

The Employment Effects of The Minimum Wage: Evidence from China

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Abstract. The minimum wage system, as a labor legal system designed to ensure the basic survival and living needs of low-wage workers, was initially intended to protect the basic rights and interests of workers and meet their basic living needs. This article evaluates the appropriateness of China's minimum wage system from the perspective of its employment effects. Firstly, a simple regression model including a dummy variable for the minimum wage was established, and it was found that the implementation of the minimum wage system has a significant promotional effect on general employment. Secondly, through propensity score matching (PSM) and difference-in-differences (DID) analysis, it was found that the impact of raising the minimum wage standard on general employment is nonlinear. When the increase in the minimum wage standard is below a certain threshold level, it manifests as a suppressive effect on employment; when the increase in the minimum wage standard exceeds this threshold, it manifests as a promotional effect on employment.

Keywords: Minimum Wage; Employment Effect; Difference-in-difference Method.

1. Introduction

In the employment relationship, the labor supplier, that is, the laborer, is often in a disadvantaged position in the bargaining process and may not be able to obtain labor income corresponding to his labor supply. Therefore, the minimum wage system, as an important tool to protect the basic rights and interests of workers, has increasingly become the focus of global economic policy discussions.

More and more countries have established and improved the statutory minimum wage system. The design and implementation of the minimum wage system is not only related to the healthy development of the labor market in various countries and regions but also directly affects economic growth, social equity, and international competitiveness. The early minimum wage system can be traced back to the 1880s. In New Zealand and Australia, the minimum wage system was formulated by government-recognized trade unions to prevent sweatshops in the manufacturing industry from controlling the labor force.

China promulgated and implemented the "Regulations on Minimum Wages for Enterprises" in 1993, and the minimum wage system has developed for thirty years, playing an important and positive role in ensuring the basic living needs of low-income individuals. However, it has also been accompanied by many controversies, especially regarding the employment effects of minimum wage adjustments. Some argue that minimum wages reduce employment [1,2,3], believing that minimum wages above market equilibrium wages lead to an oversupply of labor. According to supply and demand theory, overall societal employment decreases, exacerbating the employment situation, weakening the cost advantage of labor, affecting business competitiveness, and worsening the employment and living conditions of low-income workers. Other views suggest a positive correlation between employment rates and minimum wage increases [4,5].

Given the existing employment relationships in China, where workers are in a disadvantaged position, the minimum wage system serves more as a protective measure. Therefore, the economic and institutional environment in which China's minimum wage policy operates differs significantly from that of Western countries, leading to different policy outcomes. At the beginning of implementing the minimum wage system, academia in China engaged in extensive debates, focusing on the necessity of introducing a minimum wage system, whether its introduction would affect labor costs and hiring standards of Chinese enterprises, and whether it would cause large-scale

unemployment. However, existing research has not reached a consensus on these issues. In recent years, China has frequently adjusted the minimum wage standards, and the adjustment has also increased significantly from the initial establishment of the minimum wage standards, which may have different impacts on the labor market.

All in all, it is indispensable to conduct a more detailed analysis of the economic impact of the minimum wage in the context of China's specific situation, exploring the employment effects of the minimum wage system under the hiring relationships characteristic of China.

2. Literature Review

Starting from the 1940s, the focus of the minimum wage system has been primarily on the specific standards of the minimum wage system. Representative models include the two-sector model, the monopsony model, and the human capital model, etc. Taking the two-sector model as an example, the ultimate impact of the minimum wage on employment depends on factors such as the labor demand elasticity in different sectors, labor supply elasticity, the coverage of the minimum wage, and the extent of the minimum wage increase. Therefore, the impact of the minimum wage on unemployment is not certain and requires further empirical analysis for verification.

In the 1960s and 1970s, the impact of minimum wage on the labor market was widely discussed in academia. Based on empirical data from the United States and Canada, the employment elasticity of minimum wage for young workers is between -0.1 and -0.3 [6,7]. In their research, young workers, due to their lack of work experience, are one of the representative groups of low-skilled labor, and their income levels are often closest to the minimum wage level. Subsequent studies have pointed out that skill differentiation among young workers is more common. The differences in capital-labor substitution rates are also larger, and different identification methods will likely affect the conclusions [8]. Even so, the minimum wage may also lead to an increase in family poverty levels by 4% to 6% [7]. In this sense, the implementation of the minimum wage has not only failed to improve social welfare but has also led to a loss of welfare for low-skilled groups, both in terms of employment opportunities and family poverty.

In the 1990s, a new round of discussions on the impact of minimum wage on the labor market began. The "academic consensus" that the implementation of minimum wage leads to a decline in overall social welfare once again became fragmented, and the negative impact of minimum wage on employment started to diverge. Some scholars' research suggests that minimum wage has promoted employment growth [5,9], with an employment elasticity of around 0.7 [10]. However, some scholars point out that regardless of how the low-skilled worker group is defined, as long as reasonable control variables are included and valuable information is fully utilized, this negative impact is significantly present [11,12,13].

The divergence in the employment effects of minimum wage is mainly due to differences in identification techniques. Some studies have issues with the introduction of some control variables, while valuable information has not received enough attention [8]. There are also studies pointing out that this is related to national institutions, such as China's dual employment system [14].

Due to the varying minimum wage standards across different provinces in China, the current research outcomes focus solely on a specific industry or a single province as the subject of study, neglecting the overall perspective on minimum wage research. Current research literature predominantly examines the employment effects of the minimum wage standard from only one angle, ignoring the analysis of employment effects of the implementation of the minimum wage. Therefore, this paper will take a holistic perspective, focusing primarily on the introduction and implementation of China's minimum wage system in 1993, to analyze and discuss the specific impact of China's minimum wage system on the Chinese labor market.

3. Methodology

3.1. Overview

An effective method to analyze the policy effect is the DID method [15]. An analysis was conducted on the variable selection and model setting before the empirical analysis. Then, the employment effects of the minimum wage were empirically analyzed from both the national and provincial levels, as follows:

1) Studying the employment effect of the minimum wage nationwide. This includes two aspects: the employment effect analysis of the introduction of the minimum wage law and the employment effect analysis of the increase in the minimum wage amount. First, a dummy variable for the minimum wage was constructed to study the overall impact on employment in China since the implementation of the minimum wage system. The results show that the effect of the minimum wage system on promoting employment is very significant. Second, a quasi-natural experiment and the DID method were used to study the impact of the increase in the minimum wage standard on employment. Provinces that raised the minimum wage from 1993 to 2019 were used as the treatment group, and propensity score matching methods were used to match corresponding control groups to eliminate systematic differences. Then, the employment changes caused by the increase in the minimum wage were calculated using the DID method. Finally, regression analysis was used to verify whether the increase in the minimum wage standard will boost employment.

2) Studying the employment effect of the minimum wage from a provincial perspective. A panel cointegration regression model was established to study the employment effects of the minimum wage on each province, and the research results were analyzed and interpreted. The model takes the number of employed people as the dependent variable, and the independent variable is the minimum wage. At the same time, other potential variables affecting employment were controlled.

3.2. Variables

Table 1. Variables

Variable	Indicator Meaning	Indicator Name	Code
Dependent Variable	General Employment	Urban unit employment (thousand people)	EMPU
	Low-Income Group Employment	Private enterprise employment (thousand people)	EMPP
	Broad Employment	Sum of urban unit and private enterprise employment (thousand people)	EMPU P
Independent Variable	Minimum Wage Level	Minimum wage standard (yuan/month)	MWG
Control Variables	Regional Economic Development Level	Per capita GDP (yuan/person)	PGDP
	Industrial Structure	Share of tertiary industry (%)	PFTI
	Local Wage Level	Average wage of urban unit employees (yuan/month)	AWG
	Aging Population Level	Elderly support ratio (%)	ELD
	Urbanization Level	Urban population proportion (%)	URB
	Worker Quality	Illiteracy rate among those aged 15 and above (%)	ILL
	Social Security Factors	Urban minimum living standard (yuan/person·month)	MLS

3.3. Models

3.3.1 Simple Regression Model

The model includes a dummy variable for the minimum wage is constructed to study the impact of the implementation of the minimum wage system on employment at national level.

$$EMP_t = \alpha_0 + \alpha_1 GDP_t + \alpha_2 PFTI_t + \alpha_3 URB_t + \alpha_4 ELD_t + \alpha_5 DUM_t + \mu_t \quad (1)$$

$$DUM_t = \begin{cases} 1, & t \in [1993, 2019] \\ 0, & t \in [1978, 1992] \end{cases}$$

3.3.2 PSM-DID Model

(1) PSM

Assuming that any individual has the same probability of being included in the experimental group, and incorporating other confounding factors that affect the explanatory variables as control variables into the model, a logistic regression equation is constructed:

$$P_i = \alpha_1 x_{1i} + \alpha_2 x_{2i} + \alpha_3 x_{3i} + \alpha_4 x_{4i} + \alpha_5 x_{5i} + \alpha_6 x_{6i} + \epsilon_i \quad (2)$$

(2) DID

Based on the experimental and control groups matched using propensity score matching, a difference-in-differences treatment is applied to eliminate systematic differences.

$$EMP_{ij} = \beta_0 + \beta_1 D_j + \lambda X_{ij} + \epsilon_{ij}$$

$$X = (X_1, X_2, X_3, X_4, X_5, X_6)^T \quad (3)$$

$$\lambda = (\lambda_1, \lambda_2, \lambda_3, \lambda_4, \lambda_5, \lambda_6)$$

In the equation, D_j is a dummy variable, where $j=1$ indicates the period before the minimum wage increase, and $j=2$ indicates the period after the minimum wage increase. $i=treat$ represents the treatment group, i.e., the time when the minimum wage standard changes; $i=control$ represents the control group, i.e., the time or period when the minimum wage standard remains unchanged. X denotes other control variables introduced into the model.

Then, by applying within-group first differences and between-group differences, i.e., the DID approach, the net effect of employment changes after the minimum wage increase is obtained.

$$REMP = \nabla EMP_{treat} - \nabla EMP_{control}$$

$$\nabla EMP_{treat} = EMP_{treat,2} - EMP_{treat,1}$$

$$\nabla EMP_{control} = EMP_{control,2} - EMP_{control,1} \quad (4)$$

4. Results

4.1. The Employment Effect of the Minimum Wage System Implementation

This paper standardizes the above six variables using 0-1 normalization and establishes a simple regression model including a dummy variable for the minimum wage. After eliminating the insignificant variables, the final regression model results are as follows:

Table 2. Regression Results of Employment Effects on Minimum Wage

	Coefficient	SE	t	p-value
Intercept	0.0788	0.0269	2.9320	0.0057
GDP	-0.4902	0.0829	-5.9100	0.0000
PFTI	1.2181	0.1113	10.9480	0.0000
DUM	0.1974	0.0408	4.8440	0.0000
Multiple R-squared	0.9567			
Adjusted R-squared	0.9533			
F-statistic	279.8000			
p-value	0.0000			

The regression results of the model indicate that, at the national level, the proportion of the tertiary industry has a significantly positive relationship with employment, demonstrating that since the reform and opening up, the tertiary industry's ability to absorb employment has been continuously strengthening. In contrast, the impact of Gross Domestic Product (GDP) on employment is negative, which may be because technological progress brought about by economic development has a greater destructive effect on employment than its creative effect, thus showing a negative influence. Lastly, regarding the minimum wage policy that we are primarily studying, it has a significant positive impact, indicating that the implementation of the minimum wage system has significantly promoted employment level nationwide. Overall, the effect of the minimum wage policy in promoting employment is significant.

4.2. The Employment Effect of Minimum Wage Hikes

Firstly, based on whether the minimum wage was increased compared to the previous year, an experimental group and a control group are built. The experimental group consists of provinces where the minimum wage standard was raised, while the control group consists of provinces where the minimum wage remained unchanged. Secondly, propensity score matching (PSM) is used to process the samples to eliminate the systematic differences between the control and experimental samples. This paper selects several key indicators that represent sample heterogeneity and are closely related to employment, including per capita GDP, the proportion of the tertiary industry, average wage, urban population ratio, elderly support ratio, illiteracy rate among those over 15 years old, and average salary, as the basis for propensity score matching. Standardized vectors are chosen for propensity score matching to avoid the impact of inconsistent vector dimensions on the matching results.

Regression analysis is conducted on the employment effects obtained from the quasi-natural experiment regarding the increase in the minimum wage to explore the possible correlation between changes in employment and changes in the minimum wage, to verify whether the impact of the minimum wage increase on employment is significant. After continuous model tuning and refinement, a polynomial regression model is ultimately established where the employment change rate is related to the minimum wage change rate and the square of the minimum wage change rate.

$$\begin{aligned}
 REMP = & -0.0883 + 0.8412RMWG - 1.2252RMWG^2 \\
 & (0.0333) \quad (0.2842) \quad (0.4515) \\
 & (-2.6550) \quad (2.9160) \quad (-2.713)
 \end{aligned} \tag{5}$$

$R^2=0.2883 \quad F=4.2530$

In the model, REMP and RMWG represent the change rate of employment and minimum wage, respectively.

The difference-in-differences regression results indicate that the P-values for the coefficients of the first and second terms of the minimum wage change rate are 0.0083 and 0.0130, respectively. Under the significance level of 0.05, the model coefficients are significant. The negative coefficient for the second term and the positive coefficient for the first term suggest that there is an inverse U-

shaped quadratic relationship between the employment change rate and the minimum wage change rate. When the change rate of the minimum wage standard is within the range of [12.93%, 55.73%], the employment change rate is positive, indicating that when the adjustment of the minimum wage standard is within this range, it can have a positive effect on employment. Once it deviates from this range, it will produce a negative inhibitory effect on employment.

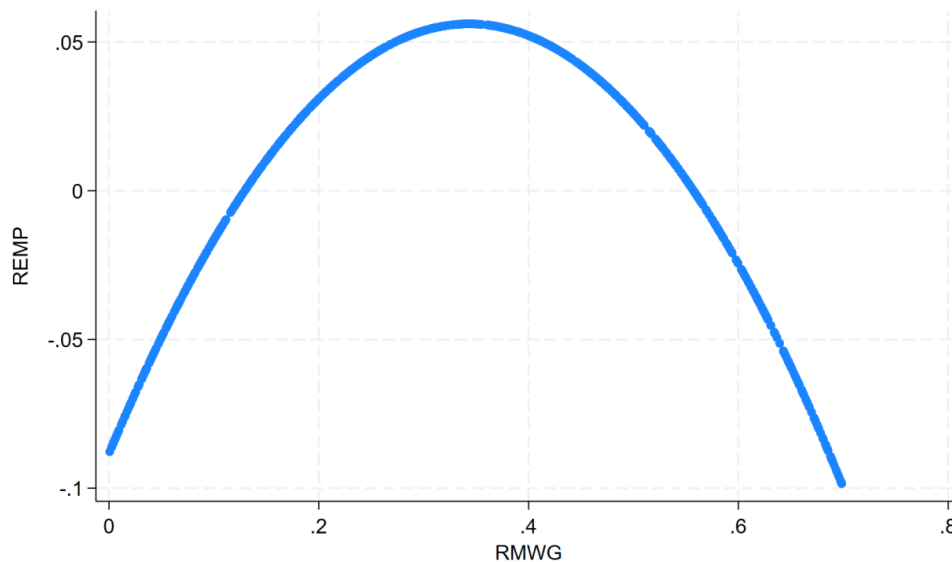


Figure 1. The Quadratic Relationship Between the Employment Change Rate and the Minimum Wage Change Rate

5. Discussion and Conclusion

From a practical standpoint, analyze the rationality of the upper and lower limits of this range. In reality, the adjustment range of the minimum wage standard generally cannot reach the upper limit of this range. Considering local economic development, price index, and cost of living, the minimum wage standard is not likely to increase by 55.73% at one time from its original level, thus there is no need to worry about the employment suppressive effect due to an overly large adjustment. Therefore, the part with practical significance is the first half of the curve. When the adjustment range of the minimum wage standard is below 12.93%, it manifests as a suppressive effect on employment; when it is above this standard, it manifests as a promotional effect on employment, and it seems that when the adjustment range of the minimum wage standard reaches 34.33%, its promotional effect on employment is the greatest. The impact of the minimum wage standard increase on the employment change rate shows a similar inverted U-shape.

Thus, when the increase in the minimum wage standard is below a certain threshold level, it exhibits a suppressive effect on employment; once the increase in the minimum wage standard exceeds this threshold, it exhibits a promotional effect on employment. This indicates that when the adjustment range of the minimum wage standard is too low, it not only fails to meet the living needs of low-income workers but may also produce a suppressive effect on employment. The key to adjusting the minimum wage standard seems to focus on this threshold standard, which can ensure that the minimum wage standard meets the basic needs of low-income earners while maintaining a relatively high rate of employment growth.

In conclusion, this paper, through regression analysis that includes a dummy variable for the minimum wage system, finds that the regression coefficient for the minimum wage system dummy variable is positive and statistically significant. This indicates that the minimum wage system in China has had a relatively positive impact on employment at the national level since its implementation. The increase in wage levels due to the implementation of the minimum wage system may have been absorbed by enterprises in the form of a shock effect. That is, the monetary loss from the rise in labor

costs due to the implementation of the minimum wage system has been compensated for by increasing productivity. Quasi-natural experiments and difference-in-differences studies show that there is an inverted U-shaped correlation between the change rate of China's minimum wage standards and employment rates. When the increase in the minimum wage standard is below a certain threshold level, it has an inhibitory effect on employment; once the increase in the minimum wage standard exceeds this threshold, it manifests as a promotional effect on employment. This suggests that the adjustment range of the minimum wage standard should be raised above this threshold while considering the cost pressure on enterprises. Judging solely from the current development of minimum wage standards in various provinces, China's minimum wage standard adjustment range is above this threshold level and has not produced an inhibitory effect on employment. Due to the significant disparities in economic development among different regions in China, and the ongoing deepening of class solidification and the urban-rural dual structure, the minimum wage system in the relatively underdeveloped northwest regions hurts employment, as these areas are more sensitive to market pressures. In contrast, in the more developed southeast regions, where industry development is more mature, enterprises are more willing to pay higher remuneration for talent. Therefore, the minimum wage tends to have a promotional effect on employment, which is consistent with monopsonistic behavior [16].

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