged 50-64 or on male employment for any cohort over the country.

In other regions, minimum wages seem to have an adverse employment effect on young females in Eastern and Central regions, for whom a 10 percent increase in the current year's minimum wage led to a statistically significant 1.72 percent and 1.55 percent reduction in employment, respectively. We also find minor disemployment effects of minimum wages on males aged 30-39 in the Central region, with elasticities of -.052 for the current and -.072 for the lagged minimum wage variables.

4.3. Skill Level

In the literature, the preponderance of evidence supports the view that minimum wages reduce the employment of low-wage workers. Moreover, when researchers focus on the least-skilled groups, which are most likely to be directly affected by minimum wage increases, the

evidence for disemployment effects seems to be especially strong (Neumark and Wascher, 2008). We present the estimation results by three skill groups as measured by educational attainment in Table 6. In each group, we report the estimates using the fixed-effects model with both fixed year and county effects.

[Table 6 about here]

Our estimates reveal disemployment effects of minimum wages on low-skilled workers (high school graduates or below). For example, looking at panel A of Table 6, the results show that the current minimum wage has an adverse effect on the employment of workers who are high school graduates or below: the elasticities of $-.054$ and $-.080$ are statistically significant at the 5 percent level. Furthermore, we also find lagged negative effects of minimum wages on the employment of vocational school degree workers—a 10 percent increase in the previous year minimum wage results in a statistically significant .40 to .47 percent reduction in the current year employment.

In the East, we find that the current minimum wage has a negative employment effect on low-skilled workers, with an elasticity of $-.070$, but no effect on other workers with higher degrees. As shown in Panel C of Table 6, we find that the minimum wage has an adverse effect on low-skilled workers in the Central region, with elasticities of $-.071$ to $-.077$ for the current year and $-.047$ to $-.052$ for the previous year minimum wage variables. In addition, we also find a lagged disemployment effect on workers with vocational school degrees in the Central region, with elasticities in the range of $-.083$ to $-.090$. Finally, we examine the effect of minimum wages on workers with a college degree or above (including junior college) and do not find a significant effect in any region.

4.4. *Minimum Wage Effects on Migrant Workers*

The new minimum wage regulations of 2004 were designed in large part to protect rural migrant workers, who tend to work in non-state enterprises in which labor standards and wages are low (Cooke, 2005; Zhang and Deng, 2005; Wang and Gunderson, 2011). Minimum wages are expected to have a stronger effect on rural migrant workers because they tend to work in low-wage sectors and the higher wages will induce some enterprises to use more skilled workers or more capital to substitute for the now more expensive rural workers (Wang and Gunderson, 2011).

Using the micro-level UHS data, we are able to examine how the minimum wage affects the employment of rural migrant workers at the county level. Because very few rural migrants work in state-owned enterprises in our sample, we focus on non-state enterprises and report the results for all enterprises as well. Table 7 reports the results for Eastern, Central, and Western regions. Consistent with the findings of Wang and Gunderson (2011), we find that the minimum wage has negative employment effects on rural migrant workers in the less developed and more slowly growing Western regions: for all enterprises, a 10 percent increase in the lagged minimum wage results in a statistically significant 2.16 to 2.82 percent reduction in employment. In particular, for migrant workers in non-state enterprises, we find a larger disemployment effect of current minimum wages, with elasticities of $-.408$ and $-.411$. In contrast, the results show positive coefficients (though statistically insignificant) of the minimum wage variables in the East, which is consistent with the monopsonistic behavior found in Wang and Gunderson (2011).

4.5. *Endogeneity Issue*

In China, the decisions of whether to increase minimum wages are determined by local government officials, who must often consider various factors, such as economic conditions, which could result in potential endogeneity problems, making our results unreliable. To possibly address this issue, we separate our sample into three different time periods—2002-2004, 2004-

2007, and 2008-2009—by viewing the promulgation of new minimum wage regulations in 2004 as a quasi-experiment. Specifically, we estimate Eq. (1) for the three time periods and focus on young adults and at-risk groups.¹²

Table 8 reports the estimates for all regions in Panel A, the Eastern regions in Panel B, and Central and West regions in Panel C. The evidence supporting our main results is significant. Over the country, we do not find minimum wages to have an effect on employment in the 2002-2004 period. In contrast, we find that current and lagged minimum wages do have negative effects on at-risk groups in the 2004-2007 period (elasticities $-.359$ and $-.246$ for the current and lagged minimum wages, respectively) and a lagged disemployment effect on young adults in the 2008-2009 period (elasticity $-.103$). In separate regions, we find a similar phenomenon in the East, where there is no effect in the 2002-2004 period but the minimum wage has negative employment effects in both the 2004-2007 and the 2008-2009 periods. In the Central and West regions, we find lagged negative effects on young adults in both the post-2004 periods but no effect in the 2002-2004 period.¹³

In short, our results in Table 8 seem to support the pattern observed in Figure 1, namely, that the year 2004 is the watershed of the minimum wage policy in China. Empirically, the new minimum wage standards of 2004 can be viewed as a quasi-experiment that may be able to address the endogeneity issue.

In addition to using the promulgation of new minimum wage regulations in 2004 as a quasi-experiment, we also consider instrumental-variables (IV) estimation of the fixed-effects specifications from Table 4 for young adults and at-risk groups. Our instrumental variables are

¹² Because there are not enough observations in the West in the 2002-2004 period, we combine the Central and West regions and report the results in Panel C of Table 8.

¹³ For at-risk groups, we do not find significant effects in the 2004-2007 and 2008-2009 periods, however, there is a statistically significant positive effect in the current minimum wage variable. We are aware that there are only 31 observations in the Central and West for this group; hence, one should interpret this coefficient in caution.

the mean of the minimum wage level in all geographically bordering provinces (Neumark and Wascher, 1992), real minimum wages (Feliciano, 1998), and the changes of province leader variable to capture the effect of Chinese political system. We instrument the current and previous year minimum wage variables and present the estimates in the estimation equations (1) and (2) of Table 9, respectively.

Viewing the results, along with considerations of the validity of the instruments, we find that minimum wages have negative effects on young adults—a 10 percent increase in the previous year's minimum wage led to a statistically significant .92 percent reduction in young adults' employment for the entire sample; in the Eastern and Central regions, we find a 10 percent increase in the current minimum wage led to a statistically significant 2.15 percent and 2.56 percent reduction in young adults' employment, respectively; in the Western region, the minimum wage has a larger negative effect on young adults with elasticities in the range of -.272 to -.845.

Furthermore, the results show that the employment elasticities are more strongly negative for at-risk groups: the elasticities are -1.678 (current minimum wage) and -.697 (lagged minimum wage) for the entire sample and -1.263 (current minimum wage) and -.663 (lagged minimum wage) for the Central region. The finding is consistent with several studies such as Neumark and Wascher (1992) and Feliciano (1998) that endogeneity bias generates a positive correlation between employment rates and minimum wages. In contrast, we do not find a statistically significant effect in the East and West of China.

5. Conclusions

We use a large set of panel data at the county level that contains relevant information on minimum wages combined with a longitudinal household survey of 16 representative provinces

to estimate the employment effect of minimum wage changes in China over the 2004 to 2009 period. After the new minimum wage regulations were promulgated in 2004, the minimum wage changes have been substantially large and frequent both over time and across different jurisdictions. Compared to previous studies using provincial-level data and reporting mixed results, we found that minimum wage changes have significant negative effects on the employment in the Eastern and Central regions of China, and resulted in disemployment for females, young adults, and low-skilled workers, particularly at-risk groups.

We began by estimating the employment effects of minimum wages by three geographical regions and sought to explain the impact for the 2004 to 2009 period. The estimates showed that in the more developed East China, the negative employment effects of the current and lagged minimum wages on young adults are statistically significant, with elasticities in the range of -.088 and -.136 to -.156, respectively. Furthermore, we found that minimum wage changes over the country resulted in a large lagged disemployment effect for at-risk groups over the same period, with elasticities in the range of -.265 to -.340. In the Central region, we found that the minimum wage has lagged effects—a 10 percent increase in the minimum wage led to a statistically significant 2.16 percent and 3.10 to 3.36 percent reduction in employment for young adults and at-risk groups, respectively. In contrast, we did not find significant effects in the less prosperous and slower-growing Western region.

We then assessed the effect of minimum wages by gender and age cohort. Consistent with most studies in the literature, we found that the minimum wage has negative effects on female young workers (age 15-29)—the most disadvantaged and vulnerable groups in the labor market. However, we did not find significant effects on the employment of their male (age 15-29) and senior counterparts (age 50-64) for the entire sample.

Our study seems to reconcile the mixed results reported by Ni, Wang, and Yao (2011) and Wang and Gunderson (2011). By examining the effects for several subgroups, we found that, similar to Ni, Wang, and Yao (2011), the minimum wage has a significantly negative effect on all employees in the East and a lagged positive effect in the Western region in 2004-2009; on the contrary, using rural migrants as the target group, we found that the minimum wage has an adverse and significant effect in the West and a positive effect (though statistically insignificant) in Eastern region over the same period, as found in Wang and Gunderson (2011).

Finally, we investigated whether the minimum wage affects the employment of low-skilled workers. Our results support that minimum wages reduce the employment of low-skilled workers, indicating that Chinese workers who are high school graduates or below or have vocational school degrees were directly and adversely affected by minimum wage increases.

References

- Campolieti, Michele, Morley Gunderson, and Chris Riddell. 2006. "Minimum Wage Impacts from a Prespecified Research Design: Canada 1981–1997." *Industrial Relations: A Journal of Economy and Society* 45 (2):195-216. doi: 10.1111/j.1468-232X.2006.00424.x
- Chan, Anita. 2001. *China's Workers under Assault: The Exploitation of Labor in a Globalizing Economy*: ME Sharpe.
- Cheung, Steven N. S. 2004. Another Eye on Minimum Wages. In *Southern Weekly*. June 17 (in Chinese).
- _____. 2010. The Lethality of Minimum Wages. In *Economic Information Daily*. February 24 (in Chinese).
- Cooke, Fang Lee. 2005. *Hrm, Work and Employment in China*: Routledge.
- Ding, Shouhai. 2009. "An Analysis of Minimum Wage Effects on the Employment of Rural-Urban Migrant-Evidence from the Survey of 827 Rural-Ruban Migrants in Beijing." *China Rural Survey* 4:26-36 (in Chinese).
- Du, Yang, and Meiyan Wang. 2008. "The Implementation of Minimum Wage System and Its Effects in China." *Journal of Graduate School of Chinese Academy of Social Sciences* 6:56-62 (in Chinese).

- Feliciano, Zadia M. 1998. "Does the Minimum Wage Affect Employment in Mexico?" *Eastern Economic Journal* 24 (2):165-80.
- Frost, Stephen. 2002. Labour Standards in China: The Business and Investment Challenge. In *Association for Sustainable and Responsible Investment in Asia*.
- Gong, Qiang. 2009. "The Impact of Minimum Wages on Welfare of Firm and Labor in China." *Journal of Nanjing University* 2:61-68 (in Chinese).
- Han, Zhaozhou, and Zhangjin Wei. 2011. "Minimum Wage Standards: Questions and Policies." *Guangdong Social Sciences* 1:192-200 (in Chinese).
- Jia, Peng, and Shiwei Zhang. 2013. "Spillover Effects of Minimum Wages Increase." *Statistical Research* 30 (4):37-41 (in Chinese).
- National Bureau of Statistics of China. 2010. The 6th China Population Census.
- _____. 2012. "China Labour Statistical Year Book."
- Neumark, David. 2001. "The Employment Effects of Minimum Ages: Evidence from a Pre-Specified Research Design." *Industrial Relations: A Journal of Economy and Society* 40:121-44.
- Neumark, David, and William Wascher. 1992. "Employment Effects of Minimum and Subminimum Wages: Panel Data on State Minimum Wage Laws." *Industrial and Labor Relations Review* 46 (1):55-81.
- Neumark, David, and William L. Wascher. 2008. *Minimum Wages*. Vol. 1, *Mit Press Books*: The MIT Press.
- Ni, Jinlan, Guangxin Wang, and Xianguo Yao. 2011. "Impact of Minimum Wages on Employment: Evidence from China." *The Chinese Economy* 44 (1):18-38.
- Ping, Xinqiao. 2005. "On the Industrial Relations of Private Companies." *China Reform* 4:61-62 (in Chinese).
- Rama, Martin. 2001. "The Consequences of Doubling the Minimum Wage: The Case of Indonesia." *Industrial and Labor Relations Review* 54 (4):864-81.
- Su, Hainan. 1993. "Research on the Legislation of Minimum Wage Law of China." *Review of Economic Research* Z1:26-36 (in Chinese).
- Sun, Suqing. 2006. "The Economic Analysis for the Chinese Employment Influence to the Adjusting the Lowest Wage Policy." *Journal of Hubei College of Finance and Economics* 18 (5):13-15 (in Chinese).
- Wang, Jing, and Morley Gunderson. 2011. "Minimum Wage Impacts in China: Estimates from a Prespecified Research Design, 2000-2007." *Contemporary Economic Policy* 29 (3):392-406. doi: 10.1111/j.1465-7287.2010.00239.x

_____. 2012. "Minimum Wage Effects on Employment and Wages: Dif-in-Dif Estimates from Eastern China." *International Journal of Manpower* 33 (8):860-76. doi: 10.1108/01437721211280353

Xue, Zhaofeng. 2004. The Undesirable Minimum Wage Law. In *21st Century Business Herald*. November 18 (in Chinese).

Yang, Tao. 2006. What Is the Social Background When China Implemented Its Minimum Wage Law? In *People's Daily*.

Ye, Min. 2005. "Discussions on the Effects of Minimum Wages on Rural-Urban Migrant Workers and the Youth." *Theory and Modernization* 7:86-87.

Zhang, Juan, and Juqiu Deng. 2005. "On Minimum Wage System of Peasant Laborers." *Journal of Beijing Agricultural Vocation College* 19 (5):46-49 (in Chinese).

Zhang, Zhiyong. 2007. "Will Minimum Wage Decrease Immigrant Peasant Workers' Employment?" *Finance and Economics* 10:103-10 (in Chinese).

Table 1 Minimum Wages Across Various Jurisdictions in China, 2004–2009

Province	2004			2005			2006			2007			2008			2009		
	MW	S.D.	Obs.	MW	S.D.	Obs.	MW	S.D.	Obs.	MW	S.D.	Obs.	MW	S.D.	Obs.	MW	S.D.	Obs.
East																		
Beijing	509.5	.0	2	562.5	.0	2	611.8	.0	2	665.4	.0	2	735.4	.0	2	820.1	.0	2
Shanghai	590.3	.0	2	662.5	.0	2	712.1	.0	2	757.7	.0	2	894.0	.0	2	984.2	.0	2
Liaoning	282.3	46.0	96	361.9	36.6	96	405.5	41.2	96	465.8	48.7	96	550.1	59.9	97	587.8	63.2	97
Shandong	348.4	35.2	129	440.9	50.0	129	454.6	53.5	129	476.2	66.3	129	571.9	75.6	129	609.9	80.6	129
Jiangsu	416.2	59.9	66	457.6	66.8	66	517.9	70.4	66	591.0	78.0	75	647.8	88.1	75	694.4	94.7	75
Guangdong	361.2	59.9	104	442.1	80.6	104	475.0	84.9	104	516.6	88.5	104	574.3	88.2	104	636.1	98.2	104
All East	349.1	68.5	339	426.7	72.1	399	460.6	76.0	399	507.4	86.5	408	583.6	87.6	409	629.7	95.7	409
Central																		
Heilongjiang	282.0	28.1	30	287.8	28.7	30	384.0	45.7	30	418.0	53.6	30	456.0	58.6	30	486.3	62.5	30
Anhui	304.6	11.7	86	330.7	17.1	86	350.1	19.1	86	400.7	27.1	86	420.4	29.2	86	448.3	31.2	86
Jiangxi	246.7	6.6	99	317.7	8.9	100	328.9	9.4	100	427.5	15.2	100	460.3	21.8	100	490.9	23.3	100
Shanxi	348.2	21.8	119	445.4	22.3	119	454.2	22.4	119	476.3	21.6	119	536.6	22.8	119	642.5	28.6	119
Hubei	271.9	34.9	89	320.6	36.8	89	330.2	37.2	89	402.4	39.1	89	453.4	45.6	89	541.5	58.5	89
Henan	251.5	15.5	127	278.5	17.0	127	345.0	27.9	127	371.1	25.7	127	477.2	42.5	127	509.0	45.3	127
All Central	284.8	43.6	550	337.1	63.8	551	366.2	54.7	551	416.3	46.3	551	473.1	51.7	551	529.1	77.0	551
West																		
Gansu	298.2	8.5	87	304.4	8.7	87	322.1	16.3	87	344.6	35.1	87	471.6	36.3	87	549.4	39.2	87
Chongqing	334.7	21.7	42	365.7	24.6	42	409.0	30.1	42	477.8	39.8	42	554.8	44.5	42	591.7	47.4	42
Sichuan	295.4	32.1	50	352.2	41.9	50	392.2	43.8	50	425.0	42.3	181	477.9	53.0	181	509.7	56.5	181
Yunnan	297.5	18.0	138	365.2	23.4	138	403.6	23.4	138	427.0	22.8	138	527.2	31.5	138	562.3	33.6	138
All West	302.3	23.3	317	346.5	36.1	317	380.1	45.0	317	414.9	51.8	448	499.1	52.3	448	541.3	54.1	448
All Provinces	309.5	56.7	1266	367.7	73.1	1267	399.4	73.3	1267	442.3	74.8	1407	513.5	79.2	1408	562.2	88.3	1408

Note: MW represents the mean of time-weighted monthly minimum wages calculated using all counties in a jurisdiction, and it has been adjusted for inflation and converted into 2005 RMB.

Table 2 Summary Statistics

Variable			Minimum/Average Wage		Employment/Population	
			Mean	S.D.	Mean	S.D.
All		100.0	.291	.094	.595	.072
Gender						
	Male	55.3	.256	.089	.673	.074
	Female	44.7	.354	.115	.520	.087
Region						
	East	54.1	.276	.099	.607	.068
	Central	32.9	.298	.086	.586	.074
	West	13.0	.335	.074	.572	.071
Age Cohort						
	Age 15–29	13.1	.392	.167	.359	.129
	Age 30–39	30.7	.295	.107	.810	.096
	Age 40–49	35.8	.283	.096	.802	.094
	Age 50–64	20.3	.278	.128	.415	.110
Educational Attainment						
	Elementary School or Below	2.1	.593	.505	.226	.139
	Junior High School	20.7	.433	.135	.447	.101
	High School	25.2	.355	.107	.566	.098
	Vocational School	12.0	.314	.112	.673	.131
	Junior College	24.8	.246	.086	.801	.092
	College or Above	15.2	.183	.085	.797	.120
Industry						
	Mining	2.3	.291	.201	-	-
	Manufacturing	21.6	.346	.134	-	-
	Power Production and Supply	3.4	.248	.142	-	-
	Construction	3.2	.352	.211	-	-
	Transportation and Postal Service	7.6	.288	.132	-	-
	Information Technology	2.4	.292	.314	-	-
	Wholesales and Retail Sales	9.9	.471	.197	-	-
	Hotel and Restaurant	2.7	.498	.333	-	-
	Banking and Finance	2.9	.234	.157	-	-
	Real Estate	1.9	.355	.353	-	-
	Leasing and Commercial Service	1.6	.371	.313	-	-
	Scientific Research	2.1	.204	.175	-	-
	Environment and Public Facility	1.3	.311	.212	-	-
	Housekeeping	9.6	.509	.213	-	-
	Education	7.2	.237	.101	-	-
	Health Care	4.8	.265	.170	-	-
	Sports and Entertainment	1.8	.280	.226	-	-
	Public Service	13.9	.245	.094	-	-
Total observations		287,668				

Note: The average wage is calculated as the mean wage in each category. Because age cohort 16-19 and 20-24 only account for .17 percent and 3.6 percent of total observations, respectively, we choose the first age cohort to be age 16-29.

Table 3 Characteristics of Workers Earning the Minimum Wage, 2004-2009

Variable	Less than Minimum	Minimum	More than Minimum
Percent of Total (%)	5.62	3.28	91.09
Percent of Female (%)	61.52	63.84	42.99
Minimum/Average Wage	2.52 (4.66)	1.00 (.06)	.35 (.20)
Region (%)			
East	5.33	3.27	91.40
Central	5.46	2.88	91.66
West	7.26	4.36	88.38
Age			
Age 15–29	9.53	4.30	86.17
Age 30–39	4.73	2.84	92.43
Age 40–49	4.90	3.26	91.83
Age 50–64	5.73	3.33	90.94
Educational Attainment			
Elementary School or Below	15.75	9.41	74.84
Junior High School	9.43	6.00	84.57
High School	6.60	3.99	89.40
Vocational School	4.89	2.85	92.26
Junior College	3.08	1.50	95.43
College or Above	2.17	.82	97.01
Industry			
Mining	3.10	1.88	95.02
Manufacturing	5.50	3.30	91.20
Power Production and Supply	2.47	1.37	96.16
Construction	5.78	3.04	91.17
Transportation and Postal Service	4.00	2.10	93.90
Information Technology	5.42	2.27	92.31
Wholesales and Retail Sales	10.46	6.30	83.24
Hotel and Restaurant	9.98	6.52	83.50
Banking and Finance	2.74	1.21	96.04
Real Estate	5.46	3.05	91.49
Leasing and Commercial Service	6.37	3.16	90.46
Scientific Research	2.20	.84	96.96
Environment and Public Facility	3.89	2.23	93.87
Housekeeping	12.63	7.58	79.79
Education	2.74	1.39	95.87
Health Care	3.57	1.74	94.69
Sports and Entertainment	4.10	1.77	94.13
Public Service	2.41	1.77	95.82

Note: standard deviations are in parentheses.

Table 4 Estimates of Minimum Wage Effects on the Employment-to-Population Ratio

Dependent Variable: Employment/Population	Young Adults		At-Risk Group		Entire Sample	
Independent Variable	(1)	(2)	(1)	(2)	(1)	(2)
A. All Regions						
MW	-.088** (.042)	-.062 (.043)	-.213* (.128)	-.200 (.129)	-.055*** (.018)	-.045** (.018)
MW, lagged 1 year	-.156*** (.040)	-.136*** (.042)	-.340*** (.102)	-.265*** (.102)	-.031*** (.012)	-.028** (.011)
CPI		-.002 (.010)		.006 (.013)		.002 (.003)
GDP per capita		.042** (.019)		.231* (.126)		.007 (.006)
FDI		.034*** (.011)		-.012 (.015)		.003 (.004)
R^2	.144	.218	.024	.025	.079	.091
Sample size	1,601	1,504	1,294	1,209	1,681	1,580
B. East						
MW	-.234*** (.047)	-.154** (.070)	-.201 (.219)	-.213 (.220)	-.068*** (.025)	-.067** (.027)
MW, lagged 1 year	-.100** (.048)	-.046 (.057)	-.322** (.128)	-.310** (.124)	-.018 (.020)	-.015 (.020)
CPI		-.001 (.016)		.021 (.015)		.000 (.004)
GDP per capita		.142 (.274)		.362** (.173)		.004 (.011)
FDI		.043 (.034)		-.022 (.027)		-.003 (.007)
R^2	.213	.223	.041	.056	.084	.085
Sample size	733	731	617	615	762	760
C. Central						
MW	-.032 (.068)	-.034 (.070)	-.297 (.181)	-.272 (.177)	-.039 (.025)	-.039 (.026)
MW, lagged 1 year	-.216*** (.061)	-.216*** (.061)	-.336* (.174)	-.310* (.184)	-.041*** (.015)	-.042*** (.014)
CPI		-.025 (.022)		-.029 (.024)		-.006 (.006)
GDP per capita		.006 (.032)		.192 (.162)		.003 (.010)
FDI		.026 (.018)		-.015 (.023)		.011** (.006)
R^2	.129	.151	.031	.043	.094	.133
Sample size	663	627	497	464	708	670
D. West						
MW	.088	-.037	.018	.022	-.096	-.069

	(.114)	(.106)	(.208)	(.223)	(.063)	(.064)
MW, lagged 1 year	.124	-.153	.000	.124	.055	-.005
	(.107)	(.110)	(.258)	(.276)	(.075)	(.043)
CPI		-.021		.037		.005
		(.028)		(.032)		(.008)
GDP per capita		.059		.019		.014
		(.068)		(.023)		(.018)
FDI		.010		.001		-.007
		(.025)		(.012)		(.007)
R^2	.153	.169	.014	.051	.015	.043
Sample size	205	146	180	130	211	150

Note: ***, **, and * indicate that the estimate is statistically significant at the 1 percent, 5 percent, and 10 percent levels, respectively. Cluster-robust standard errors are in parentheses. All variables in the table are at the county level, except that CPI is at the city level.

Table 5 Estimates of Minimum Wage Effects on Employment by Age Cohort

Dependent Variable: Employment/Population	Age 15-29		Age 30-39		Age 40-49		Age 50-64	
Independent Variables	Male	Female	Male	Female	Male	Female	Male	Female
A. All Regions								
MW	-.031 (.047)	-.148*** (.047)	-.019 (.027)	-.068*** (.025)	.017 (.016)	-.040 (.027)	.009 (.053)	.023 (.056)
MW, lagged 1 year	-.027 (.029)	-.061** (.030)	-.031 (.019)	-.034 (.021)	-.015 (.013)	-.040** (.017)	-.009 (.032)	-.023 (.034)
CPI	-.002 (.014)	-.007 (.012)	.001 (.005)	.006 (.006)	.001 (.004)	.007 (.006)	.013 (.009)	-.003 (.017)
GDP per capita	.078*** (.023)	.015 (.022)	.008 (.058)	.009 (.011)	.001 (.059)	.032*** (.011)	.153 (.113)	.227 (.214)
FDI	.020 (.015)	.041*** (.012)	-.001 (.006)	.010 (.007)	.005 (.005)	.003 (.007)	.014 (.013)	.032 (.029)
R^2	.173	.169	.022	.097	.012	.093	.052	.055
Sample size	1,428	1,430	1,532	1,532	1,537	1,532	1,523	1,363
B. East								
MW	-.103 (.112)	-.172** (.076)	-.023 (.022)	-.098*** (.033)	-.001 (.017)	-.043 (.032)	.022 (.042)	-.057 (.061)
MW, lagged 1 year	-.012 (.049)	-.040 (.046)	-.010 (.011)	.007 (.024)	-.016 (.013)	-.021 (.025)	-.018 (.031)	-.001 (.041)
CPI	.014 (.025)	.001 (.018)	.001 (.005)	.003 (.009)	.005 (.008)	.015 (.011)	.022 (.017)	-.028 (.031)
GDP per capita	.116 (.298)	.011 (.035)	-.000 (.012)	.001 (.017)	.005 (.011)	.022 (.020)	.032 (.022)	.124** (.044)
FDI	.040 (.046)	.055** (.023)	-.007 (.006)	.002 (.011)	-.001 (.017)	-.003 (.014)	-.014 (.016)	-.056* (.031)
R^2	.176	.195	.049	.094	.013	.092	.039	.094
Sample size	711	712	737	741	745	739	737	675
C. Central								
MW	.014 (.062)	-.155** (.068)	-.052** (.020)	-.087** (.040)	.013 (.023)	.034 (.062)	.025 (.085)	.152** (.075)
MW, lagged 1 year	-.014 (.068)	-.066 (.044)	-.072*** (.020)	-.071** (.036)	-.018 (.022)	-.013 (.029)	.021 (.052)	-.024 (.047)
CPI	-.036 (.029)	-.037 (.028)	-.010 (.009)	.015 (.015)	-.005 (.007)	.000 (.015)	.013 (.016)	-.000 (.034)
GDP per capita	.079** (.037)	.054 (.036)	.008 (.010)	.007 (.018)	.024 (.047)	.034 (.094)	.106 (.151)	.301 (.283)
FDI	.011 (.022)	.054*** (.018)	.003 (.006)	.023* (.013)	.004 (.008)	.024 (.015)	.007 (.016)	.035 (.038)
R^2	.123	.114	.076	.148	.015	.057	.044	.089
Sample size	577	584	645	642	643	647	640	550
D. West								
MW	-.071 (.170)	-.145 (.109)	.231* (.123)	.078 (.078)	.093 (.080)	-.018 (.111)	-.394** (.188)	-.400*** (.120)

MW, lagged 1 year	-.121 (.124)	-.215* (.110)	.117** (.053)	-.103** (.046)	.004 (.053)	.066 (.072)	-.136 (.139)	-.037 (.093)
CPI	-.032 (.035)	.005 (.028)	.009 (.010)	-.006 (.013)	.001 (.011)	.014 (.022)	-.011 (.025)	-.001 (.056)
GDP per capita	.045 (.081)	.053 (.065)	.252 (.162)	.029 (.026)	.082 (.178)	.032 (.241)	.157 (.422)	.611 (.605)
FDI	.036 (.040)	.003 (.027)	.010 (.013)	.012 (.011)	.019 (.013)	.004 (.016)	.031 (.037)	.017 (.042)
R^2	.172	.179	.236	.152	.102	.085	.091	.269
Sample size	140	134	150	149	149	147	146	138

Note: ***, **, and * indicate that the estimate is statistically significant at the 1 percent, 5 percent, and 10 percent levels, respectively. Cluster-robust standard errors are in parentheses. All variables in the table are at the county level, except that CPI is at the city level.

Table 6 Estimates of Minimum Wage Effects on Employment by Educational Attainment

Dependent Variable: Employment/Population	High School or Below		Vocational School		Junior College		College or Above	
Independent Variables	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
A. All Regions								
MW	-.080** (.040)	-.054** (.025)	-.037 (.025)	-.046* (.025)	-.018 (.020)	-.023 (.020)	-.006 (.013)	-.013 (.014)
MW, lagged 1 year	-.019 (.020)	-.029 (.018)	-.040** (.020)	-.047** (.020)	-.002 (.021)	-.016 (.021)	-.005 (.015)	-.019 (.015)
CPI		.004 (.005)		-.009 (.007)		-.000 (.014)		.001 (.006)
GDP per capita		.009 (.008)		.035*** (.010)		.011* (.006)		.040*** (.010)
FDI		.010** (.004)		.003 (.006)		.008** (.003)		.011 (.007)
R^2	.046	.076	.036	.068	.044	.079	.003	.032
Sample size	1,655	1,555	1,593	1,497	1,637	1,538	1,578	1,480
B. East								
MW	-.070* (.038)	-.061 (.041)	-.049 (.046)	-.054 (.047)	-.048 (.037)	-.064 (.040)	-.031 (.020)	-.032 (.020)
MW, lagged 1 year	-.025 (.023)	-.017 (.024)	-.003 (.028)	-.006 (.030)	.028 (.027)	.018 (.028)	-.039 (.027)	-.039 (.027)
CPI		.004 (.007)		-.014 (.011)		-.001 (.017)		-.007 (.010)
GDP per capita		.000 (.015)		.133 (.128)		.003 (.009)		.199*** (.087)
FDI		.007 (.010)		.008 (.015)		.018*** (.006)		.000 (.025)
R^2	.056	.062	.028	.036	.053	.091	.011	.032
Sample size	752	750	726	724	744	742	733	731
C. Central								
MW	-.071** (.034)	-.077** (.035)	-.048 (.037)	-.051 (.037)	.012 (.023)	.007 (.023)	.074 (.056)	.077 (.057)
MW, lagged 1 year	-.052** (.025)	-.047* (.025)	-.083*** (.032)	-.090*** (.033)	-.030 (.033)	-.033 (.034)	.080 (.038)	.079 (.038)
CPI		-.006 (.008)		-.012 (.014)		.001 (.008)		-.001 (.016)
GDP per capita		.005 (.014)		.039** (.017)		.030** (.013)		.001 (.077)
FDI		.015** (.006)		.000 (.009)		-.002 (.005)		.012 (.020)
R^2	.083	.111	.073	.094	.045	.082	.045	.046
Sample size	693	655	659	625	683	646	639	604
D. West								
MW	-.184 (.163)	-.030 (.092)	-.019 (.073)	.012 (.086)	-.068 (.062)	-.034 (.060)	.033 (.084)	.112 (.103)

MW, lagged 1 year	.154 (.120)	.037 (.092)	-.046 (.090)	-.031 (.089)	.020 (.078)	-.021 (.072)	-.020 (.070)	-.054 (.062)
CPI		.008 (.012)		.009 (.021)		-.000 (.010)		-.003 (.014)
GDP per capita		.088** (.038)		.061 (.038)		.021 (.018)		.045 (.030)
FDI		-.020 (.014)		.018 (.016)		.009 (.009)		.011 (.019)
R^2	.013	.059	.028	.052	.017	.099	.019	.080
Sample size	210	150	208	148	210	150	206	145

Note: ***, **, and * indicate that the estimate is statistically significant at the 1 percent, 5 percent, and 10 percent levels, respectively. Cluster-robust standard errors are in parentheses. All variables in the table are at county level. All variables in the table are at the county level, except that CPI is at the city level.

Table 7 Estimates of Minimum Wage Effects on the Employment of Migrant Workers

Dependent Variable: Employment/Population	East		Central		West	
Independent Variables	(1)	(2)	(1)	(2)	(1)	(2)
A. All Enterprises						
MW	.022 (.058)	.043 (.056)	-.005 (.051)	-.037 (.056)	-.146 (.097)	-.135 (.010)
MW, lagged 1 year	.027 (.047)	.034 (.049)	.031 (.067)	.066 (.048)	-.282*** (.058)	-.216*** (.074)
CPI		-.010 (.038)		.112 (.076)		.119 (.093)
GDP per capita		.155** (.057)		.321*** (.083)		2.483* (1.454)
FDI		.171*** (.043)		.174*** (.048)		.012 (.047)
R^2	.014	.102	.091	.223	.399	.477
Sample size	249	248	104	99	83	72
B. Non-state Enterprises Only						
MW	.077 (.113)	.087 (.111)	-.017 (.057)	-.044 (.071)	-.411*** (.098)	-.408*** (.128)
MW, lagged 1 year	.013 (.075)	.002 (.078)	.057 (.079)	.058 (.073)	-.120 (.124)	-.070 (.129)
CPI		-.072 (.061)		.127 (.102)		-.066 (.096)
GDP per capita		.110 (1.325)		.255** (.107)		1.182 (1.619)
FDI		.242 (.208)		.137** (.063)		.084 (.069)
R^2	.147	.178	.202	.289	.489	.581
Sample size	224	223	84	80	69	62

Note: ***, **, and * indicate that the estimate is statistically significant at the 1 percent, 5 percent, and 10 percent levels, respectively. Cluster-robust standard errors are in parentheses. All variables in the table are at the county level, except that CPI is at the city level. The effects of migrant workers of state-owned enterprises cannot be estimated due to an insufficient number of observations.

Table 8 Estimates of Minimum Wage Effects on the Employment by Period

Dependent Variable: Employment/Population	2002-2004		2004-2007		2008-2009	
Independent Variable	Young Adults	At-Risk Groups	Young Adults	At-Risk Groups	Young Adults	At-Risk Groups
A. All Regions						
MW	-.141 (.162)	.391 (.301)	-.060 (.080)	-.359** (.165)	-.052 (.047)	.010 (.227)
MW, lagged 1 year	-.014 (.090)	-.084 (.377)	-.106* (.060)	-.246** (.110)	-.103*** (.039)	-.283 (.196)
CPI	-.060 (.062)	-.012 (.030)	.005 (.022)	.024 (.021)	.002 (.010)	-.008 (.015)
GDP per capita	-.001 (.066)	.004 (.027)	.099*** (.028)	.152 (.154)	.034 (.023)	.069 (.177)
FDI	.006 (.008)	.009 (.010)	-.002 (.015)	-.004 (.022)	.043*** (.013)	.006 (.021)
R^2	.102	.073	.172	.050	.176	.014
Sample size	79	66	585	502	919	707
B. East						
MW	.082 (.168)	-.017 (.475)	-.171 (.111)	-.293 (.230)	-.126** (.054)	.236 (.169)
MW, lagged 1 year	.017 (.088)	-.012 (.540)	-.022 (.078)	-.218* (.117)	-.060 (.055)	-.382* (.205)
CPI	-.106 (.091)	-.040 (.080)	-.017 (.037)	-.001 (.056)	-.030 (.039)	-.014 (.019)
GDP per capita	.041 (.110)	.050 (.073)	.032 (.040)	.298 (.365)	.053 (.035)	.023 (.017)
FDI	.011 (.012)	.019 (.020)	.029 (.025)	.037 (.027)	.022 (.030)	.026 (.023)
R^2	.080	.043	.203	.030	.198	.033
Sample size	41	35	298	258	418	348
C. Central and West						
MW	-.291 (.384)	.213 (.485)	-.011 (.102)	-.176 (.141)	-.018 (.068)	-.207 (.276)
MW, lagged 1 year	-.262 (.319)	-.580 (.768)	-.152* (.079)	-.129 (.153)	-.131** (.054)	-.248 (.274)
CPI	-.069 (.100)	-.013 (.036)	-.060 (.053)	-.007 (.020)	-.029 (.029)	-.039 (.049)
GDP per capita	.019 (.102)	-.015 (.044)	.083 (.057)	.009 (.021)	.096*** (.034)	.348 (.240)
FDI	.016 (.015)	.009 (.018)	.034 (.054)	.036 (.065)	.026 (.043)	.022 (.038)
R^2	.169	.242	.103	.018	.086	.023
Sample size	38	31	316	270	519	376

Note: ***, **, and * indicate that the estimate is statistically significant at the 1 percent, 5 percent, and 10 percent levels, respectively. Cluster-robust standard errors are in parentheses. All variables in the table are at the county level, except that CPI is at the city level.

Table 9 IV Estimates of the Minimum Wage Effects on Employment

Dependent Variable: Employment/Population	Young Adults		At-Risk Groups	
Independent Variable	(1)	(2)	(1)	(2)
A. All Regions				
MW	-.037 (.092)	.129 (.334)	1.933 (1.704)	-1.678 ^{***} (.554)
MW, lagged 1 year	-.092 [*] (.054)	-.018 (.064)	.385 (.592)	-.697 ^{***} (.242)
CPI	.014 ^{***} (.003)	.015 ^{***} (.003)	.009 (.006)	-.003 (.004)
GDP per capita	.137 [*] (.078)	.135 [*] (.081)	.035 (.083)	.078 (.062)
FDI	.015 (.018)	.013 (.021)	.039 (.025)	-.003 (.019)
Weak Identification Statistic	78.65 ⁺⁺	4.20	1.38	9.73 ⁺
Hansen J Statistic	2.309 (.315)	2.503 (.286)	4.499 (.106)	.679 (.712)
Sample size	1,429	1,429	1,102	1,102
B. East				
MW	-.215 ^{**} (.096)	-.261 (.407)	1.003 (2.347)	-1.053 (.945)
MW, lagged 1 year	-.066 (.056)	-.190 ^{***} (.065)	-.021 (.606)	-.495 (.418)
CPI	.015 ^{***} (.003)	.013 ^{***} (.004)	.004 (.004)	.001 (.005)
GDP per capita	.044 (.104)	.017 (.138)	.077 (.092)	.042 (.082)
FDI	.034 (.033)	.040 (.037)	-.029 (.032)	.023 (.037)
Weak Identification Statistic	54.06 ⁺⁺	2.47	.64	3.34
Hansen J Statistic	.070 (.965)	.084 (.959)	4.401 (.111)	3.188 (.203)
Sample size	703	703	582	582
C. Central				
MW	-.256 [*] (.149)	1.416 (1.321)	1.213 (1.134)	-1.263 ^{**} (.630)
MW, lagged 1 year	-.105 (.091)	.173 (.167)	.316 (.555)	-.663 [*] (.344)
CPI	.010 ^{**} (.005)	.001 (.012)	.009 (.008)	-.003 (.007)
GDP per capita	.156 (.147)	.025 (.331)	.119 (.094)	.174 ^{**} (.088)
FDI	.004 (.047)	-.006 (.060)	-.034 (.028)	-.004 (.026)
Weak Identification Statistic	26.50 ⁺⁺	.67	1.91	10.98 ⁺

Hansen J Statistic	2.099 (.350)	1.105 (.576)	1.002 (.606)	.797 (.671)
Sample size	598	598	406	406
D. West				
MW	-.533 (.361)	-.845* (.444)	-1.042 (.945)	-.401 (.269)
MW, lagged 1 year	-.305** (.143)	-.272* (.149)	-.777 (.574)	-.148 (.277)
CPI	-.040*** (.011)	.035*** (.009)	-.003 (.010)	.002 (.009)
GDP per capita	.569** (.248)	.689** (.298)	.306 (.199)	.141 (.130)
FDI	.002 (.039)	.016 (.051)	.038 (.031)	.013 (.014)
Weak Identification Statistic	11.68 ⁺	.99	3.57	5.16
Hansen J Statistic	1.194 (.551)	.547 (.761)	.262 (.877)	2.195 (.334)
Sample size	128	128	114	114

Note: ***, **, and * indicate that the estimate is statistically significant at the 1 percent, 5 percent, and 10 percent levels, respectively. Cluster-robust standard errors are in parentheses, except that of Hansen J statistics report Chi-square P-values. All variables in the table are at the county level, except that CPI is at the city level. Models (1) and (2) report the estimates of instrumenting the current and previous year minimum wages, respectively. Weak identification test reports the Cragg-Donald Wald F statistic in which ⁺⁺ and ⁺ indicate that the statistics are greater than the 5 percent and 10 percent maximal IV relative bias of Stock-Yogo weak identification test critical values, respectively. Hansen J test reports the overidentification test of all instruments.

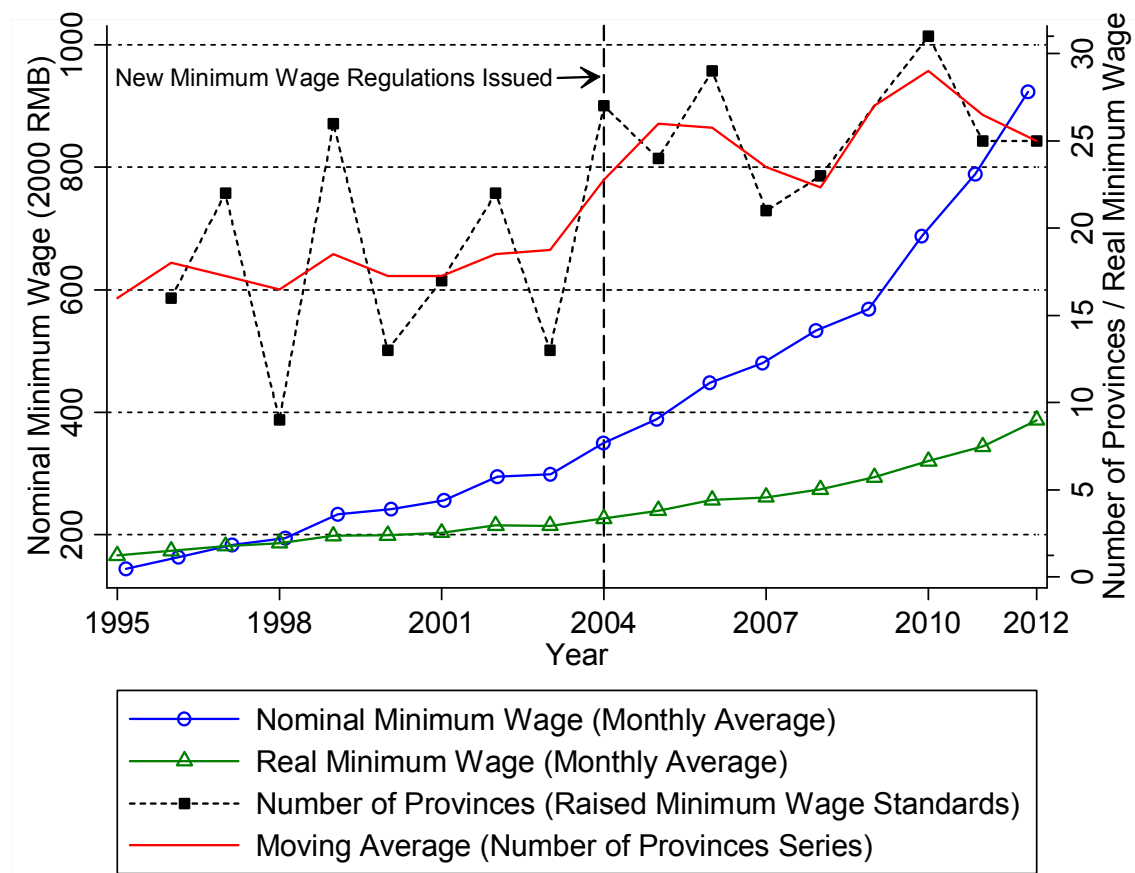


Figure 1 Minimum Wages in China, 1995–2012

Nominal and real minimum wages are adjusted for inflation and expressed in 2000 RMB.

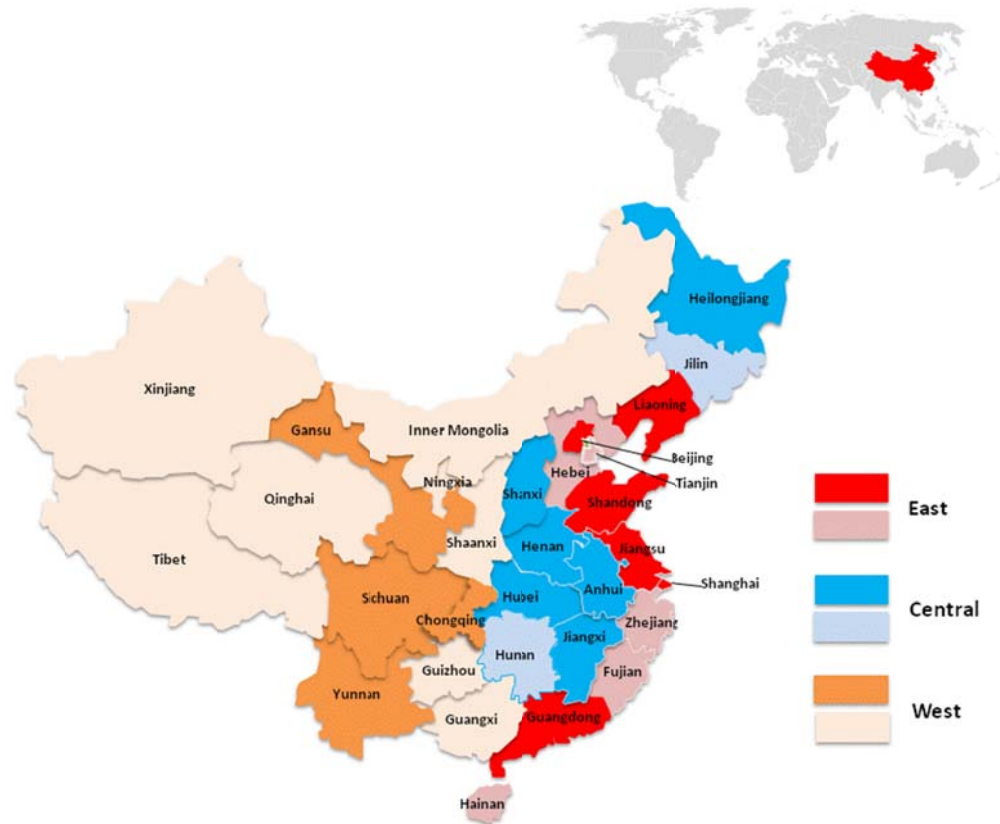


Figure 2 Panel Data with Minimum Wages in China

The panel data used in the analysis include 16 provinces/municipalities (darker areas in the map) covering three regions in Mainland China. The East includes Liaoning, Beijing, Shandong, Jiangsu, and Guangdong; the Central region includes Heilongjiang, Shanxi, Henan, Anhui, Hubei, and Jiangxi; and the West includes Gansu, Chongqing, Sichuan, and Yunnan.