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# Employment and Working Hours Effects of Minimum Wage Policy in China

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## **Title Page**

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## **Executive Summary**

The effect of minimum wage policy on employment and working hours is crucial for assessing the overall effect of this policy. A large number of scholars studied this issue from both the theoretical and empirical perspectives, but still no consensus was reached. Under the background of economic rebalance which is a transition from the export-oriented economy towards domestic demand-oriented economy in China, this issue is triggering more intensive debate. This paper aims to provide new reliable evidence to this hot debate and fill the knowledge gap in the literature as well.

In the paper, a three-year pooled cross-sectional micro data obtained from the large dataset of China General Social Survey covering 28 out of the 34 provinces are used. By establishing regression-adjusted difference in differences models in the short and medium term respectively, a comparative analysis of minimum wage effect on employment and working hours is conducted.

The estimation results imply that the negative effect of minimum wage policy on employment and working hours is not very severe: although in the short term it will harm the low-wage male workers' employment and extend their working time, as time goes on, the negative effect will disappear. The Harris and Todaro model could give a possible explanation to the result. Besides, the paper provide the second explanation that the increase of labor productivity may create a space for the increase of minimum wage without hurting employment.

In terms of the working hours effect, the increase of minimum wage will extend the working hours for male workers in the short term, but reduce it in the medium term. We attribute this result which is different from many studies in the developed countries to the monthly wage dominant system in China. The longer working hours for male workers in short term may be explained as male workers who remain employed have to extend their working hours to compensate their increase of wage.

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## **Chapter 1 Introduction**

#### **1.1 Research Background**

The new round of minimum wage increase starting from 2012 in China makes minimum wage regulation a hot spot among academic circles, policy-makers and the general public. This old and popular tool mainly used to reduce poverty by European and American governments since a century ago attracts the attention of the Chinese government as China begins to emphasize a more regulated labor market. Between 2008 and 2012, the nation had registered 12.6% annual growth in minimum wage standards. From 2012 to the beginning of 2013, 24 regions across the country had raised their minimum wage levels. And there's a trend that more regions will adjust it with bigger magnitude in the future according to recent government reports: according to China's five-year plan for 2011-2015, the minimum wage should be raised by at least 13 percent annually and reach 40% of average urban salaries by 2015.

Why is China keen on increasing minimum wage? Unless most countries which use minimum wage mainly to reduce poverty and weaken employers' control on wages, the driver for China is more extensive: 1) reduce population in poverty 2) tackle the widening income gap between rich and poor 3) spur consumer spending and domestic consumption to make up for the loss of international trade 4) relieve the difficulties in recruitment in some regions, industries and enterprises 5) promote the enterprises to speed up the transformation and upgrade by strong labor cost pressure and so on. The plan of rebalancing economy and national goal of social stability also plays important role in the active enforcement of minimum wage provision.

However, can the effects of minimum wage policy meet China's expectations? The answer is uncertain according to theoretical and empirical research. Although the positive effect on reducing poverty can be proved, the controversial employment effect makes the net impact of minimum wage quite ambiguous. A wealth of literature shows that the minimum wage compresses the wage distribution and has a small adverse effect on employment (Sara Lemos, 2009), while David Metcalf (2007) found little impact of the employment effect in Britain and Stephen Machin and Alan Manning (1994) have estimated negligible or even marginally positive employment effects of the minimum wage.

In addition, China's special circumstances make things more complex. Migrant workers from rural areas who account for a big part of low-wage population may prick up social contradiction. The increased labor cost would worsen the already grave situation for export enterprises under the condition of the economic crisis in Europe and America. Therefore, the effectiveness of minimum wage as an economic policy tool in China needs to be checked in the dynamic environment and the employment effect should be the research focus.

#### **1.2 Problem Statement**

In order to delineate the problem addressed in the paper clearly, we start with the economics of minimum wage provision (see appendix 1). The effects of minimum wage provision can be identified in four main aspects reviewing the results of existing research. They are the effects on international trade, employment, poverty and spillover effects. In this part, the economics of minimum wage provision will be presented under the assumption of a competitive market and the problem addressed in this paper can be derived from it.

When increasing minimum wage, there are two direct influences: firstly, the labor cost increases. This results in greater pressure of factors of production on enterprises, especially for labor-intensive industries such as manufacturing and retail trade. In order to relieve the pressure, enterprises which pursue maximization profit will start to seek alternatives to cheap labor cost. Then the substitution effect appears. In a competitive market, each worker receives the value of his marginal product under competition. If a minimum wage is effective, it must therefore have two effects: First, the productivity of low-efficiency workers is increased. Second, workers whose services are worth less than the minimum wage are discharged and thus forced into unregulated fields of employment, or into unemployment or retirement from the labor force. In this case, there are also two possibilities for enterprises. First, the aggregate output is reduced due to less input of labor<sup>1</sup>. Second, enterprises tend to increase the labor productivity by introducing new techniques with less low-efficiency workers or more skilled-labors instead. The second possibility will bring a positive effect: industrial upgrading. However, both of these two cases end with an unemployment effect for low-efficiency workers. In addition, the labor cost increase reduces the price competitiveness of export products and therefore harms the international trade position. This leads to a decline of aggregate export output and consequently reduces job opportunities.

The second direct influence of minimum wage increase is the rise of low-wage labors' income. Then, there are three possible effects. First, a scale effect on employment shows up. Due to the increase of income, aggregate demand of society increases. Subsequently, the aggregate output increases and the domestic consumption increases. The output increase could create more employment opportunities. Second, the most desirable effect of minimum wage provision is to reduce poverty by increasing family income, which also could work on the domestic consumption. The last important effect that attracts a lot attention of economists is the spillover effect. Studies show

<sup>&</sup>lt;sup>1</sup> Here we assume that the factors of production curve remain the same.

that minimum wage rises have effects on wages beyond the increases required to bring those previously below the new minimum up to it by raising the relative price of low-skilled labor, more skilled labor, and reservation wages and so on. This effect has influence on the wage distribution and poverty gap.

The analysis above is a general economic model which could be applied to many countries under a series of assumptions. The effects of reducing poverty without affecting the federal budget is the main reason why minimum wage provision is so popular around the world although there is still no consensus on how effective it is. The main controversy on minimum wage exists in the employment effect. From the model, we can see employment effect is crucial to evaluate the net effect of minimum wage provision. If there is no unemployment effect, then the effect of reducing poverty will be significant. However, in theory the direction of employment effect cannot be concluded. Substitution effect and the effect on international trade have negative impact on employment while scale effect has positive impact. The net effect depends on which impact is stronger. In the field of empirical study, a number of papers have addressed this issue. But there is also no consistency due to different data sets and methods.

Furthermore, if we turn our attention to developing countries, the minimum wage literature contains limited evidence. The economics of the minimum wage is different in developing countries, where the minimum wage affects many more workers and labor institutions and law enforcement differ in important ways (Lemos, 2009). There is a knowledge gap. Here when we add the Chinese circumstances to the general economic model above, a more complex situation appears.

First, the migrant workers from rural areas account for a big part of the low-wage population. To reduce poverty and stimulate domestic demand, they should be at the center of poverty-reducing policy. However, as migrant workers are mostly concentrated in the informal sector, whether they are covered by the minimum wage provision and benefit from it is still a question.

Second, China's economy is shifting away from an export-oriented model towards one hinging on consumption and strong domestic demand. Economic rebalancing is a main goal for economic policy. However, such a transformation is facing significant challenges. Fast growth in recent decades has led to income inequality which runs counter to fostering domestic consumption, but has also been straining the fabric of Chinese society. The minimum wage provision is expected to be effective on spurring domestic consumption and narrowing wealth gap. The employment effect which is already crucial for reducing poverty has even more broader impacts in China.

To sum up, the problem addressed in this paper could be described as follows:

Without knowing the direction of the employment effect of minimum wage, is it a good

choice for China to enact this provision at the time of economy rebalancing from the export-oriented economy towards domestic demand-oriented economy ?

#### **1.3 Research Objective**

Based on the previous description of the problem, the main purpose of this paper is to evaluate the employment effect and working hours effect of minimum wage policy in China to fill the knowledge gap in the literature and provide new evidence to policy makers.

The objectives could be carried out by:

- Study the progressing process of minimum wage policy in China.
- Analyze the economy of minimum wage in Chinese context.
- Study the effect of minimum wage policy on employment and working hours in the short term and the relatively longer term using the latest dataset.

#### **1.4 Research Question**

In order to fulfill the objectives above, we need to answer the following questions during the analysis, including one main research question and some sub-questions. Our main research question is: what is the effect of minimum wage provision on employment and working hours in China?

The sub-questions are listed below:

- What is the current evidence of the effect of minimum wage on employment and working hours in China according to the literature?
- What is the implementation status of the minimum wage policy in China?
- What is the direction and magnitude of the employment effect and the working hours effect in China? How can the effect be explained?

#### **1.5 Research Methodology**

The main methodology used in this paper is empirical study. The increase of minimum wage can be viewed as a exogenesis intervention to the original labor market, then the provinces with a minimum increase and the provinces without a minimum increase form the experiment group and control group in a nature experiment. By using the individual data from China General Social Survey between 2005 and 2008, a difference in differences model is established to estimate the net difference between two groups.

Difference in differences is a quasi-experimental technique used in econometrics that

measures the effect of a treatment at a given period in time. In contrast to a within-subjects estimate of the treatment effect (that measures the difference in an outcome after and before treatment) or a between-subjects estimate of the treatment effect (that measures the difference in an outcome between the treatment and control groups), the DID estimator represents the difference between the pre-post, within-subjects differences of the experiment and control groups.

#### 1.6 Structure of the Paper

In chapter 2, a shorter literature review on the influential works of employment and working hours effect of minimum wage is conducted. The focus is on the research on China in recent years. Chapter 3 presents a comprehensive overview of minimum wage policy in China from three aspects: the development of minimum wage policy, the adjustment and supervision process and the implementation. Chapter 4 establishes the theoretical framework for assessing the employment effect of minimum wage legislation in China and provide a foundation for the empirical study. The attempt is made to focus on China's circumstances. Then, chapter 5, 6 and 7 elaborate the empirical process and results. In chapter 5, the experiment elements including experiment time, experimental subjects, control group and experiment group are introduced. Then, a difference in differences model (DID model) used to evaluate the impact of minimum wage legislation is built. Chapter 6 performs the descriptive analysis, which establishes a general concept of the minimum wage effects on employment and working hours in China. After that, chapter 7 gives the estimation results from the DID models and discusses the explanation for the results. Finally, chapter 8 presents the conclusions of the paper.

## **Chapter 2 Literature Review**

The employment effect of minimum wage increase is not only the main factor for evaluating minimum wage system, but also the foundation of analyzing other economic effects (human capital effect, wage distribution effect) of minimum wage increase. Therefore, a large number of authors have focused on this topic from both theoretical and empirical aspects. In theory, different theoretical frameworks draw inconsistent conclusions: in a competitive labor market, the increase of minimum wage will have adverse employment effect, while in a monopsony labor market, if the initial minimum wage standard is low, the employment effect is positive (Zavodny, 1998). In addition, the analysis under the framework of Harris-Todaro model finds that the employment effect can be positive, negative and even not obvious, depending on the value of the elasticity of demand for labor in the urban sector and the initial minimum wage level (Rapanos, 2005).

The inconsistent conclusion in theoretical study has been confirmed in empirical research. Card and Krueger (1993) used nature experiment method to study the impact of the increase in the New Jersey minimum wage on fast-food employment and found that no evidence showing the rise of minimum wage reduced employment. However, Sabia, Burkhauser, and Hansen (2012) used similar research methods of original Card and Krueger New Jersey study to analyze the effects of an increase in the New York state minimum wage from \$5.15 per hour in 2004, to \$7.15 per hour in 2007, an opposite result was found that raising the New York minimum wage significantly reduced employment rates of less-skilled, less-educated New Yorkers. Their research is criticized for the reason that it is difficult to generalize from a single case study and the estimation result could be only one possibility in the outcomes distribution. Therefore, Dube, Lester, and Reich (2010) essentially replicated Card and Krueger's study by comparing employment differences across contiguous U.S. counties with different levels of the minimum wage. This method solved the problem and the results displayed strong earnings effects and no employment effects of minimum wage increases which is in line with Card and Alan Krueger's study. Besides, Hirsch, Kaufman, and Zelenska (2011) also use the same industry - a sample of 81 fast-food restaurants in Georgia and Alabama - to study the impact of the 2007-2009 increases in the federal minimum wage by a before-and-after methods, they found that although the measured employment impact is variable across establishments, but overall not statistically distinguishable from zero. The same absence of a significant negative effect is found for employee hours, even when examined over a three-year period. These series of empirical study shows that even in the same country, using similar method and studying the same industry, the results can be contradictory. By reviewing the burgeoning literatures in this field, Neumark and Wascher (2006) pointed out that there is a wide range of existing estimates and, accordingly, a lack of consensus about the overall effects on low-wage employment of an increase in the minimum wage.

The inconsistency not only comes from different techniques, data periods and data sources, but also from the minimum wage level, enforcement and labor market particularities and institutions in each country (Lemos, 2009). Therefore, a comparison across international studies is more difficult. The complete review of a vast of volume of research on the employment impact of the minimum wage is beyond the scope of this paper. Next, the shorter review will highlight the influential works on minimum wage in China in recent years.

Since the minimum wage policy is only implemented in China for 20 years, the volume of research on this topic is not as big as in developed countries, but the uncertainty of the result is the same. In general, the empirical literatures on minimum wage in China can be separated into two strands: the research using time series model based on the macro economic dataset and the research using econometric models based on individual cross-section data.

The first group includes contributions from Luo (2007a, 2007b). The paper defined the Chinese labor market as a monopsony labor market. By establishing a regression model between the employment of migrant workers and macroeconomic indexes of GDP, minimum wage and the elasticity of GPD with respect to the employment of migrant workers between 1993 and 2005, a case study of Shanghai showed that the minimum wage can promote migrant worker employment. However, when the sample was extended to 31 provinces of China, the result showed that the minimum wage has a threshold, before this value, the increase of minimum wage standard had a positive effect over the rural-worker's employment, but after it, the effect turned to be negative. In addition, Shi (2009) used a similar method to investigate the employment effects between 1996 and 2006 from the national, sub-regional and sub-industry perspective respectively and concluded that nationwide, there was a slight negative employment effect in the year of minimum wage increase, and the effect became even smaller in the next year. There was a negative employment effect in the eastern and western regions, but the employment effect of the western region was significantly smaller than the eastern region. The increase in minimum wage didn't have a negative impact on the employment in manufacturing industry, but no impact on construction industry. Although the time series model has a relatively long study period, the macroeconomic data doesn't include the impact of individual characteristic on employment.

A typical study in the second group is Ding Shouhai's (2010) research using the difference in differences method. Based on the data gathered from 439 enterprises in Guangdong and Fujian provinces, the author found that the increase in the minimum wage in 2008 clearly affected the job market for migrant workers and its effect was even more severe than in 2007. However, the increase did not significantly affect the labor market in cities and towns. The author's analysis further points out that the major impact on the migrant worker labor market was occasioned by the intensified implementation of the law of Employment Contracts. However, the impact on the labor market in cities and towns was miniscule due to the effects of the dual

employment system specific to China. Another recent study using enterprise-level data is Ma shuang, Zhang Jie, Zhu Xi's work (2012). The paper evaluated the relationship among minimum wage, average wage and employment in Chinese manufacturing firms based on the exogenous variation of city-level minimum wages from 1998-2007. It is found that if the minimum wages increase by 10%, the average wages in firms would pick up by 0.4%-0.5% and employment loss by 0.6% or so. The minimum wage policy would contribute more to the average wages hikes of labor intensive firms or firms with lower asset per capita than to other firms. The negative employment effect of minimum wage is also supported by Xiao, xiaoyong (2009).

In addition to the impact on employment, it is also possible that employers may reduce working hours instead of employment in response to minimum wage increase for the simple reason that adjusting working hours is more easy and rapid than adjusting employment, particularly in the short run (Zavodny, 2000). So the impact of minimum wage may be underestimated if we ignore the possible working hours effect (Couch & Wittenburg, 2001). However, compared with the numerous study of employment effect, the study on hours effect is much fewer. Furthermore, there is no consensus on the direction of this effect either. The negative working hours effect is found by Michl (2000), Brown (1999), Neumark, Schweitzer, and Wascher (2004) and Stewart and Stewart and Swaffield (2008). While, Zavodny (2000) found that minimum wage increases may have small negative employment effects but do not appear to lower the number of working hours.

There are few authors investigating the working hours effect of minimum wage increase in China. The most influential one may be Jia and Zhang (2012). By using individual-level data, they found that the employment of male workers is not affected by minimum wage increase, but their working hours is increased as a result, while the employment of female workers is more likely to be negatively affected by minimum wages increase, but their working hours remain constant.

In summary, the literatures available for China give no consistent result on employment effect of minimum wage increase. The effect could be positive, negative or not obvious. In spite of the abundant econometric models, different source of data and research period adopted in the literature lead to incomparable estimation results. In addition, nearly no study focuses on the comparison between the employment effect in the short term and long term using a on-going dataset. Delayed policy effect which may always happen is ignored. Finally, little attention paid to the minimum wage effect on working hours, resulting in a lack of empirical evidence in this area. In order to fill the gap in the literature, a comparative analysis of minimum wage effect on employment and working hours using the lastest data in China is necessary.

# Chapter 3 Overview of Minimum Wage Policy in China

As early as 1938, the US government introduced the federal minimum wage rate by enacting the *Fair Labor Act*. Minimum wage regulations have been widely accepted in most developed countries. This century, China has undergone a process of regulating its labor market through the enactment of a flock of labor-related laws and regulations. Minimum wage is one of the most important regulations affecting the Chinese labor market. In this chapter, we have a comprehensive overview of minimum wage policy in China. First, the development of minimum wage policy is introduced. Then the adjustment and supervision process is explained. Finally, we analyze the implementation of minimum wage in China.

#### 3.1 Development of Minimum Wage Policy in China

The minimum wage was first introduced in China in 1993. The former Ministry of Labor issued the Enterprise Minimum Wages Regulation for the purpose of meeting the needs of the development of the socialist market economy, ensuring the basic necessities of laborers and their family members, and improving the quality of labor and the fair competition between enterprises. The regulation specified that the labors who have provided normal labor within the promissory working hours should be paid no less than the minimum wage standard by the employing entities. In principle, the minimum wage rate should be decided through the democratic consultation among the government, trade union and enterprises. The labor administrative department under the state council is responsible for the management of the national minimum wage system. While, the labor administrative department under the governments of provinces, autonomous regions and municipalities directly under the central government are in charge of the implementation of the minimum wage in their administrative areas. In general, the standards of minimum wages appear in the form of monthly minimum wage standard. It can also be converted to the form of weekly, daily and hourly minimum wage standard. The specific standards of minimum wage are set by provincial governments based on local living expenses, local average wages, labor productivity, unemployment rate and economic development and there is no national unified standard. This article provides considerable flexibility for provinces and cities in setting their minimum wages. Besides, the regulation requires the local governments to adjust minimum wages according to the change of factors above, but the adjustment frequency should not be more than once annually. This ambiguous condition leads to a inactive adjustment of minimum wage until 2004 in large extent. In the 1993 regulation, the minimum wage is applicable to all economic types of enterprises except township and village enterprises(TVE) and whether TVEs are included depends on the local policy made by the government of provinces,

autonomous region and municipalities directly under the central government. No uniform provision for TVEs is mainly due to two considerations: firstly, since the development degrees of TVEs in different provinces are quite uneven in 1990s, the institutional minimum wage may harm the development of some TVEs in the early stage. Secondly, most of the labors in the TVEs are migrant rural workers who also earn from agricultural and sideline products besides wages, so the income level for them is difficult to evaluate. Therefore, this regulation gives large policy space to the local governments to adjust based on their actual situations. However, it also leaves blind spots for governments to over protect local TVEs' benefit and consequently harm workers' interests. Furthermore, it reflects that the rural migrant workers problem had not gotten much attention from the central government at that time.

After the *Enterprise Minimum Wages Regulation*, in 1994, the eighth National People's Congress examined and approved the *Labor Law*, which first established a system of minimum wage in the form of national law. In 1995, 130 cities adopted this policy and started to set minimum wage standards. However, the implementation situation was not optimistic in the following 10 years. With ambiguous adjustment regulation and weak supervision rules, the minimum wage policy was insufficiently enforced.

In 2004, under the background of a growing gap between rich and poor and the desire of a domestic demand-led growth economy, the Ministry of Labor and Social Security issued the *Minimum Wage Regulation* to replace the *Enterprise Minimum Wages Regulation* in 1993, which symbolized the overall implementation of the minimum wage system in China. After this, both local and central governments started to use minimum wages to monitor the labor market (Du & Pan, 2009). Till 2012, Shenzhen has the highest monthly minimum wage at 1,500 Yuan (€183), and Beijing has the highest hourly wage at 15.2 Yuan (€1.85). The new regulation made some changes and improvements on the basis of the old one. The main differences are the following six aspects.

First, the applicable scope of the new regulation has widened and is more clear. The new regulation sets the applicable scope exactly the same as that of the labor law. It applies to the enterprises, private non-enterprise entities (such as voluntary school, private scientific research institution), individual industrial and commercial households with employees (hereinafter collectively referred to as employing entities) and the laborers who have formed a labor relationship with those employing entities. The state organs, public institutions and social bodies and the laborers who have formed a labor relationship with the present provisions. Certainly, the TVE which is special regulated in the old regulation is included in the new one. The explicit explanation of the applicable scope promotes both the enterprise's implementation and government supervision of minimum wage policy.

Second, the new regulation adds a hourly minimum wage standard. Thus, the

standards of minimum wages appear in two forms, namely the monthly minimum wage standard which applies to full-time employees and the hourly minimum wage standard for part-time employees. This change makes Chinese minimum wage regulation in line with the international ones and safeguard the part-time workers.

Third, the new regulation adjusts the content of minimum wage and requires it to consider the factors such as social insurance premiums and the public accumulation funds for housing paid by the employee themselves. This change makes the composition of minimum wage more reasonable and increase the standards and benefits the labors directly.

Forth, the new regulation explicit state that minimum wage in each province should adjust at least once every two years. This article provides legal basis for supervision and greatly promotes the implementation of minimum wage since 2004.

Fifth, the regulation adds a new article stating that the employing entities shall, within 10 days from the day when the standards on minimum wages are announced, announce the standards to all their laborers thereof. The article guarantees the workers to know the minimum wage standard in time, however since no supervision measures are illustrated, whether the enterprises will comply with it is a question.

Finally, the new regulation adjusts the employer's legal liability. If enterprises violate the provision of minimum wage, they should pay compensation to employees. In the 1993 regulation, the amount is set as 20 - 100 percent of the back salary. In the new regulation ,the amount increases to 100 - 500 percent of the back salary.

Although, the new adjusted minimum wage regulation still has a lot of shortcomings such as lack of explicit supervision measures, compared with the old one, it makes obvious progress. In further, it implies that the central government's starts to emphasis on increasing the income of low-wage population. In 2008, the *Labor Contract Law* further stipulates the workers in probation period are also protected by minimum wage. And in China's 12th Five-year Plan, a key target during 2011 to 2015 is to increase income through raising minimum wage and the minimum wage standard should increase by no less than 13 percent on average each year. Therefore, minimum wage is an important policy tool to solve livelihood problem in China. Increasing minimum wage is part of the whole strategy, and is the emphasis of government work.

#### 3.2 Adjustment and Supervision of Minimum Wage in China

The effect of minimum wage on employment greatly depends on the minimum wage level and its enforcement. Therefore, in this section, the regulating and supervising process of minimum wage is analyzed, highlighting the Chinese features of top-to-bottom policy making process, bottom-to-top supervising process and weak labor union. The institutions involved in the determining, adjusting and supervising minimum wage policy are mainly "government", "department of labor and social security", "labor union" and "league of enterprise". Due to China's hierarchical government organizational structure, these institutions are categorized as three levels, namely central level, provincial level<sup>2</sup> and local level<sup>3</sup> as shown in figure 3.1. Generally, the institutions at high level are in charge of the ones at low level within its administrative area.

The minimum wage standard is carried out at the local level but determined at the provincial level. First, the administrative department of labor and social security at the provincial level in consultation with the labor union and the league of enterprises at the same level formulates the program for determining and regulating the standards on minimum wages of its administrative regions. Then, the report should be submitted to the Ministry of Labor and Social Security(MLSS) at the central level. The MLSS collects opinions of the China Labor Union and the China League of Enterprises and provides advice on the revision of the program. If there is no advice within 14 days, the program is officially approved by the central level. After that, the minimum wage program should be reported to the people's government at the provincial level. Within 7 days from the day when the program is approved by provincial government, it should be announced through the bulletin of the local government and at least one newspaper circulated widely in the area. Then, the final standards will be reported to the MLSS again and the employing entities shall announce the standards to all their laborers within 10 days from the day when the standards on minimum wages are published. That finishes the determining and adjusting process of minimum wage standards.

<sup>&</sup>lt;sup>2</sup> Institutions at provincial level refers to the institutions of a province, autonomous region or municipality directly under the Central Government.

<sup>&</sup>lt;sup>3</sup> Institutions at local level refers to the institutions under provincial level, such as institutions of a prefecture city or a county.



#### Figure 3.1 Determining and supervising process of minimum wage standard

Note: The blue lines describe the determining process of minimum wage standard and the yellow lines describe the supervising process of implementation of minimum wage.

Among these actors, provincial administrative department of labor and social security is the real initiator and coordinator. Although the employees and enterprises do not participate in the process directly, the provincial labor union and league of enterprise should be on behalf of them respectively and safeguard their interests. However, the symbolic meaning of labor union in China considerably outweighs its practical significance. Labor union basically has no real function and becomes a department of enterprise in charge of organizing recreational activities and distributing benefits during festivals. The leaders in labor union are not elected by employees, but appointed by the managers of enterprises. In state-owned enterprises, the labor union even represents the interests of managers and becomes a tool to reassure employees. Therefore, whether the interests of employees are reflected in the minimum wage standards is a question. Furthermore, due to the top-to-bottom policy making style in China, the central government plays a significant role in the minimum wage regulating and enforcement process. Besides making regulations, its attitude directly affects the adjustment frequency, adjustment magnitude and supervising strength of minimum wage at the provincial and local levels. Thus, the continuity of minimum wage policy cannot be guaranteed. The bad implementation before 2004 and the active enforcement after that at provincial levels is a strong support for this point of view.

On the contrary with determining process, the supervising of minimum wage implementation is a bottom-to-up process. The administrative departments of labor and social security at or above the county level are responsible for the supervision and inspection over the employing entities' fulfillment of minimum wage provision within their administrative areas. In further, the labor unions of all levels shall conduct supervision over the implementation. If a labor union finds that any employing entity pays employees wages in violation of the present provisions, it has the power to require the local administrative department for labor and social security to deal with the case. So the supervision and inspection function is released to the local level which may not take part in the policy making process. Besides the powerlessness of labor union, the employees in small private-owned enterprises which may not have a labor union are insufficiently protected by this provision. It is rather difficult for the low-wage workers with less bargaining power and relatively weak legal consciousness to report the situation to the local administrative departments of labor and social security by themselves. In addition, the regulation only defines the supervision entities but doesn't define detailed measures and the punitive article - the enterprise should make up the wages owing to the laborers and it may be ordered to pay laborers compensations in the sum of one to five times of the wages owed within a time limit - is ambiguous and lacks in mandatory power.

In sum, although the process of regulating and supervising of minimum wage seems completely set, it will meet obstacles in practice considering China's actual conditions. The compromised minimum wage level and its enforcement will definitely influence the effect of minimum wage on employment and working hours.

#### 3.3 Implementation of Minimum Wage in China

This chapter aims to analyze the implementation of minimum wage provision in China using provincial and city level data. Attempts are made to answer the following three questions: first, how is the progressing of minimum wage in China since 1993? Second, what are the minimum wage standards for the current labor market? Third, is the minimum wage level suitable for China?

Basically, the minimum wage information is gathered from the "announcement of minimum wage adjustment" on the provincial government websites. The CPI, average wage and GDP data are collected from the "annual statistical bulletin of human resources and social security development " and "China labor statistical yearbook". In

spite of the fact that minimum wage was introduced into China as early as 1993, part of the information in the early years of its introduction is not available on websites either because of no access to it or no minimum wage implemented at all. In order to extend the study to a larger time series, for the minimum wage information in provincial and city levels between 1995 and 2001, we partly refer to Lili's (2012) collection. Although the secondhand data may limit our accuracy of research, the essential data features of minimum wage are captured.

Year	Number of provinces with minimum	Share of provinces with minimum		
	wage adjustment	wage adjustment (%)		
2001	9	29.03		
2002	15	48.39		
2003	12	38.71		
2004	25	80.65		
2005	11	35.48		
2006	28	90.32		
2007	20	64.52		
2008	20	64.52		
2009	0	0		
2010	30	96.77		
2011	24	77.42		
2012	25	80.65		

Table 3.1 Proportion of provinces with minimum wage adjustment: 2001-2012

Source: Calculate by the author.

As elaborated in section 3.1, the minimum wage policy was not sufficiently enforced until 2004 when the new *Minimum Wage Regulation* was issued. In 1994, the first year after minimum wage introduced, only 13 provinces adopted this policy and the number reached 28 in 1995. However, it was until 2004 when Tibet set its minimum wage standard, the minimum wage system had been overall implemented in China. The whole process took incredible 9 years, reflecting a bad enforcement and loose inspection of minimum wage policy from central to local governments.

In terms of adjustment frequency, from 1994 to the March of 2004, the average adjustment interval is 2.63 years for each province. While since 2004, according to the requirement that minimum wage should be adjusted at least once every two years, the adjustment frequency significantly speeds up: during the next 8 years from 2004 to 2012, except 2009 when the financial crisis was such severe that the central government halted the minimum wage adjustment to protect small and medium-sized enterprises, the average adjustment interval shortens to 1.35 years, which is greatly less than the statutory 2 years.

In addition to a faster frequency, the adjustment magnitude also keeps increasing.

Figure 3.2 presents the nominal and real minimum wage rates between 1995 and 2012. From it we can see that the average real minimum wage presents a similar trend as nominal wage. In general, the adjustments to the nominal minimum wage make up the increased price level (Du & Pan, 2009). The growing gap between real and nominal wage is due to a relatively high CPI (Consumer Price Index) value in base year 1995. The increase of minimum wage can be divided into four stages - 1995 to 1998, 1999 to 2003, 2004 to 2009 and 2010 to 2012 - each with a raised growth rate. And in the last stage, the growth rate has a significant boom. Between 2008 and 2012, the nation had registered 12.6% annual growth in minimum wage standards, which is 4.6 point higher than that between 1995 to 2004. In China's five-year plan for 2011- 2015, it is said that minimum wage should be raised by at least 13 percent annually. Thus, in the foreseeable future, the trend of rapid growth of minimum wage standards will continue.



Figure 3.2 Average minimum wage in nominal and real term: 1995-2012

Source: Data of year 1995 to 2001 refers to Li (2012)'s addendum; data of year 2002 to 2012 comes from announcements of minimum wage adjustment on provincial government websites. Note: The base year is 1995.

Year

Simply discussion of the trend of minimum wage cannot present the level of minimum wage standard, therefore, next we compare average monthly minimum wage with average wage in urban non-private enterprises, average wage in urban private enterprises and monthly per capita GDP.

The ratio of the minimum wage with respect to the average wage is an important indicator when evaluating minimum wage level. Figure 3.3 displays the average minimum wage, average wage in urban non-private enterprises and the ratio using provincial level data. From it we can see, the growth rate of average wage is greatly larger than minimum wage. Accordingly, the gap between them is dramatically extending. Basically, the ratio of the minimum wage with respect to the average wage

has been declining from 1995 to 2009 and then, from 2009 to 2012, there is a modest rise, but the level is still much lower than that in 1995. The trend implies that although government has speeded up the adjustment recent years, the increase of minimum wage cannot catch up with the increase of the average wage in urban non-private enterprises because of the significant increase of average wage in last decade and the late start of adjustment of minimum wage.



Figure 3.3 Average minimum wage VS average wage in urban non-private enterprises

Source: Average wage information comes from annual statistical bulletin of human resources and social security development, 1995-2012.

In 1995, the ratio was 0.46. Then, it dropped to the lowest point of 0.26 in 2009 and rose to 0.3 in 2012. The government has set the target of increasing minimum wage to 40% of average urban salaries by 2015 in the 12th five-year plan. Since there are just three years left, only the growth rate of minimum wage keeps at a higher level, the target can be achieved. Jia Peng (2012) compared the ratio of the minimum wage with respect to the average wage between China and OECD countries, the results shows that opposite to the trend of China, the ratio in OECD countries has been increasing gradually to above 0.35 in 2009. Therefore, the minimum wage level in China is lower than the international one, speeding up the adjustment step can help to match the international standard.

What should be noticed is that the information on average wage is based on reporting systems that take the employment of fix types of enterprises into account rather than labor market surveys. Therefore, it cannot sufficiently reflect the dynamic of labor

market and by excluding migrant workers and informal employment from the statistical system, the average wage of the urban labor market has been overestimated (Du & Pan, 2009). If we use the new index of average wage in urban private enterprises in the government bulletin since 2009, the ratio keeps around 0.04 from 2009 to 2012.

Although the trend of increase is consistent in the overall China, the gap of minimum wage standards between provinces and cities are still large due to uneven economic development. Figure 3.4 presents the minimum wage distribution in China in 2012. It reflects a regional difference of minimum wage standards: The southeast coastal area and the autonomous regions like Tibet, Inner Mongolia and Xinjiang tend to have a higher level of minimum wage, while the inland provinces like Gansu, Shan'xi and Guizhou have a lower level of minimum wage. Among 31 provinces in the mainland of China, Shanghai has the highest minimum wage level of 1450, which is 66.67% more than the lowest level of 870 in Jiangxi province.

In further, the minimum wage levels between different cities within the same province are very different as well. Basically, China's cities are categorized into four hierarchies according to the administrative level: the largest major cities, which are centrally administered such as Beijing and Shanghai, the vice-provincial-level cities which are usually capital cities of provinces, the prefecture-level cities, and the county-level cities (Du & Pan, 2009). Take Heilongjiang Province as an example, the minimum wages are also categorized into four levels: the highest level of 1160 is applicable to the capital city Harbin and the second largest city Daqing; the second level of 1050 is applicable to the most of the prefecture-level cities; the third level of 900 is applicable to the downtown of small prefecture-level cities and the country-level cities and the lowest level of 850 is applicable to counties. The standard of minimum wage is determined by local average wage, living expenses and economic development and etc. The huge difference between provinces and inside provinces directly reflects the huge gap between poor and rich in China.



Figure 3.5 Monthly minimum wage distribution in Heilongjiang: 2012



# Chapter 4 Theoretical Analysis of Employment Effect of Minimum Wage on China's Labor Market

This chapter aims to establish a theoretical framework used for assessing the employment effect of minimum wage legislation in China and provide a foundation for the empirical study. The attempt is made to focus on China's content. Since a minimum wage most likely has impact on the low-wage and low-skilled labor market, the characteristics of low-skilled labor market in China are analyzed first, emphasizing the *hukou* system, large-scale rural-to-urban migration, segmented labor market and the confusing labor shortage of recent years. Then we briefly review the economic models generally used to study minimum wage. Although numerous authors have generated models under different assumptions to evaluate the impact of minimum wage from classical, neoclassical and institutional economic perspective, the model most applicable to the circumstances of low-skilled labor marker in China seems the Harris-Todaro model in the framework of a dualist economy (Bahns, 2005).

## 4.1 The Characteristics of China's Low-Skilled Labor Market

In this chapter, the characteristics of China's low-skilled labor market are illustrated focusing on four issues: registered permanent residence system(Hukou system), rural-urban migration, labor market segmentation and unbalanced labor demand and supply. These characteristics distinguish China's labor market from the ones in developed countries and accordingly have a significant effect on the economics of minimum wage.

Although the four issues are elaborated separately for illustrative purposes, there are close relationships between them and as a whole they tell the story of China's low-skilled labor market: the underemployment in rural areas associated with urban expansion and the increasing gap between urban and rural area in terms of income, education and social welfare lead to a trend of rural-urban migration in China for many years. However, it is difficult for migrant workers to find a secure job in the formal sector in the city. Besides low education, the registered permanent residence system with Chinese characteristics, Hukou system, which limits the labor market mobility is also a main reason. This leads to the labor market segregation not only existing in the urban and rural labor market but also inside the urban labor market. An example is the segregation between the formal and the informal sector in cities. Since

2003, due to the growth of the cost of living, the income of low-wage positions in the informal sector hardly make up for migration workers' risks and costs. Therefore, with higher wage expectations, there is a strange phenomenon in China's low-skilled labor market that both labor shortage for small-sized enterprises and difficulties to find jobs for workers exist.

The minimum wage legislation is implemented in this context. Hence, it is necessary to have a basic understanding of the characteristics of China's low-skilled labor market before starting the theoretical prediction of the minimum wage effect.

#### 4.1.1 Hukou System

The hukou system in China, also known as the registered permanent residence system, uses residence permits to divide Chinese citizens into urban and rural dwellers. Individual's hukou status determines a person's access to state services. Under normal circumstances, a person with a rural hukou status is not eligible for state services in urban areas, and vice versa. In addition, changing the hukou status which is primarily inherited from one's parents at the time of birth is quite difficult and complex. Therefore, hukou itself becomes a kind of resource and has a significant impact on individual welfare. According to the social investigation of China Youth Daily, 78.5 percent of the respondents think that hukou system takes too much social function: the bigger of the cities, the more benefits and special resources tied to hukou. The resources include housing accumulation fund, medical insurance, endowment insurance, educational level, etc. To take an extreme example, a Beijing hukou is sold at the high price up to five hundred thousand Yuan (around sixty thousand euro) on the internet. Despite this expensive price, this kind of information still attracts a lot of attention from graduating students, oversea students and the parents who are looking for the opportunity of sending children to top schools in Beijing. Although the feasibility of hukou trade must be doubted, it reflects people's recognition of its intrinsic value.

Normally, the function of hukou system is defined as population movement control and resource allocation. However, this is not the whole story. At first, the hukou system is established to monitor population migration and mobility instead of controlling it. Actually, in the early 1950s, the movement between urban and rural area is relatively free. However, with the continuing rise of rural-to-urban migration, migrant workers' living and employment problem became a serious social problem and greatly increase burden on the city. The original order of urban labor market is disturbed by large number of migrant workers. In this context, the central government began to try to prevent the rural labor's "blind flow" and finally came up with the "Household Registration Ordinance" in 1958 which grants more power to the national institutions to control population flows by issuing registered permanent residence migration permit, certificate for school and so on. Although fifty years past, this system has still kept its original appearance and takes the responsibility of controlling population movement and resource allocation including labor resource between industry and agriculture, urban and rural area.

For low-skilled workers, a main distinction when finding jobs in cities is made between the one with a non-agricultural hukou and agricultural hukou. An agricultural hukou applies to the persons who permanently live in rural areas, while non-agricultural hukou, also called urban hukou applies to those living in towns and cities. A worker seeking to move from the rural to urban areas to take up non-agricultural work would have to apply through the relevant bureaucracies. The number of workers allowed to make such moves was tightly controlled. Migrant workers would require six passes to work in provinces other than their own. People who worked outside their authorized domain or geographical area would not qualify for grain rations, employer-provided housing, or health care. There were controls over education, employment, marriage and so on. Therefore, the hukou system has helped to create the societal-wide imbalance between rural and urban area and contributed to the formation of segmented labor market both between rural and urban labor market and inside urban labor market.

Due to historical reasons, there are two extra types of hukou existing in the current system, named "self-care food hukou"<sup>4</sup> and "blue stamped hukou". At the end of 1970s, China began the economic reforms and the emerging household responsibility system (HRS) eventually replaced collective production team system, which gives more freedom back to rural labors(Zhao, 2005). Due to the development of agricultural productivity, a large number of surplus labor emerged in rural area and the trend of rural-to-urban migration started. Under this background, the government created the "self-care food hukou" for migrants. The condition is that they have to do business or work in the urban enterprises, must have their own house in towns and prepare food for themselves. The blue stamped hukou appeared in 1992, aiming to control the privately urban hukou selling phenomenon in local governments. Unlike self-care food hukou which restricts appliers to the ones doing business in towns, the blue stamped hukou is open to bigger cities and towns like Guangzhou and Shanghai. Qualification for it is mainly based on the "contribution" to local area, which refers to investment amount or level of education and skills. Although the population with "self-care food hukou" and "blue stamped hukou" are also categorized as non-agricultural population, they don't have the same right to benefit from urban social welfare and subsidy as urban residents. This makes them disadvantaged in the labor market as well.

Since the establishment of hukou system, criticisms about it have never stopped. The main argument is that it has helped to expand the inequality between rural and urban area and contributed to the segmented labor market (Kuang & Liu, 2012; Park, 2008).

<sup>&</sup>lt;sup>4</sup> From 1955 to 1993, China practices planed economy. To control urban food demand and to facilitate food distribution, *a food rationing system* is established for urban residents. The food was traded by ration stamps. Only persons with urban hukou can be supplied ration stamps in a fixed amount. With "self-care food hukou", people cannot enjoy this right.

Thus, why does hukou system still play an important role in current China? According to Lin, Cai, and Li (2003), the deep motivation underlying hukou system is the need of tying farmers to the land so that cheap agricultural products can be provided to the industrial sector. This explanation is consistent with the situation of dual economy in China and the economic reform strategy that "allow some people get rich first, then the rich lead the poor, and ultimately achieve common prosperity". However, the official explanation for the existence of hukou system is even from a higher-level view: the hukou system is created to consolidate the socialist system, maintain the interests of the state. Managing population migration and allocating resources are just part of its functions. In this sense, the function of hukou system is to provide effective information and policy channels to fulfill national objectives (Chan & Zhang, 1999).

#### 4.1.2 Rural-to-urban Migration and Labor Market

#### Segmentation

The rural-to-urban migration is an inevitable result of China's rapid industrialization and urbanization. During the 12th five-year plan implementation period (2011-2015), the urbanization level aims to increase from 47.5% to more than 50%, which indicates a continuing migration wave from rural to urban area in the foreseeable future (Y. Zhang, 2011). In 2012 a total of 262.61 million migrant workers (an increase of 3.9% compared to 2011) existed in China. Out of these, migrant workers who left their hometown and worked in other provinces (trans-regional migrant workers) accounted for 163.36 million (an increase of 3% compared to 2011) and migrant workers who worked within their home provinces (local migrant workers) reached 99.25 million (an increase of 5.1% compared to 2011). Obviously, it has been a long time that migrant workers become the major component of low-skilled labor market and contribute to the urban development. However, how to eliminate identity discriminate, improve working environment and social welfare for this special group without compromising urban worker's welfare are still challenges to government. Migrant worker becomes a specific characteristic of China's labor market. In this section, the rural-to-urban migration in China will be analyzed focusing on its potential drivers and the employment situation of contemporary migrant workers. Additional, the segmented urban labor market is looked at for the purpose of understanding the coverage of minimum wage.

The potential driver for migration is generally thought as the income gap between rural and urban areas (Knight & Song, 2003; Tianhong, Maruyama, & Kikuchi, 2000). According to De Brauw and Rozelle (2008), migration significantly reduces poverty in rural areas, through increases in income and relaxation of credit and liquidity constraints. The classic Harris and Todaro's two sector model (Harris & Todaro, 1970) which analyzes the economy of a developing country is also established under this assumption. In China, although the growth rate of rural per capita net income exceeds urban growth rate since 2010, the income gap keeps growing as shown in figure 4.1.

Hence, we can conclude that income gap still drives rural-to-urban migration.

In addition, Appleton and Knight (2002) find that another important reason for rural-to-urban migration is the shortage of agricultural land using the data of Hebei province. Mullan, Grosjean and Kontoleon (2011) state that the incomplete land rights of secure possession and transfer in China limit the extent to which land can be used to finance migration. Therefore, agricultural land also has impact on the determination of migration. The rapid city spreading and the new policy which allows farmers to transfer land use right in the form of sub-contract, lease, exchange, transfer and stock cooperation, add weights to this argument.

Furthermore, as 1980s and 1990s generation become main labor force, the motivation of migration is more diverse. According to a investigation by *legal weekly*, young migrant workers give the same weight to "opening mind", "self development" and "learning new skills" as "increasing income" (J. Wu, 2013). This reflects that migration is not only a way of living, but also an opportunity to access to higher social status and get rid of the label of peasant. The high expectation largely affects young migrant workers' job selection. Compared with skilled jobs, the low-end positions in the hotels and catering industry or assembly work become the second choice due to the few developing opportunity. While the jobs like brick layer, carpenter in the construction industry which could increase personal skills are popular.



Figure 4.1 The income gap between rural and urban area

Source: Data are gathered from China statistical bulletin for national economy and social development: 2004-2012.

Note: Rural per capita net income<sup>5</sup>=Total net income of selected households/ Total number of

<sup>&</sup>lt;sup>5</sup> Rural per capita net income refers to the total income of rural residents from all sources minus all corresponding expenses. It was classified as the sum of income from wages and salaries,

permanent residents of selected households. Urban per capita disposable income <sup>6</sup>=Total disposable income of selected households/ Total number of permanent residents of selected households.

Although migration can improve migrant workers income greatly, their social status is not well protected. The social welfare and even basic civil rights cannot be guaranteed in the cities. Solinger (1999) have documented clear evidence of occupational discrimination. According to 1990 census data, nationally only 3 percent of all migrants were in professional, cadre, clerical positions compared with 24 percent for urban residents. It is common for the floating population to undertake jobs that the urban populace do not want at the wages offered (Yang & Guo, 1996). These jobs are often so-called "three-D" jobs - dirty, dangerous and demeaning jobs - which are common in industries such as construction and mining for males and sanitation and textiles for females (Shao et al., 2007). Reviewing the distribution of main industries that migrant workers engaged in 2008 to 2012, there is nearly no improvement for the bad employment situation.

					Unit: %
	2008	2009	2010	2011	2012
Manufacturing industry	37.2	36.1	36.7	36.0	35.7
Construction industry	13.8	15.2	16.1	17.7	18.4
Transportation, warehousing and post	6.4	6.8	6.9	6.6	6.6
Wholesale and retail industry	9.0	10.0	10.0	10.1	9.8
Hotels and catering services	5.5	6.0	6.0	5.3	5.2
Resident service and other service	12.2	12.7	12.7	12.2	12.2

Table 4.1 Distribution of the main industries that migrant workers engaged in

Source: The national monitoring report of migrant workers in 2012.

Besides the relatively low education level, the restriction for migrant workers to find formal jobs in urban area is the non-urban hukou status. Nearly all rural migrants are non-urban hukou, that is, legally they are "temporary" migrants, even though they may have lived and worked in the given destination for years. As analysis of previous

income from household operations, income from properties and income from transfers, minus household operation expenses, depreciation of fixed assets for production, taxes and fees paid, and gifts to non-rural relatives. In the actual course of the survey, wage income was mailed and returned income by the long-term migrant workers.

<sup>&</sup>lt;sup>6</sup> Urban per capita disposable income refers to the actual income at the disposal of members of the residents which can be used for final consumption, other non-compulsory expenditure and savings. This equals to the sum of income from wages and salaries, cash income from household operations, income from properties and income from transfers, minus income tax, personal contribution to social security and subsidy for keeping diaries in being a sample household. Currently, disposable income of urban residents included cash income received only.

chapter, this hukou status brings a lot of obstacles for migrant workers when finding jobs since many state-owned enterprises only employ non-urban residents. However, even so more than 80% migrant workers don't intend to transfer to urban hukou because giving up agricultural hukou means returning the contracted land to government, which is their survival foundation for several generations. This indicates that working in the informal sector for migrant workers is not a stepping stone on the way to formal sector employment, but an end in itself. Actually, there are three employment choices open to migrant workers in the urban sector: wage earners in the urban formal sector, wage earners in the informal sector, self-employed in the informal sector. According to Meng's (2001) study, the more educated migrants are more likely to be part of the self-employed group, while the less qualified will be wage-earners. However, the proportion of self-employment for migrant workers is quite low with only 4.7% for the trans-regional migrant workers and 27.2% for local migrant workers in 2012. Therefore, most of the migrant workers takes informal jobs. Including self employment, the urban informal sector plays an essential role in absorbing rural surplus labor in China.

The existence of the informal sector in the urban area in China is proved by many studies (Meng, 2001). It is characterized by free entry, reliance on indigenous resources, family ownership of enterprises, small scale of operation, labor-intensive and unregulated and competitive markets. The strong competition reduces workers bargaining power and the unregulated characteristic makes informal sector a black spot of legal regulation. Data shows that recent years the ratio of signing labor contract with employers keeps only 44%. In 2012 more than 75% of the migrant workers didn't have a labor contract in the construction industry. The ratio for manufacturing industry, which has the best situation, also reaches 48.8%. It is clear that workers' labor rights are easily breached because of the informality of the employment relationships. In addition, since the majority of workers found their jobs through personal networks, workers are more likely to tolerate mistreatments by the employer due to personal ties. This phenomenon further increases the difficulty of implementing minimum wage in the informal sector, which strongly affects the adjustment effect of minimum wage legislation on labor market.

#### 4.1.3 Uneven Labor Demand and Supply

An interesting phenomenon in China's labor market is that despite numerous labor surpluses in rural areas and high urban unemployment rate, some provinces are suffering from labor shortages. This phenomenon first appeared in 2003 as a shortage of migrant workers in the southeastern coastal cities like Guangzhou, Shenzhen where there are a mass of labor-intensive export enterprises. As the global financial crisis spread to China's booming manufacturing industry in 2008, 23 million migrant workers were laid off, which ended the first wave of labor shortage(Cai & Chan, 2009). However, just one year later when the economy had not fully recovered, the situation deteriorated to more severe level that a complete labor shortage sprawled from developed areas in Pearl River Delta, Yangtze River Delta economic circles to the inland cities which were big migrant workers send-out provinces, such as Hubei, Anhui and Henan. Take Jinjiang in Fujian province as an example, the labor shortage is up to 40%-70% in the labor-intensive industries like shoemaking. However, during these period China's working-age population maintains a steady growth and reached a new high of 940.72 million in 2011, which reflects a sufficient labor force in the market. At the same time, solving unemployment problem is the government's topmost priority. It is difficult to conceive that severe labor shortage would occur at a time when there is labor surpluses and unemployment is really high. The shortages and the abundance appear to be incompatible and paradoxical(Chan, 2010).



Figure 4.2 Working-age population: 2006-2012

Source: Data comes from China statistical bulletin for national economic and social development :2006-2012.

Some authors argue that the step-growth wage of migrant workers and the new wave of labor shortage indicate China has reached the Lewis turning point and entered a new era of labor surplus from a period of unlimited labor supply(X. Zhang, Yang, & Wang, 2011). This argument is challenged by many facts in China. It is easy to list several aspects of China's economy that are not consistent with the conditions of Lewis turning point. Firstly, the Chinese workers' wage is far below their marginal labor productivity. The marginal productivity of China's rural labor force is also far below that of urban labor force. Furthermore, the employment of migrant workers is characterized by seasonality and cyclicality, and most of them stay in the urban informal sectors since the formal sectors cannot provide enough positions. It is still far away for migrant workers to achieve full transfer from rural to urban area(H. Wu, 2012). More authors argue that China is still on the way of approaching Lewis turning point (Knight, Deng, & Li, 2011; Minami & Ma, 2010; Yao & Zhang, 2010), and attribute the labor shortage to the segmented labor market for a long time and the adjustments of people's livelihood policies in recent years. Therefore, the labor shortage does not mean that there is a lot of rural surplus labor in the market has been changed: it also does not mean that a rural labor transfer trend reversal occurred. More precisely, the labor shortage is a cheap labor shortage. There are various explanations for this phenomenon.

Firstly, due to the regional industrial transfer in China, the central and western regions host many labor-intensive manufacturing factories like Foxconn, which are almost homogenous as the enterprises in southern coastal regions. These new factories attract part of the labor force in the original labor market. When the wage gap between eastern and western enterprises are smaller, the relatively high living cost, far away from home province, expensive travel fare for southern cities reduce the attraction for migrant workers. More and more migrant workers tend to work in or near home provinces. This trend leads to the labor shortage by changing the distribution of migrant workers.

			Units: ten thousand			
	2008	2009	2010	2011	2012	
Rural migrant workers population	22542	22978	24223	25278	26261	
1.Trans-regional migrant workers <sup>7</sup>	14041	14533	15335	15863	16336	
(1) family in local area <sup>8</sup>	11182	11567	12264	12584	12961	
(2) family moving out <sup>9</sup>	2859	2966	3071	3279	3375	
2.Local migrant workers <sup>10</sup>	8501	8445	8888	9415	9925	

Table 4.2 The population of migrant workers: 2008-2012

Source: The national monitoring report of migrant workers in 2012.

Furthermore, segmentation in the labor market restricts rural-to-urban labor migration. The institutional constraints such as hukou system create difficulties for migrants living in urban areas - in respect of good and secure jobs, housing, and access to public services - and these deter or prevent migrant workers from bringing their families with them. This in turn makes many rural workers reluctant to leave the village, at least for long periods (Knight et al., 2011). For new-generation migrant workers, the survival situation of low wage, low welfare, low security cannot meet their expectation. The gap between "city dream" and the reality stops their footsteps to the city.

<sup>&</sup>lt;sup>7</sup> Trans-regional migrant workers refer to the migrant workers who leave their hometown and work in other provinces for more than six months in one investigation year.

<sup>&</sup>lt;sup>8</sup> The migrant workers with family in local area refer to the migrant workers who work outside hometown area but their family stay.

<sup>&</sup>lt;sup>9</sup> The migrant workers with family moving out refer to the migrant workers whose family also move out from hometown to the provinces they work in.

<sup>&</sup>lt;sup>10</sup> Local migrant workers refer to the migrant workers who engage in non-agricultural activities with their hometown province for more than six months in one investigation year.

In addition, in order to support the agricultural development and improve the living conditions of farmers, the government has implemented a series of preferential policies for the farmers since 2000. The actions like removal of agricultural tax, direct subsidies to farmers, conscientiously improve farmer's income level and tie farmers to the land. Therefore, the desire of migration is not strong as before and even a part of migrant workers flow back to rural areas.

### 4.2 Theoretical prediction of Minimum Wage Effect on

#### **Employment**

This section briefly reviews the main theoretical frameworks used to study the minimum wage. The purpose is to present a broad prediction of the effects of the minimum wage increase on employment and find a more applicable model for China's situation. First, we start with the traditional competitive model which is set in a purely competitive labor market. Next, the competitive assumption is relaxed and a monopsony model is introduced. Finally, we focus on the Harris and Todaro model under the framework of a dual economy since it is thought to fit well with China's facts in the aspects of the large rural-urban wage gap, high unemployment rate and rapidly growing informal sector(Bahns, 2005).

#### **4.2.1** Competitive model

The traditional model of the minimum wage effect is set in a purely competitive labor market with identical firms and homogeneous workers. Similar as other supply and demand curves, in this model the intersection of an upward-sloping labor supply curve and a downward-sloping labor demand curve determines the market-clearing equilibrium wage( $w^*$ ), which is equal to the value of marginal product of labor. The underlying assumptions are (1) firms maximize profits (2) the low-skilled labor market is competitive and firms have no monopsony power.

The statutory minimum wage( $w^{min}$ ) could be chosen lower, equal to or higher than the equilibrium wage. In the first case, the policy leaves space for the labor market to self-adjust by raising wages to stimulate the labor supply. Consequently, the minimum wage would not have an impact on employment as the labor market will finally reach equilibrium at the level of  $w^*$  as shown in figure 3. However, if a minimum wage above  $w^*$  is imposed, there will be a level of employment loss from  $E^*$  to  $E^{min}$ . The magnitude of the loss depends on the wage increase and the wage elasticity of labor demand, but the direction of change is unambiguous.

The unemployment is caused by two aspects: firstly the increase of wage forces employers to discharge low-skilled employees whose value of marginal product is lower than their wage, which reduces the labor demand. In addition, the raised wage spurs more laborers entering to the labor market and increases the labor supply. Accordingly, a binding of minimum wage will definitely lead to unemployment under the competitive model's settings. The workers with a higher value of marginal product are better off due to a higher wage, while the others who are laid off loss.

However, the reversed employment effect derived from the competitive model is inconsistent with the results of numerous empirical researches which find that minimum wage increase do not reduce employment(Bazen, 2000; Card & Krueger, 1993). This result is unsurprising as the assumptions made in this model is not in line with reality (Lemos, 2004). In particular, the competitive labor market does not exist in China's low-skilled labor market, the coverage is far from complete since most of the workers work in informal sector and workers are not homogenous. These attributes change the nature of the competitive model and its predictions will be not convincing.



Figure 4.3 Effect of binding minimum wages in a competitive labor market

#### 4.2.2 Monopsony model

In this sector, the competitive market assumption is relaxed and the model is set in a imperfect market where firms have monopsony power.

In the competitive labor market, it assumes that each firm is so small that its labor demand doesn't affect market labor demand. Thus, although the market labor supply curve is upward-sloping, individual firms face a horizontal labor supply curve and can hire an unlimited number of workers at the market-clearing wage. By contrast, in a monopsony market firms face an upward-sloping labor supply curve, that is monopsonistic firm has to pay a higher wage than the going rate to attract additional workers. In a nondiscrimination monopsony case, the wage for current workers also needs to be increased. Therefore, the cost of hiring an additional worker is the wage paid to that worker plus the increase in the wages of all current workers. The marginal cost of labor to firms with monopsony power always exceeds the supply price of labor(Stigler, 1946). To maximize profits, monopsonists will reduce labor hired to the point at which the marginal cost of labor is equal to their labor demand(E) and pay a wage level of w. It is clear that in a monopsonic labor market, the total employment and the wage level are both lower than the equilibrium point in the competitive market.

The gap between the marginal cost of labor and the wage allows a minimum wage to potentially increase employment(Zavodny, 1998). Once a minimum wage is introduced, the monopsonist becomes a price-taker up to the competitive wage rate,  $w^*$ . Consequently, a minimum wage which is set at  $w^{min}$  leads to an increase in employment from E' to  $E^{min}$ . However, if the minimum wage is set at a level higher than  $w^*$ , employment would be reduced below its competitive level  $E^*$  because the monopsonist now determines employment from the intersection of the wage floor and the value of the marginal product curve.

Some authors use this model to explain the positive employment effects of minimum wage in the recent empirical researches. For example, by studying the relationship between minimum wage and migrant workers employment in Shanghai, Luo(2007a) found that increasing minimum wage could promote migrant worker's employment and explained this result through China's monopsony labor market model. However, many economists also doubt the applicability of this model since the low-wage labor market is usually characterized by a large number of small firms instead of a monopsony firm which employs a large proportion of workers(Zavodny, 1998).



Figure 4.4 Effect of binding minimum wages in a monopsony labor market
#### 4.2.3 Harris and Todaro model: a dual economy

The basic competitive model and monopsony model introduced above both assume that minimum wage is applied to the whole labor market. Obviously, this is not the case in developing countries like China considering a mass of labor force stay in informal sector or rural areas in the form of self-employment. Therefore, the Harris and Todaro model(HT model) which has two independent sectors seems more suitable for describing the dynamic labor market in China. Bahns (2005) examined the applicability of the HT model to rural-to-urban migration processes in developing countries and found that it fits well with China's facts including the large rural-urban wage gap, high unemployment rate and rapidly growing informal sector. Hence, in this chapter the Harris and Todaro model(Harris & Todaro, 1970) under the framework of dual economy will be introduced focusing on the effect of minimum wage change on employment. The explanation basically refers to Basu's study (1997). There are two sectors in the basic form of HT model : the rural sector(R) and the urban or modern sector(M). Both sectors only use labor and capital as factor inputs in production. The model is set as a short-run model with fixed capital endowment in each sector. The rural sector is assumed to be labor intensive and produce X<sub>R</sub> units of output and employ L<sub>R</sub> units of labor, while the modern sector is capital intensive and produce X<sub>M</sub> units of output and employ L<sub>M</sub> units of labor. Hence, output in each sector is supposed to be a function of labor

$$X_R = f_R(L_R)$$
  $f'_R > 0; f''_R < 0$  4-1

$$X_M = f_M(L_M)$$
  $f'_M > 0; f''_M < 0.$  4-2

Equation 4-1 and 4-2 mean that the increase in labor input increases the aggregate output in each sector, but decreases the marginal product of labor. The total labor units available in the economy is fixed at L and the labor force can be not fully utilized. Hence,

$$L_R + L_M \le L \qquad \qquad L_R; L_M \ge 0. \tag{4-3}$$

For simplicity, we assume that both sectors produce the same good (though by different techniques). This assumption does not affect all the major HT results. It can be viewed in an alternative way. We could think of  $X_R$  and  $X_M$  as different commodities in a small open economy. Then assuming constant world prices, we may redefine the units of  $X_R$  and  $X_M$  such that both their prices are equal to unity.

Let w be the urban market wage expressed in real terms. The urban capitalist is a wage-taker and his objective is to maximize profit, which implies

$$f_M'(L_M) = w.$$

when the marginal product of labor equals the margin cost of labor. However, in this economy the urban wage has a political or institutional lower bound(minimum wage) at  $\overline{w}$ :

$$w \geq \overline{w}$$

This is an important assumption and will be referred to as the wage rigidity axiom. We

assume that  $\overline{w}$  is above the wage that would prevail if wages were flexible. This ensures that, for wages  $\overline{w}$  and above, there is an excess supply of labor in the urban sector which implies that competition will derive w down to  $\overline{w}$ . Hence the profit-maximizing condition above may be written as

$$f'_M(L_M) = \overline{w}.$$
 4-4

In the rural sector wages are flexible and equal to the rural marginal product  $f_R'(L_R)$ . This flexibility ensures that there is no rural unemployment. Therefore, the total labor force (employed plus unemployed workers) in the urban sector is equal to  $L - L_R$ , and the probability of a migrant finding urban employment is supposed to be  $L_M/(L - L_R)$ . Workers maximize *expected earnings*. Hence if

$$f_R'(L_R) < \overline{w} \frac{L_M}{L - L_R}$$

the expected earnings for rural labors is more than their marginal product of labor, workers would migrate from the rural to the urban sector. Migration equilibrium is attained when

$$f_R'(L_R) = \overline{w} \frac{L_M}{L - L_R}.$$
4-5

This completes the description of an HT economy.

A HT equilibrium is a situation satisfying 4-1 to 4-5. It is possible to solve for  $L_M$ ,  $L_R$ ,  $X_M$  and  $X_R$  from 4-1 to 4-5. Denote the solution vector as  $[L_M^0, L_R^0, X_M^0]$  and  $X_R^0$  which, for brevity, will be referred to as  $E^0$ . It is possible to show, and is obvious from figure 5, that  $L_M^0 + L_R^0 < L$ , i.e.  $E^0$  satisfies 4-3. Hence  $E^0$  satisfies all the five conditions and depicts the HT equilibrium.

Assume that social welfare, U, depends on the output produced, i.e.  $X_R$  and  $X_M$ . Since in the present version both sectors produce the same good, we may write

$$U = X_R + X_M 4-6$$

Suppose we have a command economy in which the government can distribute labor between sectors R and M as it wishes and the only constraints it faces are 4-1 to 4-3. How should the government choose  $L_R$  and  $L_M$ ? This is answered by maximizing 4-6 subject to 4-1, 4-2 and 4-3. Since  $f'_R > 0$ ,  $f'_M > 0$ , unemployment is never desirable. Hence 4-4 to 4-3 holds as a strict equality. Hence, the maximization is a simple Lagrangian exercise which yields the following first order conditions:

Let  $L_R^*$ ,  $L_M^*$  be the solution of 4-7 and 4-8. By inserting these values in 4-1 and 4-2 we get the optimum sectoral outputs,  $X_R^*$  and  $X_M^*$ . Let  $E^*$  denote the optimum vector  $[L_M^*, L_R^*, X_M^*, X_R^*]$ . It is not difficult to see that if the wage rigidity axiom was not present then the *laissez-faire* outcome would coincide with  $E^*$ .

Let  $MP^{M}$  and  $MP^{R}$  in figure 5 be the marginal product curves of labor in sectors M and R. These are drawn with original 0 and 0', respectively, where the length of 00' is

equal to the total labor force, *L*. Clearly, output is maximized by breaking up the labor force between the two sectors at the point where  $MP^{M}$  and  $MP^{R}$  intersect. Hence the optimum entails employing  $0L_{M}^{*}$  in the urban sector and  $0'L_{R}^{*}$  in the rural sector.

In the HT model the urban sector has an institutional fixed minimum wage  $\overline{w}$ . If  $\overline{w} > f'_M(L^*_M)$ , the optimum is unattainable, because the urban sector will then employ less than  $0L_M^*$ . As shown in the figure, urban employment will be equal to  $0L_M^0$ . And the level of rural employment is  $0'L_R^0$  derived from the intersection between H, a rectangular hyperbola through point N =  $(L^0_M, \overline{w})$ , and  $MP^R$ . <sup>11</sup> 0'Q gives the rural marginal product of labor. Urban unemployment consists of  $L_M^0 L_R^0$ . If the minimum wage  $\overline{w}$  increases to w', accordingly, the urban and rural employment will reduce to  $0L_M'$  and  $0'L_R'$  respectively and unemployment increase to  $L_M' L_R'$ . The magnitude of increase depends on the elasticity of  $MP^M$  and  $MP^R$  on wages.



Figure 4.5 Effect of binding minimum wages in a dual labor market

From the model we can see it is the institutionally fixed minimum wage in the urban sector that distorts the labor market and is the source of persistently high urban unemployment levels. The driver of rural-to-urban migration is modeled as the wage differential between the rural and the urban sector. Accordingly, migration will continue until wages are equalized between the two sectors. However, we should note that the model assumes that rural migrants do not compare the wages in monetary but the expected wage, which depends on the probability of finding jobs. Hence, the rural-to-urban migration will continue as long as the expected urban real income is greater than the wage rate in the rural sector that equals the marginal product of agricultural labor. Rapanos (2005) analyzed the effects of a change in the minimum wage on income distribution, sectoral employment and unemployment under the

<sup>&</sup>lt;sup>11</sup> Since H is a rectangular hyperbola,  $(\overline{w})(0L_{M}^{0}) = (0Q)(0L_{R}^{0})$ . This implies that  $(\overline{w})\frac{(0L_{M}^{0})}{(0L_{R}^{0})}$ . This is the same as (5) and hence  $L_{M}^{0}$  and  $L_{R}^{0}$  in figure 3 represent the HT equilibrium.

framework of original Harris-Todaro model. He found that if the elasticity of demand for labor in the urban sector is less than one and the initial level of urban unemployment is at a rather low level, when the minimum wage increases, in the short term, employment in the urban sector will reduce and the released labors could either move to the rural sector or be out of work in the urban sector. At the same time, the increased minimum wage raises the expected urban wage despite that the probability of employment decreases. Consequently, there will be an extra incentive for those fired labors to stay in the labor sector and the labors in the rural sector to move to the urban sector. Thus, the reduced employment opportunity and the new motivated labor lead to a rise of urban unemployment. However, in the medium term, the minimum wage may have reached a higher level where the urban unemployment is already high. The increase in the minimum wage may not be sufficient to compensate for the reduced probability to find employment in the urban sector, and the expected urban wage will fall. As a result, there will be out-migration from the urban to the rural sector, and if this out-migration offset the reduced employment in the urban sector, urban unemployment will have no obvious change; if it is greater than the reduced employment, the employment rate in the urban sector can even rise. While, if the elasticity of demand for labor is greater than one, the results may be reversed.

## **Chapter 5 Empirical Strategy**

The increase of the minimum wage could be viewed as a natural experiment. In this chapter, the experiment elements including the experiment time, experimental subjects, control group and experiment group are introduced. Then, a difference in differences model (DID model) used to evaluate the impact of minimum wage legislation is built following the basic setup of Athey and Imben's study(2006).

# 5.1 Viewing Minimum Wage Increase as Natural Experiment

The increase of the minimum wage could be viewed as natural experiment. A natural experiment is an observational study which can be undertaken to assess the outcomes and impacts of policy interventions. It is often possible where there is a divergence in law, policy or practice between nations, regions or other political, jurisdictional or social units. Like a normal artificial experiment, the essence of a natural experiment is that one population has received an intervention while the other has not. However, to be different, a natural experiment is not under the control of researchers: it internally has a treatment group which is thought to be affected by the policy, and a control group which is thought to be not affected under the similar conditions(Wooldridge, 2012). Therefore, natural experiment method provides possibility to assess the social policy effects by studying differences between two groups. In this paper, we exploit a natural experiment to study the employment effects of minimum wage provision.

Statutory minimum wage was first introduced in China in 1993 followed by the Labor Law of 1994 making some regulations on minimum wage. However, this economic term did not receive much attention due to insufficient enforcement until 2004 when the Ministry of Labor and Social Security issued Minimum Wage Regulations, which symbolizes the overall implementation of a minimum wage system in Chinese labor market(Du & Pan, 2009). This regulation further specifies that provinces and cities should adjust their minimum wage at least biennially, which provides more space for our study to examine both the short-term and long-term effects. The policy has been widely adopted by provincial-level governments compared with the implementation of last ten years from 1993 to 2004 when each province only adjusted 3.8 times on average: in 2005, 12 provinces released their new minimum wage standard and in 2006 the number increased to 28, among which 9 provinces just adjusted a year ago. Furthermore, not only the frequency and coverage of minimum wage standard greatly increased, its magnitude also grew sharply. From 2004 to 2006, the average annual increase of minimum wage is up to 14% and this figure is six point higher than that

from 1994 to 2004. The fact indicates that the increase of minimum wage since 2005 is a non-negligible exogenous policy event in labor market. Therefore, this study choose the dataset of 2005, 2006 and 2008.

By using 2005 and 2006 survey, we will look at the short-term impact of minimum wage increase, while using 2005 and 2008 survey, the medium-term effect is evaluated. The distinction made between medium-term effect and short-term effect is based on the consideration of policy effect delay and social reaction time. To be specific, one possibility is that the employment effect of minimum wage policy may have a delay on firms, especially for large and medium-size firms since some of them may choose to bear the increased labor cost to maintain the normal production initially. However, in the long term, sustaining extra labor cost may be beyond a firm's financial capacity and cause financial problem. Hence, the firms would respond to the minimum wage increase and take actions like laying off employees or extend working hours to compensate not immediately but after a period of time, which leads to a delay of policy effect. Besides, there is another possibility that in the long term, firms could expect the regular minimum wage increase. As a result, the firms will consider it and make company strategies like adjusting employment plan, upgrading techniques to handle the problem. Consequently, the employment effect in medium term may quite different from short term.

Although the minimum wage provision is released by central government, the local governments have the right to formulate specific standards based on their own social-economic development status. Therefore, there is a huge divergence in the increase magnitude of minimum wage and the timing of implementation among different regions and even in the same province. It cannot be intervened by researchers in the natural experiment. For consistency, we use the minimum wage for the capital city in each province and its policy execution time. The treatment is defined by the increase in magnitude of the minimum wage during the experiment period. Since the questions in the surveys are stated in a form of reflecting respondents' past status, for example "what is your last year's income; how is your health condition in the past few months", we consider the start date of 2005 survey as the beginning of the treatment and exclude the 2006 (2008) survey investigate period. So, for the short-term effect, the provinces which did not increase minimum wage between September 2005 and August 2006 is thought to have received no treatment and hence these are categorized as control group, while the others with at least one increase in the minimum wage are in the experiment group. For the medium-term effect, as all provinces had increased their minimum wages, the provinces with higher growth between September 2005 and September 2008 are defined as experiment group. Detailed criteria for treatment and the grouping results are described in the next section.

#### 5.2 Control Group and Experiment Group

As mentioned above, the treatment for the short-term experiment is defined as at least one minimum wage increase between September 2005 and August 2006. According to this, thirteen provinces are categorized as experiment group and the others are in the control group. Table 5.1 presents the minimum wage adjustment information of the experiment group. From the table we can see that Heilongjiang has the highest increase in terms of both growth rate and absolute growth. Its growth rate is remarkable 58.97%. Jilin and Xinjiang rank number two and three with growth rate of 41.67% and 39.58% respectively, which are also significant. The reason for them to show up first on the list is that their base numbers are relatively small and set two to three years ago. Another fact to be noticed is that the top three provinces are all less developed regions located in or near the boundary of China, which indicates a less active attitude for them to increase the minimum wage in the past. In contrast, Zhejiang is in the last place with 8.06% growth rate and is only one seventh of Heilongjiang's. Beijing, Tianjin and Jiangsu which are cities with good economic development follow Zhejiang on the list. What is interesting is that these four provinces with lowest growth rate have the highest level of minimum wage both before and after increase. The reason is that they did adjust the minimum wage annually during 2004 to 2006, accordingly the magnitudes of increase each time are not very large but the absolute values are high. After adjustment during experiment time, Zhejiang has the highest level of minimum wage of 670 Yuan, while the wage for Gansu is 240 less at only 430 Yuan. The huge differences in minimum wage standard reflect huge differences in economic and social development in different areas of China.

No.	Province	Times	Before	After	Absolute growth	Growth rate
1	Heilongjiang	1	390	620	230	58.97%
2	Jilin	1	360	510	150	41.67%
3	Xinjiang	1	480	670	190	39.58%
4	Fujian	1	470	650	180	38.30%
5	Gansu	1	340	430	90	26.47%
6	Henan	1	380	480	100	26.32%
7	Hunan	1	480	600	120	25.00%
8	Hainan	1	500	580	80	16.00%
9	Yunnan	1	470	540	70	14.89%
10	Tianjin	1	590	670	80	13.56%
11	Jiangsu	1	620	690	70	11.29%
12	Beijing	1	580	640	60	10.34%
13	Zhejiang	1	620	670	50	8.06%

Table 5.1 Nominal minimum wage increase of experiment group between 2005.9 and2006.8

Source: data comes from official websites of provincial governments.

Next, we come to the medium-term experiment. As all provinces had increased their minimum wages, it is impossible to define treatment in the same way as short-term experiment. However, we could find out the provinces with such large growth rate that makes them significantly different from the others as experiment group. The rest are in the control group.

Table 5.2 shows the minimum wage information of 28 provinces in the dataset between September 2005 and September 2008. We can see from the table that after the adjustments, Guangdong occupies the first place with minimum wage standard of 1000 Yuan. Shanghai follows it with 960 Yuan which are more than 400 higher than Anhui's standard. Gansu had the highest growth rate up to 82.35%. Jilin, Heilongjiang, Henan and Chongqing occupy the second to the fourth place with more than 70% growth rate. While, in contrast with their large increase, the minimum wage in Shanxi only increased 17.31% compared to 2005 minimum wage standard and lists in the last place. Thus, the increase magnitudes of 28 provinces has huge difference and vary from 90 Yuan to maximum 316 Yuan in absolute increase. Although all the provinces had increased their minimum wage at least twice, compared with the provinces which increase more than 70%, the policy effect of provinces which increase less than 30% would be less significant. For this reason, we use both the minimum wage increase magnitude in absolute term and relative term as standards to define treatment. The provinces which rank high both in absolute increase and increase rate are categorized as experiment group, otherwise they belong to the control group. Finally, 12 provinces - Gansu, Jilin, Heilongjiang, Henan, Chongqing, Xinjiang, Guizhou,

Neimenggu, Fujian, Liaoning, Hubei and Guangdong - are in the experiment group as they are the overlap of first thirteen provinces descending sorted by absolute increase and increase rate. While the other 16 provinces are thought to be no treatment received relatively and therefore in the control group.

No.	Province	Times	Before	After	Absolute increase	increase rate
1	Gansu	2	340	620	280	82.35%
2	Jilin	2	360	650	290	80.56%
3	Heilongjiang	2	390	680	290	74.36%
4	Henan	2	380	650	270	71.05%
5	Chongqing	2	400	680	280	70.00%
6	Xinjiang	2	480	800	320	66.67%
7	Guizhou	2	400	650	250	62.50%
8	Neimenggu	2	420	680	260	61.90%
9	Jiangxi	2	360	580	220	61.11%
10	Fujian	2	470	750	280	59.57%
11	Liaoning	2	450	700	250	55.56%
12	Hubei	2	460	700	240	52.17%
13	Guangdong	3	684	1000	316	46.20%
14	Guangxi	3	460	670	210	45.65%
15	Yunnan	2	470	680	210	44.68%
16	Sichuan	2	450	650	200	44.44%
17	Hebei	3	520	750	230	44.23%
18	Shandong	2	530	760	230	43.40%
19	Shanghai	3	690	960	270	39.13%
20	Tianjin	3	590	820	230	38.98%
21	Hunan	3	480	665	185	38.54%
22	Beijing	3	580	800	220	37.93%
23	Jiangsu	3	620	850	230	37.10%
24	Zhejiang	3	620	850	230	37.10%
25	Anhui	2	410	560	150	36.59%
26	Hainan	2	500	630	130	26.00%
27	Shan'xi	2	490	600	110	22.45%
28	Shanxi	2	520	610	90	17.31%

Table 5.2 Provincial nominal minimum wage increase between 2005 and 2008

Source: data comes from official websites of provincial governments.

To further verify the difference between control group and experiment group, a one-tailed student-t test is run with the null hypothesis that there is no difference between the two groups' averages. The result shows that the mean of the control group (38.41%) is smaller than that of the experiment group (65.24%) at the confidence level of 0.05. Therefore, we can conclude the control group and

experiment group are two different groups and their difference has statistical significance.

Two-sample t test with equal variances										
os Mean	Std. Err.	Std. Dev.	[95% Con	f.Interval]						
6 0.3841	0.0255	0.1021	0.3297	0.4386						
0.6524	0.0319	0.1107	0.5821	0.7227						
0.4991	0.0322	0.1705	0.4330	0.5652						
-0.2683	0.0404		-0.3513	-0.1852						
ean(1)				t = -6.6389						
		degrees of freedom $= 26$								
	Ha: diff != 0	]	Ha: diff $> 0$							
Pr	$( \mathbf{T}  >  \mathbf{t} ) = 0.$	$\Pr(T > 1)$	t) = 1.0000							
	with equal varian os Mean 6 0.3841 2 0.6524 8 0.4991 -0.2683 ean(1) Pr	with equal variancesosMeanStd. Err. $5$ 0.38410.0255 $2$ 0.65240.0319 $3$ 0.49910.0322 $-0.2683$ 0.0404ean(1)Ha: diff $!= 0$ Pr( $ T  >  t $ ) = 0.	with equal variancesosMeanStd. Err.Std. Dev. $5$ 0.38410.02550.1021 $2$ 0.65240.03190.1107 $3$ 0.49910.03220.1705 $-0.2683$ 0.04040.0404Ha: diff $!= 0$ Pr( $ T  >  t $ ) = 0.0000	with equal variancesosMeanStd. Err.Std. Dev.[95% Cor $6$ 0.38410.02550.10210.3297 $2$ 0.65240.03190.11070.5821 $8$ 0.49910.03220.17050.4330 $-0.2683$ 0.0404-0.3513ean(1)degrees of frHa: diff $!= 0$ Pr( $ T  >  t $ ) = 0.0000Pr( $T > t$						

Table 5.3 Student-t test result for the difference between experiment group and control group

#### **5.3 Difference In Differences Model**

When evaluating the effect of a minimum wage increase on employment and working hours, a direct idea is to analyze the relationship between the change of employment (working hours) and the event of minimum wage increase. Naturally, we expect the experiment group has a change of employment (working hours), while the control group does not. Unfortunately, sometimes the control group which did not receive the treatment also had a change, and even in the same direction with experiment group. This makes the change of experiment group confusing. It cannot be simply concluded that the employment change is due to the minimum wage increase instead of the other factors like the overall economic situation, and consequently the effect of policy cannot be verified. Base on this, a "Difference in Differences Model" which could solve this problem is applied in this paper.

Difference in Differences method is popular in the field of economics for estimating the net effect of policy interventions. It is used in problems with multiple subpopulations - some subject to a policy intervention or treatment and others not - and outcomes that are measured in each group before and after the policy intervention. To count for time trends unrelated to the intervention, the change experienced by the experiment group is adjusted by the change experienced by the control group (Athey & Imbens, 2006).

To be general, we wish to evaluate the impact of a treatment on an outcome  $Y_i$  over a population of individuals. Two dummy variables are set: Group dummy variable is denoted by  $G_i \in \{0,1\}$  where 0 stands for control group in which individuals do not receive any treatment(minimum wage increase), and 1 stands for experiment group in

which individuals do receive treatment; Time dummy variable is denoted by  $T_i \in \{0,1\}$  where 0 stands for a time point before treatment, i.e. pre-treatment, and 1 stands for a time point after treatment, i.e. post-treatment. If i = 1,2,3,...,n is a random sample drawn from the population, the group dummy variable and time dummy variable can be viewed as random variables. Then, the observed data of individual *i* are the triple  $(Y_i, G_i, T_i)$ . For the sake of notation, let  $Y_i^0$  denote the outcome for individual *i* with no treatment received, and let  $Y_i^1$  denote the outcome for individual *i* can be expressed as

$$Y_i = Y_i^0 \cdot (1 - I_i) + I_i \cdot Y_i^1.$$
 5-1

where  $I_i = G_i \cdot T_i$  in the two-group-two-period case. In the DID model, the outcome variable  $Y_i^0$  for individual *i* without treatment received satisfies

$$Y_i^0 = \alpha + \beta \cdot T_i + \gamma \cdot G_i + \varepsilon_i$$
 5-2

where the coefficients  $\alpha$ ,  $\beta$ ,  $\gamma$ , are all unknown parameters and  $\varepsilon_i$  is a random, unobserved "error" term which contains the other determinants of  $Y_i$  which our model does not consider, such as characteristics of the individual. The second coefficient  $\beta$  represents the time effect which is not affected by group dummy variable. The third coefficient  $\gamma$  represents the group effect which is not affected by time dummy variable. Then, the *difference-in-differences estimator* can be formulated as

$$\tau^{\text{DID}} = \{ E[Y_i | G_i = 1, T_i = 1] - E[Y_i | G_i = 1, T_i = 0] \} -\{ E[Y_i | G_i = 0, T_i = 1] - E[Y_i | G_i = 0, T_i = 0] \}.$$
 5-3

It is defined as the difference in average outcome in the experiment group before and after treatment minus the difference in average outcome in the control group before and after treatment (Albouy, 2004). In other words, the net policy effect is the residual of the average change over time in experiment group subtracting the average change over time in the control group. The purpose is to remove the biases caused by common time trend unrelated to the intervention from the total.

Assume that the treatment has the same effect on each individual, we get  $\tau = Y_i^1 - Y_i^0$ . Combining this assumption with equation 5-2, the outcome  $Y_i$  is modeled as follows:

$$Y_i = \alpha + \beta \cdot T_i + \gamma \cdot G_i + \tau \cdot I_i + \varepsilon_i$$
 5-4

where the coefficients have the following interpretation:

 $\alpha$  = constant term  $\beta$  = time trend common to control and experiment groups

#### $\gamma$ = group specific effect $\tau$ = true effect of treatment

The true effect of treatment  $\tau$  can be calculated in two ways: (1) compute the differences in averages between experiment group and control group in each time period( $\gamma$ ,  $\gamma + \tau$ ), and then difference the results over time as shown in equation 5-3. (2) compute the change in average over time for each of the experiment and control groups( $\beta$ ,  $\beta + \tau$ ), then difference these changes (Wooldridge, 2012). The two ways can get the same  $\tau$  as shown in table 5.4 and  $\gamma$ ,  $\gamma + \tau$ ,  $\beta$ ,  $\beta + \tau$  are called the first difference.

Table 5.4 Illustration of the difference-in-differences estimators

	Before	After	After-Before
Control	α	$\alpha + \beta$	β
Experiment	$\alpha + \gamma$	$\alpha + \beta + \gamma + \tau$	$\beta + \tau$
Experiment-Control	γ	$\gamma + \tau$	τ

Hence, the difference in differences model has a clear advantage of differencing out all permanent individual characteristics of each group (through the first difference), as well as all other shocks or macroeconomic trends that affect both groups similarly (second difference) (White, 2011).

In addition, other factors could be added to equation 5-4 to control for the fact that the populations sampled may differ systematically over the two periods. Then, the outcome  $Y_i$  is formulated as

$$Y_i = \alpha + \beta \cdot T_i + \gamma \cdot G_i + \tau \cdot I_i + \delta \cdot X_i + \varepsilon_i$$
 5-5

where  $X_i$  presents for the other explanatory variables that may influence outcome  $Y_i$ . Equation 5-5 is generally called *regression-adjusted difference in differences model* (Angrist & Pischke, 2008), which we will mostly refer to in the empirical study chapter.

In this paper, in order to evaluate the net effect of minimum wage increase on employment, outcome  $Y_i$  is the individual's employment status and weekly working hours, and  $X_i$  consists of individual's demographic information including age, education, marital status, health condition, the number of household members, monthly income and hukou status.

## **Chapter 6 Data and Descriptive Analysis**

This chapter aims to establish a general concept of the minimum wage effects on employment and working hours in China by descriptive analysis. The dataset used in the paper is introduced firstly with detailed explanation of data selection and processing. Then the features of dependent and independent variables used in the regression models are elaborated for both short-term experiment and medium-term experiment. Finally we focus on the difference in differences estimators which may present the minimum wage effects.

#### **6.1 Data Introduction**

For the purpose of this study, we use pooled cross-sectional micro data obtained from China General Social Survey(CGSS) for the year 2005, 2006 and 2008, covering 28 of the 34 provinces in China. CGSS is the first continuous national social survey project in China mainland co-conducted by Department of Sociology of Renmin University of China and Department of Social Sciences of Hong Kong University of Science and Technology. It is an annual or biannual survey of China's urban and rural households designed to gather longitudinal data on social trends and the changing relationship between social structure and quality of life in China. The employment and demographic information needed in the paper are included. Besides, the 2005, 2006 and 2008 survey chosen in the paper are the latest three years available, which guarantees the timeliness of our research. Respondents of the survey are the population over the age of 18 to 69. Using random sampling method, for each survey, 10000 households were first selected from the 28 provinces<sup>12</sup>. Then, one family member is selected randomly as respondents according to certain rules in each of the selected households. The 2005 and 2006 survey were conducted between September and October, while the 2008 survey was conducted between October and December.

In order to assess the employment effect of minimum wage increase, we select those observations taken from individuals who have higher possibility of being influenced by this policy. Therefore, besides dropping missing values, the sample is further restricted to the individuals whose employment status is "having a job" and "being out of work but looking for a job" under 60 years old with less than or equal to junior high school education.

Considering the current social situation that large-scale rural surplus labor transfer from rural areas to cities during the slack seasons of farming and return during the busy seasons, the employment status of "part-time farming<sup>13</sup>" is classified as "having

<sup>&</sup>lt;sup>12</sup> The 28 provinces are Beijing, Tianjin, Hebei, Shanxi, Neimenggu, Liaoning, Jilin, Heilongjiang, Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Hebei, Hubei, Hunan, Guangdong, Guangxi, Hainan, Chongqing, Sichuan, Guizhou, Yunnan, Shan'xi, Gansu, Xinjiang.

<sup>&</sup>lt;sup>13</sup> Part-time farming refers to the employment status that in addition to normal agricultural production, farmers

a job", while the full-time farmers in China who generally market their own products and consequently don't have employment relationship are not included.

The upper age limit, 60 years old, is the legal retirement age for male staff, after which they could receive pension. Although the retirement age for female is 5 years earlier than male, we unify it as 60 according to the fact that first, part of them tend to continue working after retirement; second, the selection of employment status had already removed the retired females that do not work anymore.

The education level has been restricted to "less than or equal to junior high school" for the reason that the main affected group by minimum wage is thought to be rural migrant workers and low-skilled workers in cities. Most of them only have junior high school and primary school education and work in labor-intensive industries such as manufacturing industry, construction industry, retail industry, catering industry, etc.

In addition to employment information, demographic information which may affect employment status is also collected including individual's gender, age, education, marital status, health condition, number of household number, monthly income and hukou status. According to the conclusions of literatures that young workers are more likely affected by minimum wage policy(Laporšek, 2013; Neumark & Wascher, 1999) and the fact that older workers are less competitive in the labor market, we expect that the relationship between age and employment is an inverse-U shape. Having more education, better health condition and a non-agricultural hukou are typically expected to increase the possibility of employment. In addition, a higher monthly income may indicate longer working hours. The variables of marital status, number of household members, the working province are also assumed to affect individual's employment, but the direction cannot be predicted simply. The full set of statistical variables used to evaluate minimum wage effects are listed in table 6.1 with their descriptions. Among them, employment status and weekly working hours are set as dependent variable used to stand for the employment effect of the minimum wage, and the other variables are independent variables to control for individual characteristics.

The data is first grouped based on short-term experiment(2005, 2006) and medium-term experiment(2005, 2008). In each experiment, following the basic setup when doing social investigation, we further group the data by gender and then calculate the statistics and do regressions for male and female separately. The reason is that generally males and females play different roles in the labor market, especially for the low-skilled labor market where physical labor intensity is bigger. This feature will strongly influence the estimation results.

also engage in gainful jobs in the rural or urban areas during the slack season of farming.

Variable name	Variable description
employment rate	The number of individuals who have a job divided by the number of individuals who have a job and who are out of work but looking for a job.
employment status	Employment status is equal to 1 if the respondent was employed at the survey time, otherwise, it is equal to 0. Being employed means having a full-time job, part-time job, temporary job or part-time farming
weekly working hours	The total working time per week including overtime.
gender	1 stands for male and 2 stands for female.
age	-
education	The education respondents achieved: 1 stands for no formal education, 2 stands for literacy program, 3 stands for primary school and 4 stands for junior high school.
marital status	Marital status equals 1 if respondent are married, otherwise, equals 0.
health condition	Discrete variable with 1 to 6 standing for "very good" to "very poor" respectively.
no. of household member	The number of persons living with respondents together including himself/herself.
monthly income (Yuan)	Yearly income, including wage earnings, bonus, subsidy, operational income and etc, divided by 12 months.
hukou status	0 stands for agriculture hukou and 1 stands for non-agricultural hukou including blue-stamped hukou and self-care food hukou.
province	The province that respondent works in.

Table 6.1 Statistical variables used in the paper

#### **6.2 Descriptive Analysis**

The empirical study starts with a descriptive analysis of individual characteristics and employment information. The data characteristics extracted from this study are the foundation for econometric modeling. In this chapter, the data of survey 2005 and 2006 used in the short-term experiment is analyzed first. Then, the data of survey 2005 and 2008 used in the medium-term experiment is analyzed using the same logic. Finally, a comparison is made between the two results.

#### 6.2.1 Short-term Experiment

Table 6.2 gives the descriptive statistics of employment information and individual characteristics for short-term experiment. From it we can see that the employment

rates of 2006 are higher than that of 2005 in both control and experiment group for male and female workers. This reflects a consistent time trend of employment for all the observations, which may arise from a better economic condition in 2006. It further clarifies that only using the first difference is infeasible to display the employment effect of minimum wage increase.

Besides, the employment rate of males is higher than that of females basically, which is in line with male and female's roles played in Chinese society that male tend to work outside as the primary wage-earner for the family, while females tend to stay at home and take care of the family. This feature also appears in the statistics of weekly working hours and monthly income. In terms of weekly working hours, the indicator for female is slightly smaller than male. However, for both females and males the weekly working hours are over 50, which is much higher than 44, the statutory maximum weekly working hours. This may reflect a poor enforcement of labor laws and weak bargaining power of low-educated workers in China. From the monthly income we can see the low-educated population we study is also the low-income population, which are most likely to be covered by minimum wage. The education level for males is a little higher than for females and also males have better health condition than females. This could partly explain the gap between males and females in the employment rate, working hours and monthly income as education and health are important influencing factors on employability. As for family indicators, the female nuptiality is higher than male but the number of household members for female is smaller. These facts could also give a reason for the female's lower employment rate and weekly working hours.

Another important indicator is hukou status. Basically, in the sample the proportion of agricultural hukou is higher in the male group than female group. This is consistent with the social trend that male rural labor tends to migrant more. The hukou status distribution of 2005 and 2006 are shown in figures below. The 2005 sample has more respondents with urban hukou, which indicates that 2005 should have a higher probability of employment rate since urban hukou is an advantage when job hunting as we analyzed in previous chapter. However, the descriptive data presents a inverse result.



Comparing indicators between control group and experiment group we can have a snapshot of the effect of minimum wage increase. As the employment rate of control group and experiment group change in the same direction, we cannot estimate the net effect of minimum wage increase simply. However, reviewing the data we could have a reasonable guess that the growth of employment rate may be caused by younger average age and better health condition from 2005 to 2006. As for another dependent variable, the weekly working hours remain the same level for both females and males in the control group, while the data of females in the experiment group increase from 53.79 to 54.72 and that of male increase even larger from 52.16 to 56.94, which indicates that the increase of minimum wage may extend working hours for low-income population, especially for male workers. In addition, the increase of female working hours could be due to the lower average age, higher education level, better health condition and less household members. The increase of male working hours could be due to the higher monthly income, lower average age, better health condition and less household members. Whether these factors contribute to the changes of dependent variables and which one dominates the changes needs to be examined by multiple regression models.

	Control group				Experiment group			
Indicators	Female		Male		Female		Male	
	2005	2006	2005	2006	2005	2006	2005	2006
Employment rate(%)	69.48	90.84	88.00	91.56	68.31	88.11	81.11	85.59
Weekly working hours	53.92	53.69	56.11	56.85	53.79	54.72	52.16	56.94
Monthly income(Yuan)	560	808.58	920.76	1110.89	769.5	752.25	875.91	960.95
Age	44.17	43.03	44.94	44.17	44.82	42.63	45.49	42.82
Education(Level)	3.68	3.63	3.77	3.72	3.66	3.78	3.79	3.8
Married(%)	89.69	80.66	87.62	80.09	89.23	85.46	84.72	78.96
Health	2.64	2.47	2.42	2.36	2.72	2.36	2.58	2.3
No. of household member	3.9	2.92	3.85	3.19	3.62	3	3.78	3.31
Agricultural hukou (%)	39.59	51.91	44.36	57.14	23.84	49.34	35.10	42.07
No. of observations	485	393	525	462	325	227	360	347

Table 6.2 Descriptive statistics of individual characteristics for short-term experiment

Except for control variables analyzed above such as age, education level and etc, the time trend during experiment period caused by macroeconomic environment and the difference between control group and experiment group can also lead to a change of employment rate and weekly working hours. In order to evaluate the net effect of the policy event of minimum wage increase, next we calculate the difference in difference estimators of minimum wage effects on employment rate and weekly working hours.

Table 6.3 gives the estimation results. From it we can see that the female employment rate for control group and experiment group have increased 21.36% and 19.8% respectively, which gives a difference of 1.56% points. Applying the same logic to male workers, we get a 0.92% net difference. These statistical results may reflect a slight negative effect of minimum wage increase on female employment and a positive effect on male employment. However, the changes are quite small and may be caused by sample error. In terms of weekly working hours, the net effect of minimum wage increase is positive for both female and male workers which means workers have to work longer than before. After this policy intervention, the female working hours increase 1.16 per week and the male working hours increase 4.04 per week on average which nearly equal to 50 minutes per day.

0	Female				Male			
Group	before	after	FD	DID	before	after	FD	DID
Employment rate(%)								
Control group	69.48	90.84	21.36	-	88.00	91.56	3.56	-
Experiment group	68.31	88.11	19.8	-1.56	81.11	85.59	4.48	0.92
Weekly working Hours(h)								
Control group	53.92	53.69	-0.23	-	56.11	56.85	0.74	-
Experiment group	53.79	54.72	0.93	1.16	52.16	56.94	4.78	4.04

Table 6.3 DID estimates of minimum wages effect for short-term experiment

Note:"FD" stands for "first difference"; "DID" stands for "difference in differences".

#### 6.2.2 Medium-term Experiment

After the analysis of short-term effect of minimum wage increase, next we have a look at the medium-term effect. Table 6.4 gives the descriptive statistics of employment information and individual characteristics for year 2005 and 2008. From it we can see that the employment rates in 2008 are higher than that in 2005 for all groups, which reflects the same time trend on employment as short-term experiment that the employment situation in 2008 and 2006 is better than in 2005 even in the absence of policy intervention. In terms of working hours, the indicator for males is higher than females in 2005 and 2006, but this phenomenon didn't appear in 2008, male and female workers have similar working time per week. The monthly income has experienced a large increase from 2005 to 2008 for all observations and the increase magnitude for male is greater than female. Expect for a better economic environment due to the Beijing Olympic Games in 2008, the strong implementation of minimum wage policy could also be a reason. Besides, the differences of individual characteristics between male and female are also found in medium-term data: comparing with female workers, male workers have higher education level, better health condition, more household members but low marriage rate. Some of these differences could contribute to male's higher employment rate and higher monthly income in both years. In terms of hukou status, the statistical result is similar with short-term experiment that 2008 has less workers with urban hukou in the sample but higher employment rate and working hours.

#### Figure 6.1 2005 hukou status distribution Figure 6.3 2008 hukou status distribution



Similarly, we can have a general idea of the effect of minimum wage increase on employment and working hours in medium term by comparing indicators between control group and experiment group. As shown in table 6.4, although the net effect on employment cannot be concluded yet, we can find that the increase of employment rate for both groups may be due to younger average age and better health condition from 2005 to 2008. For female workers, the weekly working hours increased in both control and experiment group. The increase may be due to younger average age, higher education level, better health condition and less household members. The male weekly working hours increase from 53.89 to 56.85 in control group but remained at the same level in experiment group, which indicates a negative effect of minimum wage on working hours. Furthermore, the increase of male weekly working hours in the control group may be due to the higher monthly income, lower average age, lower marriage rates, better health condition and less household members.

		Control group				Experiment group			
Indicators	Fei	Female		Male		Female		Male	
	2005	2008	2005	2008	2005	2008	2005	2008	
Employment rate(%)	71.92	95.52	85.34	92.96	64.93	90.66	85.50	94.95	
Weekly working hours	53.41	56.92	53.89	56.85	54.34	56.47	55.39	55.59	
Monthly income(Yuan)	650.28	1013.16	947.75	1538.29	631.83	961.65	830.91	1304.492	
Age	44.59	41.99	45.21	43.54	44.04	42.42	45.12	42.38	
Education(Level)	3.69	3.58	3.8	3.7	3.66	3.68	3.76	3.7	
Married(%)	90.89	84.75	87.59	82.59	86.57	82.97	85.21	85.20	
Health	2.63	2.53	2.43	2.4	2.76	2.3	2.59	2.27	
No. of household member	3.75	3.24	3.84	3.48	3.81	3.15	3.78	3.29	
Agricultural hukou (%)	34.67	52.02	45.18	47.78	30.60	43.41	33.43	44.89	
No. of observations	527	223	532	270	268	182	338	277	

Table 6.4 Descriptive statistics of individua	l characteristics for medium-term
experimen	t

Table 6.5 shows the difference in difference estimators of minimum wage effects on employment rate and weekly working hours for medium term experiment. From it we can see that the minimum wage policy may have a positive net effect on employment. After raising minimum wage, for both female and male workers the employment rate increase 2.13% and 1.83% respectively. In terms of weekly working hours, the net effect of minimum wage increase is negative for both female and male workers which means the weekly working time is shorter than before. After this policy intervention, the female working hours decrease 1.38 per week and the male working hours decrease 2.76 per week.

Table 6.5 DID estimates of minimum wages effect for Medium-term Experiment

		Female				Male			
Group	before	after	FD	DID	before	after	FD	DID	
Employment rate(%)									
Control group	71.92	95.52	23.60	-	85.34	92.96	7.62	-	
Experiment group	64.93	90.66	25.73	2.13	85.50	94.95	9.45	1.83	
Weekly working Hou	rs(h)								
Control group	53.41	56.92	3.51	-	53.89	56.85	2.96	-	
Experiment group	54.34	56.47	2.13	-1.38	55.39	55.59	0.2	-2.76	

Note:"FD" stands for "first difference", "DID" stands for "difference in differences".

Combining the results of two experiments, the statistics show that the female employment rate reduced in short term but increases in medium term; the male employment rate increased no matter in short term or medium term. The working hours in short term both increased for males and females, while in medium term they decreased.

The descriptive analysis results give a preliminary impression of minimum wage effects. To test whether the changes are statistically different from zero, we need to find its standard error by using a regression analysis. In order to get more accurate estimates of minimum wages effects, the control variables which may have an impact on the estimation results should also be included to control for individual heterogeneity(Jia & Zhang). The regression analysis will be elaborated in details in chapter 7.

Although the significance of the results need to be tested in further, we can see that the increase of minimum wage has discriminative effect in medium term and short term and also different for female and male workers.

# Chapter 7 Minimum wage effects on employment and working hours

In this chapter, by establishing regression-adjusted difference in differences models, we estimate the net effect of minimum wage on employment and working hours in short term and medium term respectively. In order to improve the estimation results, three scenarios are considered in each experiment: scenario 1 is set as regression with basic DID variables; scenario 2 adds a full set of control variables to control individual's heterogeneity; scenario 3 further adds province dummy variables to control the impact of geographic location. After that, the reasons for the minimum wage effect in China is analyzed and discussed.

#### 7.1 Minimum wage effects on male and female employment

#### 7.1.1 Short-term Experiment

In this section, we evaluate the minimum wage effects on male and female employment in the short term through regression-adjusted difference in difference model. The variable setting is a little different from the descriptive analysis. Since the data are individual data, we use "individual's employment status" as the dependent variable rather than the employment rate. "Employment status" is a binary variable (0/1), so a logistic regression method is used to model it.

Logistic regression calculates the probability of "having a job" over the probability of "don't have a job", the estimation results are in the form of log odds ratio. To be specific, the dependent variable  $Y_i$  can be expressed as

$$Y_i = \log \left[ \frac{Prob_i(employment=1)}{Prob_i(employment=0)} \right].$$
 7-1

standing for an individual's likelihood of being employed.

In order to be consistent with the results of descriptive analysis and get basic DID estimators, we first consider a simple scenario leaving out the impact of economic environment and individual characteristics. The logistic regression is done under the basic DID setup with the independent variables of group dummy variable(group), time dummy variable(y06) and the interaction term(y06group). The parameter of our interest is on the y06group which measures the net effect of minimum wage increase on employment between 2005 and 2006, assuming that individual's possibility of employment does not change for other reasons. Column 1 in table 7.1 gives the

estimation results for male workers. From it we can see, both the coefficients of the interaction term and group variable are statistically significant at the confidence level of 0.05. Compared with year 2005, the log odds of employment in 2006 increase by 2.671. This result is in line with the result obtained from the descriptive analysis that employment rate is higher in 2006. The log odds of employment decrease by 0.633 due to the policy intervention, which indicates that the minimum wage increase has a negative employment effect for male workers in short term.

Considering the respondents' differences between 2005 and 2006 survey, it is necessary to add individual characteristics as control variable to the model. Column 2 presents the estimation results with full set of demographic control variables(age, age square, education, marital status, health condition, number of household member, hukou status). From it we can see, the coefficient of interaction term is still significantly negative and close to that without controls, but we get a smaller Log pseudolikelihood. We can conclude that, after controlling for individual characteristics, the negative employment effect of minimum wage still exists for male workers although the effect becomes slightly smaller.

Running a Wald test to test whether the coefficients for the demographic control variables are simultaneously equal to zero, we get a p-value of 0 associated with a chi-squared value of 79.00 with seven degrees of freedom, meaning that including these variables creates a statistically significant improvement in the fit of the model. The positive coefficient of marriage variable shows that married male workers tend to have higher possibility of employment. Besides, better health condition could increase the possibility of employment, which meets our expectation. Having less number of household members can also help male employment. The possible reason is that male workers with less household members could have more time and energy to focus on working. Hukou status positive correlate to male's employment probability and the coefficient is strongly statistically significant, verifying that a non-agricultural hukou is an advantage in the labor market.

The vast territory and uneven regional development of China make it necessary to consider the impact of individual's location on employment. In addition, chapter 5.2 points out that the grouping result of control group and experiment group is related to the geographic locations of provinces due to their different economic development levels and wage policy strategies. Therefore, in the third scenario we add 27 province dummy variables to the model to control for the location differences. Column 3 gives the estimation results. From it we can see the results are similar to scenario 2, further confirming the negative effect of minimum wage on male employment. Under this scenario, besides marriage, health and number of household members, the coefficient of education variable is also statistically significant, which means having higher education will increase the employment possibility for male workers.

Indonon dont von okto-	Male (Dependent variable: employment status)						
independent variables	(1)	(2)	(3)				
group	0.031	0.030	-0.927				
	(0.22)	(0.21)	(-1.36)				
y06	$2.671^{***}$	2.843***	$2.906^{***}$				
	(14.12)	(14.03)	(13.63)				
y06group	-0.633*	-0.689*	$-0.726^{*}$				
	(-2.38)	(-2.48)	(-2.49)				
age	-	0.087	0.103				
	-	(1.20)	(1.35)				
agesq	-	-0.001	-0.001				
	-	(-1.32)	(-1.40)				
education	-	0.089	0.174				
	-	(0.79)	(1.53)				
marriage	-	0.803***	$0.767^{***}$				
	-	(3.84)	(3.63)				
health	-	-0.145**	-0.124*				
	-	(-2.94)	(-2.41)				
household member	-	-0.206***	-0.254***				
	-	(-4.58)	(-5.12)				
hukou status		$0.695^{***}$	$0.687^{***}$				
		(5.33)	(4.84)				
other variables	-	-	28 provinces				
constant	-0.288**	-2.294	-2.573				
	(-3.26)	(-1.41)	(-1.47)				
N	1694	1684	1684				
Pseudo R2	0.20	0.24	0.27				
Log pseudolikelihood	-881.90	-830.96.	-793.36				

Table 7.1 Minimum wage effects on male employment in short term

Note:

 Column (1) is the basic DID setup; Column (2) adds full set of demographic control variables; Column (3) adds province dummy variables;

"group" stands for the group dummy variable, it equals 1 if the respondent is in the experiment group, otherwise, it equals 0; "y06" stands for the year dummy variable, it equals 1 if the year is 2006, otherwise, it equals 0. "y06group" is the DID estimator which gives the net effect of minimum wage policy.

3. z statistics in parentheses: \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001.

4. Robust standard errors are estimated to deal with heteroskedasticity.

5. Each of the models as a whole is statistically significant.

6. The coefficient of provinces as a whole is  $0.015^{***}$  in column (3)

Applying the same analytic logic to female data, we get the estimation results of short-term minimum wage effect on female employment in four scenarios shown in table 7.2. From column 1 we can see, the coefficients on group variable, time variable and interaction term are all statistically significant at the confidence level of 0.05. Similar to the male experiment conclusion, compared with year 2005, the log odds of female employment in 2006 increase by 2.929 holding all the other variables constant, which reflects a better environment for job creation in 2006. The positive coefficient on group variable shows that individuals in experiment group have a higher possibility of employment than those in control group. The coefficient on interaction term is minus 0.635, which is very close to the male result(-0.633), reflecting a similar level of negative effect of minimum wage increase on female employment in short term.

Column 2 shows the estimation results of scenario 2. After controlling for individual characteristics, the negative employment effect is still statistically significant. In contrast with male results, education and marriage do not have a significant influence on female employment. But better health condition and less household members can increase the probability of employment for female workers as well, which meets our expectation.

However, female workers with an agricultural hukou have higher probability of employment. This result inverses our expectation that employers tend to hire workers with urban residence permit. One possible explanation could be normally urban workers have higher expectation on jobs than rural workers. Thus, the low-wage jobs which are covered by minimum wage policy are more attractive to migrant workers with an agricultural hukou. Once the minimum wage increases, migrant workers are more stimulated to join the labor market and accordingly this leads to a higher probability of employment.

Adding province dummy variables to the model, we can see from column 3 that the negative employment effect is greater with a coefficient of minus 0.687, but it is no longer statistically significant. Besides, the impact of group variable, health condition and hukou status are insignificant as well, indicating that the province dummy variables may largely capture the characteristics of group variable and parts of the demographic variables.

Indonendont	Female (Dependent variable: employment)					
Independent variables –	(1)	(2)	(3)			
group	0.344*	$0.298^{*}$	-0.213			
	(2.33)	(1.98)	(-0.34)			
y06	$2.929^{***}$	$2.866^{***}$	3.161***			
	(14.70)	(13.58)	(13.03)			
y06group	-0.635*	-0.649*	-0.687			
	(-2.07)	(-2.07)	(-1.89)			
age	-	0.063	0.098			
	-	(0.78)	(1.15)			
agesq	-	-0.001	-0.001			
	-	(-0.82)	(-1.22)			
education	-	0.093	0.091			
	-	(0.98)	(0.90)			
marriage	-	-0.134	-0.257			
	-	(-0.55)	(-0.96)			
health	-	$-0.127^{*}$	-0.105			
	-	(-2.30)	(-1.77)			
household member	-	-0.126**	-0.127***			
	-	(-2.74)	(-2.58)			
hukou status		$-0.127^{*}$	-0.105			
		(-2.30)	(-1.77)			
other variables	-	-	28 provinces			
constant	-0.635***	-1.395	-1.326			
	(-6.65)	(-0.81)	(-0.71)			
N	1430	1426	1417			
Pseudo R2	0.23	0.24	0.29			
Log pseudolikelihood	-737.94	-724.40	-680.32			

Table 7.2 Minimum wage effects on female employment in short term

Note:

1. Note 1 to 4 of Table 7.1 also apply to this table.

2. Each of the models as a whole is statistically significant.

3. Wald test for demographic control variables: chi2(7)=19.69, Prob > chi2= 0.006

4. The coefficient of provinces as a whole is 0.013\* in column (3).

Combining two estimation results, basically the minimum wage increase has a significant negative effect on both male and female employment in short term and the negative effect is a little greater on female employment than male. However, what should be noticed is that after controlling for province differences and restricting the experiment group to the provinces with higher minimum wage growth, the negative effect becomes insignificant for female although the effect magnitude is larger.

#### 7.2.2 Medium-term Experiment

The medium-term employment effect of minimum wage increase is tested under the same three scenarios as short-term experiment.

Table 7.3 shows the estimation results for male workers. From it we can see, the coefficients on interaction term are all positive in four scenarios, which is consistent with the positive DID estimators(table 6.5) got from descriptive analysis. However, none of these coefficients is significantly different from 0 at the confidence level of 0.05. Therefore, we cannot find a impact of minimum wage increase on male employment in medium term based on the estimation from this sample. We may conclude that the negative employment effect of minimum wage increase in short term disappears in medium term for male workers.

Reviewing other variables, we can find that the coefficients on time dummy variable, marriage and health are statistically significant. Due to Beijing Olympic Games in 2008, the boom of catering industry, tourist industry which provide huge demand for low-skill workers make the employment environment in 2008 better than 2005. Consistent with short-term results, married male workers with better health condition have higher possibility of employment. Besides, hukou status also has a significant relationship with employment: having a non-agricultural residence permit versus an agricultural one, decreases the log odds of employment by around 1.6.

Independent veriables	Male (Dependent variable: employment)		
independent variables –	(1)	(2)	(3)
group	0.013	0.211	1.636
	(0.07)	(0.99)	(1.87)
y08	$0.820^{**}$	0.813**	$0.784^{**}$
	(3.06)	(2.90)	(2.65)
y08group	0.339	0.151	0.298
	(0.82)	(0.35)	(0.64)
age	-	0.087	0.078
	-	(0.84)	(0.72)
agesq	-	-0.001	-0.001
	-	(-1.19)	(-1.01)
education	-	0.045	0.053
	-	(0.24)	(0.26)
marriage	-	1.062***	0.891**
	-	(3.95)	(3.10)

Table 7.3 Minimum wage effects on male employment in medium term

health	-	-0.199**	-0.171*
	-	(-2.96)	(-2.36)
household member	-	-0.072	-0.044
	-	(-1.04)	(-0.62)
hukou status	-	-1.583***	-1.508***
	-	(-6.28)	(-5.70)
other variables	-	-	28 provinces
constant	$1.761^{***}$	1.548	0.525
	(14.37)	(0.64)	(0.20)
Ν	1417	1411	1272
Pseudo R2	0.03	0.13	0.16
Log pseudolikelihood	-485.80	-431.00	-401.00

Note:

 Column (1) is the basic DID setup; Column (2) adds full set of demographic control variables; Column (3) adds province dummy variables.

- "group" stands for the group dummy variable, it equals 1 if the respondent is in the experiment group, otherwise, it equals 0; "y08" stands for the year dummy variable, it equals 1 if the year is 2008, otherwise, it equals 0. "y08group" is the DID estimator which gives the net effect of minimum wage policy.
- 3. Note 3 and 4 of Table 7.1 also apply to this table.
- 4. Each of the models as a whole is statistically significant.
- 5. Wald test for demographic control variables: chi2(7)=78.83, Prob > chi2= 0.000.
- 6. The coefficient of provinces as a whole is 0.004 in column (3).

Tables 7.4 gives the estimation results for female. From it we can see, the coefficients on interaction term is statistically insignificant although it is negative in all three scenarios. The negative employment effect of minimum wage increase in short-term experiment doesn't exist in the medium term for female workers as well.

The coefficients of age and age squared variable show that there is an inverse-U shape of female employment provability with the increase of age, which meets our expectation. Different from the male estimation results, marital status doesn't have a significant impact on female employment. But having better health condition and agricultural hukou could increase the probability of employment for female workers either.

In summary, we cannot find evidence showing that the minimum wage increase has statistically significant impact on employment for both male and female workers in medium term from the estimation results of the sample used in this paper. The negative employment effect shown in short term may disappear as time passed.

In donou dont wowohl	Female (Dependent variable: employment)			
independent variables –	(1)	(2)	(3)	
group	-0.325*	-0.301	-0.026	
	(-2.02)	(-1.80)	(-0.02)	
y08	$2.118^{***}$	$2.017^{***}$	$2.310^{***}$	
	(6.27)	(5.97)	(5.87)	
y08group	-0.461	-0.445	-0.787	
	(-1.04)	(-0.99)	(-1.56)	
age	-	$0.217^{*}$	$0.263^{*}$	
	-	(2.08)	(2.43)	
agesq	-	-0.003*	-0.003*	
	-	(-2.18)	(-2.55)	
education	-	-0.015	-0.055	
	-	(-0.12)	(-0.44)	
marriage	-	-0.344	-0.501	
	-	(-1.11)	(-1.55)	
health	-	-0.094	-0.108	
	-	(-1.61)	(-1.72)	
household member	-	0.010	0.026	
	-	(0.14)	(0.36)	
hukou status	-	-1.085***	-1.065***	
	-	(-5.58)	(-5.28)	
other variables	-	-	28 provinces	
constant	$0.940^{***}$	-2.239	-2.732	
	(9.70)	(-0.97)	(-1.14)	
Ν	1200	1198	1192	
Pseudo R2	0.09	0.13	0.16	
Log pseudolikelihood	-583.84	-556.99	-533.57	

Table 7.4 Minimum wage effects on female employment for in medium term

Note:

1. Note 1 to 4 of Table 7.3 also apply to this table.

2. Each of the models as a whole is statistically significant.

3. Wald test for demographic control variables: chi2(7)=49.49, Prob > chi2= 0.000.

4. The coefficient of provinces as a whole is 0.001 in column (3).

# 7.2 Minimum wage effects on male and female working hours

#### 7.2.1 Short-term Experiment

In order to establish a linear relationship between working hours and the event of minimum wage increase and get an approximate percentage effect, the dependent variable "weekly working hours" is log transformed. Then the coefficients present approximate changes in the form of percentage. Following the setup in the analysis of employment effect, three similar scenarios are considered: scenario 1 is set as regression with basic DID variables; scenario 2 adds a full set of control variables (age, age squared, monthly income, education, marital status, health condition, number of household member, hukou status) to the model; scenario 3 further adds province dummy variables to control for the influence of geographic location.

Table 7.5 gives the estimation results of minimum wage effect on male working hours in the short term. The parameter of our interest is on the y06group which measures the net effect between 2005 and 2006, assuming that individual's weekly working hours of experiment group and control group do not change for other reasons. From table 7.5 we can see the coefficient on the interaction term is statistically significant at the confidence level of 0.05 under all the scenarios, which indicates a positive net effect of minimum wage on working hours: because of the increase of minimum wage, the weekly working hours extend about 16.88%<sup>14</sup> for male workers in the experiment group. This result is consistent with the DID estimator got from descriptive analysis (table 6.3).

After controlling for individual characteristics, the adjusted R square increases substantially to 0.06 from 0.01, implying a better goodness of fit in this case. The coefficient on group variable is minus 0.123, which means the weekly working hours for workers in the experiment group is 13.09%<sup>15</sup> less than in the control group, holding all other factors constant. Besides, the negative coefficient of education shows that male workers with higher education have shorter working hours. The reason could be higher-educated employees have higher probability to work in formal sectors which guarantee a statutory working time. Male workers with agricultural hukou have better employment situation than the ones with urban hukou.

Column 3 presents the estimation results of the effect of minimum wage increase on weekly working hours with province dummy variables added to the model. From it

<sup>&</sup>lt;sup>14</sup> 16.88% is calculated by  $(e^{0.156} - 1)$ . <sup>15</sup> 13.09% is calculated by  $(e^{0.123} - 1)$ .

we can see, the coefficients on each variable is similar to that of scenario 2, except that group variable is not significant, which indicates the province variables has captured most of the characteristics of group variable.

Indonondorst	Male (Dependent variable: log(weekly working hours))		
	(1)	(2)	(3)
group	-0.147***	-0.123**	-0.240
	(-3.62)	(-3.08)	(-1.75)
y06	0.019	-0.000	-0.000
	(0.54)	(-0.01)	(-0.00)
y06group	$0.159^{**}$	$0.158^{**}$	0.156**
	(2.81)	(2.86)	(2.80)
age	-	0.028	0.023
	-	(1.73)	(1.37)
agesq	-	$-0.000^{*}$	-0.000
	-	(-2.24)	(-1.82)
monthly income	-	-0.000	-0.000
	-	(-1.46)	(-0.91)
education	-	$-0.062^{*}$	-0.045
	-	(-2.15)	(-1.58)
marriage	-	-0.068	-0.067
	-	(-1.56)	(-1.58)
health	-	-0.010	-0.010
	-	(-0.76)	(-0.74)
household member	-	0.011	0.003
	-	(0.96)	(0.26)
hukou status		-0.167***	-0.166***
		(-5.66)	(-5.44)
other variables	-	-	28 provinces
constant	3.540***	3.504***	3.598***
	(144.61)	(9.32)	(9.25)
N	1672	1662	1662
$R^2$	0.01	0.07	0.10
Adjust R <sup>2</sup>	0.01	0.06	0.08

Table 7.5 Minimum wage effect on male working hours in short term

Note:

1. Column (1) is the basic DID setup; Column (2) adds full set of control variables; Column (3) adds province dummy variables.

2. "group" stands for the group dummy variable, it equals 1 if the respondent is in the experiment group, otherwise, it equals 0; "y06" stands for the year dummy variable, it equals

1 if the year is 2006, otherwise, it equals 0. "y06group" is the DID estimator which gives the net effect of minimum wage policy.

- 3. t statistics in parentheses: \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001.
- 4. Robust standard errors are estimated to deal with heteroskedasticity.
- 5. Each of the models as a whole is statistically significant.
- 6. The coefficient of provinces as a whole is 0.001 in column (3).

In contrast with male results, although it is positive, the coefficient on interaction term for female is statistically insignificant in all the four scenarios as shown in table 7.6, which means the positive DID estimates(table 6.3) got from descriptive analysis is not significant from zero. Therefore, the extension effect of minimum wage increase on male working hours is not found for female. But, agricultural hukou helps employment for female workers as well.

To sum up, the minimum wage increase has a positive effect on working hours for male workers in short term, but no obvious effect is found for female workers according to the estimation from the data used in this paper.

Combining with the results got in chapter 7.1.1 we can conclude that, in short term due to the increase of minimum wage, female workers have a sharp drop on the probability of employment, but their working hours seems not be affected. Although the negative employment effect is not as large as female, male workers have to work longer hours per week.

Indonandant variables -	Female (Dependent variable: log(weekly working hours))		
independent variables	(1)	(2)	(3)
group	-0.052	-0.026	-0.064
	(-1.25)	(-0.62)	(-0.50)
y06	-0.007	-0.030	-0.012
	(-0.20)	(-0.76)	(-0.30)
y06group	0.064	0.047	0.034
	(1.04)	(0.76)	(0.55)
age	-	-0.001	-0.006
	-	(-0.10)	(-0.36)
agesq	-	-0.000	0.000
	-	(-0.22)	(0.11)
monthly income	-	-0.000	0.000
	-	(-0.38)	(0.03)
education	-	-0.033	-0.023
	-	(-1.24)	(-0.89)

Table 7.6 Minimum wage effects on female working hours in short term

marriage	-	0.031	0.021
	-	(0.57)	(0.38)
health	-	0.008	0.003
	-	(0.56)	(0.24)
household member	-	-0.001	0.002
	-	(-0.08)	(0.14)
hukou status		-0.166***	-0.161***
		(-4.66)	(-4.51)
other variables	-	-	28 provinces
constant	3.486***	3.832***	3.836***
	(138.99)	(10.02)	(9.58)
Ν	1416	1412	1412
$R^2$	0.00	0.04	0.07
Adjust R <sup>2</sup>	0.00	0.03	0.04

Note:

1. Note 1 to 4 of Table 7.5 also apply to this table.

2. Except for model 1, the other three models are statistically significant as a whole.

3. The coefficient of provinces as a whole is 0 in column (3).

#### 7.2.2 Medium-term Experiment

In this section, by using survey 2005 and 2008, the effect of minimum wage increase on working hours is tested again under the same three scenarios to see whether the short-term effect still exists in the medium term.

Table 7.7 gives the estimation results for male workers. From it we can see, after controlling for individual characteristics and locations, the coefficient on interaction term is statistically significant at the confidence level of 0.05. However, to be different from short term, the increase of minimum wage reduces male weekly working hours by  $8.7\%^{16}$  in medium term. After restricting experiment group to the provinces with more than 60% minimum wage growth, the effect becomes insignificant.

The negative coefficient on hukou status shows that working hours for urban workers is 4.7% less than migrant rural workers. Also, higher-educated male workers have shorter working hours. The explanation could be similar for these two results that non-agricultural hukou and high education level are advantages when competing for positions in formal sectors, which are more likely to comply with law requirements on working hours.

<sup>&</sup>lt;sup>16</sup> 8.7% is calculated by  $(e^{-0.091} - 1)$ .

To do non do nó con richter	Male (Dependent variable: log(weekly working hours))		
Independent variables –	(1)	(2)	(3)
group	0.040	0.046	0.202
	(1.52)	(1.74)	(1.91)
y08	$0.070^{**}$	$0.068^{*}$	$0.073^{*}$
	(2.61)	(2.48)	(2.54)
y08group	-0.060	$-0.078^{*}$	-0.091*
	(-1.59)	(-2.08)	(-2.24)
age	-	-0.005	-0.007
	-	(-0.53)	(-0.68)
agesq	-	0.000	0.000
	-	(0.27)	(0.45)
monthly income	-	$-0.000^{*}$	-0.000*
	-	(-2.32)	(-2.38)
education	-	-0.058***	-0.053**
	-	(-3.48)	(-3.13)
marriage	-	-0.015	-0.017
	-	(-0.50)	(-0.58)
health	-	-0.015	-0.011
	-	(-1.80)	(-1.31)
household member	-	-0.001	-0.003
	-	(-0.12)	(-0.38)
hukou status	-	-0.068**	-0.048*
	-	(-3.25)	(-2.21)
other variables	-	-	28 provinces
constant	3.923***	$4.417^{***}$	$4.278^{***}$
	(216.32)	(20.19)	(18.44)
N	1410	1404	1404
R2	0.01	0.04	0.07
Adjust R2	0.00	0.03	0.04

Table 7.7 Minimum wage effects on male working hours in medium term

Note:

1. Column (1) is the basic DID setup; Column (2) adds full set of control variables; Column (3) adds province dummy variables.

"group" stands for the group dummy variable, it equals 1 if the respondent is in the experiment group, otherwise, it equals 0; "y08" stands for the year dummy variable, it equals 1 if the year is 2008, otherwise, it equals 0. "y08group" is the DID estimator which gives the net effect of minimum wage policy.

3. t statistics in parentheses: \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001.

4. Robust standard errors are estimated to deal with heteroskedasticity.

5. Except for model 1, the other three models is statistically significant as a whole.

6. The coefficient of provinces as a whole is 0.001 in column (3).

Table 7.8 gives the estimation results for female workers. Although the coefficient on interaction term is still negative, the effect of minimum wage increase on working hours is not significant for female workers in the medium term. And the education and hukou status are insignificant as well. Thus, we can only conclude that no obvious impact of minimum wage on female working hours is found based on the estimation from the data used in this paper.

In summary, for male workers, the increase of minimum wage extends working hours in short term but reduces it in medium term. For female workers, no evidence shows this policy has obvious impact on working hours both in short and medium term.

In demondent workships	Female (Dependent variable: log(weekly working hours))			
Independent variables -	(1)	(2)	(3)	
group	0.024	0.024	0.011	
	(0.88)	(0.87)	(0.10)	
y08	0.049	0.041	0.058	
	(1.48)	(1.15)	(1.49)	
y08group	-0.008	-0.005	-0.034	
	(-0.18)	(-0.12)	(-0.66)	
age	-	0.024	0.020	
	-	(1.82)	(1.43)	
agesq	-	-0.000	-0.000	
	-	(-1.93)	(-1.49)	
monthly income	-	-0.000	0.000	
	-	(-0.28)	(0.12)	
education	-	-0.033	-0.029	
	-	(-1.76)	(-1.58)	
marriage	-	-0.039	-0.040	
	-	(-1.06)	(-1.06)	
health	-	-0.009	-0.012	
	-	(-1.09)	(-1.38)	
household member	-	-0.001	-0.005	
	-	(-0.13)	(-0.62)	
hukou status	-	-0.033	-0.032	
	-	(-1.23)	(-1.16)	
other variables	-	-	28 provinces	
constant	3.921***	3.639***	3.705***	
	(236.79)	(12.30)	(12.21)	

Table 7.8 Minimum wage effects on female working hours in medium term
N	1194	1192	1192
R2	0.00	0.01	0.04
Adjust R2	0.00	0.01	0.01

Note:

1. Note 1 to 4 of Table 7.7 also apply to this table.

2. Except for model 1, the other three models is statistically significant as a whole.

3. The coefficient of provinces as a whole is 0 in column (3).

# 7.3 Results Analysis and Discussion

Summarizing the estimation results of short-term and medium-term experiments for male and female workers, we can have the following combined conclusions: For female workers, the increase of minimum wage will have no significant impact either on the employment or working hours. For male workers, in short term, the increase of minimum wage will reduce the employment probability, but extend the working hours. While, in medium term, no statistically significant employment effect is found, but the working hours will be reduced.

The final estimation results are gathered from the outcome of scenario 3 in each experiment. Compared with scenario 1 and 2, Scenario 3 controls for the most influential factors on employment (individual and regional heterogeneous) in addition to the minimum wage increase, accordingly it is viewed as a better estimation result which is more reasonable and reliable. In fact, the result in scenario 3 is robust if we consider the following two aspects: first, the employment and working hours effect got from scenario 1, 2 and 3 in each experiment for male and female workers are consistent in the direction. Basically, the significant levels of the effect are also consistent, except the employment effect for male workers in medium term, which becomes insignificant after adding province variables; Second, the coefficient on the interaction term which displays the net effect on employment and working hours of minimum wage increase in scenario 3 is very close to that in scenario 1 and 2, showing that the estimation results are not sensitive to the change of individual characteristics and regional differences.

Effecto	Ν	Male	Female		
Effects	Short term	Medium term	Short term	Medium term	
Employment probability	decrease	(increase)	(decrease)	(decrease)	
Working hours	extend	reduce	(extend)	(reduce)	

Table 7.9 Minimum wage effects on employment and working hours

Note:

1, The results are gathered from line 3 - the coefficient on the interaction term - in column 3 in table 7.1 to table 7.6.

2, () means the effect is not statistically significant.

The result of negative employment effect in short term is in line with the previous research of Ma shuang, Zhang Jie, Zhu Xi (2012) and Xiao, Xiaoyong (2009). The not obvious employment effect in medium term is in line with Mei Wang (2008), Juan Shi (2009) and Guipu Wang, Ye Ma (2009). One important contribution of our research is to generate a dynamic perspective on the effect of minimum wage increase in China and provide a comparative estimation result of the employment effect of minimum wage increase between short term and medium term. The comprehensive results indicate that although the increase of minimum wage will harm the male employment in short term, from a medium term perspective, the policy does not have negative influence on low-skilled and low-wage workers. Thus, associated with the widely agreed wage compression effect, the minimum wage regulation as a part of labor market policy is a useful tool to contribute to the fulfillment of the overall goal (economy rebalancing, narrowing income gap between the rich and poor, and improve people's living standard) in China in the long term.

The result of negative employment effect in short term and the not obvious employment effect in medium term can be explained by the Harris and Todaro model illustrated in chapter 4.2.3. An intuitive explanation for these results may be the following: assume that the elasticity of demand for labor in the urban in China is greater than one and the initial minimum wage is at a rather low level. When the minimum wage increases, in short term, employment in the urban sector will reduce and the released labors could either move to the rural sector or be out of work in the urban sector. At the same time, the increased minimum wage raises the expected urban wage despite that the probability of employment decreases. Consequently, there will be an extra incentive for those fired labors to stay in the labor sector and the labors in the rural sector to move to the urban sector. Thus, the reduced employment opportunity and the new motivated labor lead to a rise of urban unemployment. However, in the medium term, after three-years adjustment, the minimum wage may have reached a higher level where the urban unemployment is already high. The increase in the minimum wage may not be sufficient to compensate for the reduced probability to find employment in the urban sector, and the expected urban wage will fall. As a result, there will be out-migration from the urban to the rural sector, and if this out-migration offset the reduced employment in the urban sector, urban unemployment will have no obvious change. The backflow of migrant workers in recent years provides a practical support to this point of view. From this perspective, the fact that a large proportion of migrant workers are male rather than female, can give a explanation of the insignificant employment effect of minimum wage increase on female workers.

Next, we have a look at the working hours effect. The estimation results imply that the increase of minimum wage will extend the working hours for male workers in short term, but reduce it in medium term. And it doesn't have a significant effect on female working hours which is consistent with the employment effect. This result is very fruitful as it is a reverse of many empirical study results for developed countries, stating that the increase of minimum wage will reduce working hours for low-skilled workers. But it is in line with Jia Peng's (2012) study who also found a increased working hours effect of the increase of minimum wage between 2005 and 2006. The difference may be caused by the different wage system in China.

Unlike the wide application of hourly wage in western countries, the monthly wage system prevails in China. The labor law clear specifies that full-time jobs should take the monthly salary system, the hourly wage can only be applied to part-time jobs. As for the industries low-skilled workers worked in, generally, most of the manufacturing factories use piece rate to stimulate the front-line workers' working enthusiasm. Only the management jobs which cannot be evaluated by pieces take the hourly or monthly wage system. The construction industry prefer a daily wage system and usually pay in installments at the end of projects. Thus, the hourly wage likely just exists in the catering and service industry. That means the change of working hours in our experiments is caused most likely by the change of overtime instead of employment status. In this sense, the longer working hours for male workers in short term may be explained as male workers who remain employed have to extend their working hours to compensate their increase of wage. The reduced working hours in medium term, may be due to, on the one hand, the recovery of employment environment, on the other hand, a better compliance with the statutory working hours caused by the issue of Labor Contract Law in 2008.

# Chapter8Conclusionand

# Recommendation

In this chapter, the conclusions of the present research are formulated and a profound reflection is conducted by highlighting the contributions and limitations. After that, we give the recommendations for further work.

# 8.1 Conclusion

The effect of minimum wage policy on employment and working hours is crucial for assessing the overall effect of this policy. A large number of scholars studied this issue from both the theoretical and empirical perspectives, but still no consensus was reached. Under the background of economic rebalance which is a transition from the export-oriented economy towards domestic demand-oriented economy in China, this issue is triggering more intensive debate. Despite of the wide blame of its possible harm to the employment of low-wage workers among academia, the public and the government are keen on the increase of minimum wage and expect that it can contribute to the increase of people's income, narrowing the gap between rich and poor, spurring domestic consumption and so on. Can this policy meet these expectations? This paper aims to give an answer. In the paper, a three-year pooled cross-sectional micro data obtained from the large dataset of China General Social Survey covering 28 out of the 34 provinces are used. By establishing regression-adjusted difference in differences models in the short and medium term respectively, a comparative analysis of minimum wage effect on employment and working hours is conducted.

The estimation results can be formulated as three points: the increase of minimum wage standard will have a inverse effect on male employment in the short term, but have no significant impact in the medium term; the increase of minimum wage will extend the male working hours in the short term, but reduce it in the medium term; there is no significant impact found for female workers either on the employment or working hours. The findings imply that the negative effect of minimum wage policy on employment and working hours is not very severe: although in the short term it will harm the low-wage male workers' employment and extend their working time, as time goes on, the negative effect will disappear. Thus, combined with the widely agreed wage compression effect, we conclude that the minimum wage policy can benefit the low-wage group.

We argue that the estimation results obtained from our research are quite reliable and

robust. The reasons are as follows. First, the difference in differences method which is more and more popular in econometrics has clear advantage when evaluating the effect of policy interventions. It removes all permanent individual characteristics of the control and experiment group through the first difference process, as well as the biases caused by other shocks or macroeconomic trends that affect both groups similarly through the second difference process. Thus, the net effect of minimum wage policy is measured. Second, the large dataset used in the research which covers 28 out of 31 provinces in China guarantees a good representativeness for the nationwide situation. And the 2005, 2006 and 2008 survey, which are the latest three years available, guarantee the timeliness of the research. Furthermore, using the on-going dataset, the comparative analysis between the short-term and medium-term effect generates a dynamic perspective and provides a comprehensive empirical findings. Finally, the estimation results themselves also present stability for the reason that they are not sensitive to the change of individual characteristics and regional differences (the results in scenario 3 are very close to the counterparts in scenario 1 and 2). Therefore, we conclude that the results can provide a reliable evidence to the hot debate and fill the knowledge gap in the literature as well.

Before the further interpretation of the estimation results from a economic perspective, we discuss the moral issue of the minimum wage policy: could a minimum wage standard still be acceptable, when it will lead to a rise of unemployment, an extension of working hours, the failure of business and the increase of prices? From our point of view, the answer is yes. We declare that it is necessary to have a minimum wage standard in a society. Even for the homogenous workers who take part in the low-skilled work, the value of the labor should be approved and above the basic living baseline. The business should afford to pay its workers enough to survive. However, we should also face the negative effect of minimum wage policy. The possible negative effect means that the policy is not a free lunch and there is some economic cost or social cost. The consequences of rise of unemployment and the extension of working hours found in our research can be viewed as the cost of the positive effects (such as the increase of domestic consumption, a push of technical innovation and so on). So, the problem is not whether we should increase the minimum wage standard, but how to balance the cost and benefit of this policy. This is a hard question and beyond our research scope. Fortunately, the conflict between the cost and benefit of minimum wage policy is not very sharp in China according to our research results. The results imply a positive social effect of minimum wage policy in the long term. The underlying reasons of our results are worthy to be further discussed. Next, we will try to find the explanations for the results from both the theoretical and practical aspects.

According to our research, the employment effect of minimum wage increase in China changes as time goes on: in the short term, the male worker's employment probability is reduced, while in the medium term, there is no significant effect. The Harris and Todaro model could provide a possible explanation to this dynamic process. We argue that the unemployment level in the urban sector depends on the jobs provided in the urban sector and the available labor force which is determined by the bidirectional migration between rural and urban labor market. Based on the model, the increase of labor cost will reduce the jobs provided and the only motivation for migration is assumed to be the expected earnings in the urban sector. Then, if the elasticity of demand for labor in the urban area in China is greater than one and the initial minimum wage is at a rather low level, the rise of minimum wage will increase the expected earnings despite that the probability of employment decreases. As a result, there will be a migration from the rural to urban sector and it will worsen the employment situation. However, once the minimum wage is increased to a higher level that the increase in the wage cannot compensate for the reduced employment probability anymore, the expected urban wage will fall and there will be a migration from the urban to rural sector. Then, it is possible that the out-migration offset the reduced employment in the urban sector, resulting in little change in employment. Although we did not further investigate the level of the elasticity of demand for labor in the urban area in China, the open outcome of the Harris and Todaro model still provides a theoretical support for the rationality of the insignificant unemployment effect of minimum wage policy in the medium term.

The above explanation is under the framework of Harris and Todaro model, which assumes that the increase of minimum wage will lead to an increase of labor cost. As a result, the employers who pursue profit maximization will reduce the labor demand and finally it leads to a higher unemployment rate. One important factor that relates to labor cost, but not be considered in this explanation is the *labor productivity*. Actually, the profit of a firm ( $\pi$ ) depends on the Unit Labor Cost (*ULC*) calculated as ratio of average wage (w) and average labor productivity ( $\gamma$ ), rather than the absolute wage cost. It can be expressed as  $\pi = 1 - UCL = 1 - w/\gamma$ . The increase of minimum wage does increase the average wage level, however, we should also consider the change of labor productivity in order to draw the final conclusion. If the labor productivity increases at the same time, there is a possibility that labor demand do not need to be reduced, while the profit remains unchanged. So there is no incentive for employers to lay off workers.

Vergeer and Kleinknecht (2010) stated that there is a bidirectional causal relationship between wage and labor productivity. On the one hand, an increase in real wage results in an increase of labor productivity. By conducting a panel data analysis of 19 OECD countries, they found that a one percentage point change in growth rates of real wages leads to a change in labor productivity growth by 1/3 percent points. If this is the case in China, the minimum wage increase will not harm the employment severely which is consistent with our empirical results. On the other hand, the increase of productivity promotes the increase of real wage. According to Su and Heshmati (2012), the expansion of industry is a key factor that along with other improvement has eventually affected the labor productivity in China. Chen and Feng (2000) also concluded that the trend of industrialization in China is consistent with the progress of technological innovation and upgrading, allowing the labor productivity to improve. In this sense, the rapid growth of China creates a space for the increase of minimum wage standard without hurting profits. Accordingly, the employment situation is not influenced.

In fact, it is not a surprise that in the medium term the employment effect of minimum wage policy is not significant, because the employers may respond on multiple fronts to the increase in minimum wage. The possible adjustment channels in reality could be reduction in hours worked, non-wage benefits and trainings for workers, reduction in labor turnover, changes in employment composition, improvements in efficiency and so on (Schmitt, 2013). This actions largely neutralize the negative effects of minimum wage policy.

In terms of the working hours effect, our finding is more fruitful as it is different from many results in the developed countries stating that the increase of minimum wage will reduce worker's working hours. We attribute the difference to the monthly wage dominant system in China. That means the change of working hours in our experiments is caused most likely by the change of overtime instead of employment status. In this sense, the longer working hours for male workers in short term may be explained as male workers who remain employed have to extend their working hours to compensate their increase of wage. The reduced working hours in medium term, may be due to, on the one hand, the recovery of employment environment, on the other hand, a better compliance with the statutory working hours caused by the issue of Labor Contract Law in 2008.

We also argue that the difference in the effect of minimum wage increase on male and female employment and working hours is due to the fact that male workers occupy a large proportion of the total migrant workers. Thus, the increase of minimum wage standard will have much bigger impact on male workers than female workers.

In conclusion, our research think that the minimum wage policy is an acceptable policy as a part of the labor market regulations. In spite of some economic and social cost, it is a useful tool to fulfill the overall goal (economic rebalance, narrowing income gap between the rich and poor, improving people's living standard and etc.) in China in the long term.

# **8.2 Policy Recommendation**

Although the research cannot give detailed policy implementation recommendations, from the in-depth analysis of minimum wage in China in chapter 3 and the labor market characteristics in chapter 4, general policy adjustment directions are given as follows. First, we suggest that the determination process of minimum wage standard should involve the workers more. Due to the weak labor union in China, the government should create some green channels for the public to participate in the discussion of minimum wage standards directly. Second, the supervision and inspection of the minimum wage implementation should be further enhanced from the central to local governments. Third, as the effect of minimum wage policy on employment and working hours may change over time, a continuous inspection of the labor market environment is necessary. A modest minimum wage standard should be set in order to limit the negative effect of this policy.

# 8.3 Research Limitation

The biggest research limitation of the study is the infamously unreliability of natural experiment. Although we have made great effect to define the treatment - increase of minimum wage - clearly, follow a religious logic to divide control group and experiment group, and add a series of control variables to the regression model to control the individual characteristics of the two groups, it is hardly to say that the control group and the experiment group are totally heterogeneous and independent. The problem comes from the feature of nature experiment itself: the experiment setting is not under the control of researchers, but relies on the external intervention in society. Is there such thing in society as a natural control? Can the natural treatment be as accurate as in a normal experiment? We do not intend to answer these questions, but the important thing is that the unreliability of natural experiment do limit the accuracy of our distinction between the control and experiment group. It accordingly has a negative influence on our estimation results.

Besides, in order to extend the study to a larger time series, for the minimum wage information in provincial and city levels between 1995 and 2001, we partly refer to Lili's (2012) collection. The secondhand data may limit our research accuracy.

# **8.4 Future Research**

Our research suggest new research in two directions: first, the analysis in chapter 8 highlights the importance of labor productivity in explaining the insignificant employment effect of minimum wage policy. However, we did not either further

investigate the trend of labor productivity in the corresponding years, or test the relationship between wage and labor productivity in China. Since these two points are highly related to the evaluation of minimum wage effect, it calls for more research in the further.

Second, due to the data limitation, the coverage of minimum wage policy is not sufficiently researched. It will make sense to add analysis in this aspect and the distinction between formal and informal sector when doing empirical study will also contribute to the study.

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# Appendix 1: chapter 1



# **Appendix 2: chapter 4**

				τ	Unit: %
Education level	Non-	All	Local	Regional	< 30
Illiteracy	8.3	1.5	2.0	1.0	0.3
Primary school	33.8	14.3	18.4	10.5	5.5
Junior high school	47.0	60.5	58.9	62.0	57.8
High school	8.0	13.3	13.8	12.8	14.7
Technical secondary school	1.5	4.7	3.3	5.9	9.1
Junior college or above	1.4	5.7	3.6	7.8	12.6

Education level of migrant workers in 2012

Note: "non-" refers to rural non-migrant workers; "All" refers to all migrant workers; "Local" refers to local migrant workers; "Regional" refers to trans-regional migrant workers; "<30" refers to young migrant workers under the age of 30.

Source: The national monitoring report of migrant workers in 2012.

#### The region distribution of migrant workers

Unit:	%
· · · · · ·	

		2011			2012		
region	(1)	(2)	(3)	(1)	(2)	(3)	
Nationwide	20.2	32.7	47.1	20.0	33.2	46.8	
Eastern Region	32.1	51.3	16.6	32.0	51.7	16.3	
Midland	13.0	19.8	67.2	13.1	20.7	66.2	
Western Region	15.4	27.6	57.0	15.4	28.0	56.6	

Note: (1) migrant worker works outside his village but inside his county; (2) migrant worker works outside his county but inside his province; (3) migrant worker works outside his province. Source: The national monitoring report of migrant workers in 2012.

### Informal employment in China



Source: Adapted from Fang Lee Cook, 2008.

# Appendix 3: chapter 6

### Meidum-term effect:

### . sdtest Growthrate, by(experimentgroup1)

Variance ratio test							
Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Con	f.Interval]	
0	16	0.3841	0.0255	0.1021	0.3297	0.4386	
1	12	0.6524	0.0319	0.1107	0.5821	0.7227	
combine d	28	0.4991	0.0322	0.1705	0.4330	0.5652	
ratio = $sd(0)$	/ sd(1)					f = 0.8517	
Ho: ratio = 1					degrees of free	edom = 15, 11	
Ha: ratio < 1 Ha: ratio != 1			!= 1	Ha	a: ratio > 1		
$\Pr(F < f) = 0$	.3780		$2*\Pr(F < f)$	= 0.7561	Pr(F	> f) = 0.6220	

### . swilk Growthrate if experimentgroup1==1

Shapiro-Wilk W test for normal data						
Variable	Obs	W	V	Z	Prob>z	
Growthrate	12	0.98046	0.326	-2.181	0.98542	

## . swilk Growthrate if experimentgroup1==1

Shapiro-Wilk W test for normal data						
Variable	Obs	W	V	Z	Prob>z	
Growthrate	16	0.91254	1.772	1.136	0.12789	

### . ttest Growthrate, by(experimentgroup1)

Two-sample t test with equal variances							
Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Con	f.Interval]	
0	16	0.3841	0.0255	0.1021	0.3297	0.4386	
1	12	0.6524	0.0319	0.1107	0.5821	0.7227	
combined	28	0.4991	0.0322	0.1705	0.4330	0.5652	
diff		-0.2683	0.0404		-0.3513	-0.1852	
diff = mean(0) $\cdot$	- mean(1)					t = -6.6389	
Ho: diff $= 0$					degrees of	freedom $= 26$	
Ha: diff < 0	Ha: diff < 0		Ha: diff $!= 0$			: diff $> 0$	
Pr(T < t) = 0.00	000	I	$\Pr( \mathbf{T}  >  \mathbf{t} ) = 0$	0.0000	Pr(T	> t) = 1.0000	

# Appendix 4: chapter 7

In doman dant wan al la -	(Dep	oendent variab	le: employment	status)
independent variables	(1)	(2)	(3)	(4)
group	1.287	-0.274	1.482	-0.323
	(1.87)	(-0.46)	(1.66)	(-0.21)
y06	$2.913^{***}$	3.216***	$0.977^{**}$	$1.990^{***}$
	(13.55)	(12.87)	(2.86)	(5.33)
y06group	-0.908**	-0.564	1.026	-0.143
	(-2.72)	(-1.25)	(1.53)	(-0.24)
age	0.069	0.089	0.068	$0.292^{*}$
	(0.79)	(0.92)	(0.52)	(2.26)
agesq	-0.001	-0.001	-0.001	-0.003*
	(-0.76)	(-0.94)	(-0.81)	(-2.29)
education	0.178	$0.252^*$	0.174	-0.093
	(1.45)	(2.04)	(0.77)	(-0.64)
marriage	$0.794^{***}$	-0.229	0.560	-0.691
	(3.44)	(-0.79)	(1.61)	(-1.67)
health	$-0.140^{*}$	-0.092	$-0.205^{*}$	-0.150*
	(-2.51)	(-1.34)	(-2.46)	(-2.06)
household member	-0.247***	-0.071	-0.005	0.078
	(-4.55)	(-1.47)	(-0.06)	(1.00)
hukou status	$0.676^{***}$	0.250	-1.743***	-1.178***
	(4.30)	(1.43)	(-5.47)	(-4.72)
other variables	22	22	24	24
	provinces	provinces	provinces	provinces
constant	-2.120	-3.233	0.875	-3.156
	(-1.10)	(-1.60)	(0.28)	(-1.12)
N	1403	1141	963	894
Pseudo R2	0.28	0.31	0.20	0.17
Log pseudolikelihood	-646.57	-529.76	-294.23	-377.36

Sensitivity analysis for the divide of control group and experiment group

Note: column (1) is the result for male in short term; column (2) is the result for female in short term; column (3) is the result for male in medium term; column (4) is the result for female in medium term.

Independent verichles	(Depen	dent variable:	log(weekly workin	ng hours))
independent variables	(1)	(2)	(3)	(4)
group	$0.290^{*}$	-0.016	0.165	0.015
	(2.38)	(-0.06)	(1.55)	(0.13)
y06	0.001	-0.006	$0.085^{**}$	0.055
	(0.02)	(-0.15)	(2.85)	(1.32)
y06group	0.136*	0.069	-0.035	-0.025
	(2.12)	(0.89)	(-0.70)	(-0.38)
age	0.018	-0.004	0.003	0.019
	(1.01)	(-0.20)	(0.22)	(1.09)
agesq	-0.000	0.000	-0.000	-0.000
	(-1.42)	(0.02)	(-0.52)	(-1.25)
monthly income	-0.000	0.000	-0.000	0.000
	(-0.02)	(0.39)	(-1.29)	(0.77)
education	-0.028	-0.017	-0.060**	-0.041
	(-0.95)	(-0.55)	(-2.96)	(-1.87)
marriage	-0.038	0.040	-0.016	-0.039
	(-0.82)	(0.70)	(-0.45)	(-0.80)
health	-0.011	0.014	-0.011	-0.008
	(-0.77)	(0.93)	(-1.17)	(-0.71)
household member	0.005	0.005	0.003	-0.009
	(0.44)	(0.48)	(0.32)	(-0.84)
hukou status	-0.169***	-0.172***	-0.049*	-0.025
	(-5.15)	(-4.50)	(-1.99)	(-0.76)
other variables	22	22	22	22
	provinces	provinces	provinces	provinces
constant	3.495***	3.793***	$4.116^{***}$	3.790***
	(8.65)	(8.64)	(14.76)	(10.08)
N	1391	1139	1086	889
$R^2$	0.10	0.06	0.08	0.05
Adjust R <sup>2</sup>	0.08	0.04	0.05	0.02

Note: column (1) is the result for male in short term; column (2) is the result for female in short term; column (3) is the result for male in medium term; column (4) is the result for female in medium term.