

Higher minimum wage, better labour market returns for rural migrants? Evidence from China

Yanjun Ren , Yanling Peng , Bente Castro Campos & Houjian Li

To cite this article: Yanjun Ren , Yanling Peng , Bente Castro Campos & Houjian Li (2020): Higher minimum wage, better labour market returns for rural migrants? Evidence from China, Economic Research-Ekonomiska Istraživanja, DOI: [10.1080/1331677X.2020.1848607](https://doi.org/10.1080/1331677X.2020.1848607)

To link to this article: <https://doi.org/10.1080/1331677X.2020.1848607>



© 2020 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



Published online: 20 Nov 2020.



Submit your article to this journal [↗](#)



Article views: 223



View related articles [↗](#)



View Crossmark data [↗](#)

Higher minimum wage, better labour market returns for rural migrants? Evidence from China

Yanjun Ren^a, Yanling Peng^b, Bente Castro Campos^{c,d} and Houjian Li^e 

^aLeibniz Institute of Agricultural Development in Transition Economies (IAMO), Halle (Saale), Germany; ^bCollege of Economics, Sichuan Agricultural University, Chengdu, Sichuan Province, China; ^cInstitute of Agricultural Policy and Market Research, Justus Liebig University Giessen, Giessen, Germany; ^dInstitute of Agricultural Economics, University of Kiel, Kiel, Germany; ^eCollege of Economics, Sichuan Agricultural University, Chengdu, Sichuan Province, China

ABSTRACT

Using data from the 2013 China Household Income Project (CHIP), this study investigates the effects of minimum wages on labour market returns for rural migrants in China and sheds light on the potential underlying mechanisms of these effects. An instrumental variable estimation is used to address the endogeneity problem of minimum wages on labour market returns. Our empirical findings indicate that minimum wages have positive effects on migrants' wages. Specifically, we observe higher effects for women and migrants who have higher education levels. Regarding the possible mechanisms through which minimum wages influence migrants' labour market returns, we find that minimum wages tend to increase rural migrants' working time but have no significant effects on allowances related to work. We could not obtain conclusive results for social insurance due to its potential endogeneity.

ARTICLE HISTORY

Received 14 July 2020
Accepted 4 November 2020

KEYWORDS

Minimum wage; rural migrants; labour market returns; China

JEL CLASSIFICATION

J38; J31; J33

1. Introduction

In debates on minimum wage policies, their significant implications for the labour market have been theoretically and empirically analysed. The rationale behind a minimum wage policy is to increase wage levels for low-income groups, reduce poverty, and narrow income inequalities between high-wage and low-wage groups (Herr & Kazandziska, 2011). However, many economists have warned of market-distorting effects of minimum wages. Although there is a large body of literature documenting various aspects of minimum wages and their role in the labour market, no consensus has been reached on the sign and magnitude of the effect of minimum wages on employment (Brown, 1999; Fang & Lin, 2015; Neumark et al., 2004; Neumark & Wascher, 2008). Studies analysing the reverse effect have argued that enforced

CONTACT Houjian Li  14159@sicau.edu.cn

© 2020 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

minimum wages can increase poverty due to resource misallocation and efficiency reduction (e.g. Neumark & Wascher 2000; Stigler 1946), while Card and Krueger (2000) found no significant effect of minimum wage on employment.

Whether and to what extent a minimum wage affects labour market returns largely depends on the position of employees in the wage distribution. Some studies have found that a minimum wage has a statistically significant and positive effect on labour market returns for formal workers, especially for those with wages close to the minimum wage (Belman & Wolfson, 2016; Betcherman, 2012; Cunningham, 2007). Similar findings have been reported for those in the informal sector (Gindling & Terrell, 2005; Lemos, 2009; Sun et al., 2015), while Wang and Gunderson (2012) found that minimum wages had no significant impact on aggregate wages. However, a consensus has been reached on the fact that the effects of a minimum wage are felt most strongly and negatively by those at the lower end of the initial wage distribution (Neumark & Wascher, 2007; Terrell & Almeida, 2008), such as reduction in employment.

One such group is that of rural migrants to large cities in China, who are likely to work in informal sectors and receive low pay and, consequently, are most likely to be affected by a minimum wage (Du & Pan, 2009). In China, in particular, increasing numbers of rural residents are migrating to urban areas for work. These migrant workers accounted for 20% of the national total population in 2018.¹ As previous studies have highlighted, migrant workers tend to have less human capital, such as education, skills and work experience, so their access to occupations with better economic returns and prestige is often limited (Huang et al. 2010; Zhang & Wu 2017); thus, they generally earn less. Most studies concerning the effect of a minimum wage in China are in Chinese (see Zhang & Han 2019 for a literature review), and studies in English are limited (Wang & Gunderson 2012). With the increasing rate of migration and the changing demographics in China, it is worth reconsidering the effects increasing the minimum wage might have on labour market returns for rural migrants (Yang & Gunderson, 2019).

Using the instrumental variable (IV) estimation method developed by Lewbel (2012) to address the endogeneity of minimum wage, this study aims to extend the existing literature by estimating the causal effect of the minimum wage on rural migrants' wages in China and their associated mechanisms. The main contribution of this study is threefold. First, this study is to provide a better understanding on whether and the extent to what minimum wages (minimum monthly and hourly wages) affect rural migrants' wages, including yearly salary and their monthly, daily, and hourly wages. Second, we explore the potential heterogeneity in the effects of minimum wage across gender and different education levels of rural migrants, as the employers' compliance to minimum wage regulation might vary according to their backgrounds. Third, we shed light on the potential pathways through which minimum wage could affect rural migrants' wages, considering working time (total working months per year, working days per year and working hours per month) and social benefits from work (allowances and social insurance).

This study is organized as follows. The next section reviews the background of the minimum wage law in China and the relevant literature on the impacts of minimum

wages on labour market returns. Section 3 introduces the empirical model and identification strategies. Section 4 describes the data and the main variables considered. Section 5 discusses the estimation results and our main findings. The last section presents the related discussion and our main conclusions.

2. Institutional background of, and empirical research on, minimum wage in China

2.1. Institutional background of minimum wage in China

China has implemented a minimum wage policy called the Minimum Wage-Fixing Machinery Convention since joining the International Labour Organization (ILO) in 1984 (Sun et al., 2015). To accompany the progress of market reforms, China issued its first minimum wage law entitled the Enterprise Minimum Wage Regulations in November 1993. In principle, the minimum wage level is determined by local governments (the provincial governments or the city governments) in consultation with union and company representatives. However, in reality, it is mostly local governments who determine minimum wage levels (Xing & Xu, 2016). Since 1993, minimum wage standards have been tested in some of the country's more developed regions, such as Shenzhen and Zhuhai, but this policy has not had substantive effects due to lack of enforcement (Xing & Xu, 2016).

In March 2004, China issued the new Minimum Wage Regulations and enforced their implementation throughout the country. The new regulations cover all types of enterprises.² Based on the new minimum wage policy, the minimum wage level is adjusted every one or two years. The factors considered in setting minimum wage levels include local living costs, the consumer price index, social insurance (e.g. pensions and healthcare insurance), the housing provident fund,³ the average wage level, the level of economic development, and the employment situation in the local labour market.⁴ In general, there are two minimum wage standards: a minimum monthly wage and a minimum hourly wage. The minimum monthly wage applies to full-time employees, whereas the minimum hourly wage applies to part-time workers.

The minimum wage has dramatically increased since the 1990s. Between 1995 and 2003, the average nominal minimum wage increased steadily from 169 RMB to 301 RMB, amounting to a 78% increase in nine years (Fang & Lin, 2015). Since 2004, many provinces have set new minimum wage standards that substantially increase the minimum wage level. In 2004, for example, 24 provincial governments raised their minimum monthly wage standards by an average of 20% (Sun et al., 2015), and the growth rates in average nominal wage increases were 155% and 194% for the periods from 1995–2003 and 2004–2012, respectively (Fang & Lin, 2015). Some studies have indicated that the average minimum wage level in China is relatively low. It stands at about 32% of the average wage for workers (Han & Wei, 2006). The market wage of the vast majority of full-time workers in China is above the monthly minimum wage (Ye et al., 2015). Given the low minimum wages compared to higher equilibrium market wages, it could be concluded that the effectiveness of the minimum wage policy is limited (Sun et al., 2015). However, Du and Pan (2009) argued that the Chinese statistical reporting system does not include employment and wage information for

migrant workers or urban workers working in the informal sector, which may have resulted in an overestimation of average wage levels.

2.2. Overview of the past empirical research on minimum wage in China

Most empirical studies on the impact of the recent minimum wage changes in China have exclusively focused on their potential negative impacts on employment (e.g. Ye et al. 2015). Such negative effects of a minimum wage are often closely linked to the types of workers or firms investigated. Using provincial data, Wang and Gunderson (2011) found that the minimum wage had a negative effect on employment in regions with slower growth rates, especially in non-state-owned enterprises. More recently, Fang and Lin (2015) combined county-level minimum wage data and household survey data from 16 provinces for the period from 2002 to 2009. They found that minimum wage growth had a negative effect on employment, especially for females, young adults, and low-skilled workers. Using the difference-in-difference method, Wang and Gunderson (2012) found that minimum wages generally did not have a significant adverse effect on employment, although their findings varied across regions depending on the region's market access. In contrast to other empirical studies, Luo et al. (2011) have shown that the minimum wage had a negative effect in the manufacturing industry but a positive effect in the construction sector and the wholesale, retail and catering industries.

To the best of our knowledge, only a handful of studies have been conducted on the effects of the minimum wage on labour market returns for rural migrants in China. The results are mixed. Wang and Gunderson (2012) found that minimum wages had no impact on aggregate wages, while Sun et al. (2015) concluded that increases in the minimum wage positively affected wage income for low-income workers. The evidence from Yang et al. (2020) further supports the positive effect on wages. They found that the minimum wage had a positive impact on the monthly wages of migrant workers, but only for migrants living in eastern China and rural migrants. There might be other unobservable factors, such as an omitted policy that may have affected both the minimum wage and labour market returns (Ma & Li 2017; Wang & Gunderson 2012). Ignoring these factors can only indicate the correlation between minimum wage and wages rather than a causal relationship. The difference in difference method was applied in some studies to obtain the causal estimates (Ma & Li, 2017; Yang & Gunderson, 2019); however, these estimates can only reflect the effect of minimum wage policy instead of the causal effect of minimum wage. Thus, more studies are required to re-assess the relationship between minimum wage and returns in the labour market for rural migrants. Furthermore, this article is the first to address the potential endogeneity of the minimum wage in labour market returns equations; this has been overlooked in previous studies.

The mechanisms through which the minimum wage could affect rural migrants' labour market returns are the focus of the other body of literature. First, a minimum wage increase could lead to an increase or a reduction in working time or it could remain unchanged. A minimum wage could affect migrants' salaries and wages through a shift from long-term to temporary contracts to offset the additional costs,

especially since most rural migrants work in the informal sector (Du & Pan, 2009), which is more responsive to market pressures (Wang & Gunderson 2011). Such a shift could reduce their total working time and affect their access to work labour supply accordingly. Alternatively, employers could increase migrants' working time to offset the cost of increased wages, if the minimum wage standard was set per month (Jia 2014; Zhang & Han 2019). It could also happen that in response to an increase in the hourly minimum wage level, firms could reduce costs by reducing working hours and increasing work intensity, or, if the minimum wage standard was set per month, firms could dilute workers' hourly pay by increasing monthly working hours (Sun et al., 2015). Employers might also offset higher wages against other nonmonetary benefits, such as housing allowances and social insurance (Bhorat et al., 2014). These effects are difficult to identify, as evidence is limited and inconclusive. Thus, we seek to better understand the mechanisms of working time and social job benefits that underlie the impact of minimum wages on labour market returns.

3. Empirical model

3.1. The benchmark model

We employ an adjusted Mincer's (1976) approach to investigate the impact of the minimum wage on the labour market returns of rural migrants. The following function is estimated:

$$\ln Wage_i = \alpha_0 + \alpha_1 \ln MW_i + \beta_0 X_i + \xi_i, \quad (1)$$

where the dependent variable $\ln Wage_i$ denotes the logarithmic value of migrants' yearly, monthly, daily, and hourly remunerations. $\ln MW_i$ represents the logarithm of the minimum wage of individual i in county c in the year 2012, including the minimum monthly wage and the minimum hourly wage. α_1 indicates the impact of the minimum wage on migrants' labour market returns. X_i is a vector consisting of individual characteristics as a proxy for human capital (gender, age, age squared, marital status, ethnic minority status, number of siblings, educational attainment, and work experience), household properties (credit constraint and household size), controls for macroeconomic factors of the previous year (gross domestic product [GDP] growth rate, natural growth rate of the population and unemployment rate), and regional fixed effects. If $\ln MW_i$ is exogenous or uncorrelated with ξ_i , model (1) can be estimated using ordinary least squares (OLS) estimation and the estimates of α_1 will be unbiased.

3.2. Accounting for the potential endogeneity of minimum wage

The endogeneity problem of minimum wages in wage equations due to potential unobservable factors cannot be ignored. Many uncontrolled policies may influence whether or not the minimum wage plays a role in labour market returns for rural migrants' wages (Bhorat et al., 2014; Dinkelman & Ranchhod, 2012; Li & Ma, 2015; Neumark et al., 2006). For example, regulations concerning rural farmland transfer implemented in 2013 encourage and support the transfer of contracted land to large

professional households, family farms and farmers' cooperatives, thereby affecting migrants' working decisions and local wage levels.⁵ In addition to uncontrolled policies, the reverse causality might also bias the effect of minimum wage on labour market returns given the fact that the decision by cities to set higher minimum wages is likely to be affected by higher labour productivity levels.

The regular way to address endogeneity is to find a valid IV and employ a two-stage estimation procedure. However, it is extremely hard to find an exogenous variable that affects the minimum wage but has no direct effect on migrants' labour market returns. Therefore, we follow the method developed by Lewbel (2012), which is widely used by researchers in labour economics (Zhao, 2019). The identification comes from observing a vector of variables Z (it can be equal to or a subset of the vector of model variables X) that are uncorrelated with the covariance of the heteroscedastic errors. Heteroscedasticity tests must be applied to test whether the method developed by Lewbel (2012) is appropriate.

In our study, we select three exogenous explanatory city-level variables as Z : the GDP growth rate, the natural growth rate of the population and the unemployment rate.⁶ In the first stage, we regress $\ln MW_i$ on three exogenous variables and obtain the residuals (\hat{v}) from the regression. In the second stage, valid instruments are constructed using $(Z_i - \bar{Z}_i)\hat{v}$, where \bar{Z}_i is the mean of the exogenous variables. In Lewbel's (2012) method, identification requires the residuals (\hat{v}) from the first stage to be heteroscedastic. Then, consistent and unbiased estimates for $\ln MW_i$ can be obtained in the second stage.

A valid instrument should be highly correlated with the endogenous variable (relevance condition) and not correlated with the disturbance (exclusion restriction) (Wooldridge, 2012). Since we have one endogenous variable and three instruments, the model parameters are overidentified. The relevance condition can be tested using the weak identification test F statistic, and the exclusion restriction can be proved using an over-identification test (the Hansen J statistic) (Hansen, 1982).

4. Data and variables

4.1. The sample

The data used in this study are from the CHIP, a household survey consisting of five waves for the years 1989, 1996, 2003, 2008, and 2013. The Economic Institute of the Chinese Academy of Social Science (CASS) and Beijing Normal University conducted the CHIP. As part of a collaborative research project on income and inequality in China organized by Chinese and international researchers with assistance from the National Bureau of Statistics (NBS), the CHIP covers the following regions in China: Beijing, Shanxi, Liaoning, Jiangsu, Anhui, Guangdong, Henan, Hubei, Sichuan, Chongqing, Yunnan, Gansu, Shandong, and Hunan.

The CHIP database has been widely used to investigate income distribution and inequality in China. Descriptions of the CHIP surveys and main findings can be found in previous studies (Griffin & Zhao 1993; Li et al. 2008; Luo et al. 2011; Paul et al. 2017; Riskin et al. 2001). The CHIP survey includes three subsamples: the urban household survey, the rural household survey, and the rural-to-urban migrant survey

(Kong, 2010).⁷ This allows researchers to study the drivers and consequences of rural-to-urban migration from an economic perspective. In this study, we use the latest data (for 2013) only as too many observations are lost if an unbalanced panel structure is used. The rural migrants in the sample are those who held a rural Hukou status but were working in an urban area. We only consider rural migrants who were working and living in the same city due to missing information about migrants working outside cities. To restrict our sample to the working population, we limited the sample to individuals who were older than 16 years and younger than 65 years. Most of the rural migrants started working after graduating from middle school when they were about 16 years old, especially after the implementation of the Nine-Years Compulsory Schooling Law and the Provisions on the Prohibition of Using Child Labor (Castro Campos et al., 2016; Xie & Mo, 2014), which were implemented in 1986 and 1991, respectively. Wang (2012) determines the legal minimum working age as 16 years and the maximum mandatory retirement age as 65 years, since many older migrants continue to work full time even after they have reached the official retirement age of 60 years (Chen et al., 2018). Finally, we restrict our sample to those who reported to work for more than 15 days per month, since we only consider migrants' market returns from their main occupation and exclude those whose returns may be from secondary jobs (Chen et al., 2018).

4.2. Variables

4.2.1. Migrants' wages

Our main dependent variables are yearly, monthly and daily salaries and hourly wages. Using these different scales enables us to detect the differential effects of minimum wages on rural migrants' labour market returns, since the majority of rural migrants in urban areas do not have permanent contracts (Du & Pan, 2009). Related studies only consider monthly or annual salaries (Chen et al., 2018; Lin & Yun, 2016; Sun et al., 2015). For instance, Chen et al. (2018) use monthly salaries from the primary job and calculate annual salaries by multiplying monthly salaries by 12. However, this means that if rural migrants do not have a long-term contract for 12 consecutive months, their wages will be largely overestimated. Therefore, we use the yearly, monthly, daily and hourly wages, as provided in the CHIP, to get a better approximation of the overall minimum wage effect. The descriptive statistics of the wages, which are presented in Table 1, show that the average annual, monthly, daily, and hourly wages were 22,591, 2,606, 105.2, and 12.71 RMB respectively.

4.2.2. Minimum wages

In contrast to previous studies, which use provincial minimum wages, we collected our data from the Department of Human Resources and Social Security in each city surveyed. The data includes both monthly and hourly minimum wage standards in 2012. We merge the regional minimum wage levels with the data from the CHIP. Table 1 shows the 2012 monthly and hourly minimum wages for the surveyed cities. On average, the monthly and hourly minimum wages were 937.4 and 9.4 RMB, respectively. The distribution of the logarithm of the ratio between monthly/hourly

Table 1. Descriptive statistics of the main variable.

Variable	Definition	Observation	Mean	S.D.
<i>Dependent variable</i>				
Yearly	Yearly wages (RMB)	6,413	22591	13993
Monthly	Monthly wages (RMB)	6,413	2606	2011
Daily	Daily wages (RMB)	6,413	105.2	83.78
Hourly	Hourly wages (RMB)	6,413	12.71	10.67
<i>Independent variable</i> ^a				
MMW	Minimum monthly wages	6,413	937.4	156.6
MHW	Minimum hourly wages	6,413	9.356	1.610
<i>Channel variable</i>				
<i>Working time</i>				
Working months	Total working months	6,413	9.161	3.201
Working days	Working days per month	6,413	25.25	3.378
Working hours	Working hours per month	6,413	213.30	46.24
<i>Social benefits</i>				
Allowance	Allowances for food or housing (RMB)	5,112	141.23	439.86
Insurance	1 if he/she has social insurance; 0 otherwise	6,379	0.137	0.344
<i>Individual controls</i>				
Female	Female = 1; male = 0	6,413	0.480	0.642
Age	Years of age	6,413	41.21	11.98
Married	Married = 1; 0 otherwise	6,413	0.827	0.378
Minority	Ethnic minority = 1; Han = 0	6,413	0.037	0.188
Siblings	Numbers of siblings	6,413	2.448	1.676
Education	Years of education	6,413	8.559	2.784
Experience	Years of working	6,413	6.768	7.322
<i>Household controls</i> ^b				
Credit constraint	1 if household has credit constraint; 0 otherwise	6,413	0.267	0.442
Hhsize	Number of household members	6,413	3.888	1.329
<i>City controls</i> ^c				
Rgrowth	GDP growth rate	6,413	0.134	0.0187
Pgrowth	Population growth rate	6,413	0.0517	0.0335
Runemploy	Unemployment rate	6,413	0.0611	0.0285

Notes:

^aMain independent variables of *MMW* and *MHW* are city level variables, including 113 cities.^bHousehold control variables of *rationing* and *hhsz* include 4,156 households.^cCity control variables cover 113 cities.

Source: Authors' estimation using the CHIP data for 2013.

wages and the minimum monthly/hourly wages are shown in [Figure 1](#). According to our calculation, the monthly wages of 7.2% of rural migrants were below the minimum monthly wage, and the hourly wages of almost 40.5% of rural migrants were lower than the minimum hourly wages. The proportion of migrants' monthly wage below the monthly minimum wage is slightly larger compared to the 5% reported by Ye et al. (2015).

4.2.3. Potential mechanisms

[Table 1](#) also presents the descriptive statistics relating to the channel variables through which minimum wages could affect labour market returns, which are working time (total working months and working days, and working hours per month), allowances from the job, and social insurance. In our sample, rural migrants worked for approximately 9 months, 25 days per month and 213 hours per month ([Table 1](#)). These averages are much higher than the average working days (20.83) and hours (167) per month specified in the Labor Law of the PRC⁸. On average, rural migrants obtained a 141.23 RMB allowance for food or housing, and only 13.7% of them had social insurance ([Table 1](#)).

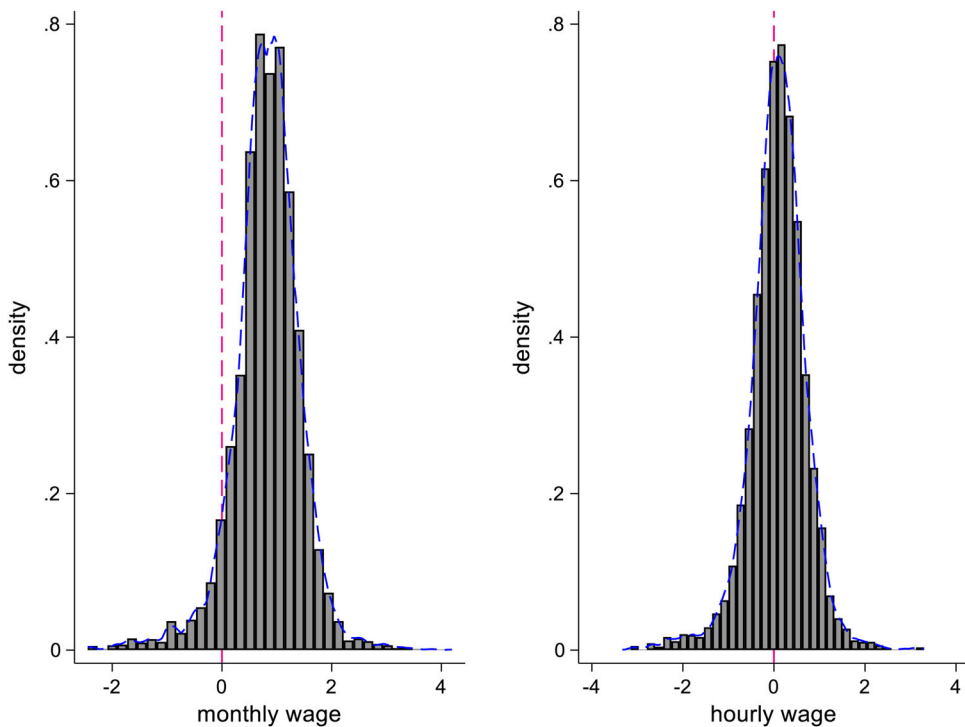


Figure 1. The distribution of the logarithm of the ratio between monthly (hourly) wage and minimum monthly (hourly) wage.

Source: Author's estimation using the CHIP data for 2013.

4.2.4. Control variables

Regarding the covariates, Table 1 shows that 48.0% of the rural migrants in the pooled sample were females. The average age was 41 years, and 82.7% of the respondents were married. The proportion of ethnic minorities in the sample was 3.7%. In general, rural migrants had more than two siblings and had obtained 8.6 years of schooling and 6.8 years of work experience. Regarding household characteristics, the average household size was 3.89, and 26.6% of the households suffered credit constraints.

The provincial macroeconomic data and population statistics are from the national or provincial statistical yearbooks, including the GDP growth rate, the population growth rate, and the unemployment rate. As presented in Table 1, the GDP growth rate was approximately 13.4%; the population growth and unemployment rates were on average 0.05% and 6.1%, respectively.

5. Results

5.1. The impact of minimum wage on labour market returns

We first estimate the effect of minimum wage on labour market returns using OLS estimations. The results are presented in Table 2 (Panel A). Minimum monthly wages are found to have statistically significant and positive effects on yearly and monthly

Table 2. The effect of minimum wage on annual salary, monthly, daily, and hourly wages using OLS and IV estimations.

Variables	(1) LnYearly	(2) LnMonthly	(3) LnDaily	(4) LnHourly	(5) LnYearly	(6) LnMonthly	(7) LnDaily	(8) LnHourly
Panel A: OLS estimation								
LnMMW ^a	0.854*** (0.13)	0.331*** (0.12)	0.208 (0.13)	0.162 (0.13)				
LnMHW					0.859*** (0.13)	0.351*** (0.12)	0.226* (0.13)	0.180 (0.14)
Controls variables ^b	YES	YES	YES	YES	YES	YES	YES	YES
Province FE ^c	YES	YES	YES	YES	YES	YES	YES	YES
Observations	6,413	6,413	6,413	6,413	6,413	6,413	6,413	6,413
F-test	50.183	36.792	33.818	30.240	50.034	36.740	33.777	30.244
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R	0.243	0.143	0.135	0.121	0.243	0.143	0.135	0.121
Panel B: IV estimation								
LnMMW	0.841*** (0.31)	0.785*** (0.29)	0.769** (0.31)	0.748** (0.33)				
LnMHW					0.835*** (0.28)	0.767*** (0.26)	0.741** (0.29)	0.738** (0.30)
Control controls	YES	YES	YES	YES	YES	YES	YES	YES
Province FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	6,413	6,413	6,413	6,413	6,413	6,413	6,413	6,413
R ²	0.243	0.138	0.128	0.113	0.243	0.139	0.129	0.114
Breusch-Pagan test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Weak identification (F-Statistics) ^d	11.356	11.356	11.356	11.356	16.405	16.405	16.405	16.405
Overidentification test (p-value) ^e	0.414	0.221	0.159	0.419	0.483	0.247	0.174	0.445
Endogeneity test (p-value)	0.767	0.141	0.086	0.076	0.724	0.171	0.111	0.085

Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Notes:

^aLnMMW (LnMHW) refers to logarithm of Minimum monthly (hourly) wages.

^bThe control variables include individual, household, and cities characteristics as listed in Table 1.

^cProvincial fixed effects include Beijing, Shanxi, Liaoning, Jiangsu, Anhui, Shandong, Henan, Hubei, Hunan, Guangdong, Chongqing, Sichuan, Guizhou, Yunnan, Gansu.

^dStock-Yogo weak ID test critical values: 5% maximal IV relative bias is 13.91 and 10% maximal IV relative bias is 9.08.

^eThe P-value is according to the Hansen's J statistic.

Source: Authors' estimation using the CHIP data for 2013.

labour market returns but insignificant effects on daily and hourly labour market returns. A one percent growth in the minimum monthly wage would increase yearly and monthly wages by 0.85 and 0.33 percentage points, respectively. We also find that minimum hourly wages have a statistically significant and positive effect on all measurements of migrants' wages except for hourly wages. A one percent increase in the minimum hourly wage would increase yearly, monthly, and daily wages by 0.86, 0.35, and 0.23 percentage points, respectively.

If the minimum wage is endogenous, our estimates might be biased. To address the endogeneity problem of the minimum wage, IV estimation is applied. The results are also presented in Table 2 (Panel B). In contrast to the main findings from OLS estimation, all the IV estimations show statistically significant and positive impacts of the minimum wage (hourly and monthly).

As shown in the lower part of Table 2 (Panel B), the Breusch–Pagan test indicates that heteroscedasticity exists for the estimations of yearly, monthly, daily, and hourly

wages. Thus, we can construct the IVs by the residuals obtained from the regression of $\ln MW_i$ on three exogenous variables and other control variables in model (1). The weak identification test is based upon F-statistics. The null hypothesis that the instruments are weakly correlated with the endogenous variable is rejected at the 1% significance level. The over-identification test is not rejected, which indicates that at least one of the IVs is exogenous. The IV estimation generates consistent estimates if the minimum wage is endogenous. The evidence from the endogeneity tests suggests that minimum wages are exogenous in the estimations of yearly and monthly wages but not in the estimations of daily and hourly wages. For yearly and monthly wages, the estimates from the OLS estimations are, thus, more efficient than the estimates from the IV estimations, while the estimates from the IV estimations are preferred for monthly and hourly wages. We conclude that monthly and hourly minimum wages have statistically significant and positive effects on migrants' wages, which indicates that higher minimum wages could increase the returns of rural migrants in China's labour market.

5.2. Heterogeneous minimum wage effects

As indicated by Wong (2019), the effects of minimum wages may depend upon employers' compliance. For instance, employers may be less likely to comply with the minimum wage regulation if rural migrants have low education levels or are females because they are likely to be constrained in their job choices. If non-compliance plays an important role, the impact of minimum wages on the labour market returns of affected migrant groups is expected to be lower. Thus, the heterogeneous effects can be captured by specifying a type-of-worker-specific minimum wage effect parameter, where the coefficient of the minimum wage variable is assumed to be a linear function of other variables that specify the different backgrounds of rural migrants. Following Wong (2019), the interaction terms between minimum wages and migrant-specific variables are introduced in model (1) and consist of gender and levels of education, across which wages are found to be significantly different. Since a potential endogeneity problem of minimum wages might exist in the estimations of daily and hourly wages, both estimates from regular estimation and IV estimation are reported and discussed in the following subsections.

5.2.1. Gender

Table 3 presents the estimation results for the heterogeneous effects of minimum wages by gender. Both OLS and IV estimations are included. In general, the main results from the two estimations are similar, but we find an endogeneity problem of minimum wages in the estimations for daily and hourly wages and for the pooled sample. Thus, our interpretation of yearly and monthly wages is based on OLS estimations and that of daily and hourly wages on the IV estimations.

As shown in Table 3, the coefficients of the interactions between female gender and minimum wages are statistically significant and positive, except for the estimations of yearly wages (both OLS and IV estimations), in which they are insignificant. This indicates that minimum monthly wages have an increased effect on labour

Table 3. OLS and IV estimations of the heterogenous effect of minimum wage on annual salary, monthly, daily, and hourly wages by gender.

Variables	(1) LnYearly	(2) LnMonthly	(3) LnDaily	(4) LnHourly	(5) LnYearly	(6) LnMonthly	(7) LnDaily	(8) LnHourly
Panel A: OLS estimation								
LnMMW ^a	0.964*** (0.15)	0.497*** (0.14)	0.405*** (0.15)	0.376** (0.15)				
LnMHW					0.937*** (0.16)	0.464*** (0.14)	0.363** (0.15)	0.337** (0.15)
Female* LnMMW	0.183 (0.11)	0.274** (0.11)	0.326*** (0.12)	0.355*** (0.12)				
Female* LnMHW					0.128 (0.12)	0.187* (0.10)	0.226** (0.11)	0.259** (0.11)
Female	-1.633** (0.77)	-2.264*** (0.76)	-2.628*** (0.81)	-2.795*** (0.82)	-0.667** (0.27)	-0.805*** (0.24)	-0.895*** (0.25)	-0.940*** (0.25)
Control variables ^b	YES	YES	YES	YES	YES	YES	YES	YES
Province FE ^c	YES	YES	YES	YES	YES	YES	YES	YES
Observations	6,413	6,413	6,413	6,413	6,413	6,413	6,413	6,413
F-test	49.028	35.627	32.561	29.079	48.391	35.109	32.135	28.840
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R ²	0.243	0.144	0.137	0.123	0.243	0.143	0.136	0.122
Panel B: IV estimation								
LnMMW	1.098*** (0.34)	1.032*** (0.31)	1.076*** (0.34)	1.033*** (0.36)				
LnMHW					1.114*** (0.32)	1.035*** (0.29)	1.083*** (0.32)	1.060*** (0.34)
Female* LnMMW	0.434 (0.27)	0.421* (0.23)	0.524** (0.24)	0.484** (0.25)				
Female* LnMHW					0.461 (0.29)	0.449* (0.25)	0.576** (0.26)	0.538** (0.27)
Female	-3.363* (1.83)	-3.282** (1.59)	-3.994** (1.68)	-3.688** (1.69)	-1.422** (0.65)	-1.403** (0.57)	-1.693*** (0.60)	-1.577*** (0.61)
Control variables	YES	YES	YES	YES	YES	YES	YES	YES
Province FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	6,413	6,413	6,413	6,413	6,413	6,413	6,413	6,413
R ²	0.243	0.139	0.129	0.115	0.241	0.138	0.128	0.114
Heteroscedasticity test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Weak identification (F-Statistics) ^d	6.730	6.730	6.730	6.730	10.255	10.255	10.255	10.255
Overidentification test (P-value) ^e	0.614	0.577	0.518	0.583	0.679	0.619	0.556	0.629
Endogeneity test (P-value)	0.758	0.151	0.086	0.083	0.724	0.181	0.084	0.086

Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Notes:

^aLnMMW (LnMHW) refers to logarithm of Minimum monthly (hourly) wages.

^bThe control variables include individual, household, and cities characteristics as listed in Table 1.

^cProvincial fixed effects include Beijing, Shanxi, Liaoning, Jiangsu, Anhui, Shandong, Henan, Hubei, Hunan, Guangdong, Chongqing, Sichuan, Guizhou, Yunnan, Gansu.

^dStock-Yogo weak ID test critical values: 5% maximal IV relative bias is 13.91 and 10% maximal IV relative bias is 9.08.

^eThe p -value is according to the Hansen's J statistic.

Source: Authors' estimation using the CHIP data for 2013.

market returns for females compared to males by 0.27, 0.52, and 0.48 percentage points for monthly, daily, and hourly wages, respectively. Similarly, the interactions between minimum hourly wages and female gender also show positive effects, suggesting that minimum hourly wages have an increased effect for females than for males by 0.19%, 0.58%, and 0.54% for monthly, daily, and hourly wages, respectively. A possible reason could be that women are more likely to have wages below the

Table 4. OLS estimation of the heterogenous effect of minimum wage on annual salary, monthly, daily, and hourly wage by education.

Variables	(1) LnYearly	(2) LnMonthly	(3) LnDaily	(4) LnHourly	(5) LnYearly	(6) LnMonthly	(7) LnDaily	(8) LnHourly
Panel A: OLS estimation								
LnMMW ^a	0.786*** (0.21)	-0.497** (0.21)	-0.752*** (0.22)	-0.751*** (0.23)				
LnMHW					0.598*** (0.21)	-0.478** (0.22)	-0.746*** (0.23)	-0.735*** (0.24)
Education Level* LnMMW	0.008 (0.02)	0.093*** (0.02)	0.108*** (0.02)	0.103*** (0.02)				
Education Level * LnMHW					0.030 (0.02)	0.095*** (0.02)	0.112*** (0.02)	0.105*** (0.02)
Education Level	-0.019 (0.12)	-0.636*** (0.13)	-0.737*** (0.14)	-0.696*** (0.14)	-0.034 (0.04)	-0.211*** (0.05)	-0.248*** (0.05)	-0.229*** (0.05)
Control variables ^b	YES	YES	YES	YES	YES	YES	YES	YES
Province FE ^c	YES	YES	YES	YES	YES	YES	YES	YES
Observations	6,413	6,413	6,413	6,413	6,413	6,413	6,413	6,413
F-test	49.967	36.363	33.960	30.139	48.929	36.059	33.732	29.865
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R ²	0.243	0.149	0.142	0.127	0.243	0.149	0.143	0.128
Panel B: IV estimation								
LnMMW	-0.096 (0.63)	-1.018* (0.54)	-1.202** (0.57)	-0.900 (0.60)				
LnMHW					-0.189 (0.58)	-1.066** (0.50)	-1.281** (0.53)	-0.964* (0.57)
Education* LnMMW	0.097* (0.06)	0.194*** (0.05)	0.213*** (0.05)	0.178*** (0.05)				
Education* LnMHW					0.109** (0.05)	0.202*** (0.05)	0.223*** (0.05)	0.188*** (0.05)
Education	-0.633 (0.39)	-1.332*** (0.34)	-1.460*** (0.36)	-1.213*** (0.37)	-0.213* (0.12)	-0.454*** (0.11)	-0.502*** (0.11)	-0.417*** (0.12)
Control variables	YES	YES	YES	YES	YES	YES	YES	YES
Province FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	6,413	6,413	6,413	6,413	6,413	6,413	6,413	6,413
R ²	0.239	0.138	0.130	0.118	0.240	0.139	0.131	0.118
Heteroscedasticity test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Weak identification (F-Statistics) ^d	7.523	7.523	7.523	7.523	13.785	13.785	13.785	13.785
Overidentification test (p-value) ^e	0.500	0.395	0.475	0.619	0.645	0.591	0.675	0.791
Endogeneity test (p-value)	0.512	0.289	0.187	0.192	0.466	0.327	0.220	0.186

Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Notes:

^aLnMMW (LnMHW) refers to logarithm of Minimum monthly (hourly) wages.

^bThe control variables include individual, household, and cities characteristics as listed in Table 1.

^cProvincial fixed effects include Beijing, Shanxi, Liaoning, Jiangsu, Anhui, Shandong, Henan, Hubei, Hunan, Guangdong, Chongqing, Sichuan, Guizhou, Yunnan, Gansu.

^dStock-Yogo weak ID test critical values: 5% maximal IV relative bias is 15.72 and 10% maximal IV relative bias is 9.48.

^eThe P-value is according to the Hansen's J statistic.

Source: Authors' estimation using the CHIP data for 2013.

monthly or hourly minimum wage and are, therefore, more likely to be affected by a minimum wage than are males. However, we do not observe significant effects of the minimum wages on migrants' yearly salaries. Many studies have found that minimum wages have negative effects on the employment of women but not on men (Fang & Lin, 2015; Jia, 2014) and that they tend to reduce the total working hours of employed workers, especially those of women (Sun et al., 2015). The reduction in women's employment could be another reason why women are more likely to be

affected by a minimum wage than are males (Yang & Gunderson, 2019), since employers may have strictly complied with the minimum wage standards for employed women and increased their wages accordingly but may have dismissed some unqualified women due to the minimum wage increase. Because of the reduction in working opportunities and increased working hours for those who remain employed, women's average annual salary might not increase significantly compared to that of men, indicated through the insignificant interaction effect.

5.2.2. Education

Education level is a dummy variable defined by years of education. It equals to 1 if rural migrants obtained more than nine years of compulsory schooling, and it equals to 0 otherwise. As shown in Table 4, the interactions between education levels and minimum wages are statistically significant and positive in both the OLS and IV estimations. The endogeneity tests indicate that minimum wages are exogenous in all estimations; thus, our interpretation is based on the coefficients from the OLS estimations.

In general, we find that migrants with a higher level of education are more likely to benefit from raised minimum wages. This result is in line with the finding of Fang and Lin (2015) that a minimum wage has a negative employment effect for low-skilled workers (defined as those with a secondary school education or less) but no negative employment effect for more educated workers. Agenor and Aynaoui (2003) argued that a reduction in the minimum wage for unskilled formal labourer can lead to a reduction in unemployment in the short term and that the process of adjustment in the labour market often involves rural-to-urban migration and formal-informal adjustments in labour supply (e.g. Mwangi et al. 2017). Surprisingly, we do not observe significant interaction effects of minimum wages on yearly wages. A possible reason could be that employers may comply with the minimum wage standards and increase monthly, daily, and hourly wages but offset these increases in other ways, such as through increasing working hours, reducing allowances or other social benefits.

5.3. Potential mechanisms underlying the effect of minimum wage

To further investigate the mechanisms through which minimum wages could affect migrants' labour market returns, two main mechanisms are analysed: working time (total working months per year, working days per year and working hours per month) and social benefits from work (allowances and social insurance).

5.3.1. Working time

As discussed above, a minimum wage could affect migrants' wages by affecting their working time. The estimation results for this effect are presented in Table 5. Minimum wages show statistically significant and positive effects on working time in the OLS estimations but are insignificant in the IV estimations. Although all tests regarding the validity of our IVs are qualified, the tests of endogeneity indicate that our main independent variables of minimum wages are actually exogenous in all estimations. Since non-compliance with overtime pay regulations is widespread, increasing working hours do not necessarily increase employers' labour costs (Ye et al.,

Table 5. OLS and IV estimations of the effect of minimum wage on yearly working months, monthly working days, and monthly working hours.

Variables	(1) LnWorking months	(2) LnWorking days	(3) LnWorking Hours	(4) LnWorking months	(5) LnWorking days	(6) LnWorking Hours
Panel A: OLS estimation						
LnMMW ^a	0.523*** (0.12)	0.123*** (0.03)	0.170*** (0.06)			
LnMHW				0.508*** (0.13)	0.125*** (0.03)	0.171*** (0.06)
Control variables ^b	YES	YES	YES	YES	YES	YES
Province FE ^c	YES	YES	YES	YES	YES	YES
Observations	6,413	6,413	6,413	6,413	6,413	6,413
F-test	18.265	4.441	6.549	18.418	4.430	6.544
P-value	0.000	0.000	0.000	0.000	0.000	0.000
R ²	0.167	0.048	0.053	0.167	0.048	0.053
Panel B: IV estimation						
LnMMW	0.055 (0.29)	0.017 (0.09)	0.037 (0.15)			
LnMHW				0.068 (0.26)	0.026 (0.09)	0.029 (0.13)
Control variables	YES	YES	YES	YES	YES	YES
Province FE	YES	YES	YES	YES	YES	YES
Observations	6,413	6,413	6,413	6,413	6,413	6,413
R ²	0.161	0.043	0.037	0.161	0.044	0.037
Heteroscedasticity test	0.000	0.000	0.000	0.000	0.000	0.000
Weak identification (F-Statistics) ^d	11.356	11.356	11.356	16.405	16.405	16.405
Overidentification test (p-value) ^e	0.638	0.576	0.957	0.703	0.559	0.954
Endogeneity test (p-value)	0.138	0.235	0.303	0.118	0.238	0.216

Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Notes:

^aLnMMW (LnMHW) refers to logarithm of Minimum monthly (hourly) wages.

^bThe control variables include individual, household, and cities characteristics as listed in Table 1.

^cProvincial fixed effects include Beijing, Shanxi, Liaoning, Jiangsu, Anhui, Shandong, Henan, Hubei, Hunan, Guangdong, Chongqing, Sichuan, Guizhou, Yunnan, Gansu.

^dStock-Yogo weak ID test critical values: 5% maximal IV relative bias is 15.72 and 10% maximal IV relative bias is 9.48.

^eThe p-value is according to the Hansen's J statistic.

Source: Authors' estimation using the CHIP data for 2013.

2015). As Sun et al. (2015) suggest, firms tend to dilute hourly pay by increasing monthly working hours when monthly salaries are fixed. Thus, we can conclude that employers could compensate for the wage gap caused by increases in the minimum wage by increasing working time, thereby transferring the labour cost brought by increased minimum wages to rural migrants (Zhang & Han 2019).

5.3.2. Social benefits from work

Minimum wages show negative but insignificant effects on housing subsidies. The results are robust across OLS and IV estimations, as presented in Table 6, columns 1 and 3. Regarding the estimation for allowances, endogeneity tests are not rejected, indicating minimum wages are exogenous variables in these estimations. Nevertheless, the coefficients of minimum wages are insignificant in both the OLS and IV estimations; thus, we conclude that employees do not offset wage increases by reducing job allowances for rural migrants. Surprisingly, the OLS estimations show

Table 6. OLS and IV estimations of the effect of minimum wage on social benefits from job.

Variables	(1) LnAllowances	(2) Insurance	(3) LnAllowances	(4) Insurance
Panel A: OLS estimation				
LnMMW ^a	-0.193 (0.80)	0.229*** (0.07)		
LnMHW			-0.061 (0.79)	0.221*** (0.07)
Control variables ^b	YES	YES	YES	YES
Province FE ^c	YES	YES	YES	YES
Observations	6,413	6,379	6,413	6,379
Chi ²	76.218	370.846	75.597	369.333
P-value	0.000	0.000	0.000	0.000
Pseudo-R ²	0.027	0.184	0.026	0.184
Panel B: IV estimation				
LnMMW	0.051 (2.12)	-0.103 (0.29)		
LnMHW			-0.265 (1.84)	-0.122 (0.26)
Control variables	YES	YES	YES	YES
Province FE	YES	YES	YES	YES
Observations	5,112	6,379	5,112	6,379
Chi ²	83.26	364.1	79.28	364.6
Heteroscedasticity test	0.000	0.000	0.000	0.000
Weak identification (F-Statistics) ^d	11.356	10.918	16.405	15.705
Overidentification test (p-value) ^e	0.185	0.026	0.218	0.033
Endogeneity test (p-value)	0.796	0.191	0.985	0.120

Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Notes:

^aLnMMW (LnMHW) refers to logarithm of Minimum monthly (hourly) wages.

^bThe control variables include individual, household, and cities characteristics as listed in Table 1.

^cProvincial fixed effects include Beijing, Shanxi, Liaoning, Jiangsu, Anhui, Shandong, Henan, Hubei, Hunan, Guangdong, Chongqing, Sichuan, Guizhou, Yunnan, Gansu.

^dStock-Yogo weak ID test critical values: 5% maximal IV relative bias is 15.72 and 10% maximal IV relative bias is 9.48.

^eThe p-value is according to the Hansen's J statistic.

Source: Authors' estimation using the CHIP data for 2013.

that minimum wages have statistically significant and positive effects on the probability of having social insurance (Table 6, columns 2 and 4). The coefficients of minimum wages are generally negative but insignificant in the IV estimations. The overidentification test is rejected; this suggests that some of the instruments might be endogenous. Thus, we could not obtain conclusive results for an effect of the minimum wage on social insurance. As indicated by Huang et al. (2010), the marginalized position of rural migrants in the urban labour market is significantly reflected in their lower participation rates in welfare schemes. While the actual monthly or hourly wages may be increased with the implementation of the minimum wage, future studies are necessary to investigate whether companies make up for the shortfall by reducing social benefits for rural migrants.

6. Discussion and conclusions

This study investigates the effect of minimum wages on labour market returns for rural migrants in China, using the data from the CHIP for the year 2013. Unlike

previous studies that solely focus on the monthly minimum wage (e.g. Ma & Li 2017; Sun et al. 2015; Zhang & Han 2019), we also estimate the wage effect of an hourly minimum wage, as our focus is on migrant workers who often have short-term contracts and mainly work in the informal sector (Du & Pan, 2009). We use four dimensions to measure migrants' returns: migrants' yearly salary and their monthly, daily, and hourly wages. This is particularly important as annual salaries might also reflect certain social benefits not captured by multiplying monthly income by working months (e.g. Chen et al. 2018). Using the real annual figures reported by rural migrants enables us to include other benefits beyond monthly, daily and hourly salaries. The potential endogeneity of minimum wage growth due to unobservable factors is addressed using the IV estimation method developed by Lewbel (2012). The working time and social benefits from work, two potential mechanisms through which minimum wage could affect migrants' wages, are also addressed in this study.

Our results show that minimum monthly wages have statistically significant and positive effects on yearly, monthly and daily salaries and hourly wages. A one percent increase in the monthly minimum wage would give rise to yearly, monthly, daily and hourly wages increasing by 0.84, 0.79, 0.77, and 0.75 percentage points, respectively. Similarly, a one percent increase in the hourly minimum wage would lead to yearly, monthly, daily and hourly wages increasing by 0.84, 0.77, 0.74, and 0.74 percentage points, respectively. Similar results have been reported in previous studies by Sun et al. (2015) and Yang et al. (2020); however, they only find significant minimum wage effects for low-income workers or rural migrants living in eastern China. In contrast, our results indicate that a minimum wage may have spill-over effects for all rural migrants (see also, David et al., 2016); this finding is further echoed by Lin and Yun (2016), who find that increasing the minimum wage can significantly reduce the earnings gap for lower income groups. In an international comparison, a positive minimum wage effect has also been found in the United States (Luttmer, 2007), the United Kingdom (Dolton et al., 2012), and Mexico (Campos Vázquez et al., 2018), but a negative effect is found for rural household in Kenya (Mwangi et al., 2017). A possible reason could be that the relative wage level in Kenya is still low, thus, an increase in the minimum wage may cause a negative effect on rural residents' employment rate.

Significant heterogeneity in the effect of minimum wages on migrants' wages is observed by gender and education level. Specifically, we find that minimum monthly wages have higher positive wage effects for females and migrants with higher education levels. As indicated by Belman et al. (2015), the minimum wage has stronger effects on women than on men. No significant effect of the minimum wage on the employment rate of men has been observed, but the evidence for women is mixed (Belman et al., 2015; Fang & Lin, 2015; Jia, 2014). If the existing minimum wage standards will be amended, the heterogeneous findings indicate that special attention needs to be paid to rural migrants who are at the bottom of the income distribution in China to overcome possible negative minimum wage effects (Zhang & Han 2019), especially to females and workers with low education levels.

Regarding the mechanisms through which the minimum wage could affect migrants' wages, we find that minimum wages tend to increase working time, while

they have no significant effect on job allowances. This suggests that employers seem to compensate for the wage gap caused by increases in the minimum wages through increasing working time, thereby transferring the labour cost brought by increased minimum wages to employees (Zhang & Han 2019). As discussed by Ye et al. (2015), there is substantial non-compliance with overtime pay regulations; almost 29% of employees who work overtime are not paid additional wages for their overtime hours, and 70% are paid less than the legally-required 1.5 times the regular wage.

Based on our findings, we conclude that rural migrants may not benefit substantially from raised minimum wages. Nevertheless, to avoid the “double-edged sword” effect of minimum wages not only on the employment rate but also on returns in the labour market, a gradual instead of a sharp increase is recommended. Since non-compliance with overtime pay regulations is widespread (Ye et al., 2015), supervision measures are necessary to promote employers’ compliance with the minimum wage policy and prevent the prevalence of overtime work.

We acknowledge several potential limitations of this study. First, we use cross-sectional data, which are insufficient to track the dynamic impact of minimum wages over time. Second, it should be noted that we only consider migrants who hold a rural *Hukou* status in their city of residence due to missing information about migrants working outside cities. Future studies are, thus, necessary to capture the dynamic effect of minimum wages and to collect information on migrants at a broader scale.

Notes

1. According to the National Bureau of Statistics, the size of the migrant population in 2018 was 288 million, accounting for over 20% of the national total population. http://www.stats.gov.cn/tjsj/zxfb/201902/t20190228_1651265.html (accessed on February 2020).
2. http://www.gov.cn/banshi/2005-08/05/content_20677.htm (accessed on February 2020).
3. The fund consists of mandatory contributions by employees and employers and can be accessed by contributing employees for the purpose of purchasing a home. See Tang and Coulson (2017) for more details.
4. Employers cannot include subsidies such as overtime pay, canteen allowances or travel subsidies in wages when calculating minimum wages. See also “Provision on Minimum Wage”: http://www.gov.cn/banshi/2005-08/05/content_20677.htm (accessed on February 2020).
5. http://www.gov.cn/jrzq/2013-01/31/content_2324293.htm (accessed on February 2020).
6. We also chose other control variables as the Z variable to check the robustness of the results, and the main conclusion remained.
7. The sampling procedure and survey method for the migrant survey are described in detail in the Rural-Urban Migration in China Project Survey Documentation (Kong, 2010).
8. <http://www.npc.gov.cn/npc/c30834/201901/ffad2d4ae4da4585a041abf66e74753c.shtml>, accessed on February 2020.

Acknowledgement

We would like to acknowledge the Chinese Academy of Social Science and Beijing Normal University for providing data from the Chinese Household Income Project (CHIP). Funding for this research from National Natural Science Foundation of China with ratification number

71603177, 71903141 is gratefully acknowledged. We also would like to thank the anonymous reviewers for their kind comments and valuable suggestions.

Disclosure statement

No potential conflict of interest was reported by the authors.

ORCID

Houjian Li  0000-0003-4852-8042

References

- Agenor, P.-R., Aynaoui, K. E. (2003). *Labor market policies and unemployment in Morocco: A quantitative analysis* (No. 3091) [Policy Research Working Paper Series]. The World Bank.
- Belman, D., & Wolfson, P. (2016). *What does the minimum wage do in developing countries?: A review of studies and methodologies* (No. 994893283402676), ILO Working Papers. International Labour Organization.
- Belman, D., Wolfson, P., & Nawakitphaitoon, K. (2015). Who is affected by the minimum wage? *Industrial Relations: A Journal of Economy and Society*, 54(4), 582–621. <https://doi.org/10/ghcqdn>
- Betcherman, G. (2012). Labor market institutions: A review of the literature. Policy Research Working Papers. The World Bank. <https://doi.org/10.1596/1813-9450-6276>
- Bhorat, H., Kanbur, R., & Stanwix, B. (2014). Estimating the impact of minimum wages on employment, wages, and non-wage benefits: The case of agriculture in South Africa. *American Journal of Agricultural Economics*, 96(5), 1402–1419. <https://doi.org/10.1093/ajae/aau049>
- Brown, C. (1999). Chapter 32 Minimum wages, employment, and the distribution of income. In *Handbook of labor economics* (pp. 2101–2163). Elsevier. [https://doi.org/10.1016/S1573-4463\(99\)30018-3](https://doi.org/10.1016/S1573-4463(99)30018-3)
- Campos Vázquez, R. M., Esquivel, G., & Hernández, A. S. S. (2018). The impact of the minimum wage on income and employment in Mexico. *CEPAL Review*, 2017(122), 189–216. <https://doi.org/10/ghqc9>
- Card, D., & Krueger, A. B. (2000). Minimum wages and employment: A case study of the fast-food industry in New Jersey and Pennsylvania: Reply. *American Economic Review*, 90(5), 1397–1420. <https://doi.org/10.1257/aer.90.5.1397>
- Castro Campos, B., Ren, Y., & Petrick, M. (2016). The impact of education on income inequality between ethnic minorities and Han in China. *China Economic Review*, 41, 253–267. <https://doi.org/10.1016/j.chieco.2016.10.007>
- Chen, Y., Wang, L., & Zhang, M. (2018). Informal search, bad search?: The effects of job search method on wages among rural migrants in urban China. *Journal of Population Economics*, 31(3), 837–876. <https://doi.org/10.1007/s00148-017-0672-x>
- Cunningham, W. (2007). *Minimum wages and social policy, directions in development – Human development*. The World Bank. <https://doi.org/10.1596/978-0-8213-7011-7>
- David, H., Manning, A., & Smith, C. L. (2016). The contribution of the minimum wage to US wage inequality over three decades: A reassessment. *American Economic Journal: Applied Economics*, 8(1), 58–99. <https://doi.org/10/ghcqdf>
- Dinkelman, T., & Ranchhod, V. (2012). Evidence on the impact of minimum wage laws in an informal sector: Domestic workers in South Africa. *Journal of Development Economics*, 99(1), 27–45. <https://doi.org/10.1016/j.jdeveco.2011.12.006>

- Dolton, P., Bondibene, C. R., & Wadsworth, J. (2012). Employment, inequality and the UK national minimum wage over the medium-term. *Oxford Bulletin of Economics and Statistics*, 74(1), 78–106. <https://doi.org/10/bq7dts>
- Du, Y., & Pan, W. (2009). Minimum wage regulation in China and its applications to migrant workers in the urban labor market. *China & World Economy*, 17(2), 79–93. <https://doi.org/10.1111/j.1749-124X.2009.01143.x>
- Fang, T., & Lin, C. (2015). Minimum wages and employment in China. *IZA Journal of Labor Policy*, 4(1), 22. <https://doi.org/10.1186/s40173-015-0050-9>
- Gindling, T. H., & Terrell, K. (2005). The effect of minimum wages on actual wages in formal and informal sectors in Costa Rica. *World Development*, 33(11), 1905–1921. <https://doi.org/10.1016/j.worlddev.2005.04.017>
- Griffin, K., & Zhao, R. (Eds.), (1993). *The distribution of income in China*. Palgrave Macmillan UK. <https://doi.org/10.1007/978-1-349-23026-6>
- Han, Z., & Wei, Z. (2006). The empirical research on China's minimum wage standard. *Statistical Research*, 1, 35–38 (in Chinese). <http://tjyj.stats.gov.cn/CN/Y2006/V23/11/35>
- Hansen, L. P. (1982). Large sample properties of generalized method of moments estimators. *Econometrica*, 50(4), 1029–1054. <https://doi.org/10.2307/1912775>
- Herr, H., & Kazandziska, M. (2011). *Principles of minimum wage policy: Economics, institutions and recommendations*. International Labour Office.
- Huang, Y., Guo, F., & Tang, Y. (2010). Hukou status and social exclusion of rural–urban migrants in transitional China. *Journal of Asian Public Policy*, 3(2), 172–185. <https://doi.org/10.1080/17516234.2010.501160>
- Jia, P. (2014). Employment and working hour effects of minimum wage increase: Evidence from China. *China & World Economy*, 22(2), 61–80. <https://doi.org/10.1111/j.1749-124X.2014.12062.x>
- Kong, S. T. (2010). *Rural–urban migration in China: Survey design and implementation*. Edward Elgar Publishing.
- Lemos, S. (2009). Minimum wage effects in a developing country. *Labour Economics*, 16(2), 224–237. <https://doi.org/10.1016/j.labeco.2008.07.003>
- Lewbel, A. (2012). Using heteroscedasticity to identify and estimate mismeasured and endogenous regressor models. *Journal of Business & Economic Statistics*, 30(1), 67–80. <https://doi.org/10.1080/07350015.2012.643126>
- Li, S., Luo, C., Wei, Z., & Yue, X. (2008). Appendix: The 1995 and 2002 household surveys: Sampling methods and data description. In B. A. Gustafsson, S. Li, & T. Sicular (Eds.), *Inequality and public policy in China* (pp. 337–354). Cambridge University Press. <https://doi.org/10.1017/CBO9780511510922.014>
- Li, S., & Ma, X. (2015). Impact of minimum wage on gender wage gaps in urban China. *IZA Journal of Labor & Development*, 4(1), 20. <https://doi.org/10.1186/s40175-015-0044-4>
- Lin, C., & Yun, M.-S. (2016). The effects of the minimum wage on earnings inequality: Evidence from China. In L. Cappellari, S. W. Polachek, & K. Tatsiramos (Eds.), *Research in labor economics* (pp. 179–212). Emerald Group Publishing Limited. <https://doi.org/10.1108/S0147-912120160000044012>
- Luo, R., Zhou, M., & Wu, W. (2011). Impacts of minimum wage on employment of migrant workers in China. In Q. Zhou (Ed.), *Advances in applied economics, business and development, communications in computer and information science* (pp. 73–77). Springer.
- Luttmer, E. F. (2007). Does the minimum wage cause inefficient rationing? *The B.E. Journal of Economic Analysis & Policy*, 7(1), 1–42.
- Ma, X., & Li, S. (2017). *The effects of minimum wage on wage distribution in urban China: Evidence from the CHIP data* [No. 201724, University of Western Ontario, Centre for Human Capital and Productivity (CHCP) Working Papers]. University of Western Ontario, Centre for Human Capital and Productivity (CHCP).
- Mincer, J. (1976). Unemployment effects of minimum wages. *Journal of Political Economy*, 84(4, Part 2), S87–S104. <https://doi.org/10.1086/260534>

- Mwangi, T., Simiyu, F. N., Beyene, L. M., & Onderi, A. (2017). *The effects of minimum wages on the labor market and income distribution in Kenya: A CGE analysis* [SSRN Scholarly Paper No. ID 3159371]. Social Science Research Network.
- Neumark, D., Cunningham, W., & Siga, L. (2006). The effects of the minimum wage in Brazil on the distribution of family incomes: 1996–2001. *Journal of Development Economics*, 80(1), 136–159. <https://doi.org/10.1016/j.jdeveco.2005.02.001>
- Neumark, D., Schweitzer, M., & Wascher, W. (2004). Minimum wage effects throughout the wage distribution. *Journal of Human Resources*, XXXIX(2), 425–450. <https://doi.org/10.3368/jhr.XXXIX.2.425>
- Neumark, D., & Wascher, W. (2000). Minimum wages and employment: A case study of the fast-food industry in New Jersey and Pennsylvania: Comment. *American Economic Review*, 90(5), 1362–1396.
- Neumark, D., & Wascher, W. L. (2007). Minimum wages and employment. *Foundations and Trends® in Microeconomics*, 3(1–2), 1–182. <https://doi.org/10.1561/07000000015>
- Neumark, D., & Wascher, W. L. (2008). *Minimum wages*. The MIT Press. <https://doi.org/10.7551/mitpress/9780262141024.001.0001>
- Paul, S., Chen, Z., & Lu, M. (2017). Contribution of household income components to the level and rise of inequality in urban China. *Journal of the Asia Pacific Economy*, 22(2), 212–226. <https://doi.org/10.1080/13547860.2017.1292767>
- Riskin, P. of E. at Q.C.C. and A.P. of E.S.R.S.E.A.I.C., Riskin, C., Zhao, R., & Li, S. (2001). China's Retreat from equality: Income distribution and economic transition. M.E. Sharpe.
- Stigler, G. J. (1946). The economics of minimum wage legislation. *The American Economic Review*, 36, 358–365.
- Sun, W., Wang, X., & Zhang, X. (2015). Minimum wage effects on employment and working time of Chinese workers – Evidence based on CHNS. *IZA Journal of Labor & Development*, 4, 19. <https://doi.org/10.1186/s40175-015-0046-2>
- Tang, M., & Coulson, N. E. (2017). The impact of China's housing provident fund on homeownership, housing consumption and housing investment. *Regional Science and Urban Economics*, 63, 25–37. <https://doi.org/10.1016/j.regsciurbeco.2016.11.002>
- Terrell, K., & Almeida, R. K. (2008). *Minimum wages in developing countries: Helping or hurting workers?* [No. World Bank Employment Policy Primer; No. 10]. World Bank.
- Wang, J., & Gunderson, M. (2012). Minimum wage effects on employment and wages: Dif-in-dif estimates from eastern China. *International Journal of Manpower*, 33(8), 860–876. <https://doi.org/10.1108/01437721211280353>
- Wang, J., & Gunderson, M. (2011). Minimum wage impacts in China: Estimates from a pre-specified research design, 2000–2007. *Contemporary Economic Policy*, 29(3), 392–406. <https://doi.org/10.1111/j.1465-7287.2010.00239.x>
- Wang, L. (2012). Economic transition and college premium in urban China. *China Economic Review*, 23(2), 238–252. <https://doi.org/10.1016/j.chieco.2011.11.001>
- Wong, S. A. (2019). Minimum wage impacts on wages and hours worked of low-income workers in Ecuador. *World Development*, 116, 77–99. <https://doi.org/10.1016/j.worlddev.2018.12.004>
- Wooldridge, J. M. (2012). *Introductory econometrics: A modern approach* (0005 ed.). South Western Educ Pub. u.a.
- Xie, S., & Mo, T. (2014). The impact of education on health in China. *China Economic Review*, 29, 1–18. <https://doi.org/10.1016/j.chieco.2013.12.003>
- Xing, C., & Xu, J. (2016). Regional variation of the minimum wages in China. *IZA Journal of Labor & Development*, 5(1), 8. <https://doi.org/10.1186/s40175-016-0054-x>
- Yang, J., & Gunderson, M. (2019). Minimum wage impacts on wages, employment and hours in China. *International Journal of Manpower*, 41(2), 207–219. <https://doi.org/10.1108/IJM-10-2018-0361>
- Yang, J., Gunderson, M., & Li, S. (2020). The Impact of Minimum Wages on Migrant Workers' Wages. In S. Li & C. Lin (Eds.), *Minimum Wages in China: Evolution, Legislation, and Effects* (pp. 145–164). Springer. https://doi.org/10.1007/978-981-15-2421-9_6

- Ye, L., Gindling, T., & Li, S. (2015). Compliance with legal minimum wages and overtime pay regulations in China. *IZA Journal of Labor & Development*, 4(1), 16. <https://doi.org/10.1186/s40175-015-0038-2>
- Zhang, S., & Han, X. (2019). The effect of minimum wage on labor supply of rural migrant workers. *Chinese Journal of Population Science*, 41, 91–99.
- Zhang, Z., & Wu, X. (2017). Occupational segregation and earnings inequality: Rural migrants and local workers in urban China. *Social Science Research*, 61, 57–74. <https://doi.org/10.1016/j.ssresearch.2016.06.020>