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How minimum wage shortens employment terms?

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ABSTRACT

The nationwide implementation of the minimum wage system in 1993 was followed by the "Minimum Wage Regulations" in 2004 with an attempt to enhance regulatory stringency of the system. The article constructs a theoretical model to establish testable propositions and conducts empirical analysis using China's Nutrition and Health Survey data to examine the impact of the minimum wage system on enterprise employment decisions. The findings reveal that the increase in the minimum wage has resulted in a shift towards short-term employment forms, and the strengthening of the minimum wage system in 2004 has further amplified this trend.

1. Introduction

The minimum wage is a core institutional arrangement in the labor system aimed at providing a basic security for workers to sustain their livings. As can be observed, more flexible, diversified, and short-term employment patterns have substantially increased in response to rising labor costs across countries.[1] This trend also prevails in China. The main purpose of *Labor Law* enacted in late 20th century is to stabilize labor relations to alleviate concerns about short-term labor contracts and labor relations.[2] Despite of that, firms might also adopt ways such as changing employment patterns to offset increased employment costs caused by strengthened regulations on the minimum wage, leading to adjustments in the labor contract term and a trend of employing short-term workers. Understanding the potential relationship between the labor security system, minimum wage, and the term of labor contract that affects the flexibility of the labor market, as well as the interaction between government labor regulations and firms' responses, can help assess the impact of increased minimum wage and the strengthened regulations on minimum wage on firms' recruitment decisions and types of employees and explore the realization of flexibility to security in *Labor Law*.

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[1] To address the issue of high and persistent unemployment in the face of rigid labor markets, various countries have relaxed labor market regulations, leading to the emergence of numerous temporary jobs. For instance, between 2000 and 2010, 90% of new employees in France and Spain were temporary workers, while only 10% were permanent employees (Cahuc et al., 2016). According to Deloitte's Global Human Capital Trends 2016, 51% of surveyed employers intend to increase their reliance on temporary employees in the future, while only 16% aim to decrease it. Additionally, more than 90% of employers across various countries agree that it is important to pay attention to the rising proportion of temporary employees.

[2] This concept is well represented in labor regulations, such as the *Labor Contract Law of the People's Republic of China* enacted in 2008, which advocates for indefinite-term employment contracts.

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In 1993, China established a minimum wage system, but its effectiveness was limited due to its scope of application, low punishment, and infrequent adjustments. The implementation of the *Minimum Wage Regulations* in 2004 was a turning point, as it established and strengthened the minimum wage system nationwide. The new regulations increased the penalties for violating minimum wage regulations and required local governments to adjust minimum wage standards at least once every two years aligning to the economic development level. As a result, minimum wage standards increased rapidly since 2004, with the median minimum wage increasing by about 253% from CNY 320 in 2003 to CNY 1130 in 2013, indicating that the new regulations significantly increased the policy effect of the minimum wage system (Fang and Lin, 2015; Gan et al., 2016).[3]

After the implementation of the Minimum Wage Regulations in 2004, there has been a significant shift in the employment patterns of Chinese firms. The proportion of permanent workers declined sharply from an average of 71% before 2004 to an average of 56% in 2004 and beyond, while the proportion of temporary workers increased from an average of 15% before 2004 to an average of 24% in 2004 and beyond. Notably, private firms had a much lower proportion of permanent employees, with only 28.3% in 2004 and beyond, compared to 45.4% of temporary employees.[4]

A natural question comes out when looking at the significant changes in the minimum wage level and employment patterns of firms, particularly in 2004: is there any causal relationship between the minimum wage and labor contract terms and employment patterns? Will there be any further impact of strengthened regulations on the those impacts of the minimum? To address these issues, the paper proposes a theoretical model based on existing literature and the labor contract terms. The model assumes that firms face uncertain future output and different types of workers with varying recruitment and layoff costs. The derived profit function allows for the measurement of firms' recruitment decisions when the minimum wage increases. The theoretical results indicate that as the minimum wage increases, the probability of firms employing permanent workers decreases, while the probability of employing contract and temporary workers increases. Furthermore, with the increasing minimum wage, the probability of firms employing temporary workers increases, while the probability of employing permanent workers and contract workers decreases. Based on these results, the paper concludes with a proposition to be tested, which is that the minimum wage leads to an employment pattern with heavier reliance on short-term employment for firms. Lastly, the increase in the minimum wage has a more significant impact on low-skilled workers as they have less bargaining power with the employers.

This paper empirically verifies that firms tend to employ short-term workers with the increase in minimum wage, and this effect is more significant due the more stringent regulation in 2004. The study also identifies the internal mechanisms through which minimum wage affects employment patterns, such as flexible wage payment and increased hiring of retired employees. Furthermore, it is found that the minimum wage has a more significant impact on low-skilled workers, as confirmed by the heterogeneity tests.

The impact of minimum wage on employment has been a topic of theoretical debate, with most existing literature based on data from Western countries (Neumark and Wascher, 1992; Katz and Krueger, 1992; Card and Krueger, 1994; Dube et al., 2010; Cengiz et al., 2019). In recent years, there has been an increase in domestic studies on the impact of minimum wage on employment (Ma et al., 2012; Sun and Shu, 2011). Liu and Zhao (2019) suggested that the increase in minimum wage increased the social insurance paid by firms, which ultimately increased the total income of employees. Lu et al. (2017) found that the increasing minimum wage increased the labor cost of listed companies. Ma et al. (2012) found that the increase in minimum wage significantly reduced the number of employees in manufacturing firms, and a 10% increase in the minimum wage led to a 0.6% decrease in the employment rate. Ding (2010) emphasized the impact of labor regulation measures, concluding that the minimum wage had a more significant impact on the employment of migrant workers with the strengthened regulations on minimum wage.

While there have been numerous studies on the impact of the minimum wage on employment, research on the employment patterns of firms from the perspectives of search and matching models and cost analysis of different employment patterns is limited (Berton and Garibaldi, 2012; Cao et al., 2010; Cahuc et al., 2016). This paper uses the cost analysis framework to study the impact of the minimum wage on labor contract term and employment patterns, and the further effect of strengthened regulations on the minimum wage. Additionally, this paper examines the equilibrium of various employment patterns based on the recruitment and layoff costs specific to labor contract terms in China. Unlike previous literature, this paper analyzes the impact of strengthened regulations on the minimum wage system on the selection of labor contract term and employment patterns.

The rest of this paper is as follows: the second part establishes a testable theoretical model; the third part introduces the development of China's minimum wage system, data description and model setting; the fourth part shows the empirical results; and the fifth part is research conclusions.

2. Theoretical models

Based on the current employment practices in China, there are three main categories of employees: permanent employees, contract employees, and temporary employees. However, the exact nature and requirements of these categories can vary depending on the specific circumstances of the labor market, as well as the regulations outlined in the *Labor Law of the People's Republic of China* and *Labor Contract Law of the People's Republic of China*. In light of these factors, the following assumptions can be made about the different employment patterns in China.

[3] Given the limitations of space, the appendices have been excluded, however, they can be provided upon request.
[4] Data are compiled by the authors based on China Health and Nutrition Survey.

2.1. Recruitment cost

Recruiting new employees incurs costs for firms, such as recruitment advertisements, organizational assessments, and on-the-job training during the probationary period. This paper assumes that the cost of hiring a permanent or contract employee is C.

In comparison, the cost of recruiting temporary employees is generally lower due to their shorter employment period and potentially lower training requirements. As such, this paper assumes the cost of hiring a temporary employee to be $(1-b)C$, where b is a factor between 0 and 1 representing the relative decrease in cost compared to hiring a permanent or contract employee.

2.2. Output and wages

Based on the research conducted by Sun and Li (2010), it has been concluded that after controlling for factors such as labor productivity and other relevant characteristics, there is no wage discrimination between permanent employees and contract employees. Thus, it is assumed that both permanent employees and contract employees who produce the same output y per unit time receive the same wage denoted as w.

Temporary positions filled by workers have unstable output and may face a certain idle period (Berton and Garibaldi,2012). For the purposes of this analysis, the output of temporary employees per unit time is assumed to be $(1-a)y$, where a is a factor between 0 and 1 that represents the degree of decrease in output compared to permanent or contract employees. The enterprise accordingly pays temporary workers a wage of $(1-a)w$.

The minimum wage directly affects the income of low-income earners, and at the same time, an increase in the minimum wage will also increase the income of other income groups. (see Appendix B for its proof).[5]

2.3. Probability of zero output

Similar to Melitz (2003) who posits that firms have different productivity levels, this paper proposes that there is a certain probability that firm positions will not produce output due to changes in market demand. To model the probability of zero output, we adopt the method introduced by Cahuc et al. (2016) and assume that the distribution of this probability follows an exponential distribution with parameter λ.The density function of the probability of zero output is: $f(t)=\lambda e^{-\lambda t}$, and corresponding distribution function can be written as: $F(t)=1-e^{-\lambda t}$. Without considering recruitment and layoff costs, we assume that employees can be hired and dismissed at any time, so the expected firm profit of the whole life cycle can be expressed as $\int_0^{\infty}(y-w)e^{-\lambda t}dt=\int_0^{\infty}[\int_0^{T}(y-w)dt]\lambda e^{-\lambda T}dT$.[6] If a firm only signs a contract with employees for the period of Δ, the expected output of the firm in this period is $\int_0^{\Delta}(y-w)e^{-\lambda t}dt$.

2.4. Layoff cost

This paper incorporates the cost of employee layoffs into the model, which is directly related to the salary of the employees. Specifically, the layoff cost for permanent employees is assumed to be Fw, where w is the wage of the employee. Contract employees, on the other hand, can be dismissed by the firm without incurring layoff costs within the contract period. However, if a labor dispute arises, employees have the right to demand fulfillment of the labor contract, and the probability of the firm paying the remaining wages after dismissing the employee within the contract period is denoted as p.[7] Additionally, we assume that the layoff cost for temporary employees is zero.

According to the above settings, the profits of firms employing permanent employees can be expressed as follows:

$$\pi_p(w,\lambda)=\int_0^{\infty}\left[\int_0^{T}(y-w)dt-Fw\right]\lambda e^{-\lambda T}dT-C, \tag{1}$$

where $\pi_p(w,\lambda)$ denotes the profits of firms employing permanent employees. The first item on the right $\int_0^{T}(y-w)dt$ denotes the difference between the accumulated output and wages paid by firms in period T. At moment T, permanent employees do not have output, and firms dismiss the permanent employees with the layoff cost Fw. In addition, $\lambda e^{-\lambda T}$ denotes the probability density of zero output at moment T, and C denotes the recruitment cost.

[5] In order to simplify the model, this paper does not consider the discount value of the expected output. If the discount value is considered, the predictions obtained are basically consistent with the findings presented in this paper.

[6] On the left side of the equation $e^{-\lambda t}$ can be written as $\int_t^{\infty}\lambda e^{-\lambda t}dt$ which measures the probability of zero output after moment t; and after substitution and exchange of integration sequence, the right side of the equation can be deduced.

[7] The *Labor Law of the People's Republic of China* of 1995, Article 98, states the employer that revokes labor contracts or purposely delays the conclusion of labor contracts in violation of the conditions specified in this Law shall be ordered by labor administrative departments to make corrections and assume responsibility over compensation for any losses that may be sustained by laborers therefrom. Additionally, according to Article 48 of the *Labor Contract Law of the People's Republic of China* of 2008, if an employer revokes or terminates a labor contract in violation of the law and the worker requests continued performance of the contract, the employer must continue to fulfill the terms of the contract. If the worker does not make such a request or if it is impossible to continue performing the labor contract, the employer must pay compensation in accordance with the provisions set forth in Article 87 of the law.

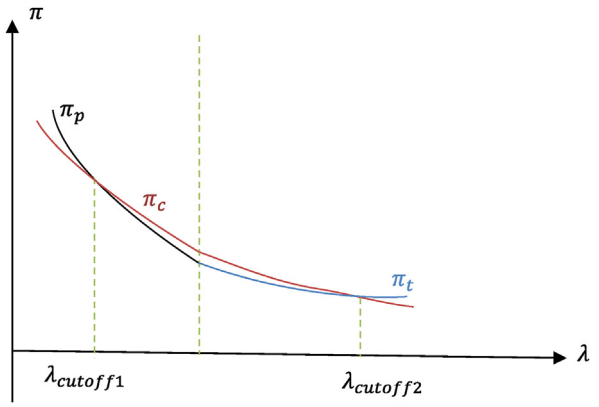

Fig. 1. Changes in profit function of firms employing permanent, contract and temporary workers with uncertainty.

After integration, the profit of firms employing permanent workers can be re-written as follows:

$$\pi_p(w,\lambda) = \frac{1}{\lambda}(y-w) - Fw - C, \tag{2}$$

Similarly, in the case of employing temporary employees, the profit function can be expressed as:

$$\pi_t(w,\lambda) = \int_0^{\infty}\left[\int_0^{T}[(1-a)(y-w)]dt\right]\lambda e^{-\lambda T}dT - (1-b)C, \tag{3}$$

where $\pi_t(w,\lambda)$ denotes the profit of firms employing temporary employees, and the first item on the right $\int_0^T (1-a)(y-w)dt$, denotes the difference between accumulated output and wages paid by firms in period T. At time T, temporary employees are not generating output, and as a result, firms terminate their employment. The recruitment cost is $(1-b)C$, and the layoff cost is 0.

In the case of employing temporary employees, the profit of a firm can be re-written as

$$\pi_t(w,\lambda) = \frac{1}{\lambda}(y-w) - \frac{a}{\lambda}(y-w) - (1-b)C. \tag{4}$$

When a firm employs fixed-term contract workers with the contract term of Δ, the profit function of the firm is

$$\pi_c(w,\lambda,\Delta) = p\int_0^{\Delta}\left(ye^{-\lambda T} - w\right)dT + (1-p)\int_0^{\Delta}(y-w)e^{-\lambda T}dT + max\left[\pi_p(w,\lambda),\pi_t(w,\lambda),0\right]e^{-\lambda\Delta} - C, \tag{5}$$

where $\pi_c(w,\lambda,\Delta)$ denotes the profit of firms employing contract employees. The right side of the function is divided into two parts. The first part is firm profit within the contract term. We assume that firms dismiss employees in the contract period, with the probability p of labor disputes. When labor disputes arise, firms need to fulfill the contract. In this case, there is no output of this job, and the profit can be expressed as $\int_0^{\Delta}(ye^{-\lambda T} - w)dt$. In addition, there is a probability of $(1-p)$ that firms directly dismiss employees without paying additional wages for the remaining contract term. In this case, the firm profit is $\int_0^{\Delta}(y-w)e^{-\lambda T}dT$. The second part is the firm profit after the contract period. After the contract period, firms can choose employing permanent employees or temporary employees, or not employing workers. However, firms will not hire contract employees again, because Δ has already been the optimal term for hiring contract employees. The second part is the largest discount value of profit of employing permanent employees or temporary employees, or not employing workers.

Assuming that the probability of no output from the job is not very high, which makes $\pi_p(w,\lambda)$ and $\pi_t(w,\lambda)$ greater than zero. Combined with equations (2) and (4), the firm can choose the optimal contract term by setting the first-order condition of equation (5) with respect to Δ. As a result, the optimal contract can be expressed in terms of λ and w[8]

$$\Delta(\lambda,w) = \begin{cases} \dfrac{1}{\lambda}ln\left(1+\dfrac{F\lambda}{p}+\dfrac{C\lambda}{pw}\right) & \lambda \le \dfrac{ay-aw}{Fw+bC} \\ \dfrac{1}{\lambda}ln\left(1-\dfrac{a}{p}+\dfrac{ay}{pw}+\dfrac{(1-b)C\lambda}{pw}\right) & \lambda > \dfrac{ay-aw}{Fw+bC} \end{cases}. \tag{6}$$

[8] According to Equation (2), when $\lambda < \frac{y-w}{Fw+C}$, the profit of employing permanent employees is larger than 0. According to Equation (4), if $y > w$ and $a < 1$, the profit of employing temporary employees will be larger than 0, which is obviously true.

According to Equation (5), the profit function of firms employing contract workers can be rewritten as follows:

$$\pi_c(w,\lambda) = \frac{1}{\lambda}(y-w) - \Delta(\lambda,w)pw - C. \tag{7}$$

Combining equations ((2), (4), (6) and (7), we can obtain Lemma 1:

$$max\{\pi_p,\pi_c,\pi_t\} = \begin{cases} \pi_p(w,\lambda) & \lambda \to 0 \\ \pi_c(w,\lambda) & \lambda \to \lambda^* \\ \pi_t(w,\lambda) & \lambda \to \infty \end{cases}, \tag{8}$$

Where λ^* denotes the value of λ when $\pi_p = \pi_t$.[9]

As $\pi_p(w,\lambda)$, $\pi_c(w,\lambda)$ and $\pi_t(w,\lambda)$ monotonically decrease with λ, changes in firms' profit function under different employment patterns with uncertainty are shown in Fig. 1.

As can be seen from Fig. 1, there is $\lambda_{cutoff1}$ with the same profit for permanent employees and contract employees. Therefore, we obtain Lemma 2 as follows:

When the profits of permanent employees and contract employees are the same, $\lambda_{cutoff1}$ meets the following condition:

$$F = \frac{p}{\lambda} ln\left(1 + \frac{F\lambda}{p} + \frac{C\lambda}{pw}\right). \tag{9}$$

Similarly, there is $\lambda_{cutoff2}$ with the same profit for contract employees and temporary employees. Then, we obtain Lemma 3 as follows:

When the profits of contract employees and temporary employees are the same, $\lambda_{cutoff2}$ meets the following condition:

$$\frac{ay-aw}{\lambda} = \frac{pw}{\lambda} ln\left(1 - \frac{a}{p} + \frac{ay}{pw} + \frac{(1-b)C\lambda}{pw}\right) + bC. \tag{10}$$

From Lemma 2 and Lemma 3, we can obtain the following predictions, respectively (see Appendix B for the proof).

Prediction 1: with the increasing minimum wage, firms employ less permanent employees, but more contract employees and temporary employees.

Prediction 2: with the increasing minimum wage, firms employ more temporary employees, but less permanent employees and contract employees.

Combining Prediction 1 and Prediction 2, we obtain the following hypothesis.

H1. with the increasing minimum wage, firms tend to employ short-term employees.

As Bernard et al. (1995) pointed out, wages of employees in a firm are not the same. Due to differences in individual characteristics, workers with different abilities have wage differentials. Those with high abilities get high wages and those with low abilities get low wages (Cahuc et al., 2006). According to Ye et al. (2015), in firms with 300–3000 employees, wages of 11.6% employees are between 100% and 110% of the minimum wage, and their wages are directly affected by the minimum wage. The wages of low-skilled workers are directly affected by the minimum wage, while effects on the wages of other groups are different. Based on Grossman (1983), this paper deduces the impact of the increase in minimum wage on high-skilled groups, and concludes that the impact of minimum wage on high-skilled groups is lower than that of low-skilled groups. This is also consistent with the empirical results of Hau et al. (2020) based on firm-level wage data. Thus the minimum wage has a larger impact on low-income groups. Combining Hypothesis 1, we obtain that the minimum wage effect (i.e., trend of employing short-term workers) mainly affects low-skilled employees. Therefore, the following hypothesis can be obtained.

H2. the increase in minimum wage has a larger impact on the employment pattern of low-skilled workers.

In the following parts, we will empirically test Hypothesis 1 and Hypothesis 2.

3. Institutional background, data description and empirical model

3.1. Minimum wage system in China

The minimum wage is a crucial policy tool for promoting income equality and safeguarding labor rights, especially for individuals and groups with low incomes. The majority of countries worldwide have implemented a minimum wage system, and in 1984, China adopted this policy with the ratification of the *Minimum Wage Fixing Convention of the International Labour Organization*. Subsequently, the implementation of minimum wage laws in China picked up pace in 1989, beginning with a pilot program in Zhuhai City, Guangdong Province, and then expanding to other cities in the following years. In 1993, the *Regulations Concerning Minimum Wage in Enterprises* were introduced and integrated into the *Labor Law of the People's Republic of China*, officially establishing the minimum wage system in China.

[9] Combining the profit functions (2) and (4), we can obtain $\lambda^* = \frac{ay-aw}{Fw+bC}$. To meet the requirements of Equation (8), We set $\frac{F(ay-aw)}{p(Fw+bC)} > \ln\left(1+\frac{(Fw+C)(ay-aw)}{pw(Fw+bC)}\right)$ which can be deduced from $\pi_c(\lambda^*) > \pi_p(\lambda^*)$ *or* $\pi_c(\lambda^*) > \pi_t(\lambda^*)$.

In 2004, the Ministry of Labor and Social Security of the People's Republic of China implemented the *Minimum Wage Regulations*, which brought significant changes to the previous minimum wage system. These regulations expanded the scope of the minimum wage by introducing monthly and hourly minimum wage rates, which apply to all firms, institutions, and individual businesses. In addition, the regulations increased the penalties for violating the minimum wage regulations, with fines escalating from 20-100% to 100–500% of the wages owed. Furthermore, the regulations stipulated requirements for the implementation of the minimum wage, with local governments assuming responsibility for supporting its implementation and ensuring that the minimum wage is adjusted at least once every two years.

In China, the adjustment of the minimum wage is primarily determined by provincial governments (Fang and Lin, 2015), with adjustment frequencies specified in strengthened regulations reflecting significant policy orientation. As a national policy, the Minimum Wage Regulations of 2004 are difficult for firms to anticipate and prepare for, thus rendering the minimum wage an exogenous shock to firm behavior (Gan et al., 2016). Because the minimum wage is closely linked to firms' labor costs, a considerable number of studies have examined its impact on firm behavior (Fan et al., 2018; Hau et al., 2020).

3.2. Data description and variable definition

There are three different data sets used in this paper.

(1) Data of China Health and Nutrition Survey (CHNS). CHNS is a longitudinal study that has been conducted nine times between 1989 and 2011, covering 11 provinces and municipalities. The survey provides data on individual economic, employment, health, and dietary characteristics and includes detailed information such as gender, age, community number, years of education, employment status, occupation, firm ownership, and wage level. The survey's broad coverage across regions and the longitudinal nature of the data makes it an invaluable resource for researchers studying changes in economic, health, and nutritional outcomes in China over an extended period.
(2) Minimum wage standards of prefecture-level cities (1997–2011). Data are obtained mainly from local government websites, bulletin boards and statistical bulletins.
(3) Macroeconomic variables at the city level. The data come from CEIC data.

The variable used to measure employment patterns is obtained from the CHNS questionnaire and consists of the position types of respondents. To ensure consistency in the sample, this study excludes self-employed individuals, family workers, and other situations, limiting the analysis to employed individuals.[10] Using the employment pattern information, we define the variable *Short* indicating short-term employment. Specifically, permanent employees are defined as 0, contract employees as 1, and temporary employees as 2.

The primary independent variable in this study is the minimum wage standards in local areas. To accurately measure the impact of minimum wage on employment patterns, this paper follows the approach of Fan et al. (2018) using the natural logarithm of the minimum wage standard of each prefecture-level city ($\log(Minwage)$)as the main explanatory variable,. Since the geographic location of individual respondents within a city is unknown, this study employs the highest level of the minimum wage in each city as a proxy for the minimum wage experienced by the respondents.

Descriptive statistics of the main variables are shown in Table C1 and Table C2 of Appendix C.

3.3. Empirical model

According to the above analysis, we set the following empirical equation:

$$Short_{it} = \alpha + \beta\ log(Minwage_{ct}) + \gamma X_{it} + \kappa X_{ct} + \varphi_c + \varphi_t + \varphi_j + \varepsilon_{it}, \tag{11}$$

where $Short_{it}$ represents the employment pattern of individual i in year t,. $Minwage_{ct}$ *is the minimum wage standard of prefecture-level city c in year t.* Individual characteristics, including gender, age, education level, and full-time employment status, are denoted by X_{it}.[11] City characteristics, including urban GDP and urban population density, are denoted by X_{ct}. φ_c denotes the community fixed effect, and is used to control the impact of communities on individuals; φ_t denotes the year fixed effect, and is used to control the impact of different years on individuals; and φ_j denotes the job fixed effect related to income type. This paper focuses on the sign and size of β, which reflects the impact of the change in minimum wage on the trend of employing short-term workers.

Based on related literature (Wang et al., 2019), this paper uses the implementation of the Minimum Wage Regulations in 2004 as an exogenous shock, the following empirical equation is established:

$$Short_{it} = \alpha + \beta_1\ log(Minwage_{ct}) + \beta_2\ log(Minwage_{ct}) \times Post2004 + \gamma X_{it} + \kappa X_{ct} + \varphi_c + \varphi_t + \varphi_j + \varepsilon_{it}, \tag{12}$$

Post2004 serves as the year dummy variable when 1 represents the year of 2004 and beyond, 0 represents the period before 2004.

[10] Following Fan et al. (2020), this study restricts the sample to individuals who are of legal working age. However, to account for the potential effect of rehiring retired workers on the findings, we have included males aged 60 and above and females aged 55 and above in our sample.

[11] To determine whether workers are full-time or not, we follow the approach of Xiang et al. (2016) and check whether their weekly working hours exceed 40 h.

Table 1
Benchmark regression.

	(1)	(2)	(3)	(4)
log(Minwage)	0.152*** (5.38)	0.189*** (5.92)	-0.0623 (-0.75)	-0.141 (-1.46)
log(Minwage) × Post2004			0.198*** (2.75)	0.317*** (3.56)
Gender		-0.0843*** (-5.45)		-0.0841*** (-5.44)
log(Age)		-0.281*** (-9.27)		-0.281*** (-9.24)
Educate		-0.146*** (-19.58)		-0.146*** (-19.57)
Fulltime		-0.0128 (-0.71)		-0.0140 (-0.77)
log(GDP)		0.127*** (3.19)		0.117*** (2.95)
log(Popdens)		0.175 (1.60)		0.0941 (0.84)
Community FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Job FE	Y	Y	Y	Y
Observations	13835	9839	13835	9839
AdjustedR^2	0.308	0.351	0.309	0.351

Note: ***, ** and * denote significance levels of 1%, 5% and 10%, respectively. And $t(z)$ statistics of estimators clustered at the individual level are in brackets. The same below.

The definitions of other variables are the same as those in Equation (11). In addition, β_1 represents the impact of the increase in minimum wage before 2004 on employment patterns, while $\beta_1 + \beta_2$ represents the impact of the minimum wage in 2004 and beyond on employment patterns. The value of β_2 reflects the effect of the new regulations on minimum wage in 2004. Given that the regulations on minimum wage were strengthened with the implementation of the minimum wage system, the sign of β_2 in Equation (12) is expected to be consistent with that of β in Equation (11).

4. Empirical results

To provide evidence for our theoretical expectation, this section investigates the impact of the increase in minimum wage on employment patterns.

4.1. Benchmark regression results

Columns (1) and (2) of Table 1 present the results of a regression analysis examining the impact of minimum wage on employment patterns, as specified in Equation (11). The regression includes fixed effects for community, year, and job. In Column (2), additional individual and macro characteristics are included as control variables. Individual characteristics such as gender, age, education level, and employment status (full-time or not) are controlled for in Column (2), as are macro characteristics like urban GDP and population density. In both columns, the coefficient for the logarithm of the minimum wage is significantly positive, indicating that an increase in the minimum wage is associated with a significant increase in the probability of employing short-term workers. Specifically, in Column (2), the overall impact of the increase in minimum wage on the trend of employing short-term workers is 0.189, which is statistically significant. This finding supports Hypothesis 1, which suggests that increasing the minimum wage will lead to an increase in the use of short-term workers.[12]

To examine whether the impact of minimum wage on employment patterns changes with strengthened regulations on minimum wage, this paper uses Equation (12) for regression, and the results are presented in columns (3) and (4) of Table 1. Column (3) does not involve control variables, while Column (4) includes control variables at both the individual and city levels. The results show that regardless of control variables, the coefficient for β1 is not statistically significant, while the coefficient for β2 is significantly positive. This suggests that prior to the implementation of new regulations in 2004, the minimum wage had no significant impact on the trend of employing short-term workers. However, after the issuance of the new regulations, the impact of the increase in minimum wage on the trend of employing short-term workers was significantly enhanced.[13] In Column (4), it is found that after the implementation of the new regulations in 2004, the average impact of the increase in minimum wage on the trend of employing short-term workers increased by 0.317 compared to before 2004. Combining the results in columns (1) and (2) of Table 1 and it can be concluded that the increase in the minimum wage increases the probability of employing short-term workers.[14]

As the core explanatory variable '*Short*' is a discrete variable, the paper employs a Tobit model to test the benchmark results. The regression results of the Tobit model, as shown in Table C3 of Appendix C, are found to be consistent with the benchmark results, indicating that the test model used in the empirical analysis does not impact the conclusions of this paper.

To mitigate endogeneity concerns, the paper introduces additional variables to the benchmark regression. Specifically, in columns

[12] The benchmark regression results show that female workers are more likely to become short-term workers than male workers. Moreover, young people and groups with low-level education are also more vulnerable to the effect of minimum wage.
[13] As the year fixed effect is controlled, the coefficient of post2004 is absorbed.
[14] This paper also uses the median or lowest level of minimum wage in prefecture-level cities to test the benchmark results, and find that the conclusions do not change.

Table 2
Regression by distinguishing permanent and temporary employees.

	(1)	(2)	(3)	(4)
	Permanent	Permanent	Temporary	Temporary
log(Minwage)	-0.658*** (-4.68)	0.113* (1.79)	0.0735*** (4.44)	-0.0279 (-0.57)
log(Minwage) × post2004		-0.219*** (-3.81)		0.0974** (2.16)
Individual CV	Y	Y	Y	Y
Macro CV	Y	Y	Y	Y
Community FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Job FE	Y	Y	Y	Y
Community FE	Y	Y	Y	Y
Observations	9839	9839	9839	9839
Adjusted R^2	0.285	0.323	0.322	0.285

Note: The control variables at the individual level in this paper include individual gender, logarithm of age, education level, and whether the individual is a full-time employee. The control variables at the macro level include logarithm of urban GDP and logarithm of urban population density. The same below.

Table 3
Group regression by time period.

	(1)	(2)	(3)	(4)
	Before2004	Before2004	After2004	After2004
log(Minwage)	0.284 (1.48)	0.106 (0.47)	0.0805* (1.69)	0.163*** (3.25)
Individual CV	N	Y	N	Y
Macro CV	N	Y	N	Y
Community FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Community FE	Y	Y	Y	Y
Observations	4308	2470	9523	7357
Adjusted R^2	0.336	0.349	0.314	0.358

(1) and (2) of Table C4 in Appendix C, macroeconomic variables such as GDP growth rate, logarithm of urban employees, and logarithm of CPI are added to the model, and the results are generally consistent with those of the benchmark regression. Additionally, the paper includes control variables at the firm level, such as employee size and the fixed effect of firm ownership, in columns (3) and (4) of Table C4 in Appendix C. The results indicate that the conclusions drawn in the paper are robust and not influenced by the inclusion of these variables.

In addition, this paper constructs instrumental variables for the minimum wage variable. Two instruments are used: the first instrumental variable is constructed using the average minimum wage of other cities in the same provincial region, and the second is constructed using the average minimum wage of other cities in the same group based on GDP per capita. The regression results using these instrumental variables are presented in Table C5 of Appendix C. Columns (1) and (2) report the results using the first instrumental variable, which are largely consistent with the benchmark results. Columns (3) and (4) present the results using the second instrumental variable, which show no significant impact on the benchmark conclusions. The use of these instrumental variables provides additional evidence that the findings of this paper are robust and not affected by endogeneity.

This paper tests Hypothesis 1, which is derived from Prediction 1 and Prediction 2 in the theoretical model. To test the predictions, the paper replaces the explained variable with "whether an employee is a permanent worker or a temporary worker" and uses Equation (11) to examine the consistency of the empirical results with the theoretical model. Columns (1) and (3) of Table 2 present the empirical results, which show that, after controlling for individual and macro variables, an increase in minimum wage significantly reduces the probability of employing permanent workers and increases the probability of employing temporary workers.

To test the impact of strengthened regulations on minimum wage on different employment patterns, Equation (12) is used. Columns (2) and (4) of Table 2 control for variables at the individual and macro levels. The regression coefficient of the interaction term for permanent employees is significantly negative, indicating that the strengthened regulations on minimum wage reduce the number of firms employing permanent workers. Conversely, the regression coefficient of the interaction term for temporary employees is significantly positive, indicating that the strengthened regulations on minimum wage increase the probability of firms hiring temporary workers. As the explained variable is a binary variable, the Logit model is used for testing. The results, presented in Table C6 of Appendix C, are consistent with those in Table 2.

4.2. Grouping

The benchmark results show that before 2004, the minimum wage has no significant impact on the trend of employing short-term workers. However, after implementation of the new regulations in 2004, the minimum wage has a significant impact on the trend of

Table 4
New employees and retired employees being rehired.

	New employees		Retired employees	
	(1)	(2)	(3)	(4)
	Short	Short	Being rehired	Being rehired
log(Minwage)	-0.423* (-1.82)	-0.722** (-2.46)	-0.0106 (-0.90)	-0.0487** (-1.96)
log(Minwage) × post2004	0.433** (2.12)	0.815*** (3.02)	0.0203* (1.94)	0.0577*** (2.58)
Individual CV	N	Y	N	Y
Macro CV	N	Y	N	Y
Community FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Community FE	Y	Y	Y	Y
Observations	2929	2076	37247	20208
Adjusted R^2	0.312	0.384	0.0323	0.0558

Table 5
Impact on fixed work forms.

	(1)	(2)	(3)	(4)
	Fixed wages	Fixed wages	Fixed working hours	Fixed working hours
log(Minwage)	-0.00552*** (-3.47)	-0.00513** (-2.51)	0.0767 (1.54)	0.0753 (1.40)
log(Minwage) × post2004			-0.0791* (-1.77)	-0.124** (-2.47)
Individual CV	N	Y	N	Y
Macro CV	N	Y	N	Y
Community FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Community FE	Y	Y	Y	Y
Observations	23324	17595	24987	18977
Adjusted R^2	0.997	0.997	0.287	0.388

employing short-term workers. Therefore, this paper uses Equation (11) for grouping regression for the periods before 2004 and the year of 2004 and beyond, and studies the different effects of the increase in minimum wage on the trend of employing short-term workers in these two periods. Research results are shown in Table 3. Columns (1) and (2) in Table 3 show that the increase in minimum wage has no significant impact on the trend of employing short-term workers before 2004. Columns (3) and (4) reflect the impact of the increase in minimum wage on the trend of employing short-term workers in 2004 and beyond. After adding control variables at the individual and city levels to Column (4), the coefficient is positive and significant at the level of 1%. This is consistent with columns (3) and (4) in Table 1.

The paper performs regression using samples in adjacent years to control the impact of unobservable time-varying variables on the conclusions due to the long sample period. The regression results are presented in Table C7 of Appendix C. Columns (1) and (2) show the results of 2004–2006, and columns (3) and (4) show the results of 2009–2011. The findings indicate that the coefficient of minimum wage is significantly positive, regardless of the control variables at the individual and city levels. This suggests that the increase in minimum wage tends to make the employment pattern more short-term, which is consistent with the benchmark conclusions of the paper.

4.3. Mechanism analyses

By using Equation (12), this study explores the effect of minimum wage increases on the employment patterns of new employees. The regression results, presented in columns (1) and (2) of Table 4, indicate that strengthened minimum wage regulations result in a tendency toward short-term employment patterns for new employees.

To explore the possibility that firms might choose to rehire retired employees instead of hiring new ones due to the greater flexibility of their employment terms, this paper conducted further analysis using Equation (12). In this analysis, the explained variable was replaced with a variable indicating whether the firm rehired retired employees or not, with a value of 1 assigned to the rehired retired employees and 0 assigned to non-retired employees. The results of the regression analysis are presented in columns (3) and (4) of Table 4. The findings of the study suggest that the strengthened regulations on minimum wage lead firms to preferentially rehire retired employees, which supports the conclusions of our earlier analyses.

If firms prefer to hire short-term employees, it is likely that the wage structure for such workers will become more flexible. Consequently, any increase in wages may affect the wage form of employees. To explore this issue, the survey data includes a question on the wage form of respondents. Specifically, this study defines employees with fixed wages as having a value of 1, and employees with unfixed wages as having a value of 0. Since data on this variable is only available in the surveys conducted in 2004 and after, this study uses Equation (11) to examine the impact of minimum wage on whether employees receive fixed wages. The regression results are presented in columns (1) and (2) of Table 5. Regardless of the individual and macro-level control variables used, the coefficient of the

Table 6
Employees changing jobs and trend of employing short-term workers.

	(1)	(2)	(3)	(4)
	Changejob	Changejob	Short	Short
log(Minwage)	-0.0204 (-1.55)	-0.0437 (-1.58)		
log(Minwage) × post2004	0.0400*** (3.24)	0.0551** (2.13)		
Changejob			0.426*** (16.35)	0.415*** (12.91)
Individual CV	N	Y	N	Y
Macro CV	N	Y	N	Y
Community FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Community FE	Y	Y	Y	Y
Observations	37580	20381	15752	10771
Adjusted R^2	0.0290	0.0420	0.313	0.354

logarithm of minimum wage is significantly negative. This finding suggests that an increase in minimum wage reduces the likelihood of employees receiving fixed wages.

To further investigate the prevalence of fixed wages in firms, this research paper examines the working hours of employees. Since employees with fixed wages typically have set working hours, the study defines a daily working period of 8 h as 1, and 0 otherwise, in order to examine the impact of minimum wage on fixed working hours. The research employs Equation (12) for empirical regression, and the findings from columns (3) and (4) of Table 5 reveal that β1 is not statistically significant, while β2 is significantly negative. These results suggest that before 2004, changes in minimum wage did not affect the prevalence of fixed working hours, whereas the strengthened regulations on minimum wage in 2004 had a significantly negative impact on fixed working hours. These results align with the earlier conclusions of the study regarding the effect of minimum wage on the likelihood of employees receiving fixed wages.

This paper suggests that an increase in minimum wage can cause firms to prefer short-term workers, assuming that firms have a significant influence over labor relations. However, if employees have greater control over employment patterns, the opposite may be true. With higher wages, employees may be more inclined to pursue stable and long-term relationships with employers rather than short-term jobs. Therefore, in order to better support the theoretical model presented in this paper, it would be necessary to further distinguish the probability of career switching among employees.

This study utilizes Equation (12) to investigate whether changes in minimum wage affect the likelihood of workers changing jobs. The dependent variable is transformed into a binary variable that indicates whether an employee has switched jobs, with a value of 1 representing a job change and 0 indicating no change. The empirical results, as shown in columns (1) and (2) of Table 6, demonstrate that β1 is statistically insignificant, while β2 is significantly positive. This suggests that the change in minimum wage before 2004 did not impact job-switching behavior, while the reinforced minimum wage regulations in 2004 significantly increased the probability of workers changing jobs. The study also reveals that firms have a crucial role in determining employment patterns, which is consistent with the current situation of the labor market in China.

Since farmers' income is not tied to the minimum wage, the primary impact of minimum wage changes falls on non-farmers. To investigate this further, a placebo test was conducted using Equation (12), with the explanatory variable changed to whether employees have changed jobs in the past. This study aims to examine the impact of minimum wage changes on the likelihood of career switches for both farmers and non-farmers. The regression results are presented in Table C8 of Appendix C. The findings from columns (1) and (2) indicate that there is no significant effect of minimum wage increases on the probability of farmers changing jobs after controlling for individual and macro-level variables. However, columns (3) and (4) demonstrate that more stringent minimum wage regulations increase the likelihood of non-farmers changing jobs.[15]

Using Equation (11) and converting the minimum wage logarithm to a binary variable representing whether an employee has changed jobs, this paper investigates the effect of job mobility on the trend of hiring short-term workers. The regression results are presented in columns (3) and (4) of Table 6. After controlling for individual and macro-level variables, we find that employees who change jobs are more likely to be employed on a short-term basis, suggesting a shift towards more temporary employment arrangements.

The findings of this paper suggest that the minimum wage leads to a reduction in the probability of hiring permanent employees and an increase in the probability of employing temporary workers. Additionally, this paper examines the effect of the minimum wage on individual employment. Using Equation (12), we redefine the dependent variable as a binary variable representing whether an individual has a job or not, with 1 representing having a job and 0 representing not having a job. Regression results are presented in columns (1) and (2) of Table C10 in Appendix C, and show that both β1 and β2 are statistically insignificant, indicating that the minimum wage has no significant effect on individual employment. Moreover, we divide the employment groups into the self-employed and the employed. Using Equation (12), we redefine the dependent variable as a binary variable representing whether an individual is self-employed, with 1 representing self-employment and 0 representing being employed by others. The regression results are presented in columns (3) and (4) of Table C10 in Appendix C, and show that the increase in the minimum wage does not have a significant impact

[15] As the employment patterns of SOEs may have their own characteristics, this paper conducts regression without considering the samples of SOEs. Results are shown in columns (1) and (2) of Table C9 in Appendix C, which show that the benchmark conclusions of this paper are still valid. Further, this paper removes the samples of collective firms. As shown in columns (3) and (4) of Table C9 in Appendix C, the benchmark results are still robust.

Table 7
Impact on workers of different educational and income levels.

	(1)	(2)	(3)	(4)
	Low-Educate	Low-Educate	Low-Income	Low-Income
log(Minwage)	0.00046 (0.00)	-0.0328 (-0.25)	-0.0143 (-0.15)	0.0442 (0.43)
log(Minwage) × Post2004	0.128 (1.25)	0.204 (1.62)	0.159* (1.86)	0.137 (1.42)
log(Minwage) × Lowedu	-0.278** (-2.35)	-0.294** (-2.36)		
Lowedu × Post2004	-1.447** (-2.20)	-1.562** (-2.19)		
log(Minwage) × Post2004 × Lowedu	0.259** (2.16)	0.277** (2.16)		
log(Minwage) × Lowinc			-0.284*** (-2.67)	-0.263** (-2.10)
Lowinc × Post2004			-1.694*** (-2.86)	-1.481** (-2.09)
log(Minwage) × Post2004 × Lowinc			0.303*** (2.79)	0.269** (2.08)
Individual CV	N	Y	N	Y
Macro CV	N	Y	N	Y
Community FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Community FE	Y	Y	Y	Y
Observations	13045	9839	12055	8991
Adjusted R^2	0.323	0.416	0.271	0.332

on the incidence of self-employment.

4.4. Heterogeneity test

The minimum wage is known to disproportionately affect low-skilled workers, making it reasonable to assume that they are more susceptible to changes in the minimum wage rate. In light of this, we aim to test the impact of a minimum wage increase on low-skilled workers by modifying the empirical equation for heterogeneity testing as follows:

$$y_{it} = \alpha + \beta_1 \log(\text{Min } wage_{ct}) \times post2004 \times Lowedu_{it} + \beta_2 \log(\text{Min } wage_{ct}) \times Post2004 + \beta_3 \log(\text{Min } wage_{ct}) \times Lowedu_{it} + \beta_4 Lowedu_{it} \times Post2004 + \log(\text{Min } wage_{ct}) + \beta_6 Lowedu_{it} + \gamma X_{it} + \kappa X_{ct} + \varphi_c + \varphi_t + \varphi_j + \varepsilon_{it} \quad (13)$$

The left-hand side of Equation (13) represents the employment pattern, as with the definition mentioned above. On the right-hand side, a binary dummy variable, $Lowedu_{it}$, is included. $Lowedu_{it}$ equals 1 if the education level of employees is at or below the median education level of the sample, and 0 otherwise. This paper employs a triple interaction model to examine the effect of minimum wage on employees with different skill levels. Theoretically, the impact of minimum wage should be larger for employees with lower skill levels, implying that β1 would be significantly greater than 0. Regression results are presented in columns (1) and (2) of Table 7. In column (1), no control variables are added at the individual or macro level, while column (2) includes such controls. The results indicate that strengthened regulations on minimum wage increase the probability of short-term employment for low-education groups, which is consistent with the main findings of this paper.

This paper also examines income level as a source of heterogeneity. Equation (13) is again used with $Lowedu_{it}$ replaced by $Lowinc_{it}$, a variable that measures low income. If an employee's income falls below the mean of the sample, $Lowinc_{it}$ equals 1, otherwise it is 0. The focus is on the coefficient of the triple interaction term. Regression results are presented in columns (3) and (4) of Table 7. Column (3) does not include control variables at the individual or macro level, while column (4) does. The results suggest that the negative impact of minimum wage on the employment pattern is particularly pronounced for low-income groups, which reinforces the conclusions drawn in this paper.

5. Conclusions

The COVID-19 pandemic over the last three years has made flexible employment a popular topic. Many businesses are struggling due to high labor costs and difficulties in managing finances. This is especially challenging for small to medium-sized businesses that rely on manual labor. Adjusting employment to manage uncertainty has become an important part of firms' decisions, but there is still not enough research available on the topic.

This paper explores the effects of an increase in the minimum wage and the strengthening of minimum wage regulations on employment structures, using both theoretical models and empirical analyses. The results show that an increase in the minimum wage leads to an increased tendency among firms to hire short-term workers, and that the effect of minimum wage is magnified by strengthened regulations. Furthermore, the phenomenon of hiring short-term workers is found to be more significant among low-skilled groups. The theoretical mechanism behind these findings is that as labor costs rise, firms are more likely to establish short-term labor relationships with employees to mitigate the risks posed by production uncertainty.

While hiring short-term workers can help firms manage market risks, it has also led to a rise in temporary and irregular employment,

as well as hidden unemployment. As such, the government needs to not only enhance minimum wage policies and promote fair distribution of income, but also take steps to regulate firm employment practices and address the potential issues associated with the increasing reliance on short-term workers.[16] Although the *Labor Contract Law of the People's Republic of China* primarily aims to promote long-term employment through open-end contracts, its intended objectives have not been fully realized due to various factors such as loopholes in legal regulations, unique features of China's labor market, and limited enforcement capabilities. To achieve a more balanced and effective labor security system, future improvement to labor-related laws should take into account both the minimum wage and the labor contract term to ensure a balance between the security and flexibility of labor laws and improve their social security functions.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

Appendix B

Derivation of the Impact of Minimum Wage on Employee Income

Suppose that manufacturers in Department 1 employ two types of workers, non-technical workers and technical workers. Non-technical workers receive the minimum wage m, and there are L_u of them. The average labor output of technical workers (L_s) is related to the effort level θ, as in Grossman (1983). The effort level is determined by the actual wage and its level relative to the minimum wage, and is defined to be positively correlated with $\frac{w^k}{m}$, where k > 1, If manufacturers are price takers, they achieve cost minimization by choosing the wage level for technical workers :

$$\min_{w} C = mL_u + \frac{wL_s(L_u, y)}{\theta\left(\frac{w^k}{m}\right)}, \tag{B1}$$

Based on the first-order condition, we can obtain the following equation:

$$\mathrm{w} = \left(\frac{\theta \mathrm{m}}{\mathrm{k}\theta'}\right)^{\frac{1}{\mathrm{k}}}, \tag{B2}$$

where θ' is the first derivative of effort, and higher actual wages and higher relative wages lead to greater effort, thus θ' > 0. Additionally, since θ > 0 , k > 0, the wage of technical workers will also increase correspondingly as the wage of non-technical workers (minimum wage) increases. Assuming that θ and θ'change relatively little, the wage increase for technical workers will be smaller than that of non-technical workers due to k > 1.

Derivation of Property 1 and Property 2

Formula (9), $F = \frac{p}{\lambda}\ln\left(1 + \frac{F\lambda}{p} + \frac{C\lambda}{pw}\right)$, can be rewritten as:

$$\frac{e^{\frac{\lambda F}{p}} - 1}{\frac{\lambda F}{p}} = \frac{C}{Fw} + 1, \tag{B3}$$

As the left side of the equation is an increasing function of λ, it can be inferred that when w increases, λ decreases. Therefore, with the increase of minimum wage, the value of $\lambda_{cutoff1}$ that makes the profits of permanent and contract workers equal will decrease. This

[16] Existing literature believes that job uncertainty and lack of incentive mechanism lead to efficiency loss of temporary jobs (Anwar et al., 2011; Davy et al., 1997). Cahuc et al. (2016) found that the replacement of a large number of permanent employees by temporary employees significantly reduced the total output. Compared with permanent employees, short-term workers are more likely to feel anxious and disappointed about the jobs (Davy et al., 1997, etc.).

implies that the probability of a firm hiring permanent workers will decrease while the probability of hiring contract workers will increase.

Taking the first derivative of λ with respect to w in equation (10), we can rearrange to obtain:

$$\left(1+\frac{1-b}{b}\frac{pw}{pw-aw+ay+(1-b)c\lambda}\right)\frac{d\lambda}{dw}=-\frac{a}{bC}-\frac{p}{bC}\ln\left(1-\frac{a}{p}+\frac{ay}{pw}+\frac{(1-b)C\lambda}{pw}\right)+\frac{1}{bC}\frac{pay+p(1-b)C\lambda}{pw+ay-aw+(1-b)C\lambda}, \tag{B4}$$

Combining the mathematical relationship: $\forall t>0$, $\ln(1+t)\geq\frac{t}{1+t}$, the right-hand side can be rewritten as:

$$\frac{-1}{bC}\frac{a^2y-a^2w+a(1-b)C\lambda}{pw+ay-aw+(1-b)C\lambda}, \tag{B5}$$

Obviously, since equation (B5) is less than zero, it can be concluded that $\frac{d\lambda}{dw}<0$.Therefore, as the minimum wage increases, the value of $\lambda_{cutoff2}$ decreases. This means that the probability of firms hiring contract workers decreases, while the probability of hiring long-term workers increases.

Appendix C

Table C1
Regression Variables and Data Sources

Type	Variable	Meaning	Data Source
Dependent Variable	Short	The job types are defined as follows: permanent employment is defined as 0, contract employment is defined as 1, and temporary employment is defined as 2.	CHNS
	Permanent	The definition of permanent employment is designated as 1, while other forms of employment designated as 0.	
	Temporary	The definition of temporary employment is designated as 1, while other forms of employment are designated as 0.	
	Changejob	A value of 1 is assigned to indicate a job change, while a value of 0 is assigned to indicate no job change.	
	Fixincome	A value of 1 is assigned to indicate fixed wages, while a value of 0 is assigned to indicate non-fixed wages.	
	Fixtime	A value of 1 is assigned to indicate an average of 8 working hours per day, while a value of 0 is assigned to indicate non-8 working hours.	
Explanatory Variable	Minwage	The minimum wage standards for the city	Local government websites, etc
	Gdp	The annual GDP value of the city	CEIC Economic
	CPI	The consumer price index of the city in the current year	Database
	GDPGrowthRate	The annual growth rate of GDP in the city	
	Popdens	The population density per unit area in the city	
	Employ	The average number of employed individuals in the city	
	Gender	0 for female, 1 for male	CHNS
	Age	Worker's age	
	Educate	Level of education	
	Firmsize	Size of the employing company	
	Fulltime	Define a workweek of 40 h or more as 1, and less than 40 h as 0	
	Lowinc	Income below the average income is defined as 1, and income at or above the average income is defined as 0	
	Lowedu	Defining low education level as individuals in the sample with educational attainment at or below the median, represented by 1, and those above the median as 0	

Table C2
Descriptive Statistics of Regression Variables

Variables	Mean	Standard Deviation	10th Percentile Value	90th Percentile Value
Short	0.593	0.803	0	2
Permanent	0.61	0.488	0	1
Temporary	0.020	0.401	0	1
Changejob	0.086	0.282	0	0
Fixincome	0.430	0.495	0	1
Fixtime	0.484	0.500	0	1
Minwage	440.21	311.38	200	930
GDP	1111.52	1480.40	152.78	2707.23
Age	39.10	11.47	23.6	54.2
Educate	2.86	1.290	1	5
Popdens	481.19	259.69	144.34	843
lowedu	0.687	0.464	0	1
lowinc	0.460	0.498	0	1

(*continued on next page*)

Table C2 (*continued*)

Variables	Mean	Standard Deviation	10th Percentile Value	90th Percentile Value
Fulltime	0.822	0.383	0	1
CPI	101.84	102.30	100.47	103.49
GDPGrowthRate	0.203	0.414	0.08	0.241
Employee	50.384	34.763	16.87	103.42
Firmsize	2.19	0.79	1	3

Note: There are 52 sample cities, with recorded years being: 1997, 2000, 2004, 2006, 2009, and 2011. The unit of GDP is RMB 100 million, the unit of Popdens is thousand people per square kilometer, and the unit of Employee is ten thousand people.

Table C3
Baseline Regression Results for Tobit Model

	(1)	(2)	(3)	(4)
	Short	Short	Short	Short
log(Minwage)	0.678*** (4.55)	0.924***(4.79)	-0.645 (-1.42)	-1.113* (-1.79)
log(Minwage) × post2004			1.215*** (3.11)	1.941*** (3.45)
Individual CV	N	Y	N	Y
Macro CV	N	Y	N	Y
Community FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Community FE	Y	Y	Y	Y
Observations	13836	9841	13836	9841

Table C4
Adding Additional Control Variables and Fixed Effects

	(1)	(2)	(3)	(4)
	Short	Short	Short	Short
log(Minwage)	0.219*** (5.82)	-0.176 (-1.41)	0.225*** (6.19)	-0.123 (-1.03)
log(Minwage) × post2004		0.349*** (3.30)		0.308*** (3.08)
Gender	-0.0593*** (-3.60)	-0.0591*** (-3.59)	-0.0372** (-2.31)	-0.0367** (-2.27)
log(Age)	-0.241*** (-7.26)	-0.241*** (-7.27)	-0.174*** (-5.39)	-0.175*** (-5.41)
Educate	-0.124*** (-15.59)	-0.124*** (-15.57)	-0.0479*** (-5.67)	-0.0478*** (-5.66)
Fulltime	0.389*** (5.01)	0.332*** (4.16)	0.357*** (4.71)	0.307*** (3.92)
log(GDP)	-0.00564 (-0.29)	-0.00636 (-0.33)	-0.0120 (-0.63)	-0.0128 (-0.68)
log(Popdens)	-0.00494 (-0.04)	-0.0444 (-0.32)	-0.0403 (-0.28)	-0.0603 (-0.42)
GDPGrowthRate	-0.0686*** (-3.00)	-0.0742*** (-3.25)	-0.0818*** (-3.31)	-0.0866*** (-3.51)
log(CPI)	-0.157*** (-11.59)	-0.157*** (-11.56)	-0.108*** (-8.22)	-0.107*** (-8.18)
log(Employee)	-0.0412 (-0.96)	-0.0321 (-0.74)	-0.0595 (-1.47)	-0.0515 (-1.27)
Firmsize			-0.140*** (-11.93)	-0.140*** (-11.89)
Individual CV	Y	Y	Y	Y
Macro CV	Y	Y	Y	Y
Community FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Community FE	Y	Y	Y	Y
Observations	13835	9839	13835	9839
Adjusted R^2	0.308	0.351	0.309	0.351

Table C5
Instrumental Variables

	(1)	(2)	(3)	(4)
log(Minwage)	0.207** (2.19)	-0.377** (-2.09)	0.213** (2.50)	0.0496 (0.37)
log(Minwage) × post2004		0.713*** (3.82)		0.242* (1.91)
Individual CV	Y	Y	Y	Y
Macro CV	Y	Y	Y	Y
Community FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Job FE	Y	Y	Y	Y
Community FE	Y	Y	Y	Y
Observations	9355	9355	9355	9355
Adjusted R^2	0.0339	0.0338	0.0339	0.0345

Table C6
Multinomial Logit Regression

	(1)	(2)	(3)	(4)
	Permanent	Permanent	Temporary	Temporary
log(Minwage)	-0.658*** (-4.68)	0.460 (1.01)	0.733*** (4.23)	-0.672 (-1.20)
log(Minwage) × post2004		-1.061*** (-2.59)		1.318*** (2.58)
Individual CV	Y	Y	Y	Y
Macro CV	Y	Y	Y	Y
Community FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Job FE	Y	Y	Y	Y
Observations	9839	9839	9839	9839

Table C7
Comparison with Similar Years

	(1)	(2)	(3)	(4)
	04–06	04–06	09–11	09–11
log(Minwage)	0.378** (2.07)	0.404* (1.94)	0.324*** (2.70)	0.441*** (2.91)
Individual CV	N	Y	N	Y
Macro CV	N	Y	N	Y
Community FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Job FE	Y	Y	Y	Y
Observations	4182	3556	5319	3782
Adjusted R^2	0.351	0.377	0.309	0.366

Table C8
Comparison between Farmers and Non-Farmers

	Farmers		Non-Farmers	
	Changejob	Changejob	Changejob	Changejob
log(Minwage)	0.0418*** (2.96)	0.0143 (0.22)	-0.101*** (-4.01)	-0.0375 (-1.26)
log(Minwage) × post2004	-0.0240* (-1.76)	-0.00581 (-0.09)	0.121*** (5.43)	0.0453* (1.71)
Individual CV	N	Y	N	Y
Macro CV	N	Y	N	Y
Community FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Job FE	Y	Y	Y	Y
Observations	17786	7667	18997	12691
Adjusted R^2	0.0328	0.119	0.0589	0.0596

Table C9
Excluding State-Owned and Collective Enterprises

	(1)	(2)	(3)	(4)
	Excluding State-Owned	Excluding State-Owned	Excluding State-Owned and Collective Enterprises	Excluding State-Owned and Collective Enterprises
log(Minwage)	-0.0786 (-0.86)	-0.191* (-1.79)	-0.0566 (-0.59)	-0.141 (-1.30)
log(Minwage) × post2004	0.209*** (2.66)	0.365*** (3.76)	0.220*** (2.66)	0.330*** (3.36)
Individual CV	N	Y	N	Y
Macro CV	N	Y	N	Y
Community FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Job FE	Y	Y	Y	Y
Observations	11967	8449	10005	7233
Adjusted R^2	0.324	0.371	0.360	0.411

Table C10
Impact on Employment

	(1)	(2)	(3)	(4)
	Employment	Employment	Self-Employment	Self-Employment
log(Minwage)	0.0161 (0.76)	-0.00637 (-0.44)	-0.0688*** (-3.32)	0.0227 (0.51)
log(Minwage) × post2004	0.0173 (0.91)	0.00607 (0.44)	0.0478** (2.53)	-0.0656 (-1.61)
Individual CV	N	Y	N	Y
Macro CV	N	Y	N	Y
Community FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Job FE	Y	Y	Y	Y
Observations	59240	20562	37335	20525
Adjusted R^2	0.395	0.0212	0.630	0.682

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