Minimum Wages and Employment in China

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Abstract

Since China promulgated the new minimum wage regulations in 2004, the frequency and magnitude of changes in the minimum wage have been substantial. This paper uses the county-level minimum wage data combined with a longitudinal household survey data from 16 representative provinces as a merged county-level panel to estimate the employment effects of minimum wage changes in China over the 2002-2009 period. In contrast to the mixed results reported by previous studies using provincial-level data, we have presented evidence that minimum wage changes had led to significant adverse effects on employment in the Eastern and Central regions of China, and had resulted in disemployment for females, young adults, and low-skilled workers.

Keywords: Minimum Wage, China, Employment

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1. Introduction

Since China enacted its new minimum wage regulations in 2004, minimum wages have sparked intense debate in the country. There is some consensus that employees generally welcome the minimum wage. However, there is considerable disagreement regarding whether the minimum wage is effective in achieving its goals. This issue, from the time of its introduction, has been highly controversial among scholars and policy-makers.

In China, supporters of minimum wages advocate them as a way to assist individuals or families to achieve self-sufficiency and to protect workers in low-paid occupations (Sun 2006; Zhang and Deng 2005). Minimum wages can help reduce inequality and serve as an important safety net by providing a wage floor (Jia and Zhang 2013; Zhang 2007). In addition, 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 (Ding 2009; Du and Wang 2008; Han and Wei 2011).

On the other hand, opponents argue that raising the minimum wage can decrease the employment opportunities of low-wage workers and also lead to reduction in other components of the compensation package (Gong 2009; Ping 2005; Xue 2004). Such regulations can undermine enterprises' dividend policies and reduce China's comparative advantage in the abundance of low-wage labor (Cheung 2004, 2010). 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).[1]

The minimum wage policy is contentious also because its effects on employment cannot be easily estimated. However, the initial evidence seems to show that the frequency and magnitude

of minimum wage changes have been substantial both over time and across jurisdictions, especially after year 2003. Since 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. These large variations both across jurisdictions and over time facilitate our estimation of minimum wage effects on employment in China.

[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 wages for each year and its moving average over the same period.[2] Between 1995 and 2003, the average nominal minimum wage increased steadily from 169 RMB to 301 RMB, amounting to a 78% growth in 9 years. However, since China implemented the new minimum wage regulations in 2004, the nominal minimum wage has increased even more rapidly by over 200%, reaching 944 RMB in 2012.[3] 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 minimum wage adjustments 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? Although there is the enormous literature documenting numerous aspects of minimum wages and their role in the labor market, most studies were conducted in the advanced

economies such as the U.S., U.K., and Canada; even there no consensus has been reached on the magnitude of an "average" effect of minimum wages on employment.[4]

This paper represents the first paper using the county-level minimum wages merged with longitudinal urban household survey data in China. Empirically speaking, there are at least three challenges involved in measuring the employment effects of Chinese minimum wages. First, provinces, municipalities, and autonomous regions[5] in China have considerable autonomy and 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. The fact that each county is responsible for documenting its own minimum wage standards implies that the county- or city-level minimum wage data containing the relevant information on the dates and the extent of minimum wage increases are not readily available.[6] Second, omitted variables and endogeneity issues (such as the decisions regarding the adjustment of minimum wage standards) make it difficult to separate causal effects from effects due to other unobserved confounding factors. Third, in China, it remains difficult to find microdata that can be plausibly representative of the population which can be influenced by 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.[7]

In this 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 responses 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 data of

minimum wages, which covers all counties (over 2000 counties each year) in China, with a longitudinal household survey of 16 representative provinces between 2002 and 2009.[8] The use of county-level data rather than provincial level data provides a more accurate measurement of the relevant minimum wage and labor market conditions, which provides more variation in detecting the effects of minimum wages on employment in China. 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, low-skilled workers, female employees, and rural migrant workers.

Our regressions based on county-level panel data have revealed significant disemployment effects of minimum wages on young adults (age 15-29) between 2004 and 2009 over the country—a 10% increase in the current and previous year's minimum wages led to a statistically significant .88% and a 1.36 to 1.56% reduction in employment, respectively. Furthermore, we find that the previous year's minimum wage has the largest 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 Great Recession). Because the new Minimum Wage Regulations of 2004 were more vigorously enforced, minimum wages are expected to be more effective after 2004 as such the minimum wage increases should have more significant effects on employment since that year. The evidence based on our regression estimates of the county-level panel data 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% increase in the current minimum wage led to a statistically significant 3.59% reduction in the employment of at-risk groups during 2004-2007 and a one-year lagged effect of 1.03% 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 found mixed results, and the results for different regions are often opposite to one another. For example, Ni et al. (2011) focused on all employees and found some negative effects in the more prosperous and rapidly growing East region, and some positive effects in the developing Central region and less developed Western regions over the 2000-2005 period. In contrast, Wang and Gunderson (2011) used 2000-2007 data of rural migrants and found no adverse effects and in fact 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 of minimum wage increases on different target groups tend to differ. By examining the effects on several subgroups, our estimates seem to be consistent with their findings—we find that, similar to Ni et al. (2011), the current minimum wage has a significantly negative effect on all employees in the East and a one-year 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 current 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). We discussed these results in more details in Section 4.6.

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 in terms of job losses when facing minimum wage increases. As anticipated, our county-level panel data analysis shows that

the current minimum wage has an adverse, though perhaps mild, effect on the employment of low-skilled workers (defined as those with a high school diploma or below), a 10% increase in the current minimum wage results in statistically significant reductions in employment, ranging from .54 to .80% for the entire sample, to .70% for the East region, and .71 to .77% for the Central region. As a placebo test, we do not find a statistically significant effect for high-skilled workers (defined those with a college diploma or above).

The remainder of the paper is organized as follows. Section 2 reviews the development of minimum wages in China. 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 provides conclusion remarks.

2. Minimum Wages in China

Prior to 1994, China had no minimum wage law. In 1984, the country stared by acknowledging the 1928 "Minimum Wage Treaty" of the International Labour Organization (ILO) (Su 1993). 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 when 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 pay wages no less than the local minimum wages. All provincial, autonomous-region, and municipal governments should set their minimum wages according to five principles and report them to the State Council of the Central

Government. Specifically, the five principles stipulated 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 across regions. These conditions provided considerable flexibility for provinces in setting minimum wage standards, according to economic development principles and the needs to attract foreign investment (Frost 2002; Wang and Gunderson 2011). By December 1994, 7 of 31 provinces had set their own minimum wages. By the end of 1995, the number increased to 24.

In the early 2000s, the slow increase of minimum wages along with growing concerns for uncovered/disadvantaged workers prompted the Chinese government to consider new minimum wage regulations. 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, private enterprises, private non-enterprise units, and employees in self-employed businesses. 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 workers. Importantly, the minimum wage standards were set and adjusted jointly by the local government, trade union, and enterprise confederation of each province. The draft would then be submitted to the Ministry of Labour and Social Security for review. The Ministry would then 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 request 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% to 100% of the owed wages to 100% to 500% of the owed wages.[9] Employers cannot include subsidies such as overtime pay or canteen allowances, or travel subsidies as part of the wages 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 an attempt to estimate the average effect of minimum wages on employment and address some of the aforementioned empirical challenges. The purpose of data collection was to obtain information on the minimum wage at the county 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 across counties. The wage sample needed to be a longitudinal at the individual level 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 Great Recession influenced our results, we sought to collect information on counties that were potentially affected over as many years as possible.

3.1. *Data*

Our study uses two primary data sources: the annual Urban Household Survey (UHS) from 2002 to 2009 and minimum wage data collected at the county level (6-digit area code) between 1994 and 2012.[10] The UHS is a continuous, large-scale social-economic survey conducted by the National Bureau of Statistics of China (NBS) to study the living conditions and standard of urban households, which covers agricultural and non-agricultural residents or non-residents who

live in the city for at least six months and migrant households with local residency. Using survey sampling techniques and daily accounting methods, the UHS collects quarterly data from households in all 31 provinces of Mainland China. Starting late December, survey teams in each province and autonomous region are required to verify and then upload the aggregated annual data to the Division of City Socio-economic Survey of NBS through intranet by January 10th of the following year. The UHS contains rich arrays of 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 provinces (the maximum number of provinces accessible to the researchers) used to study the impact of minimum wages on the Chinese labor market. We divide the 31 jurisdictions into three regions following the NBS: the more prosperous and rapidly growing East region, the developing Central region and the less developed and more slowly growing West region. The open-door and economic reforms first started in the Eastern coast regions. It is well documented that the labor market in the Eastern region is well developed and mimics the competitive labor market. As such an external shock of minimum wage increases with strong enforcement is expected to have significant adverse effects on employment, especially for those who are at-risk (youth, females, unskilled, migrants, etc.). The adverse effects could be compounded if the employers facing high labor costs choose to relocate to the Central and Western regions where there is still abundant supply of labor.

In contrast, the labor market in the Central and Western regions is relatively underdeveloped where there is still plenty supply of unskilled labor. Minimum wage legislation is also less vigorously enforced in such regions, especially in the West (see Section 4.7.3 for more

discussion on enforcement). As such minimum wages are either ineffective because of poor enforcement, or there is less spillover effects of minimum wages. The adverse effects of minimum wages could also be mitigated when firms in the Eastern regions choose to relocate to the Central and Western regions in response to the minimum wage hike. However, such effects might not apply to migrant workers. In the Eastern region there is already sign of labor shortages. Therefore, high minimum wages might not trigger job losses for migrant workers in the East region. Other the other hand, migrant workers in the Western region are more likely to work in the non-state sector and there is no sign of labor shortages. As such, employment of migrant workers might be more sensitive to minimum wage hike.

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 one municipality, Chongqing, and three less developed provinces: Gansu, Sichuan, and Yunnan. Collectively, our 16-province sample contains 65% of the total population in China, covering 60% of the counties in the country (National Bureau of Statistics of China 2010).[11]

We also need to collect actuate minimum wage data for each county. As discussed, provinces in China have considerable autonomy and flexibility in setting their minimum wage standards according to local economic conditions, amounting to 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 own 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 keep only salaried workers who work for 12 months and then divide their annual wages by 12 to obtain monthly wages for each year.[12] 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. 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 in 2004, respectively.[13] When calculating the mean minimum wages, we use the time-weighted method, as suggested by Rama (2001), to address the issue of different adjustment dates across counties within a province in a given year. The mean minimum wages have been adjusted for inflation and converted into 2005 RMB using urban resident CPI. The last row reports the mean of the minimum wages of all provinces, their standard deviations, and the total number of counties that raised minimum wages for each year.

Table 1 reveals several important patterns. First, when calculated at the county level, the mean nominal minimum wage increased by 80% (from 310 RMB to 562 RMB) between 2004 and 2009 for all counties as a whole.[14] 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). Interestingly, minimum wages of the three regions have similar annual growth rates of around 13%.[15] Third, minimum wage hikes sometimes occurred more than once in a year. For example, Beijing increased its minimum wages first in January and then July of 2004, and Jiangsu raised its standards in both April and July of 2008.

[Table 2 about here]

We defined employment as 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). Sampling weights are applied in all calculations.

Table 2 presents summary statistics of the two key variables, minimum-to-average wage ratio and employment-to-population ratio, from 2004 to 2009. Our population is constructed by including all persons in the same demographic group being examined. 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, suggesting that Chinese female workers are comparatively disadvantaged in the labor market relative to their male counterparts.[16] As anticipated, the more prosperous Eastern region has the lowest minimum-to-average-wage ratio (.276) and the highest employment-to-population ratio (.607) among three regions.[17]

A large body of empirical evidence from minimum wage studies has consistently supported that minimum wages have a greater impact on young and low-skilled workers, especially teenagers. Compared to older workers, 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 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 those of other age cohorts. For workers with different levels of skills, the evidence demonstrates that as the skill level increases, the minimum-to-average-wage ratio decreases quickly—dropping continuously from .389 for high school education or below to .183 for college or above education.

Table 2 also presents the minimum-to-average-wage ratio by industry. The manufacturing sector contains the largest share (21.6%) of workers in our sample; the public service sector is the second-largest (13.9%); and the third and the fourth sectors are wholesale and retail sales trade (9.9%) and housekeeping (9.6%), respectively. As to 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 wholesale 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% of all workers earned less than the minimum wage and 3.28% earned just the minimum, suggesting that a combined 8.90% of Chinese employees are minimum wage workers over the 2004-2009 period. Among those who earned the exact minimum wage or less than the minimum wage, 63.84% and 61.52% are females, respectively. Furthermore, the minimum-to-average-wage ratio of workers receiving less than the minimum wage is 2.52,

suggesting that these disadvantaged workers earn a wage that is only approximately one-quarter of the official standard.

By age cohorts, young adults (age 15-29) are more likely to be minimum wage workers. The percentage decreases as age increases. A similar pattern prevails for the skill levels. With regard to the industrial distribution, housekeeping sector has the largest share of minimum wage workers: approximately 20.21% of housekeepers earn less than or equal to the minimum wage. Wholesale and retail sales as well as hotel and restaurant sectors also have high concentration (16.76% and 16.50%) of minimum wage workers.

3.2. *Research Design*

Our empirical strategy is to estimate 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 convincing evidence of the employment effects has not yet been established. Our study takes advantage of a household panel data and more accurate measure of minimum wages at the county level. This in turn 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. These unique features of our data provide us an opportunity to generate more reliable estimates of the employment effects of minimum wages in China.

First, we estimate the effect of minimum wages on average wages to see whether changes in the minimum wage indeed affect the observed wages of the groups being examined in our analysis. We then estimate a pre-specified set of equations proposed in Neumark (2001) and used in Campolieti et al. (2006) and Wang and Gunderson (2011). Essentially this empirical strategy would preclude running alternative specifications until preferred results are obtained.[18]

Our estimation equations for the wage and employment effects are as followed:

$$W_{i,t} = \eta_0 + \eta_1 MWL_{i,t} + \eta_2 MWL_{i,t-1} + X_{i,t}\theta + Y_t\mu + C_i\tau + \varepsilon_{i,t}, \quad (1)$$

$$E_{i,t} = \alpha_0 + \alpha_1 MW_{i,t} + \alpha_2 MW_{i,t-1} + X_{i,t}\beta + Y_t\gamma + C_i\delta + e_{i,t}, \quad (2)$$

where $W_{i,t}$ is the log of the average wage variable for county *i* in year *t*; $MWL_{i,t}$ and $MWL_{i,t-1}$ are the log of minimum wage variables (in level) for county *i* in year *t* and year *t*-1, respectively. $E_{i,t}$ is the log of employment variable (employment-to-population ratio) for 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) for county *i* in year *t* and year *t*-1, respectively. We include $MW_{i,t-1}$ in the equation to allow a lagged effect of minimum wages to occur as suggested by Burkhauser et al. (2000); 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 terms ε and e are assumed to be serially uncorrelated and orthogonal to the independent variables.

To address the potential bias from the specification error and the endogeneity problem, we include several control variables in the estimation equations. First, the county GDP per capita and CPI (at city level) capture aggregate business cycle effects and controls for the Great Recession. Second, the county foreign direct investment (FDI) is used to control for the possibility that provinces may restrain minimum wage increases to attract foreign investment (Frost 2002). For the group of young adults, we added a control variable of enrollment rates as in Neumark and Wascher (1992). We controlled for such local condition variables as they are potential determinants of minimum wage decisions.

4. Empirical Results and Discussion

4.1. *Minimum Wage Effects Across Regions*

We first present the estimation result of minimum wage effects on wages for young adults, at-risk groups, and the entire sample for the East, Central, West regions, 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. Other control variables are CPI (city level), county GDP per capita, and county FDI. For young adults, we further control for enrollment rates. All regressions are appropriately weighted by the size of the labor force in each county.

[Table 4 about here]

Our results show that, for each of the three groups, current year minimum wage variable has statistically significant and positive effects on wages for the East, Central, and all regions over 2004-2009. We also find positive but milder effects of the one-year lagged minimum wage variable on wages over the country. However, we do not find any significant wage effect in the Western region. In short, we show that minimum wage changes in the East, Central, and all regions have positively affected the observed wages of young adults, at-risk groups, and the entire sample of workers.[19]

Next, using Eq.(2), we estimate the minimum wage effects on employment for young adults, at-risk groups, and the entire sample for the East, Central, West regions, and all regions respectively and present the results in Table 5. 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 ($MW_{i,t\text{-}1}$) only, while the second equation further controls for CPI (city level), county GDP per capita, and county FDI (shown as Other controls in the table). For young adults, we further control for enrollment rates in the third specification.

[Table 5 about here]

The first and second columns of Table 5 report the estimates with cluster-robust standard errors at the county level in parentheses for young adults and at-risk groups across different regions using Eq.(2), while in the third column, we report the estimates of the entire sample for comparison. The significance of our results is compelling: for the entire country, we find negative effects of the current and lagged minimum wages on employment. For young adults, a 10% increase in the current and previous year's minimum wage led to a statistically significant .88% and 1.36 to 1.66% reduction employment, respectively. For the entire sample of individuals, a 10% increase in the current and previous year's minimum wage led to a statistically significant .45 to .55% and .28 to .31% reduction in employment, respectively.[20] When controlling for enrollment rates, the negative employment effects for young adults are even larger in magnitudes and statistically significant.

In the more developed and prosperous East China, covering large urban centers 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 and the impact of minimum wages on employment can be evident. Indeed, this is consistent with our results in Table 5. 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 one-year lagged minimum wage effect on the employment for the at-risk groups—a 10% increase in the previous year's minimum wage led to a statistically significant 3.10 to 3.22% reduction in employment. The current minimum wage effects are negative but statistically insignificant.

In the developing Central region, we also find the one-year lagged minimum wages have a strong negative employment effect on young adults, at-risk groups, and the entire working population. The lagged minimum wage has an adverse employment effect with an elasticity of -.256 for young adults when controlling for enrollment rates and -.310 to -.336 for at-risk groups. For the entire working population in the Central region, the elasticity is in the range of -.041 to -.042. The estimates of the current minimum wage variable are negative but statistically insignificant.

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 (for 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). We will discuss these results in more details in Section 4.6.

4.2. *Gender and Age Cohort*

A large number of international studies of minimum wages have reported that young workers are most vulnerable to minimum wage increases, and the disemployment effect seems especially strong for teenagers. Female workers are particularly disadvantaged in the labor market. We therefore separate the sample into four age subgroups: 15 to 29, 30 to 39, 40 to 49, and 50 to 64.[21] In each age group, we estimate Eq.(2) of the fixed-effects model separately for males and females and report the results in Table 6. 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 for the independent variables are generally consistent with the theoretical expectations.

[Table 6 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 for female young workers (age 15-29): a 10% increase in the minimum wage results in a statistically significant 1.48% reduction in employment and a more moderate lagged effect with an elasticity of -.061. As expected, we find that the negative effects on females decrease as the age brackets moves up, showing current minimum wage elasticity of -.068 for females aged 30-39 and the lagged minimum wage elasticity of -.040 for females aged 40-49. In contrast, we do not find a significant effect of minimum wages on the employment of females aged 50-64 or on male employment of any age cohort over the country.

In other regions, minimum wages seem to have an adverse employment effect on young females in Eastern and Central regions with a 10% increase in the current year's minimum wage leading to a statistically significant 1.72% and 1.55% reduction in employment, respectively. We also find mild disemployment effects of minimum wages on the employment of 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 extant literature, the bulk 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 7. In each group, we report the estimates using the fixed-effects model with both fixed year and county effects.

[Table 7 about here]

Our estimates confirm disemployment effects of minimum wages on low-skilled workers (high school graduates or below). Panel A of Table 7 shows that the current minimum wage has an adverse effect on the employment of workers who have high school or less education: the elasticities of -.054 and -.080 are statistically significant at 5% level. Furthermore, we also find lagged negative effects of minimum wages on the employment of vocational school degree workers—a 10% increase in the previous year's minimum wage results in a statistically significant .40 to .47% reduction in the current year's employment. On the other hand, we found no effects of minimum wages on other workers with higher degrees.

In the East, we find that the current minimum wage has a negative employment effect on low-skilled workers, with an elasticity of -.070. As shown in Panel C of Table 7, 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 significant effects 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 wages and labor standards are low (Cooke 2005; Wang and Gunderson 2011; Zhang and Deng 2005). Minimum wages are expected to have a stronger effect on rural migrant workers because they tend to work in the low-wage sectors and the higher wages would 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.[22] 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 8 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% increase in the lagged minimum wage results in a statistically significant 2.16% to 2.82% reduction in employment. In particular, for migrant workers in non-state enterprises, we find a larger disemployment effect of current minimum wages, ranging from 4.08% to 4.11%. In contrast, the results show positive coefficients (though statistically insignificant) of the minimum wage variables in the East, which is consistent with the results reported in Wang and Gunderson (2011) .

4.5. *Minimum Wage Effects in the Pre- and Post-2004 Periods*

In China, the decisions of whether to increase minimum wages are made by local government officials, who must often consider various factors, such as local economic conditions, which could cause potential endogeneity problems, rendering our estimates unreliable. To address this possible issue that some of the minimum wage increases might have been endogenous to local conditions, we separate our sample into three different time periods—2002-2004, 2004-2007, and 2008-2009—by taking advantage of the promulgation and strong enforcement of new minimum wage regulations in 2004. More specifically, we estimate Eq.(2) for the three time periods and focus on young adults and at-risk groups.[23]

Table 9 reports the estimation results 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 robust. For the country as a whole, we do not find minimum wages to have an effect on employment in

the 2002-2004 period. In contrast, we do 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 statistically significant effect in the 2002-2004 period but negative and significant 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.[24] In short, our results in Table 9 support the pattern observed in Figure 1, namely, that the year 2004 is the watershed of the minimum wage policy in China.

4.6. *Discussion of the Results*

We began with 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. Although the numbers are small, they are in the range of those found in the studies of developed and developing countries, and are very likely inside of the consensus range of -.1 to -.3 from the earlier literature as noted in Neumark and Wascher (2008).

Besides, we found that minimum wage changes resulted in a larger lagged disemployment effect for at-risk groups across the country, with elasticities ranging from -.265 to -.340. In particular, these effects are consistently more pronounced for both young adults and at-risk groups in the Central region. The fact that nearly all the lagged effects are uniformly more

pronounced than the current contemporaneous effects for young adults and at-risk groups highlights the importance of the adjustment period through which the disemployment effects would occur. It is worth noting that our finding of a lagged disemployment effect is not an anomaly among the empirical studies in the extant minimum wage literature. Hamermesh (1995) points out that nonlabor inputs such as capital may be costly and slow to adjust in the short run, which will also tend to slow the adjustment of other complementary inputs such as labor. Subsequent empirical studies have tended to find evidence of longer-run disemployment effects of minimum wages: for example, Baker et al. (1999) based on Canadian data, Keil et al. (2001) based on a panel of U.S. state-based data, Burkhauser et al. (2000) based on Current Population Survey data, and Wang and Gunderson (2011) based on a Chinese provincial-level panel data.

Our study offers a potential reconciliation for the mixed results reported by Ni et al. (2011) and Wang and Gunderson (2011).[25] By examining the effects for several subgroups, we found that, similar to Ni et al. (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 though statistically insignificant effect in the Eastern region over the same period, as found in Wang and Gunderson (2011). The positive but insignificant employment effects on rural migrants in the East of China would be consistent with the fact that labor shortages of migrant workers began looming in the Eastern coastal region since the spring of 2004 (Cai and Wang 2006) when there are more new job creations and increased turnovers in the private sector in the more prosperous and rapidly growing Eastern region (Cai et al. 2008). In addition, the evidence that the effects of minimum wage increases are statistically insignificant in the East is consistent with the finding in Wang

and Gunderson (2011) in that minimum wages are a largely nonbinding constraint (average wages are much higher than the minimum wages) for rural migrant workers in this region. In contrast, we found negative employment effects in the less developed Western China with stronger effects in the more market-oriented non-state enterprises which tend to employ disproportionately more rural migrants, reflecting the prevailing evidence of rural labor surplus in the Western region (Knight et al. 2011; Knight and Song 1999; Taylor 1988) and the fact that non-state enterprises are more sensitive to market forces and respond more to market pressures.[26]

Our full sample results (age 15-64) reported in column 3 of Table 5 show negative employment effects across the country and in the Eastern region, which is consistent with the findings by Ni et al. (2011), who used general working population (age 15 and above) in their analysis. When focusing on young adults and at-risk groups (which are more likely to be affected by the minimum wage policy), we found stronger disemployment effects in the East, lagged disemployment effects in the Central, and positive while insignificant effects in the Western region. The differential disemployment effects across regions can be explained in part by the fact that in the Central and Western regions young adults and at-risk groups tend to work in the state-owned enterprises—a sector that is considerably inefficient and less responsive to market pressures (Lin et al. 2001).[27]

Furthermore, our microdata sample allows us to assess the effect of minimum wages by gender and age cohort. Consistent with most studies in the literature, we found that the minimum wage has strong negative effects on young female workers (age 15-29)—the most disadvantaged and vulnerable groups in the labor market. In contrast, we did not find significant effects on the employment of young male workers (age 15-29) and older workers (age 50-64) for the entire sample. We also investigated whether and extend to which the minimum wage affects

the employment of low-skilled workers. Our results show that minimum wages reduce the employment of low-skilled workers, indicating that Chinese workers who have high school education or less, and those who have vocational school degrees were adversely affected by minimum wage increases.

Taken together, our results show heterogeneous employment effects of minimum wages by region, skill, and gender. In particular, the effect on young adults, at-risk groups, and rural migrants varies, highlighting the importance of heterogeneous effects of minimum wages by individual characteristics.[28]

4.7. *Robustness Checks*

4.7.1. Self-employment Issue

The working population defined in our analysis so far excludes the self-employed. That is, we focus on wage employees only. However, there are some concerns that by excluding the self-employed, the estimations may actually capture the effect of minimum wages on the structure of employment (wage versus self-employed) rather than on the share of people actually working. In response to the concerns, we re-examine the effects based on a broader definition of workforce by including the self-employed and also estimate solely based on a subsample of the self-employed.

[Table 10 about here]

Table 10 shows the estimates of minimum wage effects on employment based on the broader definition—both wage employees and the self-employed are included. Overall, the results are similar to Table 5 in that minimum wage changes result in statistically significant disemployment effects for young adults, at-risk groups, and the entire sample in the East, Central, and all regions over the same period of analysis. Likewise, we do not find any effect in the West.

Next we examine the effects on the self-employed only. Note that since the new Minimum Wage Regulations of 2004, China began to have hourly minimum wages for non-full time workers, those in self-employed businesses and the self-employed. Because the UHS does not contain information pertaining to hours of work, we estimated the hours of work per week for the self-employed based on the 2005 Census data at the prefecture level.[29] We then apply the estimated number of hours in 2005 to other years based on the assumption that hours of work tend to be relatively constant over a short period of time, then compute the hourly minimum wage-to-hourly wage ratio variable, and estimate the employment effects of minimum wages on the self-employed at the prefecture level using Eq.(2).[30]

[Table 11 about here]

Table 11 shows the results for the self-employed. We find that increases in the current minimum wages lead to statistically significant disemployment effects for the Central, West, and all regions but not for the East. For example, the elasticities (-.128 and -.142) are significant at 1 percent level for the entire country. In sum, we find that the minimum wage changes have statistically significant disemployment effects on wage employees and the self-employed (or both combined) across the country.

4.7.2. Normalized Minimum Wage

In their influential works, Neumark and Wascher (1992) and Card et al. (1994) discuss the potential endogeneity issue when normalizing the minimum wage by the average wage which we use in our analysis. The main concern of using normalized minimum wage variable is that average wages can be related to supply and demand factors (which also affect youth employment) and are affected by minimum wage changes. That is, if wages increase more slowly in places

where employment grow slower, one could possibly find a negative relationship between normalized minimum wages and employment even when the minimum wage does not increase.

[Table 12 about here]

To address this concern, we estimate a non-normalized minimum wage model and control for average wages of groups that are not being examined in the regression as an additional covariate (e.g., in the young adults regressions, we use the average wage of non-young adults as the additional control) and show those results in Table 12. Overall, we find that our results are robust whether or not the minimum wages are normalized. That is, we still find statistically significant disemployment effects in the East, Central and all regions for young adults, at-risk group, and for the entire sample. And we do not find any effect in the Western region.

4.7.3. Enforcement of the Minimum Wage

In a developing country like China, enforcement of the minimum wage could be an important issue that affects the reliability of our results. Hence, we first examine the differences in enforcement across 16 provinces from 2002 to 2009 by constructing a measure of enforcement as the ratio of the number of workers earning almost exactly at the ongoing minimum wage (between the exact minimum wage and 1.1 times the minimum wage) divided by number of workers earning less than the minimum wage. We show the ratio across provinces and over time in Figure 3. We then re-estimate the effect of the minimum wage on employment, adding an interaction term between the enforcement variable and the minimum wage variable.

[Figure 3 about here]

Figure 3 illustrates the enforcement of the minimum wage across our 16 sample provinces between 2002 and 2009. Overall, we find the enforcement increases over time in most provinces, especially after 2004 and particularly in the East part of China (Beijing, Shanghai, Jiangsu,

Shandong, Guangdong and Liaoning). On the other hand, provinces in the West such as Yunnan and Sichuan as well as Henan in the Central do not show increases in enforcement over the period. Taken together, from the graph we find minimum wages are relatively vigorously enforced in the East and most Central regions; however, in the less-developed West the enforcement of the minimum wages laws is relatively lax.

[Table 13 about here]

Appendix Table 5 shows the results on wages. We find that enforcement of the minimum wages does have positive effects on wages, and the coefficients for minimum wage variables are statistically significant for the three groups in the East, Central, and all regions. Except for the West, all the coefficients for the interaction terms are positive and significant for all three groups in all three samples. We do not find any effect in the Western region. Next, we present the estimates of effects of the minimum wage enforcement on employment in Table 13. The results again reinforced our main conclusions that minimum wage increases led to statistically significant disemployment effects for young adults, at-risk group, and milder effects for the entire sample in the East, Central and all regions. Except for the West region, all the coefficients for the interaction terms are negative and significant for the young adults and at-risk groups. Again, we do not find any effect in the West.

4.7.4. Endogeneity Issue

In China, the decisions of whether to increase minimum wages are made by local government officials based on a number of factors, such as labor market conditions, which could trigger potential endogeneity problems, making our results unreliable. To formally address this issue, we examine whether labor market conditions especially unemployment rates for the unskilled or youth, can predict minimum wage increases. Using the pooled and random effects

(RE) logit models with year fixed effects, we define the dependent variable as whether the minimum wage changes (0/1), and include GDP per capita, youth unemployment rate and CPI as independent variables. We also replace youth unemployment rate with general unemployment level (in log) to see if the results change.

[Table 14 about here]

Table 14 shows that in all specifications the independent variables are statistically insignificant, which suggests that labor market condition cannot predict minimum wages changes. In other words, we show that minimum wage increase decisions do not depend on labor market conditions, which mitigates the concern of potential endogeneity issues in our analysis.

4.7.5. The Effect on Migrants

As described in Section 4.4, we acknowledge that the UHS data largely under sample migrants, making our results for migrants non-informative. The issue becomes more severe if the our sample captures mainly local residents, then a higher migrant wage could reduce employment by attracting migrant workers who take jobs from local residents. Likewise, it is possible that disemployment effects result from a higher minimum wage can decrease migration. To address this concern, we use the 2005 Census data to estimate the minimum wage effect on employment of migrants and report the results in Table 15.

[Table 15 about here]

Consistent with the results using UHS data in Section 4.4, we find minimum wage increases have statistically significant disemployment effects on migrant workers in the West, with elasticities in the range of -.225 and -.467. In addition, we also do not find any effect in the East as in Section 4.4. However, in contrast to the results using UHS data, we find the minimum wage increases have resulted in disemployment for migrants in the Central region, with

statistically significant elasticities in the range of -.106 and -.261. In sum, the results of migrants using 2005 Census, which has much larger sample, generally support our findings that minimum wage increases have negative effects on the employment of migrants in the West and no effect in the East of China.

4.7.6. Provincial Level Results and Representativeness of the sample

It is important to recognize that the UHS is designed to be representative at the provincial level, not at the county level. Due to random sampling errors, our samples for some specific counties may be noisy. Moreover, the NBS only allows limited access to the microdata up to 16 provinces which casts doubt on the representativeness of the 16-province UHS sample to the entire population. To vigorously address the two concerns, we first re-examine our main results (Table 5) at the provincial level. We then utilize the 2005 Census data to compare descriptive statistics of the 16 sample provinces with the 15 provinces not in our sample, along with the entire census sample.

[Table 16 about here]

Table 16 shows the estimates of minimum wage effects on the employment in the East, Central, West, and all regions for young adults, at-risk group and the entire sample at the provincial level, respectively. Similar to the results at the county level in Table 5, the provincial level estimations do not alter our findings. Minimum wage increases continue to have significant disemployment effects on the three groups in the East, Central and all regions, but no effect in the West.

[Table 17 about here]

We then check the representativeness of our 16 sample provinces by comparing the descriptive statistics of UHS with those of the 2005 Census and report the comparisons in Table

17. We also compute the two key variables—minimum wage-to-average wage ratio and employment-to-population ratio—by gender, region, age cohort, and educational attainment for all provinces, 16 provinces in our sample, and 15 provinces not in our sample. The numbers for all provinces and 16 provinces are relatively close to those of 15 provinces not in the sample. In other words, Table 17 provides some evidence on the representativeness of our 16-province UHS sample.

5. Conclusions

We use a large set of county-level panel data 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. Compared to previous studies using provincial-level data and reporting mixed results, we found that minimum wage changes in China led to significant negative effects on the employment in the Eastern and Central regions, and caused disemployment for young adults, low-skilled workers, and rural migrants, particularly at-risk groups.

Our study makes a number of significant contributions to the empirical literature of minimum wages in China, the largest transitional economy in the world. First, the use of detailed county-level data (over 1,400 counties) provides greater accuracy and more variations (127 changes) of minimum wages in order to measure their real impact on employment. Second, the unique features of UHS microdata allow us to directly evaluate the employment effects of minimum wages on those population groups who are at risk of being affected by minimum wage increases, such as young adults and low-skilled workers. Third, our results are robust to various definitions of minimum wages and the workforce, various subsamples by regions, and across a number of population groups. Our estimated coefficients for the control variables also have the expected

signs. Fourth, minimum wages were strongly enforced after the new Minimum Wage Regulations were enacted in 2004, as such they are expected to have more significant employment effects after 2004. Our results show that minimum wages in the provinces with vigorous enforcement do increase wages of the workers while adversely affecting their employment, especially for the young adults and at-risk groups.

Competing Interest

The authors declare that they have no competing interests.

Authors' Contributions

TF participated in the design of the study, discussed the empirical results, wrote the abstract, and edited the manuscript. CL participated in the design of the study, collected the data, carried out the empirical analysis, discussed the results, and drafted the manuscript. All authors read and approved the final manuscript.

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Economics, and Renmin University of China, and the Workshop on Minimum Wages and Employment in China, Hong Kong, and the World at The Hong Kong University of Science and Technology.

Endnotes

[1] Nevertheless, these two positions are not necessarily in conflict. The minimum wage can have negative impacts but also serve those other goals advocated by its supporters. The existing evidence has shown that the minimum wage poses a tradeoff of potential benefits for some against job losses for others.

[2] There is no national minimum wage in China in which the minimum wage standards are determined at the provincial level. We discuss how we calculate the mean nominal and real minimum wages of each year in Section 3.1.

[3] The growth rates of average nominal wage are 155% and 194% for the periods of 1995-2003 and 2004-2012, respectively (National Bureau of Statistics of China 2013).

[4] The theoretically expected effect of minimum wages on employment is well established in the literature. For examples, see reviews in Card and Krueger (1995), Brown (1999), Gunderson (2005), Cunningham (2007), and Neumark and Wascher (2008). However, there is no consensus in the existing empirical studies on the magnitude of disemployment effect associated with minimum wage changes. Please refer to Card (1992), Card and Krueger (1994, 1995, 2000), Neumark and Wascher (1992, 1995), and Williams (1993) for U.S. evidence; Machin and Manning (1994), Dickens et al. (1999), Stewart (2004), and Metcalf (2008) for British evidence; Campolieti et al. (2005) and Campolieti et al. (2006) for Canadian evidence.

[5] For expositional convenience, we refer to "provinces, municipalities, and autonomous regions" as provinces.

[6] 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 35 0RMB to 530 RMB. Furthermore, the minimum wages of Fushun and 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. As such detailed minimum wage data by county are not readily available to the public, we took effort to collect the data by ourselves.

[7] 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% and 59% of the nominal minimum wages, respectively. We discuss how we address this issue in the Data section.

[8] 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.

[9] This has affected compliance significantly. According to our calculation using 2002-2009 data, over the country the share of workers who earn less than the minimum wage declined continuously, reducing from 7.28 to 5.62% in the pre- and post-2004 periods (2002-2003, 2004-2009), respectively. In particular, the number decreased from 8.08 to 5.33% in the Eastern region between the same periods; whereas in the Central region, the number decreased from 6.19 to 5.46%.

[10] The commonly-used administrative area code in China is 6 digits. The first two digits identify a provincial administrative unit; the first four digits identify a prefectural administrative unit; whereas the six digits identify an administrative unit at the county level.

[11] Note that the UHS is not publicly available. The NBS allows limited access to the microdata up to 16 provinces under certain conditions for academic research. Despite that, the 16-province sample includes most economically important provinces in China. To check the representativeness of our 16-province UHS sample, we use the 2005 Census to compare descriptive statistics of the 16 sample provinces with the 15 provinces not in the sample. We discuss and show that the 16 sample provinces are quantitatively similar to all provinces in Section 4.7.6.

[12] In the original data, we are able to identify how many months a person work and record his/her monthly income and wages in a year. From 2002 to 2009, on average, 91% of the workers have worked for 12 months in a year.

[13] Note that there was no minimum wage increase in 2009 because of the Great Recession.

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

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

[16] Note that the minimum wage standards are the same for men and women.

[17] 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.

[18] Note that Dube et al. (2010) and Allegretto et al. (2011) have criticized the state/county panel-data approach and attempt to construct better counterfactuals for estimating the effects of minimum wages on employment. However, Neumark et al. (2014) provide evidence that the methods advocated by the above two studies do not isolate more reliable identifying information (or even throw out much useful and potentially valid identifying information), leading to incorrect conclusions. A recent paper by Meer and West (2013) who use three separate state panels of administrative employment data and find that minimum wages reduce net job growth. They show that the disemployment effects are most pronounced for younger workers and in industries with a higher proportion of low-wage workers.

[19] We present the results of the minimum wage effect on wages by age cohort, educational attainment, migrant workers, three time periods, and the enforcement of minimum wage effects on wages in Appendix Tables 1 to 4, respectively.

[20] We also show results for a high skill group (defined as workers with a college degree or above) as a placebo test in Section 4.3.

[21] 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.

[22] . Nevertheless, the UHS data severely under sample migrants in urban China. We will address this issue by using census data in Section4.7.5.

[23] 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 9.

[24] 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.

[25] Note that we do not exactly replicate the results of the two studies because we use different datasets. Our paper uses a micro-level data (UHS), whereas both Ni et al. (2011) and Wang and Gunderson (2011) use aggregated published statistics collected from yearbooks.

[26] In our data, about 87% of rural migrant workers work in the non-state enterprises in the Western region.

[27] Over 2004-2009, 42% of young adults work in the state-owned enterprises in the Eastern region; 59 and 61% of young adults work in the state-owned enterprises in the Central and Western regions, respectively. For at-risk groups, 24% of them work in the state-owned enterprises in the Eastern region, while 43 and 47% work in the state-owned enterprises in the Central and Western regions, respectively.

[28] Indeed, our sample shows that the three groups are different in terms of employment type, skill, and wage distribution. Over the period of 2004-2009, less than 3 and 2.5% of young adults are at-risk groups and rural migrants in each region, respectively. Likewise, less than 3 and 2% of at-risk groups are young adults and rural migrants in each region, respectively.

[29] The same 16 provinces in the 2005 Census are used to calculate the mean hours of work per week at the prefecture level. The administrative unit identifier in the 2005 Census is 4 digits (prefecture).

[30] We report the results in Table 11 for the entire sample only since there are only 2.13 and .80 percent of self-employment for young adults and at-risk groups during 2004-2009 in our sample, respectively.

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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, 2004–2009

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	620,321				

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	Above Minimum
Percent of Total (%)	5.62	3.28	91.09
Percent of Female (%)	61.52	63.84	42.99
Minimum/Average Wage	2.52	1.00	.35
	(4.66)	(.06)	(.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. There are 620,321 observations in this period. "Less than the Minimum" are workers earning wages at or below 90 percent of the minimum wage. Minimum wage workers earn wages above 90 percent and up to 110 percent of the minimum wage. Above minimum wage workers earn wages above 110 percent of the minimum wage.

Table 4 Estimates of Minimum Wage Effects on Wages

Dependent Variable: log (Wages)	Young Adults			At-Risk Group		Entire Sample	
Independent Variables (log)	(1)	(2)	(3)	(1)	(2)	(1)	(2)
				A. All Regions			
MW level	.782***	.429***	.436***	.873***	.883***	.545***	.300***
	(.077)	(.084)	(.084)	(.034)	(.039)	(.044)	(.050)
MW level, lagged 1 year	.360***	.083*	.137*	.100***	.108***	.339***	.171***
	(.076)	(.042)	(.083)	(.033)	(.036)	(.042)	(.046)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.511	.558	.560	.916	.936	.626	.659
Number of counties per year	649	649	649	562	562	661	661
Average obs. per county per year	270	270	270	170	170	1658	1658
				B. East			
MW level	1.434***	.890***	.884***	.861***	.905***	.666***	.229***
	(.114)	(.141)	(.143)	(.097)	(.055)	(.071)	(.075)
MW level, lagged 1 year	.184	.037	.039	.115**	.095*	.449***	.186***
	(.117)	(.124)	(.122)	(.055)	(.050)	(.060)	(.071)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.676	.700	.709	.933	.934	.698	.718
Number of counties per year	286	286	286	253	253	289	289
Average obs. per county per year	329	329	329	180	180	1917	1917
				C. Central			
MW level	.257**	.080*	.095*	.874***	.884***	.289***	.256***
	(.118)	(.045)	(.053)	(.055)	(.061)	(.063)	(.068)
MW level, lagged 1 year	.241**	.205*	.203**	.108**	.116*	.078	.009
	(.122)	(.112)	(.103)	(.055)	(.062)	(.067)	(.069)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.306	.359	.360	.854	.883	.515	.552
Number of counties per year	273	273	273	230	230	279	279
Average obs. per county per year	214	214	214	154	154	1385	1385
				D. West			
MW level	.601	.328	.413	1.014	.837	.523	.450
	(.387)	(.517)	(.519)	(.873)	(.867)	(.377)	(.399)
MW level, lagged 1 year	.233	.477	.426	.022	.102	.087	.040
	(.350)	(.480)	(.505)	(.091)	(.188)	(.233)	(.348)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.330	.352	.358	.870	.889	.348	.356

Number of counties per year	90	90	90	79	79	93	93
Average obs. per county per year	250	250	250	181	181	1673	1673

Note: *** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the county level are in parentheses. All variables in the table are at the county level, except that CPI is at the city level. Young adults are defined as workers who are 15-29 years old. At-risk groups are workers whose monthly wages are between the old and new minimum wage standards.

Table 5 Estimates of Minimum Wage Effects on the Employment-to-Population Ratio

Dependent Variable: log (Employment/Population)	Young Adults			At-Risk Group		Entire Sample	
Independent Variables (log)	(1)	(2)	(3)	(1)	(2)	(1)	(2)
				A. All Regions			
MW	-.088**	-.062	-.092**	-.213*	-.200	-.055***	-.045**
	(.042)	(.043)	(.047)	(.128)	(.129)	(.018)	(.018)
MW, lagged 1 year	-.156***	-.136***	-.166***	-.340***	-.265***	-.031***	-.028**
	(.040)	(.042)	(.046)	(.102)	(.102)	(.012)	(.011)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.144	.218	.468	.024	.025	.079	.091
Number of counties per year	649	649	649	562	562	661	661
Average obs. per county per year	270	270	270	170	170	1658	1658
				B. East			
MW	-.234***	-.154**	-.171**	-.201	-.213	-.068***	-.067**
	(.047)	(.070)	(.069)	(.219)	(.220)	(.025)	(.027)
MW, lagged 1 year	-.100**	-.046	-.007	-.322**	-.310**	-.018	-.015
	(.048)	(.057)	(.064)	(.128)	(.124)	(.020)	(.020)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.213	.223	.459	.041	.056	.084	.085
Number of counties per year	286	286	286	253	253	289	289
Average obs. per county per year	329	329	329	180	180	1917	1917
				C. Central			
MW	-.032	-.034	-.083	-.297	-.272	-.039	-.039
	(.068)	(.070)	(.066)	(.181)	(.177)	(.025)	(.026)
MW, lagged 1 year	-.216***	-.216***	-.256***	-.336*	-.310*	-.041***	-.042***
	(.061)	(.061)	(.058)	(.174)	(.184)	(.015)	(.014)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.129	.151	.446	.031	.043	.094	.133
Number of counties per year	273	273	273	230	230	279	279
Average obs. per county per year	214	214	214	154	154	1385	1385
				D. West			
MW	.088	-.037	-.005	.018	.022	-.096	-.069
	(.114)	(.106)	(.104)	(.208)	(.223)	(.063)	(.064)
MW, lagged 1 year	.124	-.153	-.167	.000	.124	.055	-.005
	(.107)	(.110)	(.114)	(.258)	(.276)	(.075)	(.043)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.153	.169	.453	.014	.051	.015	.043
Number of counties per year	90	90	90	79	79	93	93

Average obs. per county per year	250	250	250	181	181	1673	1673

Note: *** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the county level are in parentheses. All variables in the table are at the county level, except that CPI is at the city level. Young adults are defined as workers who are 15-29 years old. At-risk groups are workers whose monthly wages are between the old and new minimum wage standards. Among young adults, less than 3 percent are at-risk groups in each region; likewise, among at-risk group, less than 3 percent are young adults in each region.

Table 6 Estimates of Minimum Wage Effects on Employment by Age Cohort

Dependent Variable: log (Employment/Population)	Age 15-29		Age 30-39		Age 40-49		Age 50-64	
Independent Variables (log)	Male	Female	Male	Female	Male	Female	Male	Female
				A. All Regions				
MW	-.031	-.148***	-.019	-.068***	.017	-.040	.009	.023
	(.047)	(.047)	(.027)	(.025)	(.016)	(.027)	(.053)	(.056)
MW, lagged 1 year	-.027	-.061**	-.031	-.034	-.015	-.040**	-.009	-.023
	(.029)	(.030)	(.019)	(.021)	(.013)	(.017)	(.032)	(.034)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.173	.169	.022	.097	.012	.093	.052	.055
Number of counties per year	632	626	654	653	655	653	653	598
Average obs. per county per year	113	114	253	260	309	272	231	100
				B. East				
MW	-.103	-.172**	-.023	-.098***	-.001	-.043	.022	-.057
	(.112)	(.076)	(.022)	(.033)	(.017)	(.032)	(.042)	(.061)
MW, lagged 1 year	-.012	-.040	-.010	.007	-.016	-.021	-.018	-.001
	(.049)	(.046)	(.011)	(.024)	(.013)	(.025)	(.031)	(.041)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.176	.195	.049	.094	.013	.092	.039	.094
Number of counties per year	280	280	285	287	288	285	286	269
Average obs. per county per year	131	144	299	308	337	302	266	108
				C. Central				
MW	.014	-.155**	-.052**	-.087**	.013	.034	.025	.152**
	(.062)	(.068)	(.020)	(.040)	(.023)	(.062)	(.085)	(.075)
MW, lagged 1 year	-.014	-.066	-.072***	-.071**	-.018	-.013	.021	-.024
	(.068)	(.044)	(.020)	(.036)	(.022)	(.029)	(.052)	(.047)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.123	.114	.076	.148	.015	.057	.044	.089
Number of counties per year	265	260	276	273	275	277	276	246
Average obs. per county per year	87	94	211	212	276	235	186	95
				D. West				
MW	-.071	-.145	.231*	.078	.093	-.018	-.394**	-.400***
	(.170)	(.109)	(.123)	(.078)	(.080)	(.111)	(.188)	(.120)
MW, lagged 1 year	-.121	-.215*	.117**	-.103**	.004	.066	-.136	-.037
	(.124)	(.110)	(.053)	(.046)	(.053)	(.072)	(.139)	(.093)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.172	.179	.236	.152	.102	.085	.091	.269
Number of counties per year	87	86	93	93	92	91	91	93
Average obs. per county per year	101	107	237	255	316	288	253	107

Note: *** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the county level are in parentheses. 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 Employment by Educational Attainment

Dependent Variable: log (Employment/Population)	High School or Below		Vocational School		Junior College		College or Above	
Independent Variables (log)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
				A. All Regions				
MW	-.080**	-.054**	-.037	-.046*	-.018	-.023	-.006	-.013
	(.040)	(.025)	(.025)	(.025)	(.020)	(.020)	(.013)	(.014)
MW, lagged 1 year	-.019	-.029	-.040**	-.047**	-.002	-.016	-.005	-.019
	(.020)	(.018)	(.020)	(.020)	(.021)	(.021)	(.015)	(.015)
Other controls	No	Yes	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.046	.076	.036	.068	.044	.079	.003	.032
Number of counties per year	659	659	636	636	653	653	632	632
Average obs. per county per year	744	744	196	196	408	408	277	277
				B. East				
MW	-.070*	-.061	-.049	-.054	-.048	-.064	-.031	-.032
	(.038)	(.041)	(.046)	(.047)	(.037)	(.040)	(.020)	(.020)
MW, lagged 1 year	-.025	-.017	-.003	-.006	.028	.018	-.039	-.039
	(.023)	(.024)	(.028)	(.030)	(.027)	(.028)	(.027)	(.027)
Other controls	No	Yes	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.056	.062	.028	.036	.053	.091	.011	.032
Number of counties per year	289	289	281	281	286	286	284	284
Average obs. per county per year	819	819	224	224	476	476	355	355
				C. Central				
MW	-.071**	-.077**	-.048	-.051	.012	.007	.074	.077
	(.034)	(.035)	(.037)	(.037)	(.023)	(.023)	(.056)	(.057)
MW, lagged 1 year	-.052**	-.047*	-.083***	-.090***	-.030	-.033	.080	.079
	(.025)	(.025)	(.032)	(.033)	(.033)	(.034)	(.038)	(.038)
Other controls	No	Yes	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.083	.111	.073	.094	.045	.082	.045	.046
Number of counties per year	277	277	263	263	274	274	259	259
Average obs. per county per year	650	650	170	170	341	341	197	197
				D. West				
MW	-.184	-.030	-.019	.012	-.068	-.034	.033	.112
	(.163)	(.092)	(.073)	(.086)	(.062)	(.060)	(.084)	(.103)
MW, lagged 1 year	.154	.037	-.046	-.031	.020	-.021	-.020	-.054
	(.120)	(.092)	(.090)	(.089)	(.078)	(.072)	(.070)	(.062)
Other controls	No	Yes	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.013	.059	.028	.052	.017	.099	.019	.080
Number of counties per year	93	93	92	92	93	93	89	89
Average obs. per county per year	791	791	183	183	394	394	258	258

Note: *** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the county level 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 8 Estimates of Minimum Wage Effects on the Employment of Migrant Workers

Dependent Variable: log (Employment/Population)	East		Central		West	
Independent Variables (log)	(1)	(2)	(1)	(2)	(1)	(2)
			A. All Enterprises			
MW	.022	.043	-.005	-.037	-.146	-.135
	(.058)	(.056)	(.051)	(.056)	(.097)	(.010)
MW, lagged 1 year	.027	.034	.031	.066	-.282***	-.216***
	(.047)	(.049)	(.067)	(.048)	(.058)	(.074)
Other controls	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.014	.102	.091	.223	.399	.477
Number of counties per year	238	238	172	172	144	144
Average obs. per county per year	152	152	93	93	114	114
			B. Non-state Enterprises Only			
MW	.077	.087	-.017	-.044	-.411***	-.408***
	(.113)	(.111)	(.057)	(.071)	(.098)	(.128)
MW, lagged 1 year	.013	.002	.057	.058	-.120	-.070
	(.075)	(.078)	(.079)	(.073)	(.124)	(.129)
Other controls	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.147	.178	.202	.289	.489	.581
Number of counties per year	223	223	160	160	133	133
Average obs. per county per year	151	151	88	88	119	119

Note: *** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the county level 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. Number of migrants shows the total migrant population of each region in our sample.

Table 9 Estimates of Minimum Wage Effects on the Employment by Period

Dependent Variable: log (Employment/Population)	2002-2004		2004-2007		2008-2009	
Independent Variables (log)	Young Adults	At-Risk Groups	Young Adults	At-Risk Groups	Young Adults	At-Risk Groups
			A. All Regions			
MW	-.141	.391	-.060	-.359**	-.052	.010
	(.162)	(.301)	(.080)	(.165)	(.047)	(.227)
MW, lagged 1 year	-.014	-.084	-.106*	-.246**	-.103***	-.283
	(.090)	(.377)	(.060)	(.110)	(.039)	(.196)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.102	.073	.172	.050	.176	.014
Number of counties per year	364	354	446	328	414	324
Average obs. per county per year	328	115	275	125	327	184
			B. East			
MW	.082	-.017	-.171	-.293	-.126**	.236
	(.168)	(.475)	(.111)	(.230)	(.054)	(.169)
MW, lagged 1 year	.017	-.012	-.022	-.218*	-.060	-.382*
	(.088)	(.540)	(.078)	(.117)	(.055)	(.205)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.080	.043	.203	.030	.198	.033
Number of counties per year	232	228	213	204	230	196
Average obs. per county per year	331	181	308	131	422	214
			C. Central and West			
MW	-.291	.213	-.011	-.176	-.018	-.207
	(.384)	(.485)	(.102)	(.141)	(.068)	(.276)
MW, lagged 1 year	-.262	-.580	-.152*	-.129	-.131**	-.248
	(.319)	(.768)	(.079)	(.153)	(.054)	(.274)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.169	.242	.103	.018	.086	.023
Number of counties per year	132	126	233	124	184	128
Average obs. per county per year	324	152	247	131	188	159

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

Table 10 Estimates of Minimum Wage Effects on the Employment of Both Wage Employees and Self-employed Workers

Dependent Variable: log (Employment/Population)	Young Adults			At-Risk Group		Entire Sample	
Independent Variables (log)	(1)	(2)	(3)	(1)	(2)	(1)	(2)
				A. All Regions			
MW	-.082*	-.058	-.072*	-.168	-.149	-.040***	-.032**
	(.043)	(.043)	(.044)	(.123)	(.124)	(.014)	(.013)
MW, lagged 1 year	-.152***	-.132***	-.153***	-.339***	-.276***	-.029***	-.026**
	(.039)	(.040)	(.043)	(.099)	(.100)	(.011)	(.010)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.147	.220	.487	.025	.026	.082	.094
Number of counties per year	649	649	649	562	562	661	661
Average obs. per county per year	293	293	293	182	182	1731	1731
				B. East			
MW	-.232***	-.162**	-.178**	-.170	-.180	-.044**	-.045**
	(.047)	(.062)	(.058)	(.221)	(.221)	(.018)	(.020)
MW, lagged 1 year	-.098**	-.028	-.011	-.300**	-.282**	-.011	-.009
	(.047)	(.060)	(.073)	(.132)	(.129)	(.017)	(.018)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.218	.248	.499	.043	.062	.084	.087
Number of counties per year	286	286	286	253	253	289	289
Average obs. per county per year	351	351	351	194	194	1988	1988
				C. Central			
MW	-.026	-.027	-.048	-.259	-.236	-.030	-.030
	(.068)	(.070)	(.065)	(.170)	(.165)	(.019)	(.020)
MW, lagged 1 year	-.208***	-.209***	-.224***	-.375**	-.376**	-.040***	-.039***
	(.059)	(.060)	(.053)	(.165)	(.174)	(.012)	(.011)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.134	.155	.465	.036	.062	.099	.140
Number of counties per year	273	273	273	230	230	279	279
Average obs. per county per year	231	231	231	171	171	1428	1428
				D. West			
MW	.095	-.031	.008	.007	-.026	-.074	-.060
	(.114)	(.108)	(.108)	(.301)	(.211)	(.059)	(.051)
MW, lagged 1 year	.116	-.160	-.209	-.034	.008	.038	-.019
	(.106)	(.111)	(.175)	(.259)	(.289)	(.077)	(.041)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.156	.170	.471	.018	.059	.018	.066

Number of counties per year	90	90	90	79	79	93	93
Average obs. per county per year	258	258	258	189	189	1697	1697

Note: *** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the county level are in parentheses. All variables in the table are at the county level, except that CPI is at the city level. Young adults are defined as workers who are 15-29 years old. At-risk groups are workers whose monthly wages are between the old and new minimum wage standards. Among young adults, less than 3 percent are at-risk groups in each region; likewise, among at-risk group, less than 3 percent are young adults in each region.

Table 11 Estimates of Minimum Wage Effects on the Employment of Self-employed Workers

Dependent Variable: log (Employment/Population)	Entire Sample							
	All Regions		East		Central		West	
Independent Variables (log)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
MW	-.128***	-.142***	-.101	-.095	-.163**	-.152**	-.122*	-.083*
	(.048)	(.053)	(.168)	(.154)	(.071)	(.067)	(.064)	(.048)
MW, lagged 1 year	.041	.027	.042	-.051	.047	.014	.054	.012
	(.037)	(.044)	(.100)	(.097)	(.076)	(.057)	(.060)	(.075)
City controls	No	Yes	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.058	.143	.094	.175	.110	.222	.108	.174
Observations	554	554	271	271	178	178	105	105

Note: *** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the prefecture level are in parentheses. All models are estimated at the prefecture level.

Table 12 Estimates of Minimum Wage Effects on the Employment (Non-normalized minimum wage variable)

Dependent Variable: log (Employment/Population)	Young Adults			At-Risk Group		Entire Sample	
Independent Variables (log)	(1)	(2)	(3)	(1)	(2)	(1)	(2)
				A. All Regions			
MW level	-.120*	-.005	-.102*	-.093	-.263*	-.009	-.018**
	(.072)	(.082)	(.061)	(.084)	(.158)	(.017)	(.010)
MW level, lagged 1 year	-.228***	-.060***	-.076***	-.047**	-.268***	.016*	-.024**
	(.077)	(.028)	(.035)	(.024)	(.102)	(.009)	(.013)
Mean wages[a]	No	Yes	Yes	No	Yes	No	Yes
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.070	.202	.454	.008	.025	.026	.101
Number of counties per year	649	649	649	562	562	661	661
Average obs. per county per year	270	270	270	170	170	1658	1658
				B. East			
MW level	-.198***	-.170**	-.115***	-.050	-.073	-.047*	-.026***
	(.101)	(.090)	(.054)	(.161)	(.274)	(.028)	(.013)
MW level, lagged 1 year	-.150**	-.171	-.044	-.114*	-.206***	-.026	-.025
	(.081)	(.124)	(.292)	(.068)	(.102)	(.031)	(.031)
Mean wages[a]	No	Yes	Yes	No	Yes	No	Yes
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.080	.221	.461	.017	.046	.084	.093
Number of counties per year	286	286	286	253	253	289	289
Average obs. per county per year	329	329	329	180	180	1917	1917
				C. Central			
MW level	-.054	-.056	-.186	-.043	-.023	-.038	-.033
	(.125)	(.142)	(.371)	(.124)	(.173)	(.030)	(.035)
MW level, lagged 1 year	-.126*	-.234*	-.268**	-.067	-.248***	-.032*	-.046***
	(.075)	(.126)	(.142)	(.114)	(.119)	(.017)	(.018)
Mean wages[a]	No	Yes	Yes	No	Yes	No	Yes
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.067	.126	.377	.018	.050	.031	.122
Number of counties per year	273	273	273	230	230	279	279
Average obs. per county per year	214	214	214	154	154	1385	1385
				D. West			
MW level	.021	-.117	-.268	.114	.144	-.042	-.166
	(.118)	(.186)	(.190)	(.599)	(.536)	(.365)	(.244)
MW level, lagged 1 year	.176	.510	-.409	-.026	-.178	-.021	-.347
	(.520)	(.662)	(.472)	(.434)	(.534)	(.183)	(.238)
Mean wages[a]	No	Yes	Yes	No	Yes	No	Yes
Enrollment rates	No	No	Yes	No	No	No	No

Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.058	.168	.447	.030	.076	.059	.160
Number of counties per year	90	90	90	79	79	93	93
Average obs. per county per year	250	250	250	181	181	1673	1673

Note: [a] the control variables of mean wages for young adults and at risk groups are mean wages of non-young adults and non-at risk groups, respectively. The control variable of mean wages for the entire sample is the mean wage of the entire sample.

*** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the county level are in parentheses.

Table 13 Estimates of Effects of the Minimum Wage Enforcement on the Employment-to-Population Ratio

Dependent Variable: log (Employment/Population)	Young Adults		At-Risk Group		Entire Sample	
Independent Variables (log)	(1)	(2)	(1)	(2)	(1)	(2)
			A. All Regions			
MW	-.421***	-.336***	-.387***	-.243***	-.066***	-.049***
	(.069)	(.088)	(.138)	(.137)	(.015)	(.016)
Enforcement	-.125***	-.123***	-.003***	-.002***	.008	.010
	(.036)	(.040)	(.001)	(.000)	(.012)	(.013)
Enforcement*MW interaction	-.099**	-.100**	-.040***	-.121***	.011	.012
	(.040)	(.043)	(.010)	(.010)	(.010)	(.010)
Other controls	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.222	.278	.020	.046	.076	.103
Number of counties per year	649	649	562	562	661	661
Average obs. per county per year	270	270	170	170	1658	1658
			B. East			
MW	-.383***	-.313***	-.271***	-.221***	-.060***	-.040*
	(.056)	(.081)	(.021)	(.026)	(.019)	(.023)
Enforcement	-.096**	-.090**	-.002***	-.001***	.002	.004
	(.038)	(.040)	(.000)	(.000)	(.017)	(.017)
Enforcement*MW interaction	-.076**	-.071*	-.038***	-.045***	.004	.005
	(.036)	(.037)	(.014)	(.014)	(.013)	(.012)
Other controls	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.270	.302	.018	.089	.065	.102
Number of counties per year	286	286	253	253	289	289
Average obs. per county per year	329	329	180	180	1917	1917
			C. Central			
MW	-.436**	-.499**	-.460***	-.413***	-.115***	-.108***
	(.184)	(.202)	(.224)	(.227)	(.028)	(.030)
Enforcement	-.204**	-.270***	-.003***	-.004***	-.008	-.007
	(.092)	(.103)	(.001)	(.002)	(.018)	(.019)
Enforcement*MW interaction	-.200*	-.269**	-.336*	-.329*	.002	.001
	(.121)	(.136)	(.187)	(.190)	(.015)	(.016)
Other controls	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.170	.220	.045	.056	.126	.180
Number of counties per year	273	273	230	230	279	279
Average obs. per county per year	214	214	154	154	1385	1385
			D. West			
MW	-.377	-.185	-.182	.068	.048	.073
	(.230)	(.410)	(.434)	(.656)	(.057)	(.060)
Enforcement	-.021	.016	-.001	.007	.053	.075
	(.148)	(.234)	(.015)	(.021)	(.048)	(.059)
Enforcement*MW interaction	.008	.025	.297	-.112	.045	.064
	(.182)	(.270)	(.292)	(.362)	(.042)	(.049)

Other controls	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.163	.400	.012	.073	.074	.147
Number of counties per year	90	90	79	79	93	93
Average obs. per county per year	250	250	181	181	1673	1673

Note: *** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the county level are in parentheses.

Table 14 Logit Models for the Effect of Labor Market Conditions on Minimum Wage Changes, 2004-2009

Dependent variable: Minimum wage changes (0/1)	(1)		(2)		(3)	
Independent variables (log)	RE	Pooled	RE	Pooled	RE	Pooled
GDP per capita	.067	.105	.121	.189	.263	.294
	(.530)	(208)	(.535)	(.173)	(.372)	(.231)
Youth unemployment rate	-.153	-.032	-.176	-.153		
	(216)	(.138)	(.217)	(.136)		
CPI			-5.006	-6.458	-3.774	-4.495
			(9.567)	(6.046)	(5.298)	(7.662)
Unemployment					-.212	-.378
					(.431)	(.482)
Observations	2,191	2,191	2,191	2,191	2,191	2,191

Note: All regressions are estimated with year fixed effects. Cluster-robust standard errors at the county level are in parentheses.

Table 15 Estimates of Minimum Wage Effects on the Employment of Migrant Workers, 2005 Census data

Dependent Variable: log (Employment/Population)	East		Central		West	
Independent Variables (log)	(1)	(2)	(1)	(2)	(1)	(2)
MW	.012	.008	-.261***	-.106***	-.225***	-.467***
	(.012)	(.011)	(.014)	(.018)	(.010)	(.038)
City controls	No	Yes	No	Yes	No	Yes
City fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.786	.789	.439	.672	.382	.546
Observations	91,007	91,007	7,271	7,271	6,076	6,076

Note: In the 2005 Census, the administrative unit is at the city level (4 digits). Hence, we use city level controls which include GDP per capita, FDI and CPI and estimate the models with city fixed effects. Robust standard errors are in parentheses. *** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the city level are in parentheses.

Table 16 Provincial Level Estimates of Minimum Wage Effects on the Employment-to-Population Ratio, 2004-2009

Dependent Variable: log (Employment/Population)	Young Adults			At-Risk Group		Entire Sample	
Independent Variables (log)	(1)	(2)	(3)	(1)	(2)	(1)	(2)
				A. All Regions			
MW	-.130**	-.228***	-.421**	-.049**	-.178***	-.035*	-.056**
	(.059)	(.045)	(.165)	(.021)	(.067)	(.019)	(.024)
MW, lagged 1 year	-.124***	-.081**	-.069*	-.011	-.005	-.014	-.001
	(.041)	(.041)	(.036)	(.023)	(.018)	(.018)	(.023)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.522	.646	.649	.078	.097	.191	.203
Observations	96	96	96	96	96	96	96
				B. East			
MW	-.252***	-.324***	-.272***	-.091***	-.248***	-.043***	-.042*
	(.066)	(.093)	(.136)	(.106)	(.058)	(.015)	(.018)
MW, lagged 1 year	-.038	-.113	-.082	-.014	-.037	-.022	-.023
	(.057)	(.097)	(.039)	(.059)	(.061)	(.017)	(.021)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.805	.873	.907	.034	.056	.027	.032
Observations	36	36	36	36	36	36	36
				C. Central			
MW	-.089	-.296**	-.163**	-.153***	-.182***	-.053***	-.121**
	(.082)	(.142)	(.072)	(.058)	(.050)	(.019)	(.049)
MW, lagged 1 year	-.150***	-.211*	-.035	-.017	-.074	-.044*	-.085***
	(.044)	(.110)	(.052)	(.086)	(.186)	(.023)	(.028)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.579	.711	.887	.172	.326	.541	.675
Observations	36	36	36	36	36	36	36
				D. West			
MW	-.507	-.444	-.438	.083	.254	-.087	-.244
	(.512)	(.457)	(.513)	(.051)	(.225)	(.080)	(.238)
MW, lagged 1 year	.104	.145	.129	.021	.002	.050	.270
	(.142)	(.292)	(.441)	(.054)	(.056)	(.138)	(.166)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.359	.668	.705	.258	.548	.121	.242
Observations	24	24	24	24	24	24	24

Note: *** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the provincial level are in parentheses.

Table 17 Representativeness of the 16-province Sample: Summary Statistics, 2005 Census

Year 2005 Variable	Minimum/Average Wage			Employment/Population		
	All Provinces	16 Provinces (in our sample)	15 Provinces (not in our sample)	All Provinces	16 Provinces (in our sample)	15 Provinces (not in our sample)
All	.388	.371	.425	.779	.783	.773
	(1.081)	(.087)	(.098)	(.087)	(.082)	(.093)
Gender						
Male	.361	.347	.398	.849	.852	.841
	(.082)	(.074)	(.089)	(.068)	(.058)	(.079)
Female	.432	.421	.470	.711	.719	.696
	(.098)	(.088)	(.102)	(.081)	(.074)	(.092)
Region						
East	.373	380	.461	.824	.841	.799
	(.067)	(.069)	(.100)	(.077)	(.072)	(.087)
Central	.410	.413	.400	.757	.764	.736
	(.083)	(.073)	(.099)	(.079)	(.073)	(.092)
West	.406	.410	.403	.759	.763	.751
	(.103)	(.121)	(.102)	(.093)	(.090)	(.096)
Age Cohort						
Age 15–29	.421	.411	.474	.487	.502	.434
Age 30–39	.370	.352	.409	.850	.874	.802
Age 40–49	.377	.363	.403	.867	.887	.832
Age 50–64	.371	.357	.401	.534	.563	.498
Educational Attainment						
High School or Below	.463	.455	.490	.775	.779	.767
Junior College	.288	.267	.337	.824	.824	.825
College or Above	.189	.167	.257	.877	.877	.878
Observations	1,687,919	1,084,190	603,729	1,687,919	1,084,190	603,729

Note: Standard deviations are in parentheses. The 16 provinces include Liaoning, Beijing, Shandong, Jiangsu, Shanghai, Guangdong, Heilongjiang, Shanxi, Henan, Anhui, Hubei, Jiangxi, Gansu, Chongqing, Sichuan, and Yunnan.

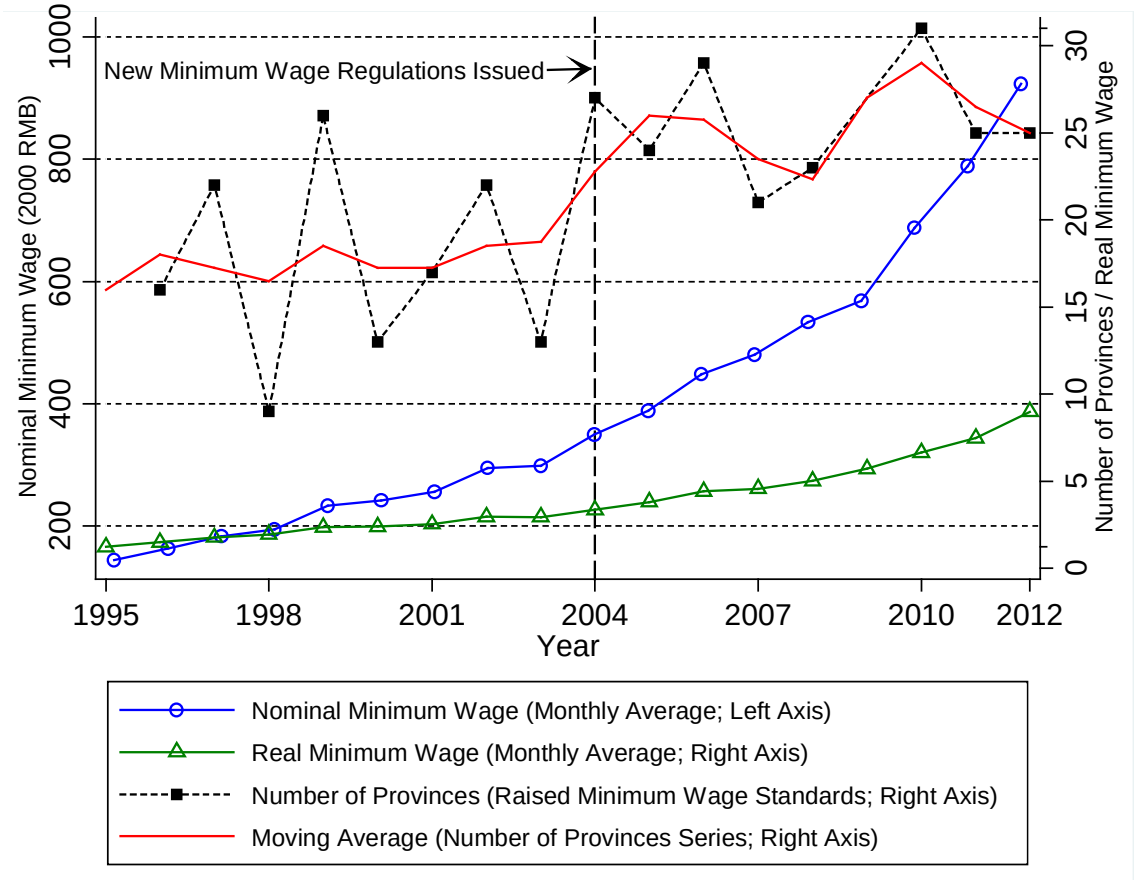

Figure 1 Minimum Wages in China, 1995−2012

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

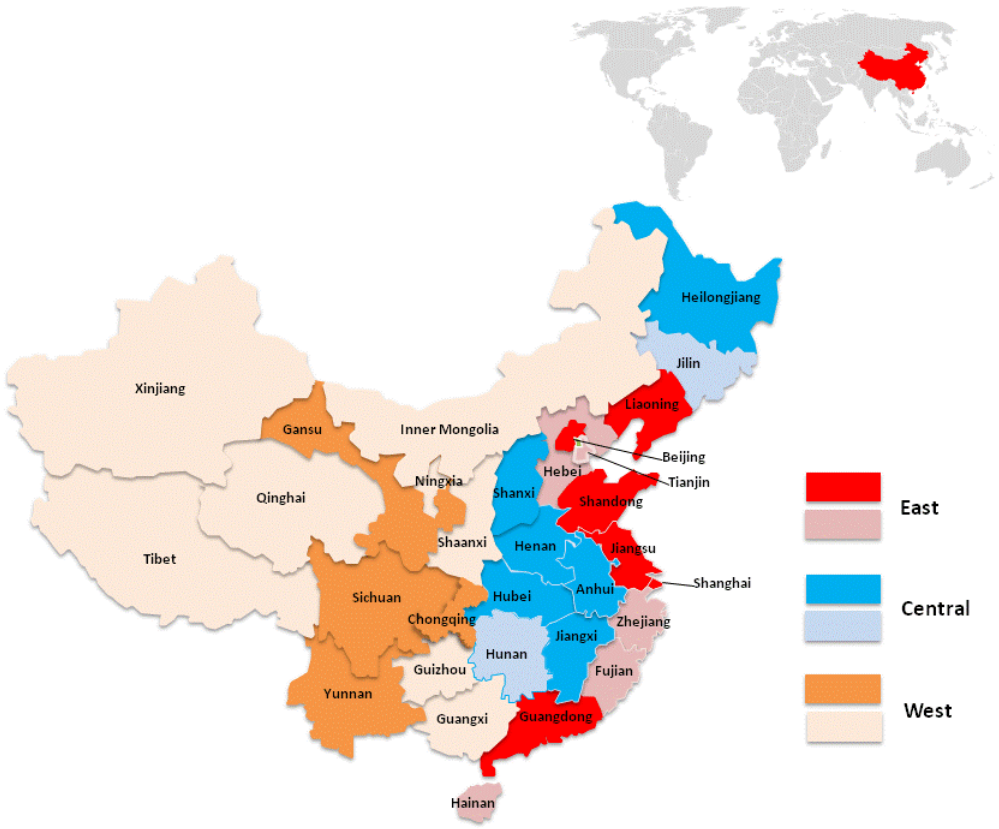

Figure 2 Panel Data with Minimum Wages in Mainland China

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

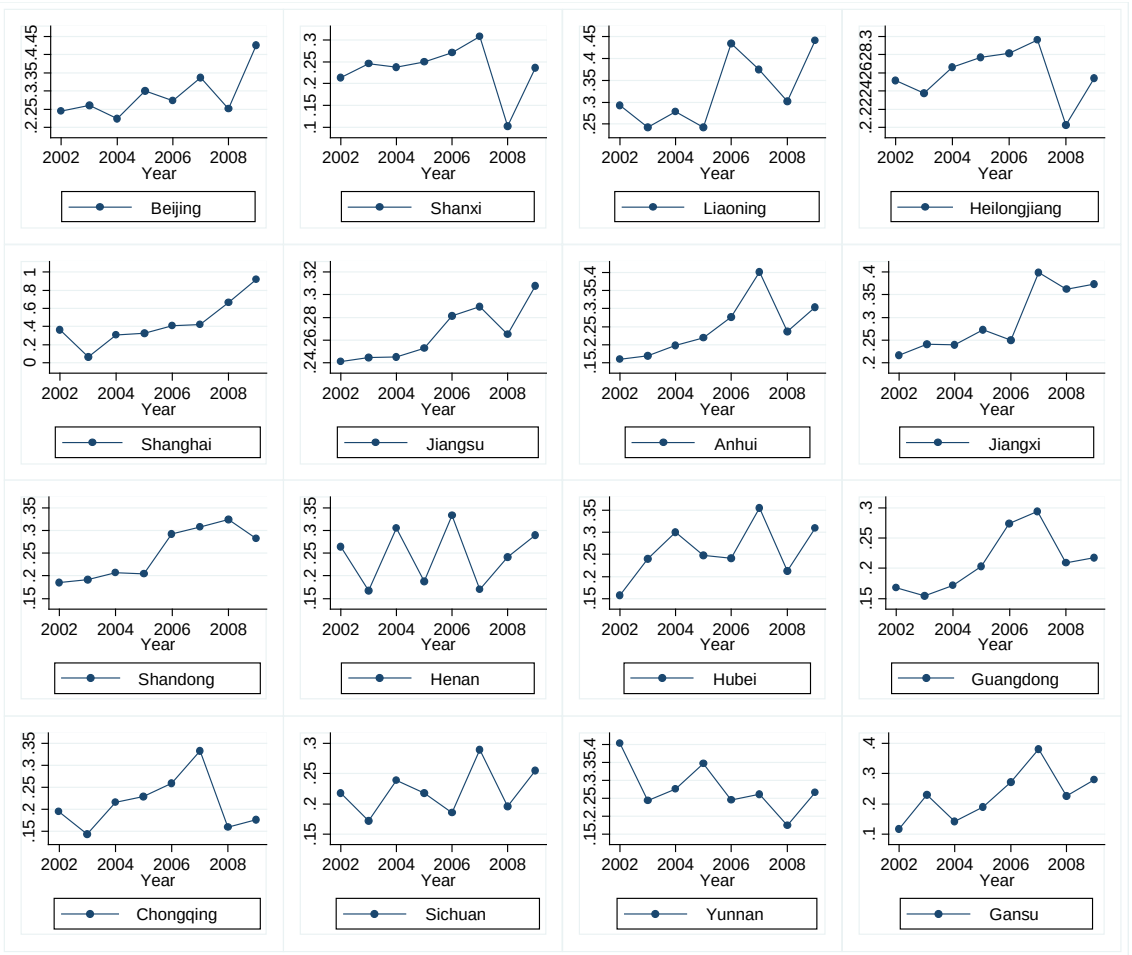

Figure 3 Enforcement of the Minimum Wage across Provinces, 2002-2009

The vertical axis is the enforcement which is defined as the number of minimum wage workers divided by the number of workers earning less than the minimum wage. Minimum wage workers earn wages between the exact minimum wage and 1.1 times the minimum wage.

Appendix Table 1 Estimates of Minimum Wage Effects on Wages by Age Cohort

Dependent Variable: log (Employment/Population)	Age 15-29		Age 30-39		Age 40-49		Age 50-64	
Independent Variables (log)	Male	Female	Male	Female	Male	Female	Male	Female
				A. All Regions				
MW level	.433***	.442***	.442***	.356***	.345***	.239***	.498***	.368**
	(.126)	(.117)	(.071)	(.078)	(.071)	(.086)	(.082)	(.156)
MW level, lagged 1 year	.245*	.051	.272***	.089	.255***	.143*	.143*	-.082
	(.127)	(.116)	(.065)	(.078)	(.062)	(.076)	(.079)	(.142)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.470	.492	.627	.557	.583	.459	.428	.181
Number of counties per year	632	626	654	653	655	653	653	598
Average obs. per county per year	113	114	253	260	309	272	231	100
				B. East				
MW level	.999***	.895***	.664***	.393***	.196	.256	.252	.442
	(.186)	(.194)	(.118)	(.127)	(.125)	(.158)	(.147)	(.324)
MW level, lagged 1 year	.057	.177	.230*	.085	.398***	.315***	.113	.011
	(.154)	(.174)	(.121)	(.139)	(.093)	(.115)	(.102)	(.233)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.617	.635	.712	.673	.639	.561	.495	.210
Number of counties per year	280	280	285	287	288	285	286	269
Average obs. per county per year	131	144	299	308	337	302	266	108
				C. Central				
MW level	.425*	.114*	.295***	.311***	.290***	.260**	.346	.500***
	(.222)	(.068)	(.092)	(.109)	(.096)	(.123)	(.239)	(.125)
MW level, lagged 1 year	.389*	.146	.027	.160	.021	.130	.105	.362
	(.225)	(.191)	(.088)	(.121)	(.095)	(.124)	(.137)	(.234)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.285	.296	.447	.364	.454	.329	.232	.127
Number of counties per year	265	260	276	273	275	277	276	246
Average obs. per county per year	87	94	211	212	276	235	186	95
				D. West				
MW level	.610	.511**	.624	.553**	.399	.442	.388***	.217***
	(.893)	(.246)	(.482)	(.269)	(.520)	(.549)	(.133)	(.048)
MW level, lagged 1 year	.153	.193	.671*	.088	.612	.778	.064	.736
	(1.007)	(.677)	(.407)	(.422)	(.512)	(.496)	(.481)	(.816)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.282	.347	.331	.256	.377	.262	.271	.210
Number of counties per year	87	86	93	93	92	91	91	93
Average obs. per county per year	101	107	237	255	316	288	253	107

Note: *** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the county level are in parentheses.

Appendix Table 2 Estimates of Minimum Wage Effects on Wages by Educational Attainment

Dependent Variable: log (Employment/Population)	High School or Below		Vocational School		Junior College		College or Above	
Independent Variables (log)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
				A. All Regions				
MW level	.541***	.326***	.560***	.391***	.056	.053	.157*	.187
	(.056)	(.066)	(.072)	(.078)	(.084)	(.088)	(.095)	(.119)
MW level, lagged 1 year	.314***	.151***	.375***	.309***	.030	.028	.080	.104
	(.051)	(.055)	(.070)	(.078)	(.068)	(.072)	(.083)	(.090)
Other controls	No	Yes	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.545	.577	.438	.448	.212	.388	.330	.536
Number of counties per year	659	659	636	636	653	653	632	632
Average obs. per county per year	744	744	196	196	408	408	277	277
				B. East				
MW level	.720***	.300***	.619***	.419***	.044	.005	.335	.346
	(.087)	(.110)	(.110)	(.143)	(.186)	(.182)	(.258)	(.254)
MW level, lagged 1 year	.370***	.172*	.607***	.456***	.016	.064	.078	.020
	(.080)	(.096)	(.120)	(.133)	(.106)	(.115)	(.101)	(.115)
Other controls	No	Yes	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.640	.660	.575	.581	.143	.560	.392	.597
Number of counties per year	289	289	281	281	286	286	284	284
Average obs. per county per year	819	819	224	224	476	476	355	355
				C. Central				
MW level	.391***	.326***	.434***	.409***	.024	.070	.016	.051
	(.084)	(.091)	(.107)	(.107)	(.105)	(.118)	(.130)	(.143)
MW level, lagged 1 year	.187***	.144*	.060	.029	.107	.135	.044	.009
	(.081)	(.087)	(.106)	(.114)	(.108)	(.117)	(.147)	(.153)
Other controls	No	Yes	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.453	.477	.260	.265	.339	.346	.356	.434
Number of counties per year	277	277	263	263	274	274	259	259
Average obs. per county per year	650	650	170	170	341	341	197	197
				D. West				
MW level	.365	.060	.436	.605	.424	.232	.498	.343
	(.348)	(.461)	(.398)	(.607)	(.294)	(.411)	(.386)	(.451)
MW level, lagged 1 year	.298	.290	.094	1.103	.061	.054	.157	.034
	(.292)	(.403)	(.304)	(.706)	(.260)	(.420)	(.232)	(.421)
Other controls	No	Yes	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.248	.344	.159	.187	.265	.280	.339	.389
Number of counties per year	93	93	92	92	93	93	89	89
Average obs. per county per year	791	791	183	183	394	394	258	258

Note: *** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the county level are in parentheses.

Appendix Table 3 Estimates of Minimum Wage Effects on Wages of Migrant Workers

Dependent Variable: log (Employment/Population)	East		Central		West	
Independent Variables (log)	(1)	(2)	(1)	(2)	(1)	(2)
			A. All Enterprises			
MW level	.988	.852	.568	.168	1.496***	1.256***
	(.653)	(.721)	(.822)	(.907)	(.643)	(.509)
MW level, lagged 1 year	.060	.040	.670	1.082	.120	.482
	(.643)	(.715)	(.798)	(.912)	(.178)	(.374)
Other controls	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.209	.214	.109	.166	.185	.335
Number of counties per year	238	238	172	172	144	144
Average obs. per county per year	152	152	93	93	114	114
			B. Non-state Enterprises Only			
MW level	.653	.403	.586	.486	1.527***	2.663**
	(.771)	(.855)	(.694)	(.828)	(.734)	(1.188)
MW level, lagged 1 year	.489	.500	.922	1.496	.340	.510
	(.759)	(.829)	(.745)	(.894)	(.605)	(.612)
Other controls	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.229	.247	.222	.343	.255	.353
Number of counties per year	223	223	160	160	133	133
Average obs. per county per year	151	151	88	88	119	119

Note: *** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the county level are in parentheses.

Appendix Table 4 Estimates of Minimum Wage Effects on Wages by Period

Dependent Variable: log (Employment/Population)	2002-2004		2004-2007		2008-2009	
Independent Variables (log)	Young Adults	At-Risk Groups	Young Adults	At-Risk Groups	Young Adults	At-Risk Groups
			A. All Regions			
MW level	.114	.770***	.280***	.793***	.747***	1.025***
	(.413)	(.127)	(.103)	(.046)	(.153)	(.068)
MW level, lagged 1 year	1.389	.149	.218**	.148***	.008	.027
	(1.583)	(.138)	(.102)	(.043)	(.151)	(.065)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.659	.919	.552	.891	.434	.860
Number of counties per year	364	354	446	328	414	324
Average obs. per county per year	328	115	275	125	327	184
			B. East			
MW level	.212	.605***	.691***	.849***	.815***	1.026***
	(.181)	(.197)	(.161)	(.070)	(.368)	(.103)
MW level, lagged 1 year	1.290	.467	.101	.120*	.343	.004
	(1.622)	(.312)	(.160)	(.063)	(.311)	(.095)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.297	.945	.696	.911	.635	.883
Number of counties per year	232	228	213	204	230	196
Average obs. per county per year	331	181	308	131	422	214
			C. Central and West			
MW level	.787	.619	.062	.765***	.339*	1.079***
	(.555)	(.656)	(.168)	(.175)	(.194)	(.079)
MW level, lagged 1 year	.077	.059	.367**	.161	.075	.007
	(.657)	(.164)	(.162)	(.170)	(.208)	(.089)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.303	.693	.190	.763	.152	.672
Number of counties per year	132	126	233	124	184	128
Average obs. per county per year	324	152	247	131	188	159

Note: *** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the county level are in parentheses.

Appendix Table 5 Estimates of Effects of the Minimum Wage Enforcement on Wages

Dependent Variable: log (Wages)	Young Adults		At-Risk Group		Entire Sample	
Independent Variables (log)	(1)	(2)	(1)	(2)	(1)	(2)
			A. All Regions			
MW(level)	.587***	.367***	.977***	.959***	.229***	.034***
	(.086)	(.093)	(.006)	(.093)	(.048)	(.013)
Enforcement*MW interaction	.005**	.008***	.003***	.010***	.003***	.003***
	(.002)	(.002)	(.000)	(.000)	(.001)	(.001)
Other controls	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.345	.640	.987	.989	.380	.700
Number of counties per year	649	649	562	562	661	661
Average obs. per county per year	270	270	170	170	1658	1658
			B. East			
MW(level)	.646***	.484***	1.208***	1.302***	.190***	.119***
	(.118)	(.161)	(.005)	(.010)	(.065)	(.009)
Enforcement*MW interaction	.005*	.009***	.003***	.003***	.001***	.001***
	(.003)	(.003)	(.000)	(.000)	(.000)	(.000)
Other controls	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.219	.701	.993	.994	.281	.734
Number of counties per year	286	286	253	253	289	289
Average obs. per county per year	329	329	180	180	1917	1917
			C. Central			
MW(level)	.554***	.226***	.927***	.915***	.167***	.106***
	(.120)	(.104)	(.018)	(.022)	(.048)	(.048)
Enforcement*MW interaction	.005*	.007*	.002***	.002***	.006***	.006***
	(.003)	(.003)	(.000)	(.000)	(.001)	(.001)
Other controls	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.410	.500	.978	.979	.480	.588
Number of counties per year	273	273	230	230	279	279
Average obs. per county per year	214	214	154	154	1385	1385
			D. West			
MW(level)	.226	.135	1.002	1.003	.464	.330
	(.140)	(.191)	(.714)	(.759)	(.297)	(.214)
Enforcement*MW interaction	.001	.006	.004	.004	.006	.008
	(.004)	(.005)	(.005)	(.005)	(.004)	(.005)
Other controls	No	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.655	.755	.986	.991	.554	.574
Number of counties per year	90	90	79	79	93	93
Average obs. per county per year	250	250	181	181	1673	1673

Note: *** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the county level are in parentheses.

Appendix Table 6 Provincial Level Estimates of Minimum Wage Effects on Wages, 2004-2009

Dependent Variable: log (Wages)	Young Adults			At-Risk Group		Entire Sample	
Independent Variables (log)	(1)	(2)	(3)	(1)	(2)	(1)	(2)
				A. All Regions			
MW level	.385***	.486***	.491***	.530***	.525***	.140***	.122***
	(.109)	(.176)	(.180)	(.072)	(.113)	(.043)	(.039)
MW level, lagged 1 year	.259***	.382***	.376***	.228**	.240**	.055	.014
	(.109)	(.109)	(.113)	(.103)	(.101)	(.047)	(.052)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.785	.854	.880	.778	.936	.541	.558
Observations	96	96	96	96	96	96	96
				B. East			
MW level	.391**	1.105***	1.143***	.409***	.495***	.082**	.457***
	(.193)	(.384)	(.393)	(.041)	(.140)	(.035)	(.060)
MW level, lagged 1 year	.275**	.626***	.618***	.367***	.411***	.101***	.538***
	(.113)	(.030)	(.065)	(.041)	(.026)	(.061)	(.209)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.744	.872	.880	.975	.981	.463	.665
Observations	36	36	36	36	36	36	36
				C. Central			
MW level	.100**	.066*	.061*	.476***	.420***	.067***	.156***
	(.048)	(.039)	(.036)	(.120)	(.186)	(.024)	(.034)
MW level, lagged 1 year	.031	.021	.029	.146	.098	.093	.001
	(.055)	(.077)	(.084)	(.093)	(.113)	(.066)	(.039)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.930	.953	.957	.898	.916	.898	.921
Observations	36	36	36	36	36	36	36
				D. West			
MW level	.535	.448	.694	1.060	.622	.136	.127
	(.251)	(.398)	(.495)	(.596)	(.456)	(.114)	(.648)
MW level, lagged 1 year	.096	.130	.023	.451	.678	.158	.196
	(.200)	(.425)	(.396)	(.495)	(.706)	(.147)	(.403)
Enrollment rates	No	No	Yes	No	No	No	No
Other controls	No	Yes	Yes	No	Yes	No	Yes
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	.901	.923	.961	.521	.692	.911	.960
Observations	24	24	24	24	24	24	24

Note: *** statistically significant at the 1 percent level; ** at the 5 percent level; * at the 10 percent level. Cluster-robust standard errors at the county level are in parentheses.