THE MINIMUM WAGE, INEQUALITY AND EMPLOYMENT IN CHINA

by

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ABSTRACT

This study looks at the welfare implications of the minimum wage in China, and covers three topics: the minimum wage and wage inequality, the minimum wage and employment, and the minimum wage and the gender wage gap. The main finding is that the welfare implications of the minimum wage in China are mixed, with both positive and negative welfare effects. Four main conclusions are reached. Firstly, minimum wages can effectively reduce overall wage inequality at the municipal level (despite non-compliance) through raising individual wages at the lower end of the wage distribution. Secondly, minimum wages generally have significantly negative effects on urban employment with some indication of more marked effects for traditionally disadvantaged groups such as youth, older workers, and women. Thirdly, minimum wages significantly raise women's wages relative to men's at the lower quantiles of wage distribution, thus reducing the gender wage gap. Together with the second result, this means that the minimum raises women's relative wages, while lowering their employment. Fourthly, these three results are especially robust during 2004-2007, when the minimum wage system was reinforced.

Specific point estimates found in this study are as follows. As regards minimum wage impacts on wages, we find that a 10% increase in the minimum wage raises the wage at the 10^{th} percentile by up to 6%, and also reduces the 10-60 wage gap by almost 10%. Given such significant wage effects, we expect employment effects, and find that elasticity of employment with respect to the minimum wage for compliant workers is about -0.2 pre-2004 and -0.3 post-2004. The figure for compliant youth is higher, approximately -0.4 pre-

2004 and -0.8 post-2004. However, we also find that the negative employment effects for compliant workers are counterbalanced to some extent by significant positive effects for the non-compliant. Overall employment effects therefore appear small for most groups, though the minimum wage causes crowding into non-compliant jobs.

DEDICATION

To My Grandfather in Heaven

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ABBREVIATIONS

AR1	Auto-Regression (1)
CHIP	China Household Income Project
CHNS	China Health and Nutrition Survey
CPS	Current Population Survey
DID	Difference in Difference
FFL	Sergio Firpo, Nicole M. Fortin, and Thomas Lemieux (2009)
GDP	Gross Domestic Product
GLS	Generalized Least Square
IDiD	Incremental Difference in Difference
ILO	International Labour Office
IV	Instrument Variable
IZA	Institute for the Study of Labor
LDC	Less Developed Country
LFS	Labour Force Survey
MW	Minimum Wage
NBER	National Bureau of Economic Research
NMW	National Minimum Wage
OLS	Ordinary least squares
RGSU	Research Group in Shandong University
SOE	State-Owned Enterprise
UHS	Urban Household Survey
UK	United Kingdom
US	United States

1. INTRODUCTION

The minimum wage is one of the most studied topics in labour economics. However, the majority of the literature concentrates on developed countries. As is to be expected given the limited literature on less-developed countries (LDCs hereafter), relevant research on China is in its infancy. The theory and empirical experience of the minimum wage in developed countries needs to be fitted into the framework of development economics, remembering that China is an LDC (albeit one of the most important). Moreover, studies on China and other LDCs can in turn afford varied and rich findings for minimum wage studies in general. In summary, it is necessary and interesting to study China's distinctive experience of the minimum wage.

This study will investigate the welfare implications of the minimum wage in China, which is important since the minimum wage potentially provides a wage floor for many millions of low-wage labourers. Generally speaking, the minimum wage is a policy confronting equity and efficiency issues. On the one hand, it redistributes earnings between employers and employees, helping workers at the lower end of the wage distribution. This equity effect is especially important in a monopsonistic labour market to avoid exploitation (payment of wages less than the marginal revenue product). On the other hand, the minimum wage forces employers to change their employment decisions, which may or may not (given monopsony power) reduce unskilled employment. Thus, when the welfare implications of the minimum wage in China are explored both redistributive and employment effects need to be considered. In addition, the minimum wage effect on the gender wage gap is examined as a special case of the above two effects since

women make up a larger proportion of the low wage workforce than men (see Table 4.1). Overall then, this study includes three components: minimum wage effects on the wage distribution, on employment, and on the gender wage gap.

The data used in this study are a sub-sample of the Urban Household Survey (UHS hereafter) in China, combined with municipal minimum wage data collected personally. In particular, the UHS sample data in this study include individual annual data over the period 1988-2003 and individual monthly data over 2004-2007. This UHS sample covers nearly half of the mainland provinces (14 out of a total of 31 provinces), with important economic zones included. Total observations amount to more than 160,000. In sum, this study is based on representative individual urban survey data for 1988 to 2007.

The remaining sections in this chapter are arranged as follows: first, a brief introduction on the institutional background is given; then research advantages, contributions and findings are illustrated; and lastly, the thesis structure is presented.

1.1. Institutional background

This section first summarises China's basic administrative divisions and regional characteristics. Then the second part takes up the labour market, describing characteristics of LDCs and transition economies relevant to China. Specifically, we discuss such concepts as the dual-economy, formal and informal sectors, state-owned enterprises (SOEs hereafter), state trade unions and rural migrants. Lastly, the minimum wage system as it has developed in China is illustrated and discussed.

Administrative and regional characteristics

First, is must be remembered that China country has four levels of administrative divisions. These divisions are *sheng* (province), *shi* (city), *xian* (town) and *xiang* (village). The fourth level (village) is usually only used in rural areas. As noted, our study is based on urban survey data; therefore, it only includes the three levels of province, city and town. However, for each administrative level there are in fact several terms with different political implications. For example, at the province level, there are 4 *zhixiashi* (municipalities directly under central government, such as Beijing), 5 *zizhiqu* (autonomous regions, such as Xinjiang) and 22 *sheng* (proper provinces, such as Shanxi) on the mainland. In order to simplify statements, normally these terms at the province level are uniformly called *sheng* (province). Thus, in total there can be said to be 31 mainland provinces.

Analogous simplifications are required for the terms *shi* (city) and *xian* (town). Two terms need to be clarified regarding *xian* (town) and municipality. First, in a large part of the literature on China (for example, see Fang and Lin, 2013) *xian* is translated as *county* following the corresponding term in the administrative division system of the United States. However, following usage in the United Kingdom, *xian* is better translated as *town*. Thus *town* in this study has the same administrative and political meaning as *county* in some literature on China (for example, see Fang and Lin, 2013), both representing the level of *xian*. Second, since towns are only smaller cities, and are often mentioned together with cities as *towns and cities*, we will use the term *municipality* to refer to both towns and cities[1]. Note that municipalities directly under

[1] *City* will be occasionally used, such as Dalian city in Liaoning province.

central government (*zhixiashi*), such as Beijing and Shanghai, are taken to represent the province level. Overall, then, our study uses two administrative levels, the province and the municipality.

The second point of the basic background is that China exhibits obvious regional differences. The eastern region includes all coastal provinces, with the most developed economy in the whole country (The summed provincial GDP of the east has always been more than half of the national GDP, since economic reform began in 1978). This area attracts enterprise, as well as skilled and low-skilled workers from all over the country, exhibiting a tight labour market. By contrast, the western region is waterless and the poorest. Its GDP is less than 20% of the national GDP. Generally, people are reluctant to work for firms or government departments in the western region. The situation of the central region is somewhere between the east and west. Thus, regional factors require consideration in this study.

The labour market

There are several characteristics of the labour market in China. First, China is a transition economy, containing features of both a market economy and a planned economy. A free labour market gradually started to appear in the 1980s. Before that, from the early 1950s to the late 1980s, there was only a system of wage administration and labour allocation (Knight and Song, 2006, p.3). Even nowadays, the government has an important influence on the labour market, for example through state-owned enterprises (SOEs). There are a large number of SOEs in our survey's urban areas. They not only influence markets as employers, but also take on "social responsibilities" as representatives of government in the market, for example, maintaining low product prices, and improving employment and worker welfare to keep society "stable". In fact, it

is widely accepted that SOEs are more policy-led than profit-led[2]. Thus, the behaviour of government and its SOEs also needs consideration in this study.

Second, like all LDCs, China has a dual-economy with a rural and urban sector. As a traditional agricultural country, a large part of the population lives in rural areas. In 1990, the fourth national census classified more than 70% of people as rural. By 2000, this ratio had fallen but still remained as high as 64%[3]. Given that part of the rural population aims to move into the relatively small urban labour markets, there is an almost unlimited labour supply to the urban labour market, as depicted by the Lewis model on the dual-economy in development economics (for example, see Cai and Wang, 2010). This elastic rural labour supply rests on the internal passport system or *hukou* (see the next paragraph), and gives rise to a dual labour market in the urban areas.

The administrative passport system restricting mobility from rural to urban areas is the household registration system called *hukou*. Each person has a *hukou* to relate his/her identity to the local police system. If a person's *hukou* corresponds to his/her administrative district, such as a province or municipality, he/she is defined as a local resident and is eligible for municipal facilities such as subsidized housing and schools, and also employer-provided benefits such as healthcare and pensions (see Knight and Song 2006, p.38).Thus, rural migrants will have lower

[2] For example, reference information can be found in two recent English news articles: *China's unfinished state-owned enterprise reforms*:
http://www.treasury.gov.au/PublicationsAndMedia/Publications/2013/Economic-Roundup-Issue-2/Economic-Roundup/Chinas-unfinished-SOE-reforms;
and *China's changing state-owned enterprise landscape*:
http://thediplomat.com/2014/06/chinas-changing-state-owned-enterprise-landscape/.

[3] See the web pages in the National Bureau of Statistics of the People's Republic of China: http://www.stats.gov.cn/tjsj/ndsj/renkoupucha/2000pucha/html/append21.htm;
http://www.stats.gov.cn/tjsj/tjgb/rkpcgb/qgrkpcgb/200204/t20020404_30320.html.

outside options and be prepared to supply their services for lower wages.

Restriction of rural-urban mobility gives China a dual labour market in urban areas with formal and informal sectors. Usually, informal sectors are characterised by avoidance of the law, small firms, and casual or self-employment. Workers in informal sectors typically have low skills and low earnings with little or no prospect of internal promotion (Shen, 2000; Zhu, 2002). It is true that there exist informal jobs in formal sectors, in part because of the high cost of *hukou* transfer. In other words, formal jobs in China should be accompanied by an official record in personnel files and a location transfer of *hukou*; that is, a transfer from a migrant to a resident identity. However, such *hukou* transfer is especially difficult for SOEs and government departments. Unlike other LDCs, therefore, even though a person is employed by a SOE or public department, he/she may still be regarded as belonging to the informal sector since he/she has had no *hukou* transfer. The dualism caused by the *hukou* system can be used to explain firms' widespread non-compliance with minimum wages (that is, payment of sub-minimum wages) as discussed below.

Workers in formal and informal sectors are also likely to be treated differently even within the same firm. Workers in formal employment obtain written labour contracts, which include wage rates that follow government rules, some kinds of in-work welfare (such as housing and medical allowances) and strict disemployment compensation, while workers in informal sectors may only make verbal agreements (Knight and Song, 2006, pp.86-99). This difference complicates our analysis of minimum wages. When the minimum wage rises, wages in formal sectors increase accordingly. This indicates a higher labour cost for the formal workers, and may lead to a fall in

employment in formal sectors relative to informal sectors. On the other hand, it must be remembered that a formal labour contract conveys job security, so that the burden of adjustment could fall on informal workers, leading to a fall in informal employment relative to formal employment. Those two opposite responses need empirical analysis.

In summary, China is a special LDC. It contains all the characteristics of LDCs, i.e. a dual-economy of rural and urban sectors, an "unlimited" labour supply to urban labour markets, and a dual labour market of informal and formal sectors in urban areas. However, it also contains its own features, with its rural migrants having *hukou* restrictions, a strong government, large numbers of SOEs, weak trade unions and low levels of social welfare. All these factors are directly or indirectly related to this study on the minimum wage, and are now considered.

The minimum wage system

China first established its minimum wage system in 1993 and reinforced it in 2004 as shown below. Its minimum wage is intended to be applicable to all employed people, including the young and the disabled. On 24th November 1993, the *Enterprises Minimum Wages Regulations* were issued by the Ministry of Labour. In the following July, the *Labour Law of China* was issued (implemented on 1st January 1995). Ten years later, in January 2004, further *Minimum Wages Regulations* were issued, and implemented in March of the same year, reinforcing the original 1993 regulation. Finally, in 2007 the *Announcement about Further Perfecting Minimum Wages Regulations* was issued, highlighting several problems in minimum wage regulation and pressing for better implementation, given problems of non-compliance (see below).

Though based on a national law, the specific level and fixing date of the minimum wage is decided by provincial governments. The minimum wage in each province, therefore, began gradually, province by province. Taking the sample data as an example, the earliest minimum wage was in Guangdong province in 1992, a test province for minimum wages before the national law. The latest one in this period was in Sichuan in 1995. Relevant details can be found in the appendix of Chapter 3 (Appendix 3a-d). Furthermore, recognising the different stages of economic development within each province, there are several levels of municipal minimum wage for the each province. This feature is similar to Canada (Wang and Gunderson, 2011), and different from the single national minimum wage level in the UK, for example. This means that China contains around 100 separate minimum wages each year, providing good variation for empirical analysis.

The procedure of minimum wage fixing is similar to other provincial policies in China – set by provinces and agreed by the central government. First, the provincial Department of Labour and Social Security, cooperating with the provincial trade union and the provincial business association, proposes provisional minimum wages (MLSS, *Minimum Wages Regulations*, 2004). Then the provincial department sends its plan to the national leading department – the Ministry of Labour and Social Security. The Ministry is then meant to consult with the National Trade Union and the National Business Association. After consultation, the Ministry may put forward some amendments, and returns the plan to the provinces. However, if there is not any response from the ministry within 14 days, it means that the plan has been approved completely (MLSS, *Minimum Wages Regulations*, 2004). Once approved, the provincial Department of Labour and Social Security reports to the local provincial government, and the new minimum wage is formally

published in the regional gazette.

Businesses are meant to respond quickly to the newly adjusted minimum wage. The regulation states (MLSS, *Minimum Wages Regulations*, 2004) that within seven days of acceptance, new minimum wages are to be announced in the regional gazette and in at least one newspaper, the circulation of which must cover the whole administrative district (either province or municipality). After the new minimum wage is announced, enterprises are meant to apply it to all employees within ten days. Thus there appear to be ten days for enterprises to adjust their wages. However, in practice the minimum wage regulations have to be revised, in recognition of which, Guandong province, for example, set a grace period of three months for enterprises to adjust their minimum wages in 2013[4]. Nevertheless, minimum wage changes are likely to have quicker effects in China than in developed countries such as the UK and US which give much more adjustment time (several months normally, see Neumark and Wascher, 2008, p.63).

As an LDC, two features regarding the implementation of the minimum wage in China can offset its disemployment effect. One is the fact that it is a monthly rate, and the other is non-compliance. Although an hourly minimum wage does exist, customarily monthly wages are popular in China and hourly wages are seldom adopted because of limited part-time work availability. Accordingly, firms can increase the minimum wage while raising working hours at the same time. In this way, any disemployment effects may be reduced. Non-compliance for its part is caused by the conflict between wage equity and employment (Cooke, 2005, pp.134-138). For example, higher costs caused by the minimum wage will weaken the competitiveness of

[4] http://finance.sina.com.cn/china/dfjj/20130206/031914514019.shtml.

export enterprises and may cause unemployment. Thus, the government would rather acquiesce with some non-compliance, which can work as a buffer against any adverse employment effects of the minimum wage policy (Empirical analysis of non-compliance is given in section 4.2 in Chapter 4). Overall, these two features make the analysis of China's minimum wage somewhat different from developed countries.

Finally, the reinforcement of the minimum wage system in 2004 is important to this study. When minimum wages were first established in the 1990s, China was transforming its planned economy to a market economy, and priority was given to efficiency (economic development) without much consideration of fairness (equal wages and income)[5]. However, when entering the 2000s, China was becoming one of the most important economic powers, and economic development was not so pressing an issue. Moreover, social problems caused by income inequality became increasingly severe. Therefore, the central government turned its policies from efficiency to fairness. A slogan, "set up a harmonious society"[6], was put forward in 2004. In 2005, the government further emphasised its aim "to pay more attention to social fairness"[7].

Against this backdrop, the new version of the minimum wage regulation in 2004 was designed to have stronger impacts than before. The most important revisions were: first, that hourly minimum wages had to be specified by local governments, not just monthly rates; second, that

[5] "Xiaolv youxian, jiangu gongping" - see *The Resolution from the Central Committee of the Communist Party of China on Perfecting theSocialist Market Economic System (Zhonggong Zhongyang guanyu Jianli Shehuizhuyi Shichang Jingji Tizhi Ruogan Wenti de Jueyi), 1993.*

[6] *The Resolution from the Central Committee of the Communist Party of China on Strengthening the Party's Governing Capacity (Zhonggong Zhongyang guanyu Jiaqiang Dang de Zhizheng Nengli Jianshe de Jueding), 2004.*

[7] *The Suggestions from the Central Committee of the Communist Party of China on Establishing the 11th Five-year Plan of National Economy and Social Development (Zhonggong Zhongyang guanyu Zhiding Guomin Jingji he Shehui Fazhan Dishiyige Wunian Guihua de Jianyi), 2005.*

governments had to adjust their minimum wages at least every two years; and third, that the determination of the minimum wage level should be changed. As regards this final revision, in the 1993 regulation, local governments were meant to consider labourers' productivity when deciding the minimum wage, while in the 2004 regulation, this productivity factor was dropped, and new factors added, including inflation, and the workers' share of social security taxes. In sum, the regulation of 2004 was intended to be more favourable to workers.

In summary, the minimum wage in China has its own particular characteristics. It exhibits good provincial and municipal variation, an advantage for data analysis. It is normally set as a monthly rate, which may reduce employment effects (since hours can increase to offset wage increases). Enterprises need to respond to increases in minimum wages within two or three months, suggesting the role of lagged minimum wages is relatively unimportant. Non-compliance is quite widespread. Lastly, there appears to be an increase in minimum wage pressure in 2004 and afterwards.

1.2. Research advantages, contributions and findings

This study has several advantages:

(1) A unique municipal minimum wages dataset has been collected personally, offering more detail than the provincial minimum wage data usually used. It must be remembered that there is no uniform source to collect municipal minimum wages in China (see Wang and Gunderson, 2011, 2012; Fang and Lin, 2013), and hundreds of municipal minimum wages have been set over the whole country since 1995. These municipal minimum wages were collected personally,

together with their specific implementation dates, giving more accuracy than in the current literature on China (Wang and Gunderson, 2011 and 2012).

(2) Individual monthly panel data are used, with individuals followed for 12-48 months, which permits individual fixed effects and thus alleviates endogeneity problems caused by omitted variables. The estimates, therefore, are more accurate than using the data at the municipal level alone.

(3) The data series cover a long period, 1988 to 2007, 20 years in all. This permits a contrast of the pre-2004 period with the post-2004 period, when the minimum wage system was reinforced. It also allows use of within-municipality variation.

This study contributes to the literature in the following ways:

(1) It is the first study to look at the direct relationship between the wage inequality index and the minimum wage in China. It is also the first study to make preliminary investigations into the spillover effects of the minimum wage in China.

(2) It is one of the few studies to focus on minimum wages at the municipal level. Almost all relevant studies on China (surveyed later) are at the more aggregate provincial level.

(3) To the best of the researcher's knowledge, this is the first study to directly examine the role of the minimum wage in the gender wage gap at various points of the wage distribution, and in particular at the bottom deciles.

This study finds that the welfare implications of the minimum wage in China are mixed, with both positive and negative welfare effects. The main conclusions include:

First, despite non-compliance, minimum wages can effectively reduce overall wage inequality at the municipal level. The channel of this “equity” effect (without considering unemployment) is through raising individual wages at the lower end of the wage distribution.

Second, minimum wages generally appear to have significant negative effects on urban employment. Three disadvantaged groups include young workers, women workers and older workers.

Third, the minimum wage appears to strongly reduce gender wage gap among the low-paid. Low-paid women’s pay is increased more than low-paid men’s. Also, more women than men become covered by the minimum. These beneficial changes occurred at a time when wage inequality, and the gender wage gap itself was generally rising.

Finally, the above conclusions are especially robust during 2004-2007, when the minimum wage institution was reinforced.

1.3. Thesis structure

This thesis has six further chapters. Chapter 2 reviews the existing literature. It includes three main sections, i.e. the minimum wage and wage inequality; the minimum wage and employment; and the minimum wage and the gender wage gap. Chapter 3 describes the data used in the thesis, as well as giving a statistical description of the main variables. In particular, the two datasets are

described. One concerns the Urban Household Survey (UHS), and the other the municipal minimum wage data collected personally. Then Chapter 4 examines the minimum wage and wage inequality, including three main sections: the compliance issue, the minimum wage and overall wage inequality, and the minimum wage and wage distribution. Chapter 5 looks at the minimum wage and employment, including theory, empirical results and robustness checks. Chapter 6 focuses on the minimum wage and the gender wage gap. Lastly, Chapter 7 draws some conclusions.

Figures, tables and appendices are attached at the end of each corresponding chapter.

2. LITERATURE REVIEW

2.1. Introduction

There is considerable literature pertaining to the minimum wage which is relevant to this inquiry in China. Extensive literature reviews can be found in Brown *et al*. (1982), Card and Krueger (1995) and Brown (1999). Two more recent surveys from Neumark and Wascher (2006 and 2008) conclude that the minimum wage compresses wage distribution but depresses employment, while the very recent survey (Belman and Wolfson, 2014) mainly of US research is less conclusive. For specific countries, Metcalf's review (2008) on the employment effects of minimum wages in the United Kingdom is notable, as is Gunderson's (2005) for Canada. Recent surveys on employment effects can be found in Schmitt (2013) and Mărginean and Chenic (2013). Minimum wages in developing countries are surveyed in Freeman (2009). Overall, most literature concentrates on minimum wages in industrial countries, and is limited in relevance for LDCs, leaving a literature gap for China.

The literature on the study of minimum wages in China is small. Empirical studies in Chinese journals only appear from 2005, one year after the reinforcement of the minimum wage system mentioned in Chapter 1 (Han and Wei, 2005). The first relevant English paper (Du and Pan, 2009) was published in 2009. To date, in English there are merely six published papers (Du and Pan, 2009; Ding, 2010; Han *et al*., 2011; Ni *et al*., 2011; Wang and Gunderson, 2011 and 2012), one conference paper (Xiao and Xiang, 2009) and two working papers (Du *et al*., 2008; Fang and Lin, 2013). It seems that China's minimum wage only attracted attention from academic economists

after 2004 when this system was reinforced and had “bite”.

The plan here is to consider research findings for minimum wage effects on wage inequality, employment and the gender wage gap in turn. In the first section, the focus is on the experience of industrial countries and LDCs as there is a gap in the literature on wage inequalities for China. Notice here the features of LDCs include a dual-economy, formal and informal sectors in urban areas, and non-compliance of minimum wages, as noted in the introductory chapter. As for the second section, the minimum wage and employment, China’s experience will be illustrated in detail since some relevant literature on China already exists. The final section on the minimum wage and gender wage gap is the shortest, since the international research effort here is just beginning.

2.2. The minimum wage and wage inequality

The fundamental target of a minimum wage policy is surely anti-poverty and redistribution (as institutional labour economists and politicians claim – see Levin-Waldman, 2009). However, limited studies investigate the wage distribution aspect of minimum wages compared with the extensive literature on the employment effect of minimum wages (Brown, 1999; Dickens *et al*., 2012). The emphasis on employment effects is based on the view that welfare and employment effects go together (assuming, as is reasonable, that the unskilled face the highest risk of being laid off when minimum wages rise), and employment is easier to measure.

Normally, two ways of thinking about wage redistribution are employed. One is to establish the direct relationship between inequality and minimum wages (Lee, 1999); the other is to

compare a counterfactual wage distribution adjusted from the minimum wage with the observed distribution (DiNardo *et al*., 1996; Firpo *et al*., 2009). In developed countries, the wage counterfactual method is more often used while in LDCs, the direct relationship is more usually measured. As for China, no literature exactly follows either of these two approaches, though there are some relevant studies of inequality. Let us now consider in turn the literature on developed countries, then developing countries and finally China.

It is important to distinguish wage and income inequality. A person's total income, besides wages from a full-time job, includes welfare payments, income from property, remittances and transfer income, wages from a second job, etc. As Brown (1999, p.2152) says, income inequality is more complicated than wage inequality. Neumark and Wascher (2008) separate wage inequality from income inequality in their studies as well. This is not only because wage inequality is at an individual level while income inequality is related to households, but also because workers on the minimum wage are usually not in households at the bottom of the income distribution (Brown, 1999; see also Macurdy 2015). That said, there is a literature relating minimum wages to both wage and income inequality, and we will consider both below.

The minimum wage and inequality in developed countries

Even for developed countries like the UK or US, the literature on the effects of minimum wages on inequality or wage compression is limited. One method is to relate wage dispersion over time or by region to the corresponding minimum wage (Lee (1999) makes the classic study for the US). The alternative is the counterfactual distribution method (see Aeberhardt *et al*., 2012). Both methods generally find large impacts of the minimum wage compressing the wage distribution.

However, this large redistributive effect appears contradictory to the mixed (and generally small) employment effects of the minimum wage, as will be reviewed in a later section. This result is called the *minimum wage paradox* (Teulings, 2000). One approach is to establish theoretical frameworks to incorporate this paradox, and the other is to probe the redistributive effect of the minimum wage more deeply. We now consider Lee's (1999) and the counterfactual distribution methods and the minimum wage paradox in more detail.

Both methods appear to agree on the substantial effects of falling minimum wages on rising inequality, though they have limitations. Lee's (1999) approach of establishing a direct relationship between inequality and minimum wages is limited by the endogeneity problem (inequality might cause rising minimum wages and vice versa). The other approach is to compare the observed wage distribution with a counterfactual one (DiNardo *et al*., 1996; Fortin and Lemieux, 1997; Aeberhardt *et al*., 2012). Autor *et al*. (2010, p.1) describe its limitation as follows: "…the estimated counterfactual wage distributions derive exclusively from reweighting of observed wage densities rather than controlled comparisons. Thus, they are closer in spirit to simulation than to inference."

Lee's exhaustive study (1999) looks at the rising inequality and concurrent decline of real minimum wages during the 1980s in the US, the methodology of which will be adopted later in Chapter 4. Specifically, Lee (1999) regresses the tenth and fiftieth percentile wage gap on the minimum wage as in the following model (simplified by Neumark and Wascher, 2008, p.128):

$$\ln (W^{10}_{jt}) - \ln (W^{med}_{jt}) = \alpha_t + \beta \cdot \{\ln (W^{min}_{jt}) - \ln (W^{med}_{jt})\} + \lambda \cdot \{\ln (W^{min}_{jt}) - \ln (W^{med}_{jt})\}^2 + \varepsilon_{jt},$$

where W^{10} refers to wages at the tenth percentile, W^{min} is the minimum wage, W^{med} is the median wage (the 50th percentile), and j and t denote states and years, respectively. Lee (1999) shows theoretically that the two effective minimum wage terms, i.e. the minimum wage relative to the median ($\ln (W^{min}_{jt}) - \ln (W^{med}_{jt})$) and its square ($\{\ln (W^{min}_{jt}) - \ln (W^{med}_{jt})\}^2$), in the above model capture the redistributive effect of minimum wages in a simple way. Moreover, his model permits spillover effects by using an increasing function to establish the relationship between the effective minimum wage and wage inequality, which are not included in the counterfactual distribution method of DiNardo *et al*. (1996) and their successors. Lee's results (1999) indicate that the falling US minimum wage can account for much of the rise in US inequality, which is supported by Leigh's (2007) similar finding from his study using Australian data, and detailed discussions in Card and DiNardo's (2002) and Lemieux's (2006) US studies. Though some doubts result from the endogeneity problem – and the fact that the median wage appears on both sides of the equation (the division problem), the method is simple and intuitive. Therefore we take it further in a later chapter, and consider ways to eliminate the endogeneity and division problems.

As for the other method used to investigate the redistributive effect of the minimum wage, the core thinking here is to find a counterfactual wage distribution that would otherwise have been under another minimum wage, higher or lower than the one observed. This counterfactual distribution is compared with the factual distribution, thus the difference between the two is the impact of the minimum wage institution, *ceteris paribus*. The literature above differs in how to define this counterfactual distribution. DiNardo *et al*. (1996) initially adopted a semi-parametric procedure to investigate the effect of the minimum wage on US wage inequality. The

characteristics of workers in 1979 are estimated under Kernel density estimation. This result is used to reweight the 1988 sample to achieve the counterfactual distribution with the aim of showing "how much a worker, with the characteristics of the 1979 workforce, would have been paid in 1988" (DiNardo *et al*., 1996). This is basically the idea of Oaxaca (1973). However, instead of using the means of covariates as in Oaxaca's method (1973), this method takes into account the whole distribution, which makes it possible to see where the minimum wage has its largest effects. They find that the decline in the real value of minimum wages is responsible for a third of rising residual wage inequality.

One problem in DiNardo *et al.*'s early study (1996) is that spillover effects are not allowed, because the change in the minimum wage is assumed to have no effect on the wage distribution to the right of the minimum. That is why Fortin and Lemieux (1997) call their method, which is much simpler but with the same idea as DiNardo *et al.*'s (1996), "cut and paste". As they say, they only "replace the mean and the variance of log wages among affected workers in 1988 by the mean and variance of log wages" of the corresponding group in 1979 (Fortin and Lemieux, 1997). Not surprisingly, as the co-authors of the above 1996 paper, they find similar large effects of the decreasing minimum wage on the increasing wage inequality. However, obviously this assumption is unrealistic, especially considering the fact that although the minimum wage influences less than 10% of workers in the US, it dramatically reduces the 50/10 log wage differentials by around 66%.

Aeberhardt *et al*. (2012) follow Firpo *et al.*'s unconditional quantile regression method (2009) to construct a counterfactual distribution for France. The difference between this study and

DiNardo *et al*.'s semi-parametric method (1996) is that unconditional quantile regressions are used to set up the corresponding weights in DiNardo *et al*.'s method (1996). Thus there is no specific regression form to restrict the wage distribution reconstruction. Combining *difference-in-difference* (DID) indicators to overcome the endogeneity problem, Aeberhardt *et al*. (2012) find small but significant impacts of minimum wages on the lower-tail of the French wage distribution between 2003 and 2005. The small magnitude of impacts is where their study differs from DiNardo *et al*. (1996) and Fortin and Lemieux's (1997). However, there is a significant effect, and it extends up to the 7th decile. Thus DiNardo *et al*.'s (1996) conclusion regarding the distributional compression effects of minimum wages is reinforced.

In the UK, Dickens and Manning (2004a) and Dickens *et al*. (2012) also show discernible impacts of the minimum wage on inequality. Dickens and Manning (2004a) use an approach that takes advantage of propensity score matching, as well as a more complicated method developed by Stuttard and Jenkins (2001) as a supplement. Their results are consistent, showing moderate (but significant) effects of minimum wages on inequality. However, Dickens *et al*. (2012) use a different method from the reweighting approach. They first examine the observed evolution of the log 50/5 and 50/10 wage gap, and then estimate the trends controlling for the National Minimum Wage (NMW hereafter). The difference between the two is the contribution of the NMW to wage inequality. Dickens *et al*. (2012) and Dickens and Manning's (2004a) results are consistent in finding the redistributive effects of the NMW, and are supported by Holmes and Mayhew (2012) (who find the NMW mitigates the effects on wage inequality of the decline in union membership).

In a word, conclusions from the reweighting distribution method have achieved a consensus. The consensus concludes that in the US the impact of the minimum wage is consistently large, and in the UK and France it is smaller but still discernible. However, the reweighting method requires a strong assumption with regard to functional form, which has typically been settled using semi- and non-parametric approaches, such as unconditional quantile regression (Firpo *et al*., 2009). Another problem in this method is that, as Autor *et al*. (2010) point out, analysis based on reweighting distribution is to simulate an assumed wage distribution, instead of using inferences and deduction based on facts. The direct estimation of the impact of the minimum wage on inequality using Lee's (1999) method overcomes this problem, as we see in Chapter 4 below.

Approaches to solving the endogeneity and division problems inherent in Lee's (1999) method are as follows. The division bias problem in OLS estimates relates to the fact that both sides of the regressions include the same variable of centrality (the boundary of spillovers, see Lee, 1999). Thus, when the measurement error is an important part of variation in the centrality, a spurious correlation between dependent and independent variables will be produced. This is partly settled by using a trimmed mean instead of the median, where the mean is calculated excluding the bottom 30% and top 30% of the sample for each state year (Lee, 1999, p.998). For example, Bosch and Manacorda (2010) use another centrality calculated from a dataset different from their regression dataset to establish an instrument variable. Since the measurement errors of the two datasets are not correlated, the division bias problem can be eliminated.

As for endogeneity, there are two sources. One is omitted-variable bias. Lee (1999) excludes

state fixed effects, yet Autor *et al*. (2010) suggest there is a strong correlation between the median state wage (a deflator for both dependent and independent variables) and the relative wage level (dependent variable). Moreover, not only median state wages, but many other factors existing in the minimum wage setting procedure from state governments exacerbate this omitted-variable problem (Boeri, 2012; Butcher, 2012). That is why Dolton *et al*. (2012b, p.14) state that their results, with a similar specification to Lee's (1999), are "indicative only of correlations in the data". The other source leading endogeneity is reverse causality; that is, inequality might cause minimum wages as well as vice versa (Dolton and Bondibene, 2012a). Dolton and Bondibene (2012a) in fact use a political instrumental variable, based on the argument that a left-wing government is more likely to increase the minimum wage.

One final point in this part is the *minimum wage paradox*, i.e. the estimated large effects of minimum wages on inequality contradict the inconsistent or small employment effects (Teulings, 2000). If sometimes the employment effect of the minimum wage is small, as reviewed in a later section, through which channel can the minimum wage compress wage distributions so obviously? Two strands are developed. One is to establish a new theoretical framework to incorporate the two effects. For example, Teulings (2000) develops a *distance-dependent elasticity of substitution* (DIDES) production function, from which a large aggregation bias can be found and used to explain the concurrent effects with distinct magnitudes. Dickens *et al*. (2012) suppose aggregate labour supply is inelastic but labour supply to an individual employer is not, so that employers are competing with each other under a fixed availability of employment. The second strand is to re-estimate the redistributive effect of minimum wages considering the endogeneity problem during estimation. Both Autor *et al*. (2008) and Aeberhardt *et al*. (2012) find much smaller

magnitudes of equality effects than previously estimated under more careful consideration and more advanced methods. In conclusion, this paradox, combined with the related endogeneity problem in Lee's method (1999), needs further study.

The minimum wage and inequality in developing countries

In contrast to the literature on developed countries, most literature on LDCs depends on direct regressions of inequality indicators on minimum wages as in Lee (1999), rather than the redistributive approaches (DiNardo *et al*., 1996; Firpo *et al*., 2009) mentioned above. Dependent variables used under Lee's method are decile gaps (for China, see Bosch and Manacorda, 2010; for South Africa, see Dinkelman and Ranchhod, 2012), along with the Gini index, Theil index, Atkinson index and the coefficient of variation (Costa Rica, see El-Hamidi and Terrell, 2001; Brazil, see Jales, 2012). This kind of study, of course, is at the country (El-Hamidi and Terrell, 2001; Dinkelman and Ranchhod, 2012) or province/municipal level (Bosch and Manacorda, 2010; Jales, 2012), though the inequality indicators are constructed from individual data. As for the redistributive approach, few cases are found, though Maloney and Mendez (2003) present a study for Latin America. Furthermore, some other methods distinguished from the above two are considered. For example, Foguel *et al*. (2001) use nominal mean wages as dependent variables in their study of Brazil. Neumark *et al*. (2006) present elasticity of real decile wages (10^{th}, 20^{th}, 30^{th} and 50^{th}) with respect to the minimum wage using the GLS method with an AR1 error process. Lemos (2009) shows Kernel log real wage distributions and spikes of the minimum wage using monthly panel data. Jales (2012) follows Lee's idea (1999), but adopts a new density discontinuity design approach. Obviously, inequality attracts more attention for LDCs, with the

simpler approach based on Lee (1999) predominating, and this will form the basis for this study of China.

Results for the economy as a whole generally point to the minimum wage causing both wage/income inequality reduction (El-Hamidi and Terrell, 2001; Leigh, 2007; Gindling and Terrell, 2009; Bosch and Manacorda, 2010; Dinkelman and Ranchhod, 2012; Jales, 2012) and wage distribution compression (Maloney and Mendez, 2003; Lemos, 2009). However, distinguishing between formal and informal sectors are concerned, results are mixed. El-Hamidi and Terrell (2001) and Gindling and Terrell (2009) suggest large positive effects in formal sectors and no effect in informal sectors. However, Foguel *et al*. (2001) and Dinkelman and Ranchhod (2012) present large positive impacts in informal sectors instead. Strong positive effects for both sectors are found as well (Maloney and Mendez, 2003; Lemos, 2009; Jales, 2012). In summary, minimum wages appear to significantly decrease inequality in LDCs, both for formal and informal sectors.

Three further points should be noted. Firstly, most studies concentrate on countries in Latin America, with a few on Africa. One of the characteristics of minimum wages in these LDCs is their high levels. For example, Ham (2013, p.6) indicates that minimum wages in Latin America are about 20-60% of average wages and 30-90% of medians, larger than those in Europe and the US. Such high minimum wages may partly explain the large redistributive effects – and also spillover effects up to high percentiles. Furthermore, informal sectors benefit from the minimum wage as well though with non-compliance, which is still a puzzle according to Neumark and Wascher (2008, pp.115-116) and needs further exploration. Lastly, poverty reduction is often

related to inequality and minimum wages in LDCs as well. However, this topic regularly uses poverty lines or household income as dependent variables and is beyond this thesis. Now let us turn to the research on minimum wages and inequality in China.

The minimum wage and inequality in China

The effects of the minimum wage on inequality and the wage distribution in China have attracted even less attention than Brazil or other typical developing countries. Neither the direct relationship between inequality and minimum wages nor its redistributive effects have been investigated.

As regards wage levels, relevant studies so far indicate little impact of the minimum wage. One careful study is by Wang and Gunderson (2012). They use the DID method to estimate the effects of the change in minimum wages between 2002 and 2004 on wages in rural and urban households in eastern China. No discernible impact is found in their whole sample or the industry or ownership sub-samples. Consistent with these findings, Luo and Cong (2009) look at the impact of changes in minimum wages on changes in the average industry wage from 1994 to 2006 at the provincial level. They also find a weak mixed relationship. Lastly, Ma *et al.* (2012) footnote finding an insignificant result of the minimum wage on the Gini index. However, they explain this finding as possibly due to inaccurate construction of the Gini from firm-based average wages. Generally speaking, the negligible impact on wages from the minimum wage may be caused by using aggregate rather than individual wages.

If the literature is extended to the impact of minimum wages on poverty or the income gap,

four empirical papers written in Chinese are relevant (Luo, 2007c and 2011; Yang, 2008; He, 2011). Luo (2011) finds significantly negative effects of the minimum wage on the poverty ratio in rural areas in 18 provinces between 1995 and 2008. However, the coefficients of the minimum wage are abnormally large. For example, in her result with pooled data, when the minimum wage rises by 1%, the rural poverty ratio will fall by 226.5%. Though unit root tests and co-integration tests are performed, her conclusions are implausible. The remaining three studies look at the effect of minimum wages on the rural-urban income gap, obtaining significantly negative results using cross-sectional data at the provincial level in 2005 (Luo, 2007c; Yang, 2008) or in 2009 (He, 2011). That is, a higher minimum wage lowers the gap since rural migrants always send their income (wages) back to their rural home to support family there. They encounter the same problem as Luo (2011): with a dependent variable – ratios of urban-relative to rural-income per capita – averaged around three, they get coefficients for log minimum wages as large as -52 (He, 2011) to -99 (Luo, 2007c; Yang, 2008) and get even larger constants of more than 240. This may be caused by their underspecified model with only covariates of the minimum wage and its square, GDP and its squares, and regional dummies of east, west and central areas. That said, the above four papers are interesting exploratory studies on the effects of minimum wages on poverty and income gaps.

Conclusions on inequality

In summary, the existing literature indicates that the minimum wage has a discernible impact on wages, whether it be in developed or developing countries, or in formal or informal sectors. This sometimes large wage impact, combined with the inconsistent employment effects of the

minimum wage, is still puzzling, and awaits further exploration. As for China, the relevant literature is scarce. What evidence there is indicates that minimum wages have small positive impacts on aggregate wages but possibly strong impacts on poverty and income inequality reduction though more research is needed here. Thus, based on the literature and methodology on developed countries, as well as that from developing countries, further study of the minimum wage and inequality in China is of interest.

2.3. The minimum wage and employment

The employment effect of minimum wages is one of the most studied fields in economics. As Dolado *et al*. (1996) say in their summary: "it is as easy to make a theoretical case against minimum wages as for them. Evidence, not theory, is what is needed now." Basically, corresponding empirical studies can be divided into four generations (Dube, 2011, p.763):

> The older time series literature, the first wave of the *new minimum wage research* that featured both case study and state-panel approaches, a third generation of follow-up work largely based on these two methodologies, and a fourth generation of recent work that tries to make sense of the sometimes contradictory evidence.

This survey will concentrate on the third and fourth generation, combined with some literature in the second generation.

This survey focuses in turn on industrial countries, developing countries and China. For industrial countries, preference is given to a general picture and examining the trend for future studies. As for LDCs, emphasis is placed on the contrasting results found for formal and informal sectors, which offers valuable experience to China. Literature on employment effects in China is much more common than on wage distribution effects. Below, empirical literature for developed

countries will be reviewed first, then developing countries and China.

The minimum wage and employment in developed countries

The theoretical forecasts for employment effects of minimum wages are as straightforward as "textbook models". In neoclassic theory, in a perfect competition market, raising minimum wages will decrease labour demand, for example reduction in employment or working hours. Details about the behaviour of supply and demand can be found in Neumark and Wascher's study (2008, p.39 and pp.50-53). At the same time, monopsony models assume that individual firms have some market power over wages, so that an upward-sloping labour supply curve will lead to rising employment as wages increase. Employment will keep moving up the supply curve until minimum wages exceed the equilibrium level obtained in a perfect competitive market. This process can be seen as profit redistribution between employers and employees (Flinn, 2010, p.28). Some extensions of the models are based on a similar theory of monopsony behaviour (Metcalf, 2008; Neumark and Wascher, 2008, pp.54-56). The other strand of studies focuses on search models (Neumark and Wascher, 2008, p.56) or develops a new production function (Teulings, 2000). Generally, the main conclusion from the theory is mixed, depending on whether one believes in a competitive or monopsony labour market.

Comparing with the relatively simple picture of theory studies, the empirical studies of employment effects are more complicated. Among the four generations of empirical studies noted above, the first wave concentrates on time series data. Brown *et al*. (1982) found a negative elasticity of youth employment with respect to the minimum wage from -0.1 to -0.3 based on earlier literature in the US. Then in the early 1990s the second wave, *the new minimum wage*

research, begins (Neumark and Wascher, 2008, pp.37-38; Flinn, 2010, pp.96-97; Dube, 2011, p.763). During this period, two strands of studies are representative. One is the case study approach using the DID method; the most famous being a study of a 'quasi-natural experiment' comparing employment between New Jersey with a rising minimum wage and Pennsylvania with a constant minimum wage in the fast-food industry in the US from Card and Krueger (1994). The other strand is the panel data approach given the availability of data under changing policies. Studies from Card (1992) and Neumark and Wascher (1992) can be seen as the beginning here. The new minimum wage research extends the scope of elasticity of employment with respect to the minimum wage from near -1 to around zero (Neumark and Wascher, 2008, p.104; Belman and Wolfson 2014, p.108), which is clearly far from reaching an agreement.

The third and fourth wave of empirical studies, has tried to reconcile the sometimes conflicting evidence. Neumark and Wascher (2008, pp.71-72) pointed out that there are three difficulties in case studies using DID: adequacy of the control groups, dealing with lagged effects, and reliability of the survey data. However, a famous study from Dube *et al*. (2010) overcomes the above shortcomings and affords convincing results using the case study method. They not only construct a data set of restaurant employment by repeating Card and Krueger's experiment (1994) thousands of times, but use contiguous US county pairs to set up all comparisons over a 16-year period. This study succeeds in "generalising" Card and Krueger's research (1994) and finds no employment effects (Schmitt, 2013). Still, this is not the end of the story. A recent study from Neumark *et al*. (2013) continues to argue that counties with geographic proximity do not compose the best control group. They adopt a "synthetic" control matching estimator to prove their perspective and find that when a better control group is established, compared with the

original cross-border pairs, significantly negative effects appear again.

As for the traditional panel data approach, the key point is that besides corresponding fixed effects, how should underlying time and regional trends in employment be accounted for (Allegretto *et al*., 2011). The follow-up work based on the panel data approach is claimed by Doucouliagos and Stanley (2009) and Schmitt (2013) to show indiscernible impacts on employment using meta-analysis. However, contrary to their conclusions, Neumark *et al*. (2013) use polynomial time trends to capture cyclical effects, and significant negative effects re-appear. There is also the recent work on a panel of OECD countries by Dolton and Bondibene (2012a) who find a large negative effect of the minimum wage on youth employment, with an elasticity of around -0.3. Also Addison and Ozturk (2012) using the same OECD panel approach find a significant negative effect of the minimum wage on the adult female employment/population rate. Thus there seem to be quite strong negative minimum wage effects on low productivity groups in the international panel-based literature.

Considering high welfare replacement rates in European countries (since high welfare also acts as a wage floor and can obscure minimum wage effects), the negative effect of the minimum wage, though small in some studies, is even more credible than had been expected. In conclusion, there is controversy on the employment effects of minimum wages in recent literature for developed countries, but this influence of minimum wages on employment is still apt to be traditionally negative.

<u>The minimum wage and employment in developing countries</u>

Studies on minimum wages and employment are limited in developing countries compared with those in industrial ones. For each country, there are only several published or working papers in English (Neumark and Wascher, 2006; Lemos, 2009). Studies using panel data, especially covering long time periods, are relatively common, such as Fajnzylber (2001), Foguel *et al*. (2001) and Lemos (2009) for Brazil from the 1980s to around 2000; Gindling and Terrell (2007) and Comola and Mello (2011) for Indonesia from around 1990 to around 2000; Gindling and Terrell (2009) for Honduras between 1990 and 2004; and Alaniz *et al*. (2011) for Nicaragua from 1998 to 2006. At the same time there are case studies adopting DID methods as well. For instance, Harrison and Scorse (2004) look at minimum wage hikes accompanied by anti-sweatshop activity in Costa Rica. Dinkelman and Ranchhod (2012) check the influence of minimum wages when previous uncovered sectors are suddenly regulated in South Africa. Magruder (2013) investigates minimum wages in Indonesia in the 1990s. It can be seen that studies for developing countries generally follow the standard framework from those for industrial countries.

Most of studies for developing countries investigate respective effects in formal and informal sectors, the separation of which is one of the most important differences of LDCs from industrial countries. Disemployment after rising minimum wages tends to be found more often in formal or covered sectors rather than in informal or uncovered sectors, as is reasonable (Foguel *et al*., 2001; Gindling and Terrell, 2007; Gindling and Terrell, 2009; Alaniz *et al*., 2011; Comola and Mello, 2011; Dinkelman and Ranchhod, 2012; Jales, 2012). The general explanation is that the job losses in covered sectors are compensated for by job gains in uncovered sectors because of mobility between the two sectors (Comola and Mello, 2011), and such “crowding” effects are what basic theory would predict. However, in another opinion, Jales (2012) argues that the

probability of migration between sectors is near to zero by the density discontinuity approach. Similarly, Fajnzylber (2001) shows negative employment effects in all sectors (formal, informal and self-employed sectors), and informal sectors even display more disemployment than formal sectors. At the same time, Lemos's (2009) research for Brazil finds no minimum wage disemployment effect in either sector (see also Magruder's (2013) study of Indonesia). It seems that results are rather mixed, but inclined to exhibit negative effects in formal sectors and positive effects in informal sectors of employment.

The minimum wage and employment in China

Most studies on minimum wages in China again concentrate on employment effects. Although these studies are far from reaching a consensus, among them Wang and Gunderson's (2011) and Fang and Lin's (2013) studies are perhaps most reliable. This is because: (i) their covariates are commonly used in conventional literature; (ii) their framework is clear; (iii) their elasticities of employment with respect to the minimum wage are in the range of what has been found in the literature in both the developed and less developed countries; and (iv) their control variables have the theoretically expected signs, which reinforce the credence of their main results.; and (v) it is written in English and hence subjected to a more rigorous peer review process than the literature in Chinese. Thus this review will mainly follow their framework and focus.

Specifically, Wang and Gunderson's study (2011) looks at rural migrant workers in 30 provinces over 2000-2007, adopting the methodology of a "pre-specified research design" (pre-specifying the estimation equation in advance of the data analysis). Their conclusions include:

> negative employment effects in slower growing regions (central and western regions); larger negative effects in non-state-owned organizations that tend to be more responsive to market pressures; much larger lagged effects reflecting the time needed for adjustments to occur; no adverse employment effects in the prosperous and growing eastern region; and a positive employment effect in state-owned enterprises in the east – consistent with monopsonistic behaviour. (Wang and Gunderson, 2011, p.392)

At the same time, Fang and Lin (2013) look at 16 provinces from 2002 to 2009, presenting evidence of significant disemployment effects in the eastern and central regions, as well as for females, young adults and low-skilled workers.

(i) Rural migrant workers versus urban permanent residents

Wang and Gunderson (2011) and Fang and Lin (2013) focus on rural migrant workers in urban areas or treat them as sub-samples, as is the case in most of the literature. Under the dual-economy of China, rural migrants in municipalities often work in informal sectors. Without household registration (*hukou*) and the corresponding entitlement to benefits, they are always the most vulnerable group when facing rising minimum wages. Employment effects are likely to be more marked for them than urban permanent residents. Therefore, in this discussion, the literature on rural migrant employment and total urban employment will be reviewed separately.

Overall, negative impacts of minimum wages on rural migrants are found (Wang and Gunderson, 2011; Ding, 2010; Fang and Lin, 2013), but positive effects are not rare (Luo, 2007a and 2007b; Li and He, 2010; Research Group in Shandong University (RGSU), 2011). On the one hand, Wang and Gunderson (2011) report that the total elasticity of employment with respect to the current and lagged minimum wage is between -0.1 and -0.3. Ding (2010) indicates nearly an 8% reduction of employment in Guangdong and Fujian provinces (eastern China) in 2008

under strict enforcement of minimum wages. Fang and Lin (2013) conclude an elasticity of -0.22 to -0.28 for migrants. On the other hand, Luo (2007a) suggests the elasticity of employment in Shanghai between 1993 and 2005 is positive, and almost 0.4. This result survives various sensitivity tests (Li and He, 2010, RGSU 2011). Thus there is no consensus on employment effects for rural migrants.

However, if the sample is expanded to all urban employment including both rural migrants and urban residents, things are different. Overall it can be seen that the effect of minimum wages for all urban employment is inclined to be negative (Ma *et al*., 2012; Shi, 2009 and 2010; Wang and Gunderson, 2012; Fang and Lin, 2013). In Ma *et al*.'s study (2012), covering 1998 to 2007, the minimum wage elasticity is -0.06 on average, and Shi (2009, 2010) finds a similar negative elasticity between -0.08 and -0.13 for a similar period, 1996 to 2007. Fang and Lin's elasticity (2013) is much larger and the total effects from the sum of current and lagged minimum wages are between -0.72 and -0.86. At the same time, Wang and Gunderson's (2012) study of the change in the minimum wage system from 2003 to 2004 (for the eastern areas only) finds insignificant and weak negative effects, in that 15 workers per 10,000 will not be employed after the reinforcement of the minimum wage system in 2004. Shi (2009 and 2010) also finds an insignificant short-term effect of minimum wages using an Error Correction Model. The only exception is Ni *et al.*'s results (2011) which show a positive but insignificant effect, with the elasticity of the employment with respect to the minimum wage being 0.15 over 30 provinces during 2000-2005. In summary, the results are mixed, though the negative findings outweigh the positive.

The magnitudes of the results for urban employment, whether positive or negative, are smaller than those of the rural migrant group alone, with the exception of Fang and Lin (2013). This conclusion is robust across different definitions of dependent variables. Both Wang and Gunderson (2012) and Fang and Lin (2013) use the ratio of employment relative to the population as the dependent variable following the classic literature. Ma *et al*. (2012) use the log-form of employment at an individual firm level. Ni *et al.* (2011) and Shi (2009 and 2010) use log employment as well but at a macro provincial level. In particular, Wang and Gunderson (2012) only look at the eastern region, and Ni *et al.*'s (2011) sample excludes employment in SOEs considering the dramatically decreasing employment of SOEs after 1997 due to other government policies. This special sample in Ni *et al.*'s (2011) study can be seen as one of the explanations for their evidence of positive effects. The smaller magnitude of employment effects compared with the rural migrant sample is another consensus result for all urban employment.

Change in working hours is an important supplement to the headcount disemployment effects of the minimum wage. Jia and Zhang (2013) find significant results for all urban employment. They find that as the minimum wage rises, the weekly working hours of male workers rises, but the employment of female workers falls (suggesting a substitution of females by males). These two effects become greater as the minimum wage increases. Once it reaches more than 30% of the original level, even male employment decreases. Du *et al.* (2008, 2009) discuss the working-hour effect of the minimum wage as well and find that both migrants and residents have negative effects.

In conclusion, research findings on the employment effect of minimum wages for rural

migrants are rather mixed, while for total urban employment, the evidence is more consistent. In general, employment effects for total urban employment are inclined to be smaller (but still generally negative) than for rural migrant workers, which is clearer than the experience in other LDCs reviewed in the last section. Finally, rising working hours under fixed monthly minimum wage rates affords supporting evidence for negative headcount employment effects. Overall, the separation between rural migrants and total urban employment is meaningful and deserves further exploration.

(ii) Regional patterns of employment effects

As one of the largest countries in the world, China exhibits obvious regional diversity. The government also implements different policies in the prosperous eastern region, developing central region and slowly growing western region. First, literature for rural migrant workers will be reviewed, and then that for total urban employment.

For rural migrants, a cautious summary for the eastern region so far may be no adverse effect when using macro-level data. Specifically, insignificantly positive effects are normally explained by the monopolistic buyer market in eastern areas (Wang and Gunderson, 2011 and 2012; Fang and Lin, 2013; Luo, 2007b). But positively significant effects are also supported by RGSU (2011), Luo (2007a), and Li and He (2010), though the last two studies are only for several cities in eastern areas. Significantly negative effects are also found using the DID method in Ding's study (2010), which investigates the two provinces of Guangdong and Fujian in the eastern region. Results therefore are mixed and most of them are not negative irrespective of significance levels.

Employment effects in the central and western regions are simpler to summarise than those in the east. For central regions, impacts are inclined to be weakly negative. In particular, Wang and Gunderson (2011) and RGSU (2011) find significant negative results. Luo (2007b) finds a negative impact as well but it is insignificant. Lastly Fang and Lin's study (2013) exhibits insignificantly positive effects. As for the western region, effects are stronger than those in the eastern and central regions, whether they are negative (Wang and Gunderson, 2011; Fang and Lin, 2013) or positive (Luo, 2007b; RGSU, 2011). Especially for the positive effect, Luo (2007b) finds the elasticity as large as 1.9, which is supported by RGSU (2011) in that three out of nine western provinces have an elasticity larger than 1. Therefore, three regions display distinctive employment effects.

As far as total employment in urban areas is concerned, results are similarly diverse, though evidence for the eastern region is in fact generally negative. However, sometimes this negative effect is significant (Ma *et al*., 2012; Shi, 2009; Fang and Lin, 2013) and sometimes not (Wang and Gunderson, 2012; Ni *et al.*, 2011). Elasticities also vary, with Ma *et al*. (2012) and Fang and Lin's (2013) studies finding only -0.01 and -0.07, respectively. Shi (2009) shows an elasticity of -0.23 within the range of literature. But when DID methods are executed for Guangdong and Fujian provinces or cities in the east by Ma *et al*. (2012), the employment elasticity jumps from -0.88 to -0.97. Thus the magnitude of employment effects in the east is controversial based on uniformly negative signs.

As for the other areas, in central areas employment effects are also mixed. Significantly negative (Ma *et al*., 2012; Fang and Lin, 2013) and significantly positive effects (Ni *et al.*, 2011),

as well as insignificantly zero effects (Shi, 2009), are reported. At the same time, in western areas the employment effect is inclined to be significantly negative (Ma *et al*., 2012; Shi, 2009). However, Ma *et al*. (2012) report an elasticity of -0.2, while Shi (2009) gives only -0.06. Fang and Lin's (2013) sums of current and lagged minimum wages are similar to Shi's (2009) magnitude, with insignificance. Ni *et al*. (2011) show insignificant results as well, with the sum of current and lagged minimum wages being 0.28. As was the case for rural migrants therefore, regional diversity of results is shown in total whole urban employment as well.

So far the picture is that of no consensus for both rural migrants and the whole sample (migrants and residents). Still, it appears that consideration of separate effects for migrants is likely to be important. Though rural migrants are under-represented in this sample, this study will try to look at different employment effects in formal and informal sectors instead, based on the fact that most migrants are employed in informal sectors. We expect to find smaller in formal than informal sectors, as has generally been shown in existing literature. Again, as regards regional differences, fewer negative effects are expected in the east than country as a whole.

(iii) Ownership patterns of employment effects

The ownership of enterprises is also important. As a main component of the previous planned-economy, SOEs nowadays still enjoy government subsidies and preferential policies, and at the same time undertake social obligations and follow laws and rules strictly. They are quite different from their private sector counterparts which are more responsive to market pressure, as illustrated in Chapter 1 (Introduction). In line with part (ii), the literature for rural migrant workers will be reviewed first, then for total urban employment.

The results for both ownerships are even more conflicting than before. The consideration of the ownership of firms is still based on the framework of the formal-and-informal sector. Specifically, SOEs can be seen as representatives of the government in the market that comply with minimum wages strictly. Non-SOEs are more responsive to market pressure. Thus SOEs belong to formal sectors and non-SOEs to informal sectors, though there are some informal departments existing within SOEs and workers there do not enjoy the same welfare and protection as their other counterparts in SOEs. On the other hand, SOEs are also supposed to provide better employment protection. These complicated roles of SOEs may explain why the results below are conflicting.

For rural migrant workers, SOEs, as expected, have a smaller (Wang and Gunderson, 2011; Ding, 2010; Fang and Lin, 2013) and sometimes less significant (Wang and Gunderson, 2011) negative response to rising minimum wages compared with non-SOEs. This is clearer in the central (Wang and Gunderson, 2011) and western regions (Wang and Gunderson, 2011; Fang and Lin, 2013). At the same time, Wang and Gunderson find significantly positive impacts for SOEs in the eastern region (2011), and insignificantly smaller positive effects on SOEs over the country compared with non-SOEs (2012). In contrast, as for all employment in urban areas, Wang and Gunderson (2012) find insignificantly positive effects for SOEs. For non-SOEs, only Ni *et al.* (2011) indicates significant positive impacts for collective firms. In the remaining private domestically-invested, foreign-funded and Hong Kong, Taiwan, Macao funded enterprises, the effects are insignificantly positive (Ni *et al.*, 2011) or insignificantly negative (Wang and Gunderson, 2012). Thus there is hardly a consensus for both ownerships, respectively.

In summary, though there is no consensus, it seems that results for all urban employment are

apt to be insignificant for both SOEs and non-SOEs, and rural migrant employment in non-SOEs has the largest response to rising minimum wages. Thus the factor of SOEs cannot be overlooked in the specifications, though it is hard to predict the significance and sign of SOE variables. Furthermore, the magnitudes of employment effects may be the largest in the informal sectors.

(iv) Industry patterns of employment effects

Industry is another factor in understanding employment effects. As in other countries all over the world, manufacturing, construction, wholesale and retail business, and private service industry employ large numbers of low-wage workers. Several studies look at the employment effect in these industries separately. Normally studies investigate the effects according to workers, but seldom do they also consider industry outputs or added value as dependent variables. Now the literature on rural migrants will be reviewed first, and then all urban employment.

For rural migrants, results are mixed as usual. Significantly positive (Luo, 2007b; Li and He, 2010) and negative (RGSU, 2011) employment effects of minimum wages exist in the manufacturing industry, and significantly positive (Li and He, 2010; RGSU, 2011) and negative effects (Luo, 2007b) exist in the construction industry as well. Positive effects are also found in the wholesale and retail industry by RGSU (2011). As for the outputs or added value of these industries, they exhibit significantly positive effects on employment (Luo, 2007b; Li and He, 2010; RGSU, 2011) except for significantly negative effects in the manufacturing industry from Luo (2007b). Overall, though it is hard to come to a definitive conclusion, at least positive employment effects on migrants in the construction and service industry are more often observed than negative effects. Thus when factors of the construction and service industry are considered

in the specification, positive signs are expected more than negative ones for informal sectors. Notice that though they are not dependent variables in this study as in the literature above, they can offer supplementary evidence.

When the whole urban labour force is considered, the results for employment effects remain mixed as usual. For the manufacturing industry, both insignificantly positive (Wang and Gunderson, 2012) and significantly negative effects (Ma *et al*., 2012) are found. Ni *et al.* (2011) show results with regional heterogeneity, in which significantly negative effects are found in the eastern region, insignificant negative effects in the central region and significantly positive ones in the western region. As for the construction industry, Wang and Gunderson (2012) indicate insignificant positive effects. For the wholesale, retail and restaurant industry, insignificant impacts are shown (Wang and Gunderson, 2012; Ni *et al.*, 2011) but significantly positive effects are reported for the western region (Ni *et al.*, 2011). Thus, if only significant results are considered, the manufacturing industry employment effects are inclined to be negative and the service industry is positive though with mixed results. For this study therefore, negative signs for the manufacturing industry and positive signs for the service industry for the whole sample (both formal and informal sectors) can be expected when these two industries are included in the specification.

(v) Other patterns of employment effects

Some other sub-samples are used to investigate employment effects. Ding (2010) looks at regulation according to his sub-samples. He divides the sample into high- versus low-wage enterprises and finds that the employment of rural migrants in low-wage firms under strict

regulation will fall 7% more than those in high-wage ones. Furthermore, according to a special question in the survey, Ding (2010) separates the rural migrant sample into two groups according to whether the Employment Contracts Law has a great impact on firms. Empirical results show that under strict regulation, firms with a great relevant impact will reduce the number of migrants employed compared with those with minor impacts. Ding (2010) concludes that disemployment effects are larger and more significant under stricter regulation. This offers evidence for the expectation that after 2004 when the minimum wage system was reinforced, employment effects should become larger.

Fang and Lin (2013) also look at the employment impacts of minimum wages for at-risk groups, young adults, different age cohorts, and low educational attainment. The effects of current minimum wages in young adults are similar to the whole sample, while they have larger lagged effects. However, as Brown (1999, p.2126) indicates, the significance of an employment effect depends on the inclusion of the education enrolment of teenagers, and Fang and Lin (2013) do not control this variable. Another group of at-risk people can be defined by wages earned between the minimum wages of two periods, and they exhibit much larger impacts than the whole sample on both current and lagged minimum wages. The minimum wage also has significantly negative effects on young female workers and workers with low education (high school education or below). Overall, their results are consistent with simple theoretical expectations for each sub-sample. Since two of their groups (young adults and age cohorts) coincide with this study, detailed comparison between their results and the thesis' will be given in the empirical chapters later.

Conclusions on employment effects

In this section the employment effect of minimum wages has been reviewed first for industrialised countries, then for developing countries and for China. For industrialised countries, there is no consensus on employment effects though a huge body of literature exists, but the impact of minimum wages on employment is traditionally inclined to remain negative. For LDCs, the results are mixed as well, though they tend to exhibit negative effects in formal sectors and positive effects in informal sectors of employment as expected by the "crowding out" effect. As far as China is concerned, the focus is on different aspects of an informal-sector framework in literature on minimum wages in LDCs. Specifically, rural migrants are more inclined to be influenced by minimum wages than other workers - though perhaps more likely to be in firms which do not comply with the minimum. It is necessary therefore to consider the issue of non-compliance as we will do below.

As for this research, first of all, standard methods will be followed to study employment effects in China, mainly based on the studies of Wang and Gunderson (2011) and Fang and Lin (2013). A formal-informal-sector framework will be adopted following literature in developing countries. Although empirical results for different patterns in China rather conflict, some predictable impacts can still be referred to for this study, as described at the end of each pattern (regions, industries, SOEs and so on).

2.4. The minimum wage and the gender wage gap

The literature on the gender wage gap in China is relatively rich compared with that on minimum

wages, though none of the Chinese studies relate minimum wages to the gender wage gap. In fact, across the world, few studies directly relate minimum wages to the gender wage gap. Thus, in this section, the general picture for the gender wage gap in China will be given first, looking at data, decomposition methodologies, and empirical results in turn. Then the literature on the minimum wage and gender differentials will be discussed, taking direct decomposition methods, direct regression methods, and indirect comparison of gender patterns.

The gender wage gap in China

Table 2.1 summarises results from the main decomposition studies of the gender wage gap in China[1]. All of them decompose the wage differential into "explained" and "unexplained" parts as will be explained below. As regards the data, there are three main sources, i.e. China Health and Nutrition Survey conducted by the Carolina Population Center (Zhang, 2004; Chen and Duan, 2009); the Household Income Project conducted by a team of international scholars and researchers at the Institute of Economics and at the Chinese Academy of Social Sciences (Gustafsson and Li, 2000; Appleton *et al*., 2005; Bishop *et al*., 2005; Demurger *et al*., 2007); and sub-samples of UHS (Ge, 2007; Ng, 2007; Chi and Li, 2008; Zhang *et al*., 2008; Ge and Zeng, 2011). As for the sample periods, the earliest year is 1987 (Chi and Li, 2008), and the latest year is 2005 (Chen and Duan, 2009), roughly covering the sample period 1995-2007 in this thesis. However, only four studies contain consecutive years comparable with this sample. They are 1988-2001 in Ge (2007) and Ge and Zeng (2011), 1988-1997 in Ng (2007) and 1988-2004 in

[1] A similar table summarising literature for employment effects in China is attached in Chapter 5, an empirical chapter on employment effects. There is no relevant literature for wage effects in China, thus no similar table is constructed.

Zhang *et al*. (2008). The remaining studies only take selected years and investigate the difference among them. Overall, sample data and periods in literature can be compared with those of this thesis, which however uses consecutive and more recent years.

As noted, most of the literature investigates gender discrimination by constructing a counterfactual wage structure. That is, supposing female workers have the same wage structure as males, what would female wages be given female productivity characteristics? Based on this idea, the different decomposition methodologies focus on how to define a counterfactual wage structure, using one of two methods. One is to decompose means based on conventional linear regression models, and the other is to decompose wage distributions based on quantile or semi-parametric models. Guo *et al*.'s literature review (2011) summarises and gives a detailed discussion of the main decomposition methods, as shown in Figure 2.1.

According to Guo *et al*. (2011) in Figure 2.1, research has moved from decomposition of means based on conventional linear models towards decomposition of distributions based on semi- or non-parametric models. The basic decomposition idea begins with Oaxaca (1973) and Blinder (1973) who decompose the wage gap into a composition part and a discrimination part (see also Cotton, 1988 and Neumark, 1988). Taking another direction, Brown *et al*. (1980) introduce the factor of occupational segregation to the decomposition using the multinomial probit model, and this has been explored more recently by Appleton *et al*. (1999). Juhn *et al*. (1991) introduced a residual decomposition method based on mean decomposition and later expanded their method to the whole wage distribution (Juhn *et al*., 1993). In more recent methods, DiNardo *et al*. (1996) construct a counterfactual wage structure by reweighting estimates based

on semi-parametric models. Machado and Mata (2005) decompose wage gaps using conditional quantile regressions. Most recently, Firpo *et al*. (2009) use unconditional quantile regression models.

When it comes to the empirical results, they are quite consistent despite different decomposition methods. The overall gender wage gap in China first begins to increase in the 1990s until around 2002, which is mainly caused by a rising unexplained component or discrimination. In fact, up until around the beginning of the 1990s, the gender gap is relatively small and stable compared to international levels (Gustafsson and Li, 2000; Demurger *et al*., 2007), and the difference in workers' characteristics can explain a large part of (Chen and Duan, 2009) or at least about half of the gap (Gustafsson and Li, 2000), suggesting that discrimination was small. Then, discrimination seems to increase (Gustafsson and Li, 2000; Zhang, 2004). Notice that based on the previous review of decomposition techniques, all studies except Zhang *et al*. (2008) look at different returns to characteristics between for males and females as discrimination, while Zhang *et al*. (2008) only take different returns to unobserved skills (i.e., residuals of wage distribution) as discrimination, following Juhn *et al*.'s method (1991).

Findings on the gender wage gap appear consistent, though different datasets and periods are studied and different techniques are adopted. Specifically, starting from the end of the 1980s, the gender gap rises. This trend continues until the beginning of the 2000s, when some signs of stability show in the gap. The main reason for the gender gap changes is that discrimination effects take the place of composition effects. As regards studies of separate effects at different quantiles of the wage distribution (e.g., Zhang *et al*., 2008 and Ge and Zeng, 2011), it appears

that in the 1990s the gap at the lower end of the distribution was larger than other parts, while after 2000, an increasing trend appears in the middle and upper end. More details will be discussed later in Chapter 6.

The minimum wage effect on the gender gap

The literature on the minimum wage effect on the gender wage gap is limited. Also, most of research is on developed countries, especially in Europe. Only one study is on LDCs[2].

First, two studies directly decompose the gender wage gap, and show mixed results. Based on the Oaxaca (1973) and Blinder (1973) decomposition, McGuinness *et al*. (2011) examine the gender wage gap in Ireland. They find no obvious effect of minimum wages for the gender gap in full-time labour markets, but substantial effects for part-time females. In contrast, Mumford and Smith (2007) find evidence of gender wage gap reduction in relation to the national minimum wage in the UK. They also adopt the Oaxaca (1973) and Blinder (1973) decomposition.

Another two studies include minimum wages in the investigation of gender wage differentials, though without decomposition. Blau and Kahn (2003) regress a standardised gender gap (based on characteristics of US workers) on minimum wages using data from 22 developed countries for the period 1985-1994. They find significant reduction effects. However, those effects disappear if they control for an extra collective bargaining variable, suggesting that the minimum wage impact relies on collective bargaining institutions. Robinson (2005) uses the difference-in-difference method to examine the effect of the minimum wage on the gender wage gap in the UK.

[2] Bulgaria and Russia in Blau and Kahn (2003), and the Slovak Republic in Perugini and Selezneva (2013) are developing countries.

She finds that the minimum wage reduces the gap by 1 to 2 percentage points, and the effects are most concentrated on regions with a relatively large share of low-earning women and regions with relatively low wages. Thus these two studies both suggest that minimum wages reduce the gender wage gap, at least in developed countries.

The remaining relevant studies compare the different gender patterns of minimum wage effects. Manning and Dickens (2002) compare different effects of the NMW on genders in the UK based on wage reweighting and propensity score reweighting methods. They find that the introduction of the NMW reduces the gap by 0.3-0.4 percentage points. Similarly, Perugini and Selezneva (2013) show the minimum wage reduces the gender wage gap at the lower end of wage distribution in Eastern Europe by comparing gender quantile regressions. The other two studies only adopt statistics to describe minimum wage effects on the gender wage gap. Dex *et al*. (2000) point out that the NMW does improve the gender pay ratio at the lower end of the pay distribution in the UK. Simon (2012) indicates that countries with higher minimum wages tend to have lower gender wage gaps in Europe. At the same time, the only study on LDCs is of the Ukraine from Ganguli and Terrell (2009). They examine gender patterns of minimum wage effects on wage distribution through spillover effects. Larger positive coefficients for females than males show a significant reduction effect on the gender differentials at the lower end of the distribution. Overall, indirect comparison of gender patterns supports the conclusion that minimum wages favour gender equity, not only for developed countries but also for LDCs.

In summary, this section reveals that there is a gap between the literature of the minimum wage effect on the gender wage gap in China and that for other countries. On the one hand, there are

some studies on the gender wage gap in China that are consistent. They suggest an increasing trend of a gap with first fast but later slow stages, and before 2000 discrimination keeps rising. On the other hand, some literature investigates the minimum wage effect on the gender gap for other countries, though these are limited. Most of relevant studies indicate that the minimum wage can effectively reduce the gender wage differentials. Thus this gap will be addressed in a later chapter and it is expected that a significant reduction effect of the minimum wage on the gender gap in China will be found.

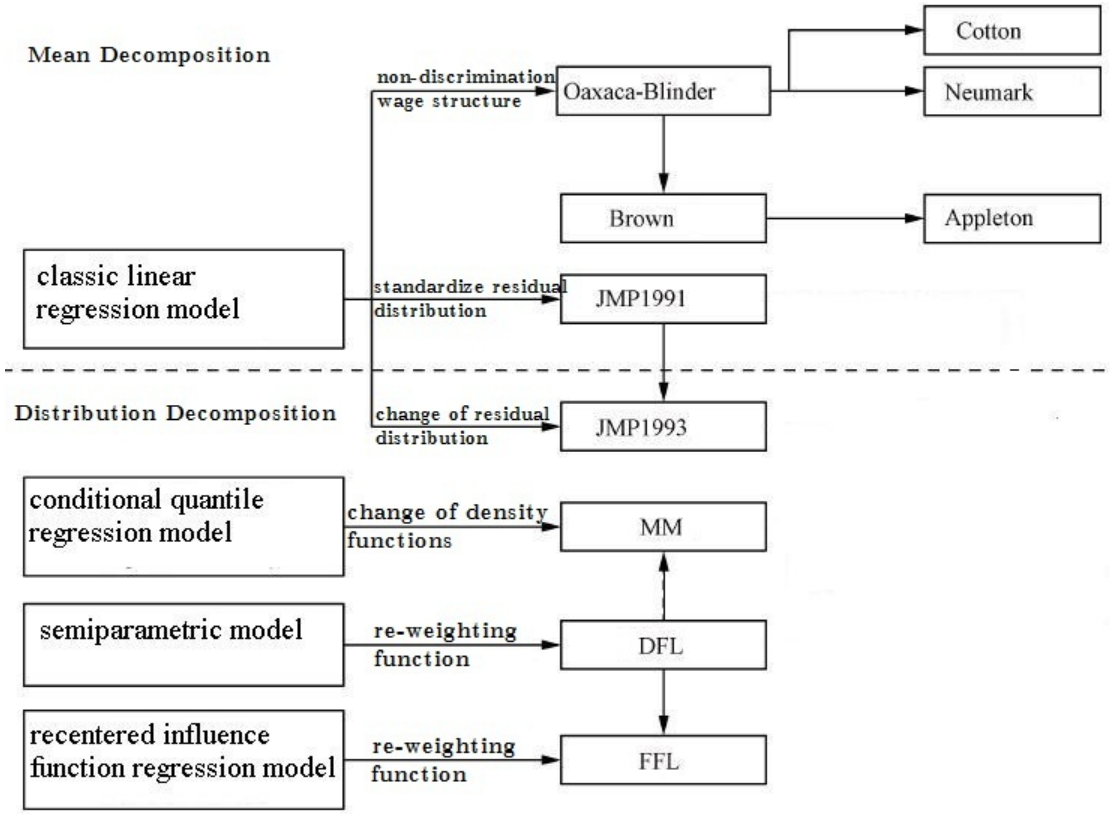
2.5. Conclusion

Overall, there are several conclusions from this literature review chapter. Taking first the effects of minimum wages on inequality, the literature indicates that the minimum wage discernibly reduces inequality, whether it be in developed or developing countries, or in formal or informal sectors. This large wage impact, coupled with apparently small employment impacts of the minimum wage, is a puzzle, and certainly it will be of interest to find whether it is repeated in the present study. In fact, for China the relevant literature is scarce. What evidence there is indicates that minimum wages have quite strong impacts on poverty and income inequality reduction though more research is needed here. Thus, based on the literature and methodology on developed countries, as well as that from developing countries, further study of the minimum wage and inequality in China is of interest.

Turning next to the employment effect of minimum wages, we reviewed evidence for industrialised countries, then for developing countries and for China. For industrialised countries, there is no consensus on employment effects though recent results suggest that the impact of

minimum wages on employment is negative for low productivity groups such as youth. For LDCs, while the results are also mixed, there is a tendency for negative effects in formal sectors and positive effects in informal sectors of employment as expected by the "crowding out" effect. As far as China is concerned, it appears that rural migrants are more likely to be influenced by minimum wages than other workers, perhaps because they are employed more in firms which do not comply with the minimum. Therefore, for China it is necessary to consider the issue of non-compliance as we will do below. For this research, the emphasis will be on standard methods study employment effects, mainly based on the studies of Wang and Gunderson (2011) and Fang and Lin (2013), within a formal-informal-sector framework.

Finally, as regards the impacts of minimum wages on the gender wage gap, we have found that there are few studies, and none for China. The literature on the gender gap itself for China finds that starting from the end of the 1980s, the gender gap rises. This trend continues until the beginning of the 2000s, when it stabilizes. Using decomposition analysis, the main reason for the gender gap changes appears to be that discrimination effects take the place of composition effects. The literature on the minimum wage effect on the gender gap is limited, as noted, but suggests that the minimum wage reduces gender wage differentials. This thesis represents the first attempt to address this question in China – will a similar reduction effect be found?



Source: Adapted from Guo *et al*. (2011)

Figure 2.1: Decomposition methods

Notes: JMP denotes Chinhui Juhn, Kevin M. Murphy, and Brooks Pierce; MM denotes José AF Machado and José Mata; DFL denotes John DiNardo, Nicole M. Fortin, and Thomas Lemieux; FFL denotes Sergio Firpo, Nicole M. Fortin, and Thomas Lemieux.

Table 2.1: Literature Summary on the Gender Wage Gap in China

Author(s)	Journal	Sample Periods	Data	Provinces*	Method	Variables besides**	Conclusions
Appleton, Song, and Xia, 2005	Journal of Comparative Economics	88, 95, 99 & 02, 4 years	CHIP, with recalled panel data	BJ, AH, GS, GD, HN, HB, JS, LN, SX, YN, 10 provinces.	OLS & fixed-effect panel data models	Party member, ethnicity, ownership, occupation, industry.	1.The gap becomes stable in 2002; 2.rising returns to edu.;falling returns to exper.; 3.Premium to party members ends; 4.SOE and heavy industries are influenced.
Bishop, Luo, and Wang, 2005	Journal of Economic Transition	88 & 95, 2 years	CHIP	BJ, AH, GS, GD, HN, HB, JS, LN, SX, YN, 10 provinces.	Oaxaca-Blinder (1973) and quantile regressions	Married, small child, party member, occupation, industry, provinces	1. The gap is rising, but discrimination is falling; 2. Particularly for low earnings women.
Chen and Duan, 2009	The Journal of Quantitative and Technical Economics (Chinese)	88, 96 & 05, 3 years	CHNS	LN, HLJ, JS, SD, HN, HB, HN, GX, GZ, 9 provinces	Machado and Mata (2005)	Region, occupation, industry, ownership. With different experience calculation.	1.1988, the gap rises with rising wages; 1996,the gap at two ends are larger than the middle; 2005, the middle gap is larger than two ends; 2.1988,composition effects are main reasons; after that, discrimination is the main reason; 3.Women with high education and white-collar occupations have advantages over men.
Chi and Li, 2008	Journal of Comparative Economics	87, 96 & 04, 3 years	UHS	(Not reported)	FFL (2009)	Ownership, occupation, industry, regions.	1.The gap rises, and it is greater for lower-quantile women; 2.Mainly because rising discrimination; 3.Especially for low-quantile women with limited education in non-SOEs.
Demurger, Fournier, and Chen, 2007	Developing Economics	88 & 95, 2 years	CHIP	BJ, AH, GS, GD, HN, HB, JS, LN, SX, YN, 10 provinces.	Oaxaca-Blinder (1973) and its extension	Dependent members, household size, terriary sector, coastal region dummy.	1.The gap is stable; 2.Discrimination in SOE rises, while in collective and foreign-invested ones falls.

Ge, 2007	China Economic Quarterly (Chinese)	88-01, 14 years	UHS	LN, ZJ, GD, ShX, SC, 5 provinces.	Appleton (1999)	province dummy.	1.Females have disadvantages of exper. and its return; 2.Females have advantages of education returns; 3.Particularly for women at the bottom and middle distribution.
Ge and Zeng, 2011	Economic Research Journal (Chinese)	88-01, 14 years	UHS	BJ, LN, ZJ, GD, SC, ShX, 6 provinces	Machado and Mata (2005)	(no other controls except education and experience)	1.The gap is large and rises at the low-end; 2.The gap is small and falls at the top; 3. Discrimination is large and rising at the low-end; 4. Composition effects are main reasons for a falling gap at the top.
Gustafsson and Li, 2000	Journal of Population Economics	88 & 95, 2 years	CHIP	BJ, AH, GS, GD, HN, HB, JS, LN, SX, YN, 10 provinces.	Oaxaca-Blinder (1973) and Jenkins (1994)	Age group, minority, party, education, ownership, occupation.	1.The gap is small but rising; 2.Composition effects are less than half. Discrimination is rising; 3.Young women and women with limited education are treated worst.
Ng, 2007	Review of Income and Wealth	88-97, 10 years & 88-90, 90-94 & 94-97 three periods	UHS	BJ, JS, GD, LN, AH, SX, HB, SC (Chongqing included), GS, 9 provinces	Wellington (1993)	Occupation, industry, ownership. Regressions within regions.	1. Both the gap and discrimination rises; 2.Especially in fast-growing areas; 3.Market competition and wage decentralization plays a role in shaping the gap.
Zhang, 2004	Journal of Population Science (Chinese)	89, 91, 93 & 97, 4 years	CHNS	LN, JS, SD, HN, HB, HN, GS, GZ, 8 provinces	Oaxaca-Blinder (1973) and Cotton (1988)	Married, small child, ownership, occupation, working status, region.	1.The gap and discrimination is rising; 2. Women with junior school or below, 40 aged or above, non-SOE, and blue-collar occupations are treated worst.
Zhang, Han, Liu, and Zhao, 2008	Industrial and Labor Relations Review	88-04, 17 years	UHS	BJ, LN, ZJ, GD, SC, 5 provinces	JMP (1991)	State-owned. And they use potential expe, instead of expe, province dummy.	1.Rising returns to observed and unobserved skills; 2.The gap in observed skills narrows, but in unobserved skills widens; 3.Rising discrimination; 4.The recent trend is the widened upper-end.

Notes: * BJ-Beijing, AH-Anhui, GS-Gansu, GD-Guangdong, HN-Henan, HB-Hubei, JS-Jiangsu, LN-Liaoning, SX-Shanxi, YN-Yunnan, SD-Shandong, HN-Hunan, GZ-Guizhou, ShX-Shaanxi, ZJ-Zhejiang, SC-Sichuan, HLJ-Heilongjiang, GX-Guangxi.

** All specifications include: education, experience, and experience-squared.

3. DATA

3.1. Introduction

This chapter gives detailed information on the two datasets used in this study, and how they are combined. One dataset is a sub-sample from the Urban Household Survey (UHS). This is a respected national survey in China with a long history, which contains rich individual information. The other dataset gives minimum wages at the municipal level during 1994-2007. It was compiled from central government and municipal publications by the researcher specifically for this PhD research project.

These datasets present several advantages. First of all, since the minimum wage data is at municipal level over several years it presents good variation for testing effects of minimum wages. It should be remembered that, unlike the position in the UK, minimum wages in China are set both by provincial governments and also often at municipal level. However, there is no publicly available dataset giving all levels of minimum wage across years, especially at the municipal level. Thus, municipal minimum wage data for 1994-2007 had to be collected specifically for this study from several official sources. Currently, this dataset is almost unique for China, since only Fang and Lin (2013) have studied Chinese minimum wages at the municipal level.

The other advantage is that the UHS gives rich information on individuals in many municipalities over a long period. It is a national survey with approximately 161,000 individuals

overall (see Table 3.2) in 180 municipalities. This means that adequate regional variation is exhibited. Moreover, there is time variation, with data points for some towns beginning in 1988 and ending in 2007. This is a long sample period for China studies considering economic reforms only began in the 1980s.

In order to take full advantage of these two datasets, this study combines them at both the municipal level and the individual level. Normally the municipal level is adopted, for example, for analysis of the municipal inequality indices (section 4.3, Chapter 4), and municipal employment rates (Chapter 5). Here, municipal level data are obtained by averaging individuals from the UHS, taken in combination with municipal minimum wages. However, sometimes individual data can be used directly, for example when analysing wage distributions (section 4.4, Chapter 4; Chapter 6). Relevant details are shown in section 3.4.

Of course, limitations exist in the data. The most important is underrepresentation in the UHS of rural migrants in urban areas. According to the literature review in Chapter 2, one target group of studies on China's minimum wage is rural migrants. Lack of information on individuals in this group means our results can only partially describe the impact on welfare of the minimum wage policy. In particular, care should be taken when interpreting the empirical results later, since most of the sample consists of urban residents. As noted in the introduction, urban residents and rural migrants are treated differently, and some of dead-weight loss caused by the minimum wage may eventually be borne by rural migrants.

In the following sections, the UHS and minimum wage data are discussed in more detail. Definitions of variables used in later empirical chapters are discussed as well, together with

general statistical information. Lastly, a conclusion is drawn.

3.2. Data of the Urban Household Survey

The Urban Household Survey (UHS) is large national survey with a long history. It is conducted every year by the statistical authority and serves as the base for the *China Statistics Yearbook*. However, it must be remembered that the UHS data used in our study are only a sub-sample. So an overview of the specific sample limitations in this study is given, including sample provinces and periods.

An overview of UHS data

The Urban Household Survey (UHS), also known as the Urban Household Income and Expenditure Survey (Gibson *et al*., 2003) or State Statistical Bureau Survey Data (Bramall, 2001), is a large household survey, as well as one of the most comprehensive surveys in the world (Bramall, 2001; Gibson *et al*., 2003). This survey is conducted by the Department of Urban Surveys, National Bureau of Statistics (NBS) of China, which is the former State Statistical Bureau. It covers household and individual samples over the whole of China, including 31 provinces (Taiwan excluded), municipalities and autonomous regions. Over 60,000 households are randomly chosen, surveyed, rotated and renewed every three years. Sample households keep diaries every month, mainly on daily income and expenditure over the course of the year, which is combined with demographic information. These records are collected by enumerators in regional branches of the NBS, and aggregated and published as the *China Statistics Yearbook*.

The UHS has a long history and provides part of the statistical basis for government policies, including GDP accounting, annual CPI reference, and nutrition and poverty management (NBSC, 2007, p.38). The survey was stopped during the Cultural Revolution (1966-1976), but then was slowly restored, and in 1985 was re-organised into its present form. The current UHS databank comprises four phases: (i) 1988–1991; (ii) 1992–2001; (iii) 2002–2006; (iv) from 2007 to the present. The sample size steadily rises from 17,000 households before 2002 to more than 40,000 in 2002 and 65,400 in 2006. The areas covered have been expanded as well from 146 cities and 80 towns before 2002 to 418 municipalities in 2002 (NBSC, 2007, pp.3-41). Overall, UHS data can be taken as reliable and representative.

The survey is drawn based on a two-stage stratification (NBSC, 2007, pp.4-7). First, municipalities are selected and all municipalities are sub-stratified according to geographic regions and population size. For each sub-stratum the sample size is determined proportional to the corresponding areas. Then all municipalities are ranked according to per capita wages of employees from higher to lower and the accumulation of population for each municipality is calculated. Finally, a random equidistant PPS (probability proportionate to size sampling) method is applied to decide which municipalities are surveyed. In the second stage of stratification, household samples are selected. In particular, a master sample is first surveyed, and the UHS sample is randomly chosen from it considering surveyed per capita income. The master sample is re-established every three years from three stratifications, i.e. for each municipality street blocks (*jiedao*) are selected, then resident committees (*juweihui*) within each street block are chosen and lastly households are drawn from each resident committee. Furthermore, if the selected household refuses to be surveyed, it is reported and there is a pre-determined rule of substitution.

This two-stage stratification method thus ensures that the UHS sample is representative of the urban population (though, as noted, rural migrants in urban areas are underrepresented).

As regards the contents of the survey, daily and monthly household information is recorded. The main contents include (NBSC, 2007):

(i) General demographic information about household members such as age, gender, nationality, employed status, employed occupation and industry.

(ii) Cash month-end income and expenditure of households. Total income is separated into several categories including earnings from full-time and part-time jobs. Thus, while hours worked is not available, our analysis can be based on earnings from full-time jobs only.

(iii) Detailed consumption expenditure of households (not directly relevant for our study, though important for computing price inflation).

A further advantage of the UHS is its monthly frequency. A third of the chosen sample is rotated every year so it is renewed every three years; consequently, every household keeps a diary of their income and expenditure for at least 12 months but no more than 36 months. UHS annual data is aggregated from these monthly data. Normally, annual survey data are extrapolated from a sample of months within the year, as happens for example in the Labour Force Survey in the UK and Current Population Survey in the US. If the UHS data are compared with such extrapolations, we find that the UHS method allows a more accurate calculation of income/wage dispersion. In particular, Gibson *et al*. (2003) suggest that inequality indices are overstated by as much as 65-100% when based on simple annual extrapolation data instead of annual aggregates based on

monthly records.

The most criticised aspect of the UHS is that its sample includes too few migrants from rural areas, defined as individuals with rural and non-local household registration. This is a particular disadvantage for this study since migrant workers are one of the main groups affected by minimum wages. Furthermore, ignoring the wages of rural migrants means that urban inequality is understated. Thus, this study can be seen as providing a lower bound estimate of inequality and minimum wage effects.

Other problems are not so serious. It is true that people require some education to record data diaries, but this is more of a problem in the Rural Household Survey, since in the UHS it is rare for every member in a household to be illiterate (Bramall, 2001). There is also a narrow definition of income (Bramall, 2001) which does not include all subsidies for family members. However, these problems are not relevant to this study which does not consider urban-rural inequality or non-working-age family members. Thus, we may conclude that the UHS affords a solid data foundation.

UHS data used in this study

The main UHS datasets that have been accessed consist of two parts. One is aggregated annual data at an individual level from 1988 to 2003. It includes five provinces, Liaoning, Zhejiang, Guangdong, Shaanxi, Sichuan, and one municipality, Beijing. Their geographic locations are indicated in the map in Figure 3.1. Beijing, Liaoning, Zhejiang and Guangdong belong to prosperous eastern coastal areas, and Shaanxi and Sichuan belong to less-developed western

inland areas. There is no province for developing central inland regions. Though there are only six provinces, all of them are important and representative economic zones in China.

The other dataset consists of monthly individual data from 2004 to 2007. It includes nine provinces, Hebei, Shanxi, Liaoning, Jilin, Heilongjiang, Jiangsu, Zhejiang, Anhui, Fujian, and two municipalities, Beijing and Shanghai, shown in light shading in Figure 3.1.The east includes seven provinces, i.e. Beijing, Shanghai, Hebei, Liaoning, Jiangsu, Zhejiang and Fujian; the central region involves four, i.e. Heilongjiang, Jilin, Shanxi and Anhui; and there is no province for the west. These eleven provinces from 2004 to 2007 comprise nearly half of the population of all 32 provinces in China, and three are among the top ten provinces with the highest GDP: Jiangsu, Zhejiang and Liaoning.[1] A large body of the national economy, therefore, has been included in this dataset.

For the above two datasets, this study has several combinations. For example, 21 consecutive years of data are obtained if monthly data from 2004 to 2007 are aggregated and combined with the 1988-2003 dataset. The advantage of this combination is the extended period of time covered, while the shortcoming is maybe the structural break caused by the different coverage of the two datasets. Another important approach is to take advantage of the rotated sample and construct individual panel data. Every year a third of households are rotated out of the survey, so the shortest is a 12-month individual panel, but some 48-month panels are available. The third dataset that can be constructed is balanced panel data which only includes three provinces from 1988 to 2007, shown as overlapped areas in Figure 3.1, i.e. Beijing, Liaoning and Zhejiang.

[1] According to national statistics in 2012, from the website of The People's Daily: http://finance.people.com.cn/GB/8215/356561/359047/

Information on the specific data combination used in the empirical analysis is given in each empirical chapter below, and sometimes different combinations are used to test for robustness of the main results.

3.3. Data on minimum wages

The availability of disaggregated data on minimum wage laws is the main problem for minimum wage analysis in China. A municipal minimum wage database (*chengshi zuidi gongzi shujuku*) has been constructed by the Institute of Population and Labour Economics and the Chinese Academy of Social Sciences (see Du and Wang, 2008). However, this dataset is not available to the public. Thus, this section describes my study's collection of a disaggregated dataset.

In fact, some studies refer to government websites (Luo, 2007b; Du *et al*., 2008; Ni *et al*., 2011; Fang and Lin, 2013), which provide official files on minimum wages. However, generally these minimum wages are at the provincial level, instead of the municipal level used in this study. Business databases are another way to set up minimum wage data (Wang and Gunderson, 2011 and 2012; Shi, 2009), but these are also province level in the main. A third approach, followed here, is to use information from local newspapers, municipalities are required to publish their minimum wages. Using this method, government websites and business databases can be used to cross-check reliability.

The provincial authorities do publish some disaggregated data. Basically, these official files can be separated into three types. Firstly, several provincial governments show minimum wages for each municipality directly in their notifications. One example is Anhui province. Its

announcement is so detailed that some districts within municipalities are even specified. Another similar example is Shaanxi province. Data collection for this type of notification is simple since original official files are easy to find on relevant provincial government department websites.

In the second type of notification, provincial governments set several levels of minimum wage for different grades of municipalities. Normally the more prosperous the area is, the higher the minimum wage. The difficulty in this situation is that definitions are obscure for different grades. For example, during 2004-2006 Hebei province set three levels of minimum wage with the lowest for poverty towns (*pinkun xian*). However, poverty towns are classified into national, provincial and municipal levels. Which standard should be applied? There is no clear requirement in official files. In this kind of situation, a search for local news at that time is needed. Another difficulty is that there are several districts in a big municipality, and sometimes two levels of minimum wage are applied within one municipality, such as Dalian city in Liaoning province, Shuozhou city in Shanxi province and Shenzhen city in Guangdong province. In this kind of situation, the level of the district where the municipal government lies was usually adopted. Data collection is therefore difficult for several municipalities for this type of government announcement.

In the third type of notification, provincial governments only set “reference” minimum wages at several levels and municipal governments are left to decide a minimum wage by themselves, such as Liaoning, Heilongjiang, Jiangsu, Zhejiang, Guangdong and Sichuan provinces. Since official files for small municipalities are hard to find, even for recent years, most of the time was spent on this type of data collection.

Data collection proceeded as follows. The first stage was to check government websites. Provincial Departments of Human Resources and Social Security have their own official websites where local official files on minimum wages for recent years are often kept. Then local newspapers were searched for minimum wage announcements. This search included printed provincial and municipal annals, as well as Web databases including the "Full-text Database for Important Newspapers in China" (*zhongguo zhongyao baozhi quanwen shujuku*), China Full-text Academic Journals (CNKI net) (*zhongguo zhi wang*), and China Infobank (*zhongguo zixun hang*).

A further important source for minimum wage data was the Website of China Labour Consultation (*zhongguo laodong zixun wang*, www.51labour.com). This business website collects news on labour and human resources, contains databases on labour laws and regulations, and offers consulting services on labour laws, including a database specifically on minimum wages at the municipal level. The important feature of this database is that it attaches original official files as well as local news after each minimum wage adjustment, thus its data are verified. Though this database does not include all minimum wages over the whole period, it provides about half of our data points.

Hopefully, the result of this effort is improved accuracy. First of all, as mentioned above, nearly all the data are verified by original official files or local news, not taken from secondary sources. That is perhaps why errors are found in the data for Heilongjiang province in 2004 and 2005 cited by Wang and Gunderson (2011, p.399), even though their data are from the database of the Ministry of Human Resources and Social Security of China. Furthermore, more detail is

available in my data. For example, since July 2005 Shanxi province has set special minimum wages for workers in the mining industry (RMB1000-1200 per month, i.e. GBP100-120 per month), which is almost twice as high as the minimum wage for workers in other industries (around RMB550 per month, i.e. GBP55 per month). Another example is Beijing municipality. It announced minimum wage adjustments twice in 2004: RMB495 (GBP49.5) per month on 1st January and RMB545 (GBP54.5) per month on 1st July. However, in Wang and Gunderson's study, only one number appears (2011, p.399). The same case is for Wuxi city and Yixing city, in Jiangsu province, which also set minimum wages twice, in 2004 and in 2007 respectively.

The appendix tables (Appendix 3a, b, c and d) show nominal minimum wages sample provinces in this study, with details at the municipal level for an example province - Zhejiang. There are 102 municipalities in six provinces during 1993-2003 and 101 in eleven provinces during 2004-2007. In total, there are 183 municipalities taking into account overlaps in two periods. For these areas from the first year of minimum wages to 2007, there are 87 unique values of nominal minimum wages, which gives good variation for regression estimation. The adjustment dates are indicated along with the minimum wages. Every fixing is shown in bold. Notice that Wang and Gunderson (2011) exhibit a similar table on the minimum wage. However, their table only contains the highest level of minimum wage for each province, and does not present the specific fixing dates. Also, their sample period only begins in 2000. Furthermore, a table with municipal minimum wages in Zhejiang province ((Appendix 3d) is attached as well, which works as an example of municipal minimum wages and shows the uniqueness of my data. My table is, therefore, reassuringly similar to Wang and Gunderson's (2011), but gives richer information.

From the appendix tables, diversified patterns of minimum wage fixing among provinces are seen; some are once or twice every year, such as Beijing, Shanghai and Jiangsu; some are once every two or even three years, like Hebei, Heilongjiang and Liaoning. Furthermore, there are different levels within each province, with the exception of Beijing and Shanghai. For example, Anhui has ten levels and Guangdong involves eight levels. Finally, Guangdong always sets the highest minimum wages among the sample provinces, and Shanghai, Jiangsu and Zhejiang follow. Since these provinces are all coastal areas, it can be seen that the eastern region has higher minimum wages than the central and western regions.

3.4. Covariates and statistics

This section first demonstrates the combination of the above two datasets and then gives definitions of the main covariates in this study. Details are given on how to combine micro (individual) and macro (municipality) data. The important minimum wage variable is also reviewed, as well as definitions of other covariates such as the employment to population ratio. It is worth emphasizing at this point that this study is restricted to full-time employed people above 16 years of age, excluding the farming industry and the self-employed. Students are excluded as well. In addition, an upper ceiling for age is not set since retired people returning to work may be a vulnerable group directly influenced by minimum wages (though sensitivity tests are performed to check whether restriction to the under 65 age category changes results).

Combination

This part describes combination of the above two datasets at the micro (individual) and macro

(municipality) level respectively. The common information/variable is *municipality* (name). The macro level data needs summary information from the UHS individual data at the municipal level. For example, the education level information of the individuals in a given municipality is used to calculate the average education level in that municipality. Section 4.3 in Chapter 4 (municipal inequality indices and the minimum wage) and Chapter 5 (municipal employment rates and the minimum wage) use the macro (municipality) level data.

As for the micro level data, the constructed municipal average variables are merged with the UHS individual data. Thus, all individuals in one municipality share the same municipal control variables and municipal minimum wages. Section 4.4 in Chapter 4 (wage distribution and the minimum wage) and Chapter 6 (the gender wage gap distribution and the minimum wage) use the micro (individual) level data.

The Minimum wage

The minimum wage is defined as the annual minimum wage, monthly weighted. For example, on 1st July 1999 Liaoning adjusted its minimum wage from 210 Yuan per month to 280 Yuan and kept the same rate in 2000. Thus the minimum wage in 1999 equals 2940 Yuan (210×6 + 280×6) and in 2000 it equals 3360 Yuan (280×12). This is similar to the time-weighted minimum wage used by Fang and Lin (2013, p.10). The weighted annual minimum wage concept has the advantage of being sensitive to variation in monthly minimum wages, in that for the same monthly rate different annual rates are expected, as in the example above.

Note that in general this study does not transform the minimum wage variable into a Kaitz

index, i.e. take the ratio of minimum wages to average wages in a municipality. This is because the Kaitz index puts strong restrictions on the coefficients of interest (requiring changes in the minimum wage and the average wage to have equal and opposite coefficients, as noted by Neumark and Wascher, 2008, p.62). Therefore, in the empirical analysis below, the municipal average wage is used as a separate control.

However, for summary purposes the Kaitz ratio is useful, and Tables 3.1a and 1b show this ratio (calculated from weighted annual minimum wages to average annual wages) for different regions and periods. Here the second highest level of minimum wage is chosen for sample provinces, instead of the top as in many other studies. The reason for this is that some top minimum wages are set exclusively for the capital city or special economic zones, such as Zhejiang province before 1997, Liaoning during 2000-2003, Guangdong and Fujian. In contrast, the second highest level covers both large and medium cities, and is more representative than the top level.[2]

From Tables 3.1a and 3.1b, trends and ranges of relevant ratios can be observed. First, it can be seen that before 2004, the overall trend of the ratio is downward, for example in Beijing from 38% in 1995 to 31% in 2003; Liaoning from 42% in 1995 to 34% in 2003; and Shaanxi from 48% in 1995 to 35% in 2003 (see also Du *et al*. 2008). However, after 2004 the trend stabilises, even with a slight increase; for example, Beijing from 29.5% in 2004 to 30.2% in 2007; Liaoning from 28.2% in 2004 to 33.2% in 2007; and Zhejiang from 28.6% in 2004 to 29% in 2007. Exceptions

[2] Another thing is that the minimum wage set exclusively for Dalian in Liaoning province and Shenzhen in Guangdong province are not under consideration, which means that the third level of minimum wage for Liaoning and Guangdong is selected.

are Jiangsu, Shanxi and Anhui, three out of eleven sample provinces. As for the range of ratios, it is between 23.4% and 47.6%, which is comparable to ratios in industrial countries, and consistent with existing literature for China (Han, 2006; Luo, 2011; Fang and Lin, 2013).

Finally, more generally, Figure 3.1 presents a scatter graph of the link between average wages and minimum wages at the municipal level. As can be seen, there is a strong positive relationship between the two. Richer cities set higher minimum wages, as is reasonable.

Other covariates

The main variables we examine are wages and employment, defined as follows: Wages are defined as earnings from full-time jobs, excluding any income from part-time jobs. Annual wages for the sample period of 2004-2007 are the sums of 12-month wages in each year. Real wages in all chapters are based on 1988 price levels. The minimum wage we have already discussed, but also relevant is the issue of compliance, since as noted, developing countries have problems of non-compliance, and China is no exception. Thus, below we will make use of a compliance ratio variable, defined as C_i/E_i, where C denotes people who earn wages at least the minimum wage, E denotes total employment and *i* represents municipality *i*. It is an important variable and is discussed in more detail in Chapter 4.

As regards employment, the main dependent variable is the employment-population ratio. Here, employment is defined as workers in full-employment aged between 16 and 65 with reported annual wages. Following this rule, working people aged above 65 are excluded even though a sub-minimum wage and non-compliance is widely seen in this group (around 48% in the sample,

see Table 4.1 in Chapter 4). Excluding workers over 65 is conventional, and in any case such workers represent only 3.7% (see Table 5.1a in Chapter 5) of all old people above 65. In fact, as discussed later, this exclusion does not change conclusions regarding minimum wage effects on employment. The population variable is constructed similarly, including all persons aged between 16 and 65.

Other important variables are as follows. *Education* is defined as education levels according to the relevant question in the survey. In total there are seven levels valued from one to seven: illiterate and semi-illiterate, primary school, junior high school, vocational high school, senior high school, college, university and postgraduate. These categories are consistent with those in the *China Labour Statistic Yearbook*.

College *enrolment* is defined as the ratio of college students to the trimmed sample in each municipality per year. That is, the number of college, university and postgraduate students is divided by the number of individuals in the trimmed sample per municipality per year. Since this variable only has much influence in the employment ratio, rather than individual wage levels, it will be used in Chapter 5 alone.

Experience is calculated as the difference between an individual's age and the year when they first began work. This procedure seems crude for women workers since it omits intermittent participation due to childbirth, but is standard in the literature. However, in China, women workers' parents usually help them to take care of children after their maternity leave ends. Thus, basically this definition of experience will not much bias results.

Industry is grouped into ten categories excluding the farming industry: (i) mining, manufacturing, and power production and supply; (ii) construction; (iii) transportation, postal service and information technology; (iv) wholesale, retail sales, hotels and restaurants; (v) finance and real estate; (vi) scientific research, and technical services; (vii) commercial and personal services; (viii) education, health care, social security and welfare, culture, sport and entertainment; (ix) government and social organisations; and (x) other industries.

Occupation is defined as six groups, excluding farming: professionals and technicians, officials and managers, clerical staff, commercial and service staff, manual workers and operators, and soldiers and others. The UHS adjusts its categories of occupation constantly. But the above six broad categories can be reasonably defined.

Ownership is grouped into six categories: (i) state-owned; (ii) collective-owned; (iii) mixed ownership including stock company, foreign enterprises and enterprises owned by residents living in Hong Kong, Macau and Taiwan; (iv) private-owner; (v) employees in private enterprises; and (vi) others including retired people returning to work. Notice that there is no relevant data offered before 1992.

Unemployment rate is calculated from my whole UHS sample, instead of trimmed sample, according to the standard definition. That is, the ratio of unemployed people to the sum of employed plus unemployed people. Specifically, there is a relevant question in the survey which can be used to distinguish the working status. Note that in China welfare is very low, so people without regular jobs have to find informal employment (e.g. selling lottery tickets), so we should rather speak of underemployment.

Table 3.2 shows the means of these covariates by province from the annual dataset. As shown in the last row, taking the 1988-2007 period as a whole, there are 180 municipalities in all and 161,271 observations (individuals). Among them, around 45% are women; the average education level is high school or vocational high school; the average college enrolment is 20%; the average experience is 20 years; around 38% work in the manufacturing sector, and the remainder in the service sector; around 57% work in SOEs; and the average unemployment rate is 5.28%. Those average numbers seem plausible. Moreover, the variables exhibit good variation across provinces. In particular, average real wages are highest for the eastern provinces, and lowest for western, indicating the different levels of prosperity.

3.5. Conclusion

This chapter describes the data used in this study and gives general statistical information. The UHS dataset is our main source, and is reliable since it is conducted by the national statistics authority. It contains accurate information for households and individuals, particularly on employment and income. Although one problem is underrepresentation of rural migrants, overall the UHS data maintains a high quality. The data cover only some of the provinces in China; however, most of them are significant economic zones. Before 2004, there are annual data for six provinces; after 2004, there are monthly data for eleven provinces. Thus, different combinations of year and provinces can be used in this study, which gives diversified robustness checks for the main results.

The other advantage of the data is that the minimum wage data was collected by the researcher from reliable sources, i.e. government files, relevant news and business databases. Each

minimum wage in the data relates to official files or local news, not an individual value. Moreover, the dataset is based at the municipal level, giving good variation for regression estimation.

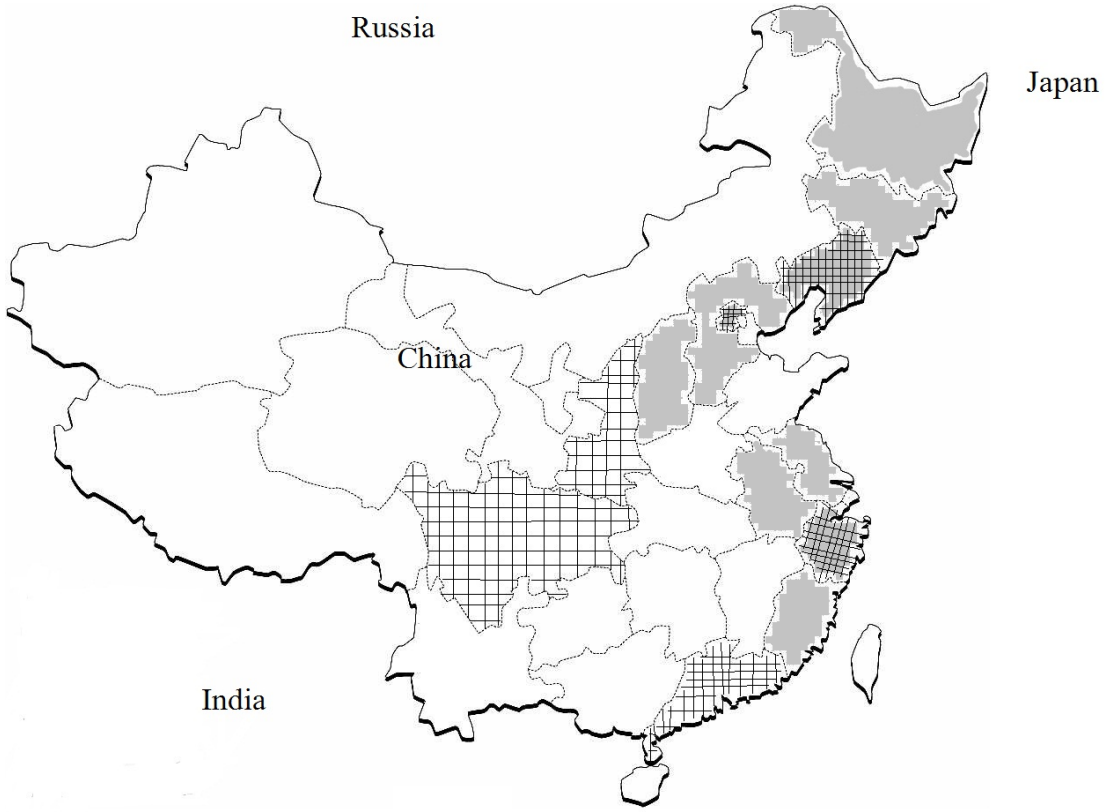


Figure 3.1: UHS panel data in China

Notes: Six provinces (Liaoning, Zhejiang, Guangdong, Shaanxi, Sichuan, and Beijing) during 1988-2003 are indicated by grids; eleven provinces (Hebei, Shanxi, Liaoning, Jilin, Heilongjiang, Jiangsu, Zhejiang, Anhui, Fujian, Beijing, and Shanghai) during 2004-2007 are indicated by light shadow. Therefore the Beijing, Liaoning, and Zhejiang areas are covered for the whole period 1988-2007.

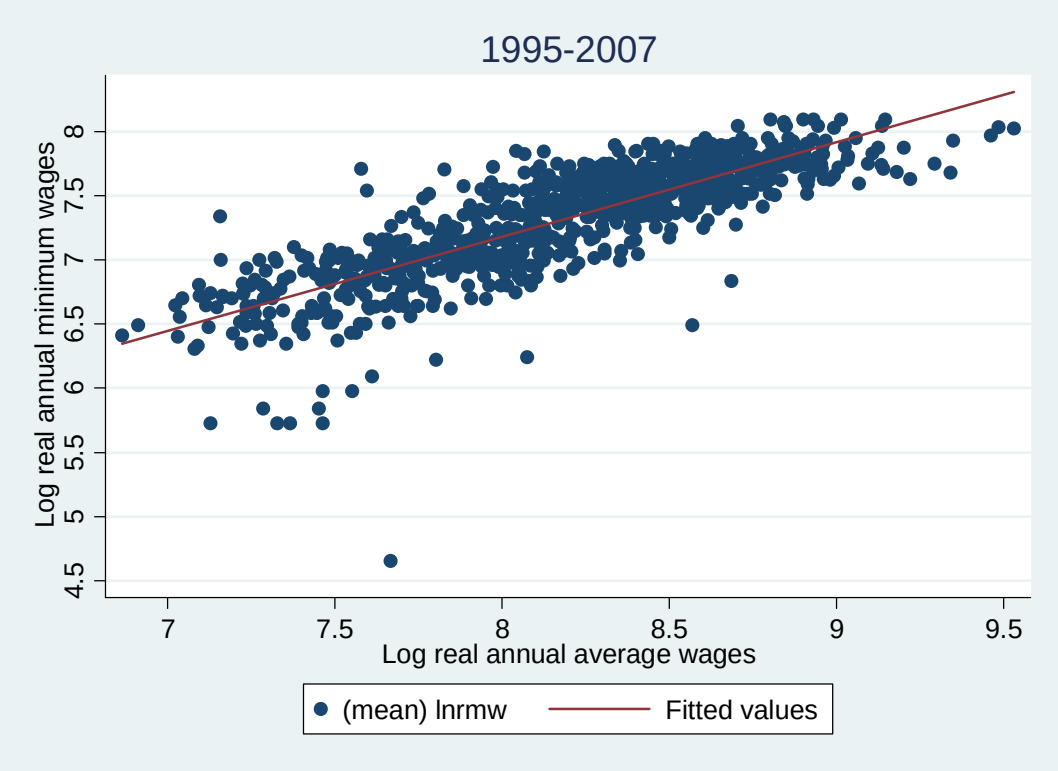


Figure 3.2: Scatter graph for real annual average wages and log real annual minimum wages at the municipal level. Each black point represents one municipality. The solid line represents fitted values.

Table 3.1a: Ratio of Nominal Annual Minimum Wages to Nominal Annual Average Wages, Six Provinces, 1995-2003

Province	Year	Minimum wage		Ratio to average*
East		monthly	annual**	
Beijing	1995	240	2700	38.09%
	1996	270	3060	36.88%
	1997	290	3380	34.70%
	1998	310	3600	35.80%
	1999	360	4120	35.99%
	2000	412	4872	38.40%
	2001	435	5082	35.98%
	2002	465	5400	35.10%
	2003	465	5580	30.64%
Liaoning	1995	180	2160	41.91%
	1996	210	2220	42.56%
	1997	210	2520	40.41%
	1998	210	2520	38.08%
	1999	280	2940	42.90%
	2000	280	3360	41.68%
	2001	280	3360	40.25%
	2002	280	3360	36.95%
	2003	280	3360	34.29%
Zhejiang	1995	230	2490	32.73%
	1996	230	2760	31.45%
	1997	250	3000	29.70%
	1998	250	3000	28.47%
	1999	350	3600	31.65%
	2000	350	4200	32.45%
	2001	410	4740	31.67%
	2002	410	4920	29.20%
	2003	480	5520	28.90%
Guangdong	1995	280	3360	29.04%
	1996	350	3570	26.09%
	1997	350	4200	26.50%
	1998	350	4200	24.35%
	1999	400	4350	25.68%
	2000	400	4800	24.51%
	2001	430	4920	23.40%
	2002	450	5200	28.46%
	2003	450	5400	26.62%
West		monthly	annual	
Sichuan	1995	160	960	19.83%***
	1996	170	1980	37.63%
	1997	190	2160	33.32%
	1998	190	2280	32.00%
	1999	190	2280	28.90%
	2000	240	2580	31.12%
	2001	240	2880	32.21%
	2002	310	3300	32.44%
	2003	310	3720	37.60%
Shaanxi	1995	175	2100	47.66%
	1996	175	2100	42.58%
	1997	195	2220	40.82%
	1998	195	2340	40.59%
	1999	235	2580	41.47%
	2000	235	2820	43.18%
	2001	290	2985	38.11%
	2002	290	3480	37.88%
	2003	290	3480	34.95%

Notes: * Annual average wages are calculted from the UHS sample, excluding farming industry and occupation, and self-employed people.
** Annual minimum wages are monthly-weighted calculated. *** Sichuan's minimum wages begin from 1st July, 1995.

Table 3.1b: Ratio of Nominal Annual Minimum Wages to Nominal Annual Average Wages, Eleven Provinces, 2004-2007

Province	Year	Minimum wage		Ratio to average
East		monthly	annual	
Beijing	2004	520	6240	29.51%
	2005	580	6750	29.35%
	2006	640	7320	29.10%
	2007	730	8220	30.24%
Liaoning	2004	400	3600	28.15%
	2005	400	4800	32.86%
	2006	480	5200	34.16%
	2007	580	5760	33.17%
Zhejiang	2004	560	6000	28.61%
	2005	610	6770	28.88%
	2006	670	7560	29.29%
	2007	750	8360	29.04%
Hebei	2004	470	4620	42.95%
	2005	470	5640	46.31%
	2006	540	5850	44.31%
	2007	540	6480	43.07%
Shanghai	2004	635	7230	25.60%
	2005	690	7950	25.79%
	2006	750	8520	25.25%
	2007	840	9360	26.47%
Jiangsu	2004	500	5700	37.31%
	2005	550	6100	34.52%
	2006	620	6810	34.45%
	2007	700	7680	34.19%
Fujian	2004	430	4200	24.29%
	2005	550	4560	24.06%
	2006	600	5295	25.69%
	2007	700	6445	27.22%
Central		monthly	annual	
Heilongjiang	2004	360	3641	30.91%
	2005	360	3660	26.63%
	2006	590	5020	33.43%
	2007	590	5700	32.31%
Jilin	2004	330	3960	34.90%
	2005	330	3960	32.91%
	2006	460	5000	37.06%
	2007	600	6360	38.33%
Shanxi	2004	400	4680	40.72%
	2005	480	5760	44.96%
	2006	510	5850	39.04%
	2007	570	6300	36.32%
Anhui	2004	390	4320	35.78%
	2005	390	4680	34.09%
	2006	500	5010	32.79%
	2007	540	6120	34.18%

Notes: * Annual average wages are calculted from the CHS sample, excluding farming industry and occupation, and self-employed people.

** Annual minimum wages are monthly-weighted calculated.

Table 3.2: Summary Statistics for Sample, 1988-2007

Region	Province	Period	Municipality no.	Obs.	Prop. of all obs.	Female	Education	Enrolment	Experience	Real wage	Manufacturing sector	SOE#	Unemployment	Migrant##
East	Beijing	1990-2007	1*	18600	11.53%	46.95%	4.2	0.26	21.99	5723.45	29.82%	67.54%	2.79%	33.91%
							(1.020)	(0.081)	(11.687)	(4882.324)	(0.457)	(0.185)	(0.019)	(0.038)
	Liaoning	1990-2007	22	33982	21.07%	45.00%	3.9	0.17	19.97	2879.57	45.84%	57.32%	5.51%	18.03%
							(0.993)	(0.075)	(10.137)	(2144.770)	(0.498)	(0.229)	(0.052)	(0.063)
	Zhejiang	1990-2007	20	22550	13.98%	45.61%	3.9	0.18	19.69	5139.46	37.62%	48.87%	4.28%	43.56%
							(1.046)	(0.067)	(10.575)	(4357.901)	(0.484)	(0.230)	(0.036)	(0.096)
	Guangdong	1990-2007	19	20098	12.46%	47.38%	4.0	0.17	19.62	6214.33	33.12%	53.91%	5.67%	38.45%
							(1.020)	(0.075)	(10.535)	(5154.441)	(0.471)	(0.284)	(0.046)	(0.065)
	Fujian	2004-2007	2	670	0.42%	42.69%	4.2	0.22	19.50	7651.27	20.00%	56.72%	6.41%	62.31%
							(0.998)	(0.052)	(11.377)	(5281.012)	(0.400)	(0.048)	(0.046)	(0.017)
	Hebei	2004-2007	16	3691	2.29%	45.73%	4.3	0.29	19.74	5050.71	24.30%	75.45%	4.17%	35.55%
							(0.910)	(0.093)	(9.617)	(2301.577)	(0.429)	(0.125)	(0.046)	(0.018)
	Jiangsu	2004-2007	26	16217	10.06%	44.88%	4.1	0.21	20.16	6859.26	36.78%	40.51%	8.34%	33.28%
							(1.059)	(0.099)	(10.587)	(5856.630)	(0.482)	(0.127)	(0.035)	(0.067)
	Shanghai	2004-2007	1*	1881	1.17%	42.85%	4.2	0.30	23.08	9653.93	28.71%	57.15%	9.30%	14.06%
							(1.039)	(0.017)	(11.928)	(8752.340)	(0.453)	(0.043)	(0.016)	(0.014)
Central	Anhui	2004-2007	12	3664	2.27%	43.94%	4.3	0.26	21.28	5165.49	36.00%	60.92%	7.63%	22.52%
							(0.990)	(0.076)	(9.347)	(3287.125)	(0.480)	(0.149)	(0.041)	(0.013)
	Heilongjiang	2004-2007	5	846	0.52%	47.28%	4.5	0.31	20.55	5403.37	56.50%	81.91%	7.13%	9.79%
							(0.906)	(0.075)	(7.842)	(2835.118)	(0.496)	(0.087)	(0.037)	(0.008)
	Jilin	2004-2007	7	1231	0.76%	45.25%	4.4	0.33	21.49	5068.81	18.77%	73.68%	5.12%	16.99%
							(0.967)	(0.121)	(10.714)	(2718.940)	(0.391)	(0.092)	(0.031)	(0.014)
	Shanxi	2004-2007	12	1737	1.08%	45.08%	4.4	0.33	18.97	4793.97	30.28%	79.56%	3.66%	21.89%
							(0.926)	(0.184)	(8.855)	(2414.311)	(0.460)	(0.146)	(0.028)	(0.042)
West	Shaanxi	1990-2003	19	15153	9.40%	44.87%	4.0	0.17	19.34	2336.39	39.21%	67.27%	4.70%	15.27%
							(0.975)	(0.075)	(10.616)	(1581.943)	(0.488)	(0.361)	(0.046)	(0.068)
	Sichuan	1990-2003	18	20951	12.99%	46.62%	3.8	0.15	19.63	2499.66	38.76%	61.37%	6.10%	25.21%
							(1.054)	(0.071)	(9.919)	(1735.590)	(0.487)	(0.299)	(0.056)	(0.060)
Total			180	161271	1	45.30%	4.0	0.20	20.11	4489.97	37.60%	57.35%	5.28%	28.79%
							(1.028)	(0.100)	(10.510)	(4274.476)	(0.484)	(0.263)	(0.046)	(0.123)

Notes: Standard errors are in parentheses.

* Municipality ** Education level 4 is senior and vocational high school. # Begin from 1992. ## Begin from 1994

Appendix 3a: Nominal Minimum Wages by Month (in Yuan) Across Six Provinces in China, 1994–2002

Province	Level	1994	1995	1996	1997	1998	1999		2000	2001	2002
East											
Beijing		**1st Dec.**	**1st Jul.**	**1st Jul.**	**1st Jun.**	**1st Jul.**	**1st May**	**1st Sep.**	**1st Jul.**	**1st Jul.**	**1st Jul.**
	1	**210**	**240**	**270**	**290**	**310**	**320**	**400**	**412**	**435**	**465**
Liaoning			**1st Jan.**				**1st Jul.**				
	1		**220***	**240**	**250***	250*	**270***		**310***	310*	**380***
	2		**210**	220*	240	240	**320**		320	320	320
	3		**180**	**210**	210	210	**280**		280	280	280
	4		**150**	**180**	180	180	**240**		240	240	240
Zhejiang		**28th Jul.**	**1st Oct.**		**1st Jan.**		**1st Jul.**			**1st Apr.**	
	1	**210****	**245****	245**	**270**	270	**380**		380	**440**	440
	2	**200**	**230**	230	**250**	250	**350**		350	**410**	410
	3				**230**	230	**320**		320	**380**	380
	4									**340**	340
Guangdong		**1st Sep.**	**1st Jan.**	**1st Oct.**			**1st Oct.**			**1st Sep.**	**1st Nov.**
	1***	**338**	**380**	**398**	**420**	**430**	**547**		547	**574**	**595**
	2	**320**	**320**	**380**	380	380	**450**		450	**480**	**510**
	3	**250**	**280**	**350**	350	350	**400**		400	**430**	**450**
	4		**250**	**320**	320	320	**360**		360	**380**	**400**
	5		**220**	**280**	280	280	**320**		320	**340**	**360**
	6		**190**	**250**	250	250	**290**		290	**310**	**330**
	7			**235**	235	235	**270**		270	**290**	**300**
	8			**220**	220	220	**250**		250	**270**	**280**
West											
Sichuan			**1st Jul.**	**1st Jul.**	**1st Jul.**				**1st Jul.**		**1st Jul.**
	1		**180**	**190**	**210**	210	210		**270**	270	**340**
	2		**160**	**170**	**190**	190	190		**240**	240	**310**
	3		**140**	**150**	**165**	165	165		**215**	215	**270**
	4		**125**	**130**	**145**	145	145		**190**	190	**230**
Shaanxi			**1st Jan.**		**1st Jul.**		**1st Jul.**			**1st Oct.**	
	1		**200**	200	**220**	220	**260**		260	**320**	320
	2		**175**	175	**195**	195	**235**		235	**290**	290
	3		**150**	150	**170**	170	**210**		210	**270**	270
	4		**125**	125	**145**	145	**185**		185	**245**	245

Notes: Each minimum wage fixing is shown in bold.

* Exclusively for Dalian. There are three levels of MWs for Dalian and the middle one for the region where government lies is shown.

** Exclusively for Hangzhou, the capital of Zhejiang.

*** Exclusively for Shenzhen. There are two levels and the higher one for Guannei region where government lies is shown.

Appendix 3b: Nominal Minimum Wages by Month (in Yuan) Across Eastern Eight Provinces in China, 2003–2007

Province	Level	2003	2004		2005	2006	2007
Beijing		*	**1st Jan.**	**1st Jul.**	**1st Jul.**	**1st Jul.**	**1st Jul.**
	1	465	**495**	**545**	**580**	**640**	**730**
Liaoning		*	**9th Nov.**			**1st Aug.**	**20th Dec.**
	1	380**	**450**		450	**600****	**700**
	2	320	**400**		400	**590**	**580**
	3	280	**350**		350	**480**	**500**
	4	240				**420**	
Zhejiang		**1st Sep.**	**1st Oct.**		**1st Dec.**	**1st Sep.**	**1st Sep.**
	1	**520**	**620**		**670**	**750**	**850**
	2	**480**	**560**		**610**	**670**	**750**
	3	**430**	**510**		**560**	**620**	**700**
	4	**390**	**440**		**490**	**520**	**620**
Guangdong		*	**1st Dec.**		**1st Oct.**	**1st Sep.**	
	1***	**600**	**610**		**690**	**810**	**850**
	2	510	**684**		684	**780**	780
	3	450	**574**		574	**690**	690
	4	400	**494**		494	**600**	600
	5	360	**446**		446	**500**	500
	6	330	**410**		410	**450**	450
	7	300	**377**		377		
	8	280	**352**		352		

Notes: Each minimum wage fixing is shown in bold.

* Please refer to Appendix 3a for the adjustment dates.

** Exclusively for Dalian. There are three levels of MWs for Dalian and the middle one for the region where the government lies is shown.

*** Exclusively for Shenzhen. There are two levels and the higher one for Guannei region where the government lies is shown.

Appendix 3b: Nominal Minimum Wages by Month (in Yuan) Across Eastern Eight Provinces in China, 2003–2007 (cont.)

Province	Level	2003	2004	2005	2006	2007
Hebei		*	**1st Jul.**		**1st Oct.**	
	1	350	**520**	520	**580**	580
	2	300	**470**	470	**540**	540
	3	250	**420**	420	**480**	480
	4				**440**	440
Shanghai		**1st Jul.**	**1st Jul.**	**1st Jul.**	**1st Sep.**	**1st Sep.**
	1	**570**	**635**	**690**	**750**	**840**
Jiangsu		**1st Jul.**	**1st Jul.**	**1st Nov.**	**1st Oct.**	**1st Oct.**
	1	**540**	**620**	**690**	**750**	**850**
	2	**450**	**500**	**550**	**620**	**700**
	3	**390**	**440**	**480**	**520**	**590**
	4	**320**	**360**	**400**		
Fujian		**1st Nov.**		**1st Jul.**	**1st Aug.**	**1st Aug.**
	1	**480****	480**	**600****	**650****	**750****
	2	**430****	430**	**550****	**600**	**700**
	3	**400****	400**	**480****	**570**	**650**
	4	**360****	360**	**470**	**550**	**570**
	5	**350**	350	**430**	**480**	**480**
	6	**300**	300	**400**	**400**	
	7	**280**	280	**350**		
	8			**320**		

Notes: Each minimum wage fixing is shown in bold.

* This adjustment date is 1st March, 2002.

** Exclusively for the regions of Fuzhou or Xiamen.

Appendix 3c: Nominal Minimum Wages by Month (in Yuan) Across Central Four and Western Two Provinces, 2003–2007

Province	**Level**	**2003**	**2004**	**2005**	**2006**	**2007**
Central						
Heilongjiang		*	**3rd Feb.**		**1st May**	
	1	325	**390**	390	**620**	620
	2	299	**360**	360	**590**	590
	3	286	**325**	325	**475**	475
	4	260	**305**	305	**450**	450
	5	234	**280**	280	**420**	420
	6	221	**250**	250	**400**	400
	7		**235**	235	**380**	380
Jilin		**1st Sep.**			**1st May**	**1st Jul.**
	1	**360**	360	360	**510**	**650**
	2	**330**	330	330	**460**	**600**
	3	**300**	300	300	**410**	**550**
Shanxi		**	**1st Jul.**	**1st Jul.**	**1st Oct.**	**1st Oct.**
	1	340	**520**	**1200*****	1200***	1200***
	2	300	**480**	**1000*****	1000***	1000***
	3	260	**440**	520	**550**	**610**
	4	220	**400**	480	**510**	**570**
				440	**470**	**530**
				400	**430**	**490**

Notes: Each minimum wage fixing is shown in bold.

* The adjustment date for Heilongjiang province is 25th Dec., 1999.

** The adjustment date for Shanxi province is 1st Jan., 2002

*** This is the special minimum wage rate for workers of mining industry.

Appendix 3c: Nominal Minimum Wages by Month (in Yuan) Across Central Four and Western Two Provinces, 2003–2007 (cont.)

Province	Level	2003	2004	2005	2006	2007
Central						
Anhui		*	**1st Oct.**		**1st Oct.**	**1st Oct.**
	1	370	**410**	410	**520**	**560**
	2	350	**390**	390	**500**	**540**
	3	340	**370**	370	**460**	**500**
	4	320	**360**	360	**430**	**460**
	5	290	**350**	350	**390**	**420**
	6	270	**340**	340	**360**	**390**
	7		**330**	330		
	8		**320**	320		
	9		**310**	310		
	10		**290**	290		
West						
Sichuan			**23rd Aug.**		**11th Sep.**	**26 Dec.**
	1	340	**450**	450	**580**	**650**
	2	310	**400**	400	**510**	**550**
	3	270	**340**	340	**450**	**450**
	4	230	**280**	280	**400**	
Shaanxi				**1st Jul.**	**1st Oct.**	
	1	320	320	**490**	**540**	540
	2	290	290	**460**	**500**	500
	3	270	270	**430**	**460**	460
	4	245	245	**400**	**420**	420

Notes: Each minimum wage fixing is shown in bold.

* The adjustment date for Anhui province is 1st Jul., 2002.

Appendix 3d: Nominal Minimum Wages by Month (in Yuan) in Zhejiang province, 1994–2007

Zhejiang	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Anji	**200**	**230**	230	**250**	250	**350**	350	**380**	380	**430**	**510**	**560**	**620**	**700**
Hangzhou	**210**	**245**	245	**270**	270	**380**	380	**440**	440	**520**	—	—	—	—
Huzhou	—	—	—	—	—	—	—	—	410	**480**	**560**	**610**	**670**	**750**
Jiande	—	—	—	—	—	—	—	—	410	**480**	**560**	**610**	**670**	**750**
Jiaxing	—	—	—	—	—	—	—	—	410	**480**	**510**	**560**	**620**	**700**
Jiangshan	—	—	—	—	—	—	—	—	380	**430**	**510**	**560**	**620**	**700**
Jinhua	**200**	**230**	230	**270**	270	**380**	380	**410**	410	**480**	**560**	**610**	**670**	**750**
Lanxi	—	—	—	—	—	—	—	—	410	**480**	—	—	—	—
Linhai	—	—	—	—	—	—	—	—	440	**480**	**560**	**610**	**670**	**750**
Lishui	—	—	—	—	—	—	—	—	380	**430**	**510**	**560**	**620**	**700**
Longquan	—	—	—	—	—	—	—	—	340	**430**	**440**	**490**	**540**	**620**
Ningbo	**200**	**230**	245	**270**	270	**380**	380	**440**	440	**520**	—	—	—	—
Pujiang	—	—	—	—	—	—	—	—	410	**480**	**510**	**560**	**620**	**700**
Quzhou	—	—	—	—	—	—	—	—	380	**430**	**510**	**560**	**620**	**700**
Shaoxing	—	—	—	—	—	—	—	—	440	**480**	—	—	—	—
Taizhou	—	—	—	—	—	—	—	—	440	**480**	**560**	**610**	**670**	**750**
Wenzhou	**200**	**230**	230	**270**	270	**380**	380	**440**	440	**520**	—	—	—	—
Xinchang	**200**	**230**	230	**250**	250	**380**	380	**410**	410	**480**	**560**	**610**	**670**	**750**
Zhoushan	**200**	**230**	230	**250**	250	**350**	350	**410**	410	**430**	**510**	**560**	**620**	**700**

Notes: Each minimum wage fixing is shown in bold. — indicates no minimum wage was collected since there is no relevant observation during this period in my UHS sub-sample. All the other municipal minimum wages were collected as this.

4. THE MINIMUM WAGE AND WAGE INEQUALITY

4.1. Introduction

Minimum wages are often defended as a means of redistributing earnings and so helping the poor. This chapter looks at such redistribution effects at the municipal level since the "bite" of minimum wages is at this level. Without wage effects, minimum wage policy would have no employment effects. Thus, wage effects of minimum wages are investigated in this chapter, before examining employment effects of minimum wages in Chapter 5.

This study contributes to the literature on minimum wages within LDCs in several ways. First, this is the first study to look within China at the direct relationship between urban wage inequality and the minimum wage. China's experience is valuable for this field given its low social security "floor", which makes it relatively easy to assess the effects of the minimum wage because there are no extra wage floors to worry about (e.g. as in France). Second, China is the largest LDC in the world, with all the important characteristics of labour markets in LDCs – as depicted in the introductory chapter - namely, multiple minimum wage levels, non-compliance, a dual-economy, and both formal and informal sectors in urban areas. Minimum wage research on this country, therefore, will provide meaningful insights for similar LDC studies. Lastly, China is also a transition economy, with the co-existence of a planned-economy and market economy, and so may provide lessons for transition economies in Eastern Europe.

To briefly preview this chapter's findings, we find that the minimum wage appears to reduce

overall wage inequality at the municipal level. The channel of this equity effect is through raising wages at the lower end of the wage distribution, with the effect continuing up to the 50th percentile, thus compressing the bottom half of the wage distribution. A reasonably high, 7%, non-compliance ratio is also found. Given definite non-compliance, the finding of significant increases in wages above the bottom decile may indicate the existence of a *lighthouse effect*[1] (see the literature review in Boeri *et al*., 2011), i.e. those workers not directly affected bargain for higher wages than they would without the minimum wage. Finally, we find that all the above effects tend to be stronger after 2004, showing the impact of the stronger minimum wage policy enforced by the central government after 2004.

The following sections first discuss the compliance issue, investigating determinants of compliance ratios in Section 4.2. Second, in Section 4.3, overall inequality and the minimum wage is examined. Third, following Lee (1999) and Bosch and Manacorda (2010), re-distributional effects are further investigated by examining wage percentiles in Section 4.4. An endogeneity concern here is that measurement errors (see Lee, 1999) may produce an upward bias on the estimated effects of minimum wages. Thus, an instrumental variable (a Kaitz index from another dataset) approach is used in this section. Furthermore, spillovers of the minimum wage are examined at the end of this section. A conclusion is given in Section 4.5.

4.2. Compliance

As Starr (1981) points out, non-compliance with minimum wage laws is one of the characteristics

[1] Note that in developed countries without non-compliance, effects of minimum wages on the wage distribution well above the minimum wage are often explained in terms of efficiency wages. This argument is advanced for example by Aeberhardt *et al*. (2012), who find that the minimum wage in France has effects up to the 70th decile.

of labour markets in LDCs. In a developing, poor country, non-compliance may be an equilibrium in the sense that market wages are smaller than the minimum wage (Indeed, some non-compliance is found even in developed countries, as noted below.). However, even if non-compliance exists, minimum wages can still have effects by affecting firm behaviour as is shown below.

This section is organised as follows. First an overview of the compliance issue is presented, including theoretical explanation and China's general picture of compliance. Then spikes on wage distributions are shown, which is a direct way to look at compliance. Next the statistical characteristics of workers whose earnings are below (i.e. non-compliance), equal to and above minimum wages are presented. Finally, in order to investigate compliance further, regression estimation results are exhibited.

An overview of compliance

Non-compliance is widespread in developing countries, with Latin America and Africa showing non-compliance rates of around 20-40% (see Saget, 2006, 2008; Basu *et al*., 2010). Indeed, non-compliance appears as one of the most important characteristics of labour markets in developing countries when studying minimum wages (Harrison and Leamer, 1997; Ashenfelter and Smith, 1979). Indeed, Starr (1981, p.148) states in his book: "…those who are most in need of minimum wage protection are precisely the groups of workers for whom enforcement is most difficult."

Economic models can explain the rationality of non-compliance. The pioneering work is

provided by Ashenfelter and Smith (1979) and Grenier (1982), with different assumptions about penalties for non-compliance. Chang and Ehrlich (1985) reconcile the conflicting reasoning from the above two perspectives and conclude that non-compliance will raise the marginal cost of labour above the free competitive market level, thus the non-complying employer will hire employees between the competitive market level and the minimum wage. Yaniv (2001) extends their theory and makes compliance endogenously decided by the profit-maximising behaviour of firms. Basu *et al*. (2010) then consider subminimum wage dispersion and construct a model of minimum wage policy with imperfect competition, imperfect enforcement and imperfect commitment. They also suggest that "turning a blind eye to legislation" may in fact be an equilibrium result for government (for example where enforcement is costly).

Starr's work (1981) is illuminating. He argues that non-compliance in developing countries can be understood in three ways (Starr, 1981, pp.148-149). First, some labour laws and regulations are only partly enforced. Therefore, minimum wages are, in effect, more likely to be a gradual aim in economics and politics rather than a legal wage floor (see also Gindling and Terrell, 2009). Second, workers with extremely low wages are always a component of labour markets considering the dual-economy with informal, unregistered work in developing countries. Finally, low compliance does not mean that minimum wages are invalid in informal sectors, as is shown with the famous *lighthouse effect*. Here, informal wages - which are not subject to the minimum wage -still develop a spike at the minimum wage (see literature review in Boeri *et al*., 2011). Consequently, a higher minimum wage may push workers from the formal to informal sectors, or attract lower skilled workers from the informal to formal sectors (Boeri *et al*., 2011).

Of course, the above conclusions are applicable to China as well. First, workers with low wages are common considering the almost unlimited labour supply from rural areas to municipalities. Furthermore, rural incomes are low compared with earnings in urban areas. Thus, even subminimum municipal wages are higher than rural incomes, and workers prefer to accept such illegal jobs. Finally, a type of lighthouse effect, with wages in the non-compliant sectors increasing with the minimum wage, is also observed in this thesis. In sum, minimum wages in China still have impacts on wages (and employment), even though non-compliance exists.

Minimum wage spikes on the wage distribution

A straightforward way to investigate the impact of minimum wages is to observe spikes (or "bumps") around the minimum wage in the wage distribution. Figure 4.1 presents kernel density wage distributions and minimum wages by years for the three provinces of Beijing, Liaoning and Zhejiang over the period 1990-2007, as well as for the three provinces of Hebei, Shanxi and Fujian for 2004-2007. The reason for choosing Beijing, Liaoning and Zhejiang is that they are the three provinces with a long run of data. On the other hand, Hebei has the highest minimum to average wage ratio among all sample provinces; Fujian is representative of a middle income coastal province; and Shanxi has the highest minimum to average wage ratio among the sample central region provinces.

In Figure 4.1, all wages and minimum wages are nominal, and provincial minimum wages are obtained from a weighted average of municipal minimum wages. The horizontal axis gives wages in log form, ranged uniformly between 3.5 and 11, and the vertical axis is density, ranged uniformly between 0 and 0.8, so that all scales are comparable.

In Figure 4.1, a mixed picture of spikes/bumps shows. Although minimum wages began in Beijing in December, 1994, bumps only begin to show from 2001. For Liaoning, bumps also appear after 1999, though less obvious than those for Beijing. Zhejiang's bumps are even smaller. However, for the other provinces observed over 2004-2007, bumps are generally found in most years. This mixed result of spikes/bumps is similar to the evidence for other developing countries (Gindling and Terrell, 2007, p.497).

Why is there no apparent spike or bump, for some provinces or in some years? One reason is that minimum wages are too low to generate a spike, as happened in the US in the 1980s (Lee, 1999, p.983). However, Table 3.1 shows that ratios of minimum wages with respect to average wages are quite high – around 30%, and only a few percentage points lower than ratios for the UK and US (Low Pay Commission Report 2013, pp.28-29; Cooper, 2013, p.5). The reason may be that non-compliance in China is widespread as we discuss below.

Characteristics of workers earning minimum wages

Characteristics of workers grouped by wages relative to minimum wages are summarised in Table 4.1. In the entire sample over thirteen years, 7.24% earn less than minimum wages, that is, are non-compliant. We see that 10% of females are non-compliant, compared to only 4.9% of males, showing the lower pay of female workers. As regards region, since only eastern areas have full 1995-2007 data, only this region is shown, and we see it is close to the total (as also found in Fang and Lin, 2013). As regards age, we see that young and old workers (particularly aged over 65) are more likely to be non-compliant, which is reasonable given that these groups contain the lowest earners. As regards the education cohorts, the higher the education level, the less people

earn below minimum wages, again as is reasonable. Industry patterns and occupation patterns are consistent considering that workers in restaurants, hotels and personal services are generally low skilled, so more than 10% earn less than minimum wages. Finally, as expected, state-owned enterprises have the fewest workers earning less than minimum wage (though still not zero) while private companies have the most.

Statistics in Table 4.1 are consistent with Fang and Lin (2013) and Ma *et al*. (2012). Fang and Lin (2013) show a non-compliance ratio of 5.62% during 2004-2009, and Ma *et al*. (2012) find falling non-compliance ratios from 18% in 1998 to 6% in 2007. Ma *et al*.'s evidence (2012) supports the evidence in Table 4.1even more than Fang and Lin's (2013) in that their data are drawn from a different source[2]; while Fang and Lin (2013) also use the UHS, though over a shorter period compared with our UHS sample. Though some non-compliance ratios in Table 4.1 might seem high (e.g.47.96% for workers over 65), they are comparable to ratios for uncovered sectors of developing countries in the recent literature (Gindling and Terrell, 2009; Alaniz *et al*., 2011).

In conclusion, some non-compliance is always apparent in our data even for people with a college education or above, or working as professionals or officials[3], as well as in state-owned enterprises. On average, if people whose earnings are less than or equal to minimum wages are added together, then about 7% of the workforce (7.24% non-compliance plus 0.05% exactly on the minimum wage) are potentially covered by minimum wages, which is quite similar to the

[2] Ma *et al.* (2012) use firm data and construct the average wage per firm by the overall firm wage divided by employed workers.

[3] It is strange that the non-compliant group includes professionals, technicians, and officials. It may be caused by reporting occupations or wages wrongly. However, this group is only 0.25% of the sample, and the results are unaffected by their inclusion. .

coverage in the UK and US, as well as the covered sectors in developing countries. Especially high non-compliance ratios exist only in a few groups, comparable to uncovered sectors in developing countries. Thus, a picture comparable to that literature is to be expected in later sections and chapters.

What determines the compliance ratio?

In order to investigate compliance ratios further, a set of simple regressions on compliance ratios are now presented, with conventional labour market covariates on the right-hand side. ln*mw* is the municipal nominal minimum wages in log form. ln*wage* is the average nominal wage for each municipality in log form. Year fixed effects are used to control period variation, including price levels, thus it is not necessary to use variables in real terms. *manufacture* and *construction* are average proportions of labourers in the manufacturing and construction industry per municipality, respectively. *service* is labourers in either the sales, hotel and restaurant industry, or commercial and personal service industry. *female*, *SOE*, *unemployment* and *migrant* are average proportions of female workers, workers in state-owned enterprises, unemployed and migrant workers per municipality respectively. All covariates are calculated year by year as described in Chapter 3.

The results are shown in Table 4.2. The sample period is 1995 to 2007, when minimum wages extended over the whole country. All sample provinces are included. All variances are robust. The first column is a pooled OLS regression without municipal dummies, and the remainders are municipal panel data regressions. However, the last two columns adopt different sample periods, i.e. 1995-2003 and 2004-2007. Most coefficients appear reasonable: minimum wages are negatively related to compliance ratios with strong effects, suggesting that high minimum wages

raise compliance difficulties. High municipal average wages strongly increase compliance (and municipal unemployment rates have the opposite effect), suggesting that high wage businesses (in richer cities) can more easily comply. The percent female and percent migrant variables usually negatively affect compliance, as would be expected for disadvantaged groups. Finally, compliance in cities with more people in SOEs is significantly higher, again as would be expected.

Three points deserve further consideration. First, municipal average wages explain a large part of compliance ratios in that R-squared rises considerably once average wages are included. However, this variable captures effects of other covariates, since once it is included all the other variables become insignificant except minimum wages. Two specifications with and without average wages are, therefore, presented for some regressions. Second, coefficients for female workers appear to be slightly negative with average wages included, but significantly and strongly negative (-0.11) without. This result suggests that low compliance for women is mainly because they are employed in low paying firms, rather than because they are women as such. Finally, columns (8) and (9) have the same specifications but different sample periods. After 2004, it can be seen that minimum wages have stronger (negative) effects on compliance. Also, both the negative effects of female proportions and positive effects of SOE workers become significant. These facts together may indicate a stronger effect of the minimum wage after 2004, which is reasonable given the strengthening of minimum wages then, and is investigated further in later sections.

In sum, like many other developing countries, there is definite evidence of non-compliance

in China, with a non-compliance ratio of 7.24% on average. Of course, non-compliance ratios are particularly high for workers in fringe categories, such as *other occupations* and *other industries*. These categories may be seen as part of the informal sector characteristic of a developing country. That is why spikes/bumps do not show in every wage distribution in Figure 4.1. Nevertheless, even with non-compliance, minimum wages can still have real effects. That is why there is evidence of spikes/bumps in some of the wage distributions. In later sections, further evidence of these effects is tested for.

4.3. The minimum wage and overall wage inequality

This section gives an overview of rising minimum wages and falling inequality. From descriptive evidence of the whole pooled sample, it is observed that there is an obvious decrease in inequality accompanied by a sudden increase of the minimum wage from 2003 to 2004, when minimum wages were strengthened. In the regression section, a basic model is adopted to look at the effect of minimum wages on inequality at a municipal level. Empirical results here suggest that rising minimum wages reduce inequality significantly.

Descriptive evidence

The next part shows descriptive links between increasing minimum wages and decreasing inequality. First, inequality needs to be measured, whether via Gini coefficients, wage variance, or log wage gaps. Simple regressions exploring minimum wage determinants are then presented. Of course, this picture alone cannot establish any causality relationship between inequality and minimum wages. Further work using panel methods is performed in later parts.

In this study, standard calculations of inequality based on municipalities are used. The Gini index, wage variance, and the 50-10 gap and 90-10 gap (estimated as the difference between log wages at the 90/50 percentile and log wages at the 10 percentile) are investigated. The Gini index follows the formula below:

$$G = \frac{1}{2n^2 u} \sum_i \sum_j \left| y_i - y_j \right|,$$

where y_i and y_j stand for the wage of individual i and j, respectively; n stands for the population; u is the average wage. Gini indices for each municipality can be easily obtained by downloading STATA commands. Moreover, the Gini indices in this study are directly calculated from the original individual household survey data used for the regressions here, so they contain richer information than general Gini indices downloaded from databases.

Figure 4.2 shows trends of the above four inequality indices, as well as real annual minimum wages over years. The horizontal axis is the year, from 1988 to 2007; the left vertical axis is inequality and the right is minimum wages in log form. Different symbols of scatters indicate trends of inequality indices and minimum wages. Figure 4.2a is for all eleven sample provinces. Its inequality indices are calculated by pooling individual real wage data over the sample provinces between 1988 and 2007, while minimum wages of the sample provinces are obtained through weighted municipal levels from 1995, when all provinces began minimum wages. We can observe that while the Gini index gives a small, steady increase over 20 years; both the 50-10 and 90-10 gap first rise then fall from 2002. Since the 50-10 gap is flatter than the 90-10 gap, their difference widens with time. However, the situation for wage variance is a little strange, with a sudden drop in 2002. This may be related to the new stratification areas of the UHS

beginning from 2002, as indicated in Chapter 3. In the UHS sample in this study, the number of municipalities increases from around 35 before 2002 to around 96 for the same six provinces. At the same time, real minimum wages keep rising through the years.

Figures 4.2b, 4.2c and 4.2d exhibit inequality indices and minimum wages for Beijing, Liaoning, and Zhejiang provinces, respectively, as they are the only three sample provinces that have data for the whole period of 1988-2007. Liaoning and Zhejiang's minimum wages are weighted means from municipal levels. Trends for the three provinces are similar to those for the total sample.

Figure 4.3 further gives scatter graphs between inequality and minimum wages at a municipal level. The vertical axes are inequality indices and the horizontal axes are minimum wages in each municipality. Both wages and the minimum wage are in real terms based on 1988 price levels. The red lines are fitted values obtained from regressing minimum wages on inequality. These scatters allow exploration of the link between minimum wages and inequality. Generally speaking, there appears to be no clear association between inequality indices and minimum wages, except for the wage variance. The wage variance at least shows a negative link between minimum wages and inequality, which is in the direction expected.

Before taking up the regression link between minimum wages and inequality, it is interesting to investigate the determinants of the minimum wage itself. Accordingly, Table 4.3 presents a set of simple regressions on minimum wages. The same labour market covariates as in the compliance regressions in section 4.2 are included on the right-hand side, including ln*wage*, *manufacture*,

construction, *service*, *female*, *SOE*, *unemployment* and *migrant*[4]. An extra variable *compliance ratio* is involved in two out of four regressions considering compliance is closely related to minimum wages and may capture information from other covariates. Columns (1) and (2) are pooled OLS regressions without municipal dummies, and the remaining columns (3) and (4) are municipal panel data regressions. In Table 4.3, it can be seen that the higher municipal average wages are, the higher minimum wages are, and migrant proportions are positively related to the minimum wage, while female proportions have a negative relationship, which suggests that the minimum wage determination may consider female residents, but not migrants. Compliance is negatively related to the minimum wage, as we have already found. Furthermore, once municipal fixed effects are controlled, significant effects from the manufacture and service industry, SOEs and unemployment disappear, but the municipal average wage becomes stronger. This indicates that the minimum wage depends strongly on municipal prosperity which of course relates closely to municipal average wages (see also Xing and Xu, 2015). Overall, in this part, Figures 4.2 and 4.3 give a basic idea on falling inequality after the early 2000s, and rising minimum wages. For Figure 4.2a, a jump from 2003 to 2004 happens in minimum wages, consistent with strengthening of the system described in Chapter 1. Correspondingly, the 50-10 gap, 90-10 gap and wage variance fall at the same time. After 2004, inequality keeps falling as minimum wages keep rising. The same happens in Beijing, Liaoning and Zhejiang province.

Estimation results

In this section, a basic model is adopted to look at the effect of minimum wages on inequality at a

[4] Specific information on these covariates can be found in section 4.2.

municipal level. First, the municipal level data is investigated, including three sets of results: the whole period beginning from the year when minimum wages covered the whole country, i.e. 1995; then the period before minimum wages were reinforced, i.e. 1995-2003; and the period after that, i.e. 2004-2007. Provincial level data are then further checked to compare with the literature. Finally, endogeneity concerns about minimum wages and inequality are discussed and a summary is given.

The effects of minimum wages on inequality are investigated by a panel data model as below:

$$Inequality_{mt} = \alpha + \beta_1 \cdot MW_{mt} + \beta_2 \cdot MW_{mt-1} + \lambda \cdot X'_{mt} + \gamma_1 \cdot D_t + \gamma_2 \cdot D_m + \varepsilon_{mt},$$

where dependent variables are inequality indices for the region m in year t. Among independent variables MW_{mt} and MW_{mt-1} is the corresponding minimum wage rate and its one-year lag in log forms, and X'_{mt} represents a set of control variables to describe local labour markets. D_t and D_m are vectors of fixed effects for years and regions respectively, capturing unobserved time and regional characteristics, like business cycles, price level and local culture. ε_{mt} is the error term. Thus, coefficients β_1 and β_2 are of interest, and are expected to be negative (at least the sum of β_1 and β_2 should be negative), showing minimum wages decrease inequality.

Full results on the impact of minimum wages on inequality are presented in Tables 4.4a, 4.4b and 4.4c; and summarised in Table 4.4 on which we will concentrate. The deterministic variables, in addition to the minimum wage, involve the compliance ratio; average wages in log form; average education level; proportion of female workers, as well as manufacturing, construction, service, SOE and migrant workers; and lastly the unemployment rate. In each regression, both

municipal and year effects are included. Furthermore, another specification with extra region-specific time effects following the literature (Neumark *et al*., 2013) is shown as well. Finally, some municipalities appear only before 1995 and hence are dropped. Thus, there are in total 170 municipalities in regressions over the whole period, instead of 180 as given in the sample statistics.

Table 4.4 gives us clear evidence of minimum wage effects on inequality. As we can see, almost all coefficients of the current minimum wage are highly significant with negative signs. A few of the positive effects (generally from the lagged minimum wage) are insignificant with small magnitudes, and all summed impacts are negative. Interestingly, for the wage variance and the 50-10 wage gap, effects after 2004 are apparently stronger than those for the sample before 2004. In particular, when current minimum wages rise by 10%, wage variance falls by more than 0.04[5] (-0.401 and -0.482 in Table 4.4, also see column (3) and (4), Table 4.4c) during 2004-2007. Similarly, the current effect on the 50-10 wage gap for the 2004-2007 period is nearly double (-0.859 and -0.893 in Table 4.4, also see column (5) and (6), Table 4.4c) that for the 1995-2003 period (-0.454 and -0.329 in column (5) and (6), Table 4.4b). Admittedly, effects on the Gini index and 90-10 wage gap appear no stronger in the 2004-2007 period than before. However, that there are stronger effects after 2004 for some inequality measures is in line with stricter implementation of minimum wages which is reasonable. Overall, empirical results give supporting evidence on minimum wage effects reducing inequality.

Full regressions are exhibited in Tables 4.4a, 4.4b and 4.4c. As for the results of the whole

[5] 0.04 is obtained from -0.401×0.1 and -0.482×0.1 since the independent variable of interest is log minimum wages.

sample period in Table 4.4a, compliance ratios have strongly negative effects on inequality, and unemployment rates have significantly positive effects. At the same time, high average education levels raise wage variance and the 50-10 gap of a municipality. This is understandable since highly educated workers will obviously have higher wages - and in addition, returns to education in China have been increasing (see Ren and Miller, 2012).

Furthermore, results before and after 2004 (Tables 4.4b and c) exhibit interestingly different patterns. In the sample before 2004, control variables show strong effects, while in the sample after 2004 the effects of minimum wages become stronger and those of control variables are weaker. It seems that minimum wages after 2004 capture most effects of other control variables on inequality. Supporting evidence is given by the coefficients of compliance ratios, which are closely related to minimum wages as already seen. In fact, significant negative impacts of the compliance ratio on inequality before 2004 drop by around half after 2004, while the negative impact of the minimum wage becomes stronger – perhaps indicating stricter implementation of minimum wages. Thus full regressions in the set of Tables 4.4a-c support the conclusion that minimum wage effects reduce inequality.

Robustness tests using provincial data with the same specifications are summarised in Table 4.5. All variables re-calculated from the pooled municipal data of each province. Minimum wage rates in each province are measured at the second highest levels[6], which are consistent with the statistics in Table 3.1. As can be seen, while the results show that minimum wages effects measured at the provincial level are not as significant as those at the municipal level, the trend is

[6] Remember, there are several levels of minimum wages in each province according to the appendix of Chapter 3. Here the second highest level of the minimum wage, instead of the highest, is adopted.

the same, in that minimum wages after 2004 have significantly negative effects on inequality. Effects are particularly large for the 50-10 wage gap after 2004.

The last panel of Table 4.5 then presents results at the provincial level using data for the whole country taken from the *China Labour Statistic Yearbook* (2004-2007). This dataset is more representative. Apart from inequality indices and compliance ratios, all other variables are re-calculated based on statistics yearbooks (details are recorded above in Chapter 3). Results support previous outcomes and exhibit negative effects of minimum wages, with three out of four (for lagged minimum wages) being significant. In summary, provincial data results in Table 4.5 reinforce the conclusion drawn from Table 4.4.

In sum, our results suggest that municipal minimum wages reduce inequality significantly. Effects after 2004, when the minimum wage system was reinforced, tend to be stronger, as expected. Effects on the 50-10 wage gap are larger than those on other inequality indices, like the 90-10 wage gap, which is reasonable since the minimum wage should affect the lower tail of the distribution. Most coefficients of other control variables are also consistent with expectation. Also, the robustness checks conducted using provincial level data, which follow previous literature, are generally supportive. Therefore, it can be said that so far the results show that minimum wages reduce (urban) inequality; this association is now explored further.

4.4. The minimum wage and the wage distribution

This section investigates the effect of minimum wages on wage distribution compression, giving more details on the inequality reduction effects discussed in the last section. There are four parts

in this section. The first discusses theory and methodology. The difficulty in identifying minimum wage effects lies in establishing a counterfactual distribution, i.e. the inequality trend absent the minimum wage. One method from Lee (1999) establishes a theoretical relation between the latent wage gap and minimum wages, to identify the effect through observed wage gaps. More importantly, after parameterisation of Lee's model (1999), effects of minimum wages can be obtained directly by regressions of actual wage differentials on the effective minimum wage and its square. Furthermore, Bosch and Manacorda (2010) expand this model and permit specific latent inequality trends for each municipality. The empirical results in this section are based on this expanded model and further reveal the effects of minimum wages on inequality.

The second part shows the empirical results using fixed effect models. The sample data involve 14 provinces during 1995-2007. This sample is adopted in the remaining two empirical parts. Four specifications are tried. Apart from those based on Lee (1999) and Bosch and Manacorda (2010), the remaining two specifications introduce extra province-specific trends following Allegretto *et al*. (2011) and Dube *et al*. (2010).

Another problem, measurement error, can produce an upward bias when estimating Lee's model (1999). As Bosch and Manacorda (2010) indicate, instrumental variable methods (IV) can alleviate this problem. Based on IVs in previous literature, effective minimum wages are instrumented using a quasi-Kaitz index calculated from another dataset. It is argued that this IV satisfies the requirements for a valid IV, and thus consistent and unbiased results can be obtained. Furthermore, two robustness checks give extra support to the main conclusion.

Finally, the last section shows minimum wage effects on the wage distribution at an individual

level, so that conclusions at the municipal level can be strengthened. This section presents evidence on spillovers as well. First, annual individual data by percentiles is analysed over different periods. Then monthly panel data regressions at the individual level are analysed. Overall, this section exhibits minimum wage effects on wage distribution compression at both municipal and individual levels, offering strong evidence on the minimum wage and inequality reduction from another angle.

Theory and methodology

This section discusses the theoretical relation between latent wage gaps and effective minimum wages, based on studies from Lee (1999) and Bosch and Manacorda (2010). The latent wage dispersion is defined as the wage inequality that would exist without minimum wages. The key is to distinguish effects of minimum wages from latent inequality trends. The method used by Lee (1999) is to establish a separating-equilibrium model to describe observed wage gaps through the latent wage gap and the wage minimum. After parameterisation of Lee's model (1999), it is possible to obtain the effects of the minimum wage by regressions of actual wage differentials on the effective minimum wage and its square. Furthermore, Bosch and Manacorda (2010) expand this model and permit specific latent inequality trends for each municipality.

The difficulty in evaluating the effect of minimum wages lies in separating it from latent wage inequality. Lee (1999) describes the theoretical relation between latent and observed wage inequality through the channel of *effective* minimum wages. First of all, he defines the effective minimum wage as the difference between log minimum wages and the log q-th percentile of earnings distribution. This q-th percentile is high enough so that above it there are no spillover

effects from minimum wages. Wage inequality is expressed as wage dispersion measured by the difference between the other log wage percentiles and *q*-th wage percentile. There are three cases for the relation of latent and observed wage dispersion under effective minimum wages: censoring, spillovers and truncation. A reasonable starting point is the censoring model (Bosch and Manacorda, 2010, p.137). According to this model, effects of minimum wages can be identified from the average growth in latent wage inequality.

The censoring model assumes that there are no spillovers and no disemployment. So once the minimum wage is established, all wages below will be raised to it. Another assumption is that latent wage distributions or their variation are the same across minimum wage areas, such as states, provinces and municipalities. That is, there is only one average latent wage dispersion or one average variation rate over the whole country, with the relation below:

$$W_{mt}^{p} - W_{mt}^{q} = W_{mt}^{p^*} - W_{mt}^{q^*} \quad \text{if} \quad W_{mt}^{p^*} > MW_{mt}$$

$$W_{mt}^{p} - W_{mt}^{q} = MW_{mt} - W_{mt}^{q} \quad \text{if} \quad W_{mt}^{p^*} \leq MW_{mt},$$

where MW_m is the minimum wage in municipality m; m represents wage areas, such as municipalities; t is time; and the asterisk is used to denote a latent wage distribution; p and q indicate (log) wage percentiles (Bosch and Manacorda, 2010, p.138). On one hand, if wages at the p-th percentile are higher than minimum wages, the actual wage dispersion is just the latent wage distribution. This is based on the assumption of no spillovers, which implies that minimum wages do not influence the wage distribution above the q-th percentile and, therefore, the observed wage gap equals the latent wage gap. On the other hand, if wages at the p-th percentile

are lower than or equal to minimum wages, the observed wage gap equals the difference between minimum wages and wages at the *q*-th percentile.

Supposing *q* is the 60th percentile, after a process of parameterisation and simplification, Lee (1999) suggests the model below:

$$w_{mt}^{p} - w_{mt}^{60} = \overline{\alpha_t} + \overline{\beta_1} \cdot [MW_{mt} - w_{mt}^{60}] + \overline{\beta_2} \cdot [MW_{mt} - w_{mt}^{60}]^2 + u_{mt} \quad (1).$$

In other words, the actual *p-th* to 60th percentile gap (w^P - w^{60}) is a quadratic function of the gap between the minimum wage and the 60th percentile (MW – w^{60}), which Lee also calls the "effective" minimum wage since this is the minimum wage relative to some level of local earnings unaffected by the minimum wage.

Furthermore, Bosch and Manacorda (2010) relax the assumption of the same latent wage dispersion or variation of dispersion over the country, and permit different municipal trends:

$$\overline{\alpha_t} = \alpha_m^p + \alpha_t^p + \gamma^p X_{mt}^{'},$$

where $\alpha^p{}_m$ and $\alpha^p{}_t$ are the municipal and time fixed effects at the *p*-th percentile respectively. X'_{mt} is a vector of control variables for municipal characteristics at time *t*. If this expression is inserted into Lee's equation (1999), we get:

$$w_{mt}^{p} - w_{mt}^{60} = \alpha_m^p + \alpha_t^p + \gamma^p X_{mt}^{'} + \overline{\beta_1^p} \cdot [MW_{mt} - w_{mt}^{60}] + \overline{\beta_2^p} \cdot [MW_{mt} - w_{mt}^{60}]^2 + u_{mpt} \quad (2).$$

This implies, in principle, that a regression of observed wage gaps on the effective minimum

wage and its square, combined with municipal and time fixed effects, helps us to distinguish effects of minimum wages from latent wage inequality. In particular, as Bosch and Manacorda (2010, p.139) point out, the parameters β_1 and β_2 also allow for situations where workers receive wage premia (spillovers) or penalties (noncompliance) relative to the minimum wage.

One important feature of this theory and the models (1) and (2) is that the existence of endogeneity problems can be tested. According to the theory, where minimum wages cannot influence the wage distribution – whether at the lower-tail or the higher-tail – the latent wage differential is observed. This implies that at higher percentiles where spillovers do not happen, the observed wage gap is equal to the latent one. That is to say, $\beta^p_1 = \beta^p_2 = 0$. On the other hand, if this null hypothesis at higher percentiles is rejected, it suggests that the effective minimum wage is endogenous to the error term, indicating the existence of some spurious relation between minimum wages and wage differentials. Thus, endogeneity problems for this topic become testable.

In summary, Lee (1999) and Bosch and Manacorda (2010) provide a model that can be used to estimate net impacts of minimum wages on inequality. In Lee's model (1999), when minimum wages take effect, latent inequality trends are replaced by the difference between minimum wages and the boundary percentile of spillovers; if they do not, latent inequality is equal to what is actually observed. Furthermore, parameterisation of the model makes it possible to get empirical results for minimum wage effects. Bosch and Manacorda (2010) express average latent wage inequality over the whole country as a function of time and municipal fixed effects, combined with municipal controls. Below, therefore, net impacts of minimum wages are empirically

obtained by regressions of wage gaps on the effective minimum wage and its square.

Empirical results: Fixed effect estimates

This section gives empirical results based on sample data for fourteen provinces over 1995-2007. Wages at the 60^{th} percentile are adopted as the boundary of spillovers (q = 60), for reasons discussed below. Firstly, a scatter graph compares inequality trends of sample municipalities in 1996 and 2004, to identify the latent inequality and minimum wage effects. Then models (1) and (2) are estimated separately, controlling municipal and time fixed effects, as well as province-specific trends. Endogeneity problems are also discussed based on reported F-test values. Finally, conclusions are drawn.

Figure 4.4 shows data points corresponding to the theoretical relation between the latent wage inequality and effective minimum wages at the 10^{th} relative to the 60^{th} percentile. The two solid lines are fitted lines obtained from regressions of the 10-60 wage gaps on the effective minimum wage and its square. Two outliers are dropped in order to get a better scale for the graph. One outlier is with a 10-60 wage gap smaller than -3, and hence is far below the other points. The other has an effective minimum wage larger than zero, and hence is to the far right of the other points. In this sense, they are outliers. Notice that these two outliers are only dropped from the graph, and still kept in regressions.

Figure 4.4 suggests that structures of latent wage inequality from 1996 to 2004 have changed since the intercepts of two curves exhibit different forms. However, there appears to be no change in the extent of latent wage inequality since the heights of two lines are similar. Furthermore, it

seems that minimum wages have stronger effects on inequality in 2004 than in 1996. One reason is that the curve form in 2004 is more similar to that in classic literature, i.e. an upward concave curve. Moreover, the fitted curve is steeper in 2004 (the less effect minimum wages have, the flatter the curve is). However, we should remember that time and municipal fixed effects are not controlled in the figure, so the regression results below should be clearer. Overall, the figure gives further evidence on a stronger effect of minimum wages on inequality in 2004 than in 1996.

Table 4.6 reports empirical results based on the models (1) and (2) using municipal panel data. Each column represents one specification, so in total four specifications are tried. Each row corresponds to a different dependent variable, taking in turn differences between the consecutive deciles of the wage distribution and the 6th decile (q = 60). The reason for choosing the 6th decile is that it is the boundary of spillovers of minimum wages, which is shown later.

For clearer interpretation, entries are calculated as the first derivative of each explained variable with respect to the effective minimum wage at the weighted sample mean: $\beta^{p}_{1} + 2\times\beta^{p}_{2} \times[MW - W^{60}]$. No subscript mt means that effective minimum wages here are the mean over all municipalities and all years. Asterisks for significance levels are the higher of the linear and quadratic terms. Furthermore, for the regressions of wage differentials above the spillover boundary (q = 60), Chi-squared values of F-tests are included (H_0: $\beta^{p}_{1} = \beta^{p}_{2} = 0$), shown in square brackets. Asterisks are the significance level for F-test statistic values. Finally, all regressions are estimated using municipal panel data from year 1995 to 2007.

Column (1) in Table 4.6 gives the simplest specification of Lee's theory (1999), i.e. model (1).

It only uses fixed municipal and time effects to control the latent wage gap across different municipalities, though standard errors are clustered by province. Total effects of effective minimum wages are calculated based on both the coefficients of linear and quadratic terms in each regression. The impact on the 10-60 wage gap shows that a 10% increase in average effective minimum wages will pull down 10-60 wage gap by around 2.6% (0.256×10%). Notice that this figure is different from section 4.3, since whereas the 50-10 wage gap is positive, the 10-60 wage gap is negative. Thus, a positive coefficient here indicates a decline of wage gaps. Consistent with our expectation, the higher the percentile gap, the smaller the impact of minimum wages. Moreover, above the 60th percentile, all impacts appear insignificant, which is plausible. However, two out of three F-tests (for the joint significance of the effective minimum wage and its square) significantly reject the null hypothesis of zero effects of effective minimum wages above the 60th percentile. This suggests that there exists some endogeneity problem in this specification, which makes our estimates inconsistent. Thus, further investigation of other specifications is required.

Taking next column (3) (without province×year interactions, considered later), we add the usual municipal controls[7]. Compared with column (1), in column (3) both magnitudes and significance levels have plausible changes, showing the empirical importance of municipal controls. For example, the wage at the first decile will rise by around 8.8% with respect to the 6th decile corresponding to a 10% increase in effective minimum wages. This magnitude is more than three times larger than that in column (1) and is more significant. These significant effects

[7] The controls include compliance ratios of minimum wages, average log wages and education levels; proportions of female, migrant and SOE workers; and unemployment rates, as well as the share of workers in manufacturing, construction and the service industry.

extend up to the 5th decile. Furthermore, it should be noted as well that the endogeneity problem almost disappears in column (3) in that only one out of three F-tests is significant at the 10% significance level, which is more reasonable than the results in column (1).

Columns (2) and (4) additionally control province-specific time trends. That is, provincial fixed effects and interactions of each province times each year are included in the specification, so the standard errors for columns (2) and (4) are clustered by region (east, central and west) to avoid repeated controls. This type of trend has been put forward by Allegretto *et al*. (2011) and Dube *et al*. (2010) to capture latent trends of inequality within each statistical unit. Allegretto *et al*. (2011) argue that only if the effects of minimum wages are not sensitive to the inclusion of state-specific trends, can they be seen as valid. However, Neumark *et al*. (2013, p.5) doubt this perspective, and point out that "a great deal of valid identifying information" is discarded along with those over-identified controls. In summary, the province-specific trends cannot be ignored though there is no conclusive word on them yet.

The other reason to include province-specific trends is that provincial characteristics are important for the case of China. Although it has a centralised system of government, its provinces enjoy autonomy to some extent. On the other hand, the central government assigns different policies to different regions and provinces. After all, every province has a different history, geography and culture. As a result, provincial differences are allowed within central policies. Minimum wage setting reflects this situation. Specifically, as has been illustrated in Chapter 1, provincial governments decide the fixing date, frequency and levels of minimum wages themselves according to the law or rules announced by the central government.

However, at least in this study, the inclusion of province-specific trends gives less reasonable estimation results, supporting Neumark *et al*.'s (2013) view. As can be seen in column (2), almost all effects of minimum wages below the 70th percentile vanish. Also, endogeneity problems are exacerbated in that all three F-tests significantly reject the null hypothesis that both linear and quadratic terms of minimum wages are zero for the higher percentiles. Column (4), with the full set of municipal controls, presents this problem more clearly. Not only F-test statistic values but also positive coefficients above the 50th percentile become significant, implying a spurious relation between minimum wages and wage gaps. Thus, later, the specification in column (3) is adopted, i.e. municipal and time fixed effects plus municipal controls, leaving provincial information in clustered standard errors. In conclusion, panel data models based on Lee's (1999) model show significant effects of minimum wages on reducing wage differentials up to the 6th decile of the wage distribution.

Empirical results: IV estimates

This section gives instrument variable estimates based on the specification of Table 4.6's column (3). As already noted, Lee (1999) indicates that measurement error can produce an upward bias when estimating his model. IV may alleviate or eliminate this problem. Based on IVs in Bosch and Manacorda (2010), effective minimum wages are instrumented with a quasi-Kaitz index, calculated by the difference between nominal minimum wages and nominal average wages from the *China Labour Statistical Year Books*. It is argued that this IV satisfies requirements for a valid IV and consistent and unbiased results can be obtained by using it. Furthermore, two robustness checks are proposed. One is for periods before and after 2004, and the other is for male and

female workers.

One main concern in Lee's method (1999) is measurement error. As Lee (1999) points out, a "mechanical relation" may exist between wage differentials (dependent variable) and effective minimum wages (independent variable) since 6th decile wages are used to construct both variables. If measurement error plays an important role in the variation of the 6th decile wage, a spurious positive relation will be produced between dependent and main independent variables, known as a division bias problem. Furthermore, it is difficult to identify this spurious relation since independent variables and other controls will be correlated with error terms at the same time because of sample measurement errors. To avoid this problem, Lee (1999) uses a trimmed effective minimum wage to enable robustness checks. However, Autor *et al*. (2010) suggest that this method might only settle this problem to a small extent. Other methods like instrumental variable estimates therefore seem more plausible.

Valid IVs can predict problematic variables well, provided they are not connected to stochastic errors at the same time. In previous literature, Autor *et al*. (2010) take state minimum wages as instruments since some of them are higher than the exogenous federal minimum and vary independently. Dolton and Bondibene (2012) adopt the left- or right-wing political complexion of a government as their instrument for the minimum wage. Bosch and Manacorda (2010) instrument the minimum wage with a different effective minimum wage calculated from another dataset. However, similar IVs in China are either not suitable or hard to access. Thus, based on the literature, a different IV from the above is chosen for this study.

The IV adopted is a quasi-Kaitz index calculated from the *China Labour Statistical Year Books*.

That is, the difference is taken between the nominal minimum wages of each municipality and the nominal average wage of the corresponding province. Four considerations arise when using this IV. First of all, it is calculated from another set of data, and so is uncorrelated with measurement errors of the UHS sample in this study. This idea is based on Bosch and Manacorda (2010). Second, average wages are near to the 60^{th} percentile wage. According to Bosch and Manacorda (2010), their IV is the difference between the minimum and the 60^{th} percentile wage. However, given that extra data is inaccessible to calculate another 60^{th} percentile wage, using average wages is the best choice. Third, the Kaitz index is a widely accepted measure of effective minimum wages. As Brown *et al*. (1982, pp.499-500) indicate, this index has the advantage of summarising much local labour market information in a single variable. This index is, therefore, closely related to the main independent variable – municipal minimum wages minus 60^{th} percentile wages.

There remains the issue of normalizing via provincial mean wages instead of municipal wages (giving a "quasi" Kaitz). For one thing, provincial mean wages are more exogenous to municipal minimum wages and other controls than municipal mean wages. After all, they are calculated from all municipalities in the corresponding province and are more representative. In any case, the correlation coefficient between the main independent variables and provincial IVs (around 0.28) is similar to that between the main independent variables and municipal IVs (around 0.26), indicating just as good a relation. Based on the above considerations, the IV used in this study has a good chance of giving a good prediction of the independent variable, and also being uncorrelated with stochastic errors.

Table 4.7 presents IV estimates based on municipal panel data. The effective minimum wage and its square are instrumented with the quasi-Kaitz index and its square respectively. All regressions take the specification in column (3) in Table 4.6, i.e. municipal and time fixed effects combined with municipal controls. Column (1) can, therefore, be compared directly with column (3) in Table 4.6. On the one hand, the significance of the coefficients increases and all effects are significant at a 1% level up to the 5th decile. On the other, all magnitudes decline, and even insignificant effects above the 5th decile become smaller than estimates from fixed effect models. This is consistent with the expectation since measurement error normally leads to an upward bias of minimum wage effects. When effective minimum wages rise by 10%, the bottom 10th percentile wage now rises by 7.9% relative to the 60th percentile wage, around 1 percentage point lower than estimates without IV (8.8%). Correspondingly, the 70th percentile wage will fall by 0.15% insignificantly, again about 1% lower than non-IV estimates (+0.8%). Moreover, all F-test values are insignificant, indicating IV estimates have eliminated the measurement error problem. In sum, the IV estimates offer further support for the result that minimum wages reduce wage inequality.

Two robustness checks are given in columns (2) to (5). Columns (2) and (3) investigate minimum wage effects before and after 2004. As expected, for percentiles below the 7th decile, all effects for 2004-2007 are stronger than those for 1995-2003, which shows larger impacts caused by the reinforced minimum wages after 2004. In particular, corresponding to a 10% increase in effective minimum wages, wages at the bottom decile will rise by 9.6% over 2004-2007, 2.2% higher than before 2004 (7.4%). On the other hand, at higher percentiles, such as the 5thand 7th deciles, effects in the two periods are similar and small, indicating much weaker effects of

minimum wages at higher percentiles in both periods, as expected. Overall, robustness checks before and after 2004 support the hypothesis that lower wage inequality is caused by rising minimum wages with stronger effects post-2004.

Columns (4) and (5) look at minimum wage effects for male and female workers separately. As in Bosch and Manacorda (2010), the impact is smaller for females than for males, which is difficult to explain. As can be seen, at the bottom decile, this gender difference is as large as 4% (5.6% versus 9.6%) corresponding to a 10% increase in minimum wages. However, the gender difference becomes smaller at higher percentiles since both groups are less affected by the minimum wage. The reason for the higher impact of minimum wages on earnings inequality for males than females might simply be that earnings inequality is higher for males in the first place, giving more scope for the minimum to reduce inequality. In a later chapter using quantile regressions (Chapter 6, Appendix tables 6a and b), we find that the minimum wage acts to raise women's pay in the bottom decile much more than men's, which is more what we would expect.

As a final point on the use of IVs, it can be seen that Table 4.7's F-test values at the top deciles become significant again for both gender groups, suggesting a spurious relationship to some extent that cannot be eliminated by IVs. This may be caused by the construction of IVs, i.e. the deflator of minimum wages is pooled provincial average wages, irrespective of gender. Note that Bosch and Manacorda (2010) exhibit some significant F-test statistics in their robustness checks as well. In case, the minimum wage is not likely to affect wages in the top deciles, so it is not surprising that the model fits less well. Overall, results for two robustness checks are basically plausible and consistent with this thesis' expectation.

Several features need to be noted. The first is that the above results are comparable to those for Mexico from Bosch and Manacorda (2010). For example, with municipal controls their coefficient shows that the bottom decile rises by 7% corresponding to a 10% increase in minimum wages (column 4, Table 2, p.141), only about 1% lower than Table 4.7's result. They use a similar IV technique – effective minimum wages calculated from another dataset – and their results are reassuringly similar. The second point is that under IV estimates, more control variables exhibit significance than before when the full regressions reported in Table 4.6a (simple panel) and Table 4.7a (IV) are considered. Moreover, the signs of the coefficients are plausible. For example, below the 70th percentile, low-paid workers in SOEs have higher wages than those in non-SOEs (e.g. the 10-60 wage gap is smaller in SOEs), while beginning from the 70th percentile high-wage workers in SOEs have relatively lower wages. In other words, SOEs offer more compressed wage distributions.

The third point is that the results provide evidence on a type of *lighthouse effect*. As is mentioned in the compliance section above (section 4.2), noncompliance does not mean there is no effect for workers below minimum wages. Although on average 7% of workers earn less than minimum wages, the effects of the minimum wage on the bottom decile still display the largest magnitude with strong significance levels. This result supports the suggestion (Boeri *et al*., 2011) that workers not directly covered by the minimum still bargain for higher wages than they would without it. In sum, therefore, IV estimates reinforce the conclusion that rising minimum wages reduce wage differentials at the lower end of the wage distribution.

A further check: Individual level data

This section turns to analysis of minimum wage effects on the wage distribution using individual level data. There are two objectives for this robustness check. Firstly, the assumption of the spillover boundary at 60% needs to be defended. Secondly, results based on individual samples can provide further evidence to prove the impact of minimum wages on wage distribution compression. Effects by percentiles over 1995-2007 using annual individual data are examined and separate regressions before and after 2004 are presented. Then panel data regressions for 2004-2007 are shown. These monthly data enable us to follow minimum wage fixing month by month, so that spillovers can be checked more carefully.

Spillovers describe minimum wage effects on non-binding parts of the wage distribution. As noted above, there are several reasons to expect spillovers, for example in Teulings's (2000) model, a higher minimum wage eliminates unskilled workers from the labour supply, so raising demand for slightly better skilled workers and pushing up their wages. Alternatively, the need to maintain differentials (Aeberhardt *et al*., 2013) for the efficiency wage or fairness reasons could cause spillovers as well. Spillover effects are controversial in minimum wage studies. In the UK there is no agreement on the evidence on spillovers so far (Stewart, 2012). In the US, Lee (1999) finds that the boundary of spillovers is the median wage (Lee, 1999), however in Mexico (Bosch and Manacorda, 2010), and France (Aeberhardt *et al*., 2013), spillovers appear to extend up to the 70th percentile. Let us now consider evidence for China.

Spillover effects by percentile of the wage distribution can be described by an OLS model adapted from Dinkelman and Ranchhod (2012) as follows:

$$w^{p}_{it} = \alpha + \beta_1 \cdot MW_{mt} + \beta_2 \cdot MW_{mt-1} + \lambda \cdot X'_{mt} + \gamma \cdot x'_{i} + \eta_1 \cdot D_t + \eta_2 \cdot D_m + \varepsilon_{mt},$$

where the dependent variable w^p_{it} means that the log wage of individual i belongs to the p^{th} percentile of the wage distribution in year t. In practice, wage distributions in each year are separated into ten percentiles, and then all wages within the same percentile are pooled together. Thus, superscript p for dependent variables indicates the percentile, i.e. 10^{th} percentile, 20^{th}, … and 90^{th}. Among independent variables, MW_{mt} and MW_{mt-1} is the corresponding minimum wage and its one-year lag in log form, X'_{mt} represents a set of control variables to describe local labour markets, and x'_i indicates control variables for individual i's characteristics. D_t and D_m are the usual vectors of fixed effects for years and municipalities respectively, and ε_{mt} is the error term (since year effects are included, both individual wages and minimum wages are in nominal terms). In this model, we see that coefficients β_1 and β_2 are of interest, and they are expected to be positive for percentiles affected by minimum wages.

Table 4.8 summarises the results of this exercise (full results are given in Tables 4.8a-c). The sample is individual data from 14 provinces for 1995-2007. Municipal controls include compliance ratios and log mean wages. Individual controls involve experience and its square, education levels, gender, industry, occupation and whether working in SOEs. Each column represents the percentile of the wage distribution. Specifically, two specifications are adopted for each percentile. One includes municipal and time effects, and the other involves extra provincial effects and province-specific trends following Allegretto *et al*. (2011) (indicated as "Province×year"). Standard errors are in parentheses. For the simple time effect specification, standard errors are clustered by provinces; for the *Province×year* specification, they are clustered by regions (east, central and west). Each panel represents different sample periods, so that effects before and after 2004 can be considered separately.

The results reported in Table 4.8 indicate spillover effects up to the 4th decile, with little effect for percentiles above this point. The upper panel reports the sample from 1995 to 2007. Minimum wage effects appear strongest at the bottom decile, and keep falling as percentiles rise, which is reasonable. In particular, when minimum wages increase by 10%, individual wages at the 10th percentile rise by around 1.5% to 6.2% (0.15×10% and 0.62×10%, using the sum of current and lagged coefficients) on average. In contrast, wages at the 30th percentile only rise by 0.9% to 2.1%. Above the 40th percentile, minimum wage effects are never significant, so only results below the 60th percentile are reported. As can be seen, lag terms show weak effects, indicating prompt responses of firms to the fixing, which is consistent with the reality of China and estimations in previous parts. As in previous estimations, specifications with province-specific trends exhibit larger effects than specifications without. Since there is no conclusive word about the need to include such trends, results of both specifications are given. Our conclusion on spillover effects is that – given that about 10% of workers are directly affected by the minimum wage - spillover effects begin from workers at the 20th percentile of the wage distribution and continue up to the 40th percentile.

The middle and bottom panels of Table 4.8 summarise minimum wage effects before and after 2004. Effects after 2004 are stronger than those during 1995-2003, as we have already found. For the bottom decile, effects after 2004 are three to eleven times larger than those before, indicating the minimum wage helps the poor considerably after 2004. However, spillovers do not differ much after the 20th percentile for both periods. At the 30th percentile, spillovers during 1995-2003 become insignificant. Tables 4.8a, b and c present relevant full regressions. All coefficients are plausible, and the R-squared for all estimations are as high as 0.9, indicating a strong predictive

power. The only exception is the 10th percentile where the R-squared for the estimations are only around 0.4 to 0.5, suggesting some hidden personal characteristics for the poor. In sum, separate wage effects for two periods reinforce the finding of minimum wage effects on the whole lower tail of the wage distribution, showing a spillover effect up to the 40th percentile.

We now turn to further robustness checks using individual monthly panel data during 2004-2007. These data allow fixed effect models which control time-invariant individual characteristics and identify minimum wage effects better. Furthermore, monthly panel data enable the effects to be observed more accurately than annual data. In particular, governments announce the dates when new fixed minimum wages begin. For annual data, time-weighted minimum wages are used to allow for this factor, but for monthly data, the exact month when new standards take effect can be identified. Thus, before that month, the prior minimum wage is used; after that, the new minimum wage is used. With individual panel data combined with identification of monthly minimum wages, our results should be stronger.

Table 4.9 summarises these results (an example of full results is given in Table 4.9a following). For this individual fixed effect model, only time-varying characteristics can be controlled. Municipal controls, therefore, include only compliance ratios and log mean wages; and individual controls comprise experience and its square, industry, occupation and employment in SOEs. The percentile dependent variables are presented in the first row of each panel. All standard errors are clustered by provinces.

It can be seen that the results in Table 4.9 support those in Table 4.8, exhibiting significant but decreasing effects of minimum wages from the bottom decile to the higher decile. The only

difference is that spillovers now appear to spread to the 50th percentile, higher than the 40th percentile in Table 4.8, which may be caused by better identification from panel data models. Furthermore, the magnitudes of effects are closer to Table 4.8's specification without province-specific time trends, suggesting this specification is more suitable for the sample data. Overall, therefore, Table 4.9 provides further evidence of spillover effects, indicating they reach the 50th percentile of the wage distribution.

4.5. Conclusions

This chapter looked at the effect of the minimum wage on wage inequality. The non-compliance issue was first discussed. Then we considered the link between inequality and the minimum wage, taking first overall inequality and then effects on the wage distribution percentile by percentile. Here we used methods based on Lee (1999) and Bosch and Manacorda (2010). Finally, spillover effects of the minimum wage were examined.

As regards non-compliance, we find that: the average non-compliance ratio over the sample period 1995-2007 is about 7%, but this ratio is closely and negatively related to levels of the minimum wage. The implication is that some firms avoid the minimum wage when it is raised. However, despite the existence of non-compliance, our results point to the minimum wage still reducing wage inequality significantly.

As regards the impact of the minimum wage on inequality, we found that the minimum wage significantly compresses the overall wage distribution. A 10% increase in the minimum wage raises the wage at the 10th percentile by up to 6% (Table 4.8). It also reduces the 10-60 wage gap

by almost 10% in some specifications (see Tables 4.6 and 4.7), and has spillover effects spreading up to the 40th or 50th percentile of the wage distribution. All the above effects are stronger during 2004-2007 when the minimum wage system was reinforced, approximately doubling the pre-2004 wage effects (see Table 4.8).

There are several caveats to be made regarding the conclusions in this chapter. First, this chapter only gives a partial picture about the redistributive effect of the minimum wage since the sample does not include rural migrants. It is true that the minimum wage is one of the few policies that are applied to all urban working people, irrespective of their household registration status, i.e. residents or migrants, especially rural migrants. Nevertheless, rural migrants usually work in informal sectors, and are therefore especially likely to fit into the non-compliant group, and not be helped by the minimum wage. Second, as is mentioned in Chapter 2's literature review, workers receiving the minimum wage are not always those in the poorest households. However, our results relate to earnings, not income inequality, which deserves further investigation. Lastly, inequality reduction may be counteracted by the disemployment effect of the minimum wage so this topic is investigated in the next chapter.

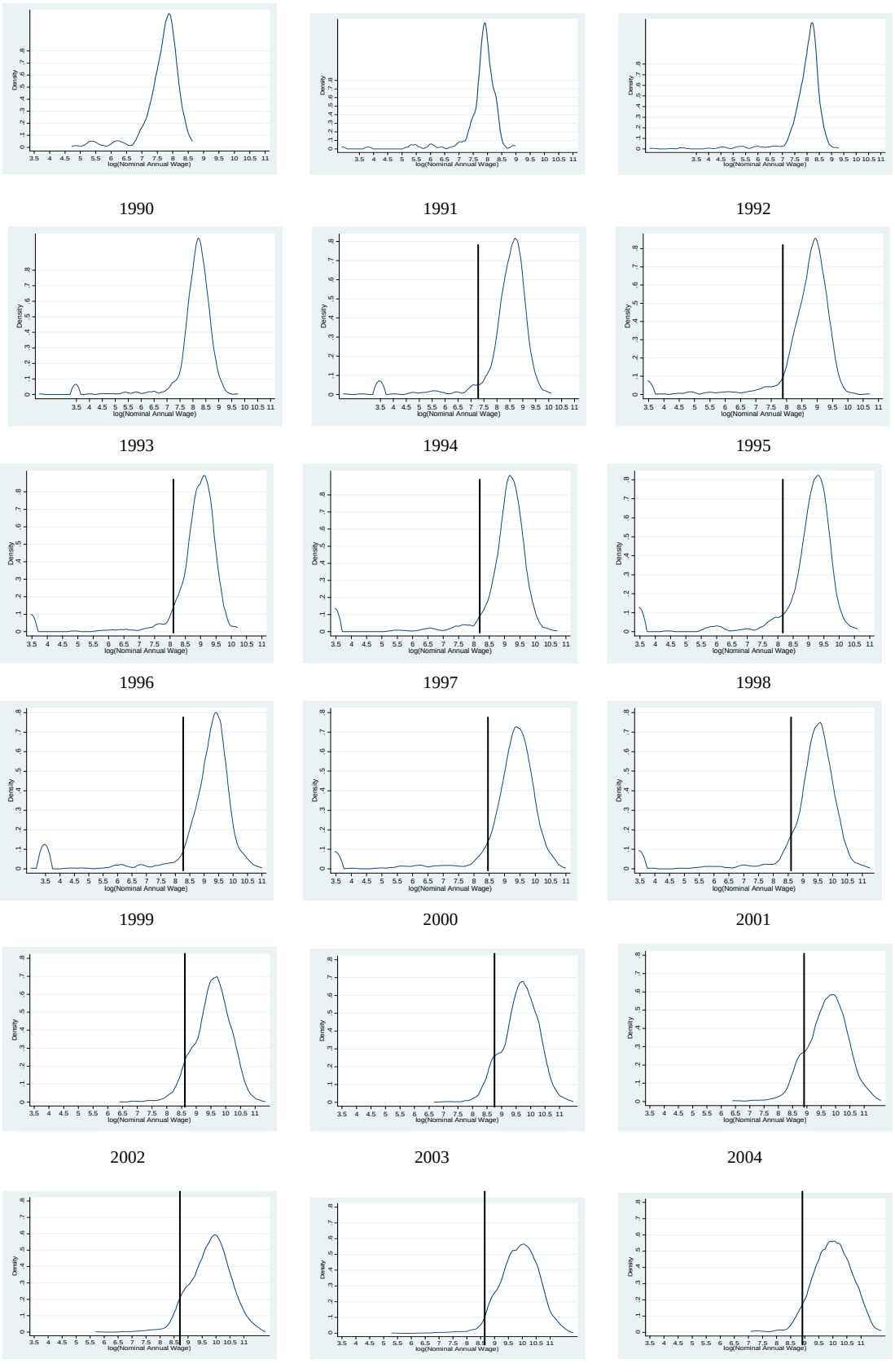


Figure 4.1a: Beijing, 1990-2007, nominal log wage distribution and nominal log MW.

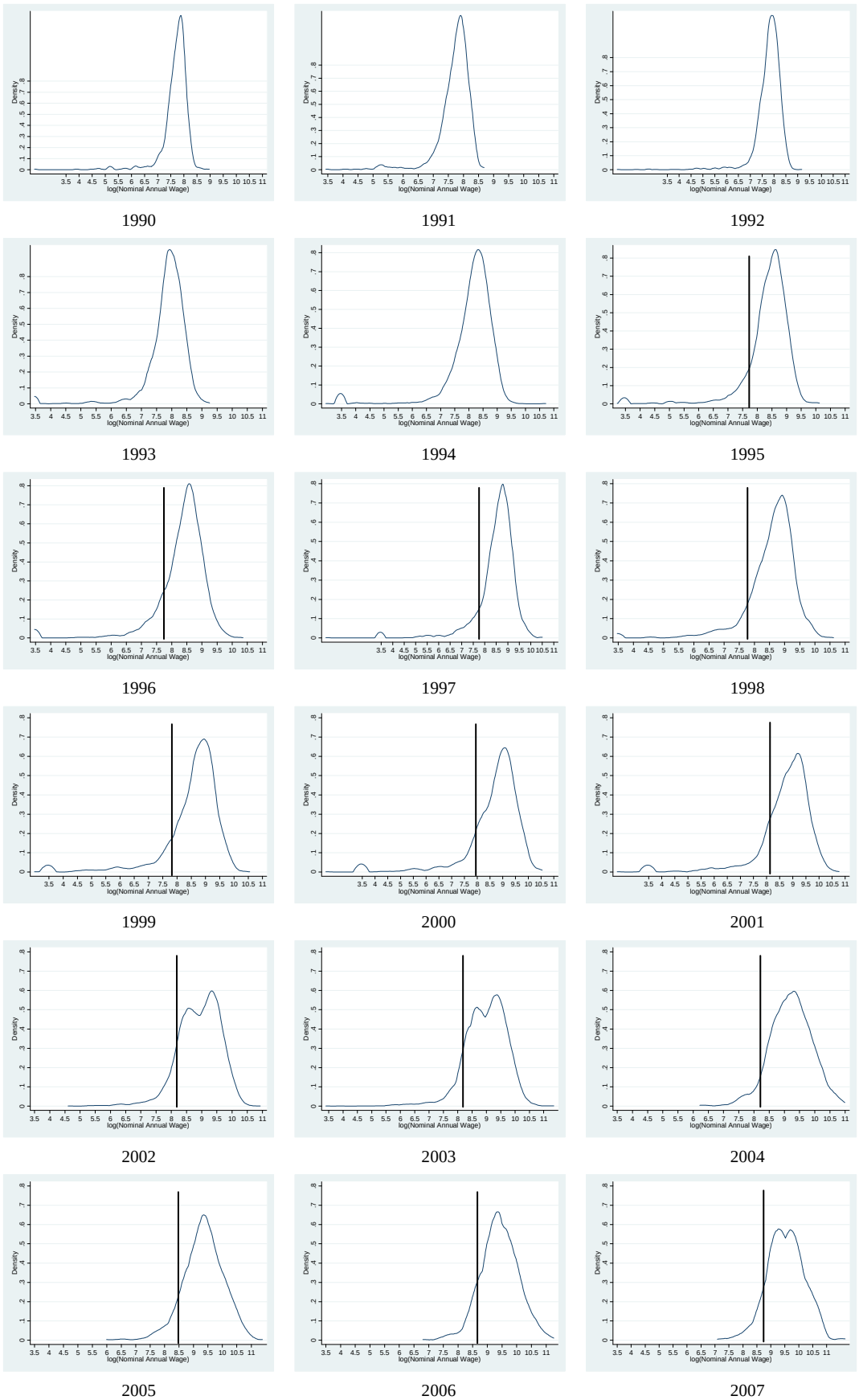


Figure 4.1b: Liaoning, 1990-2007, nominal log wage distribution and nominal log MW.

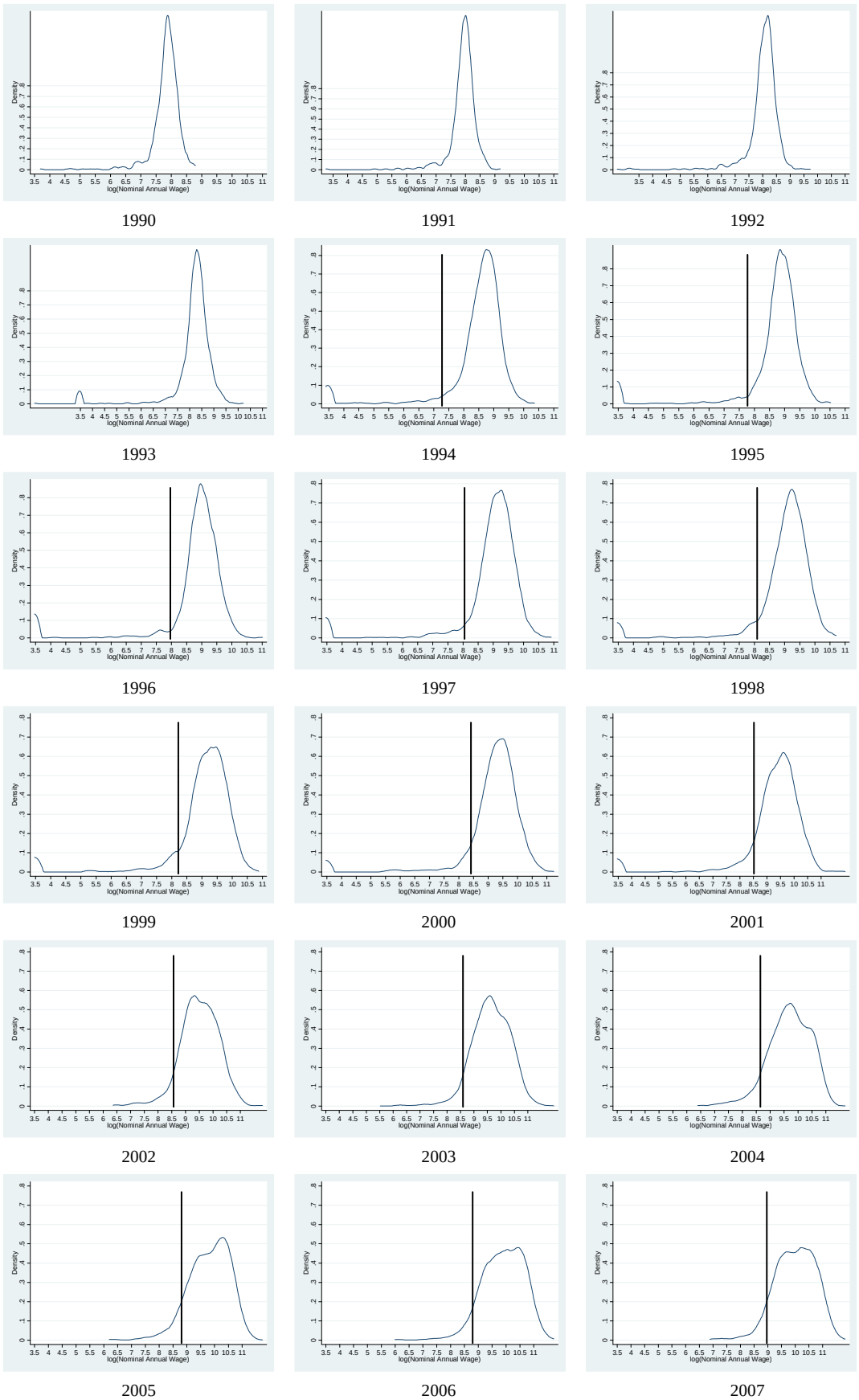
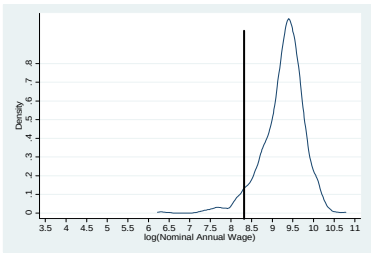
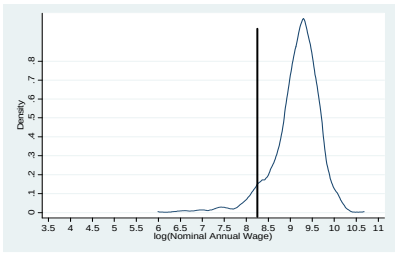
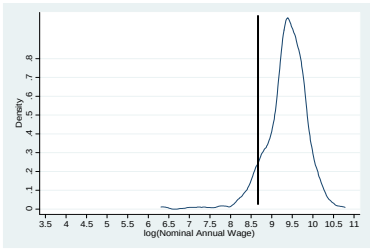


Figure 4.1c: Zhejiang, 1990-2007, nominal log wage distribution and nominal log MW.

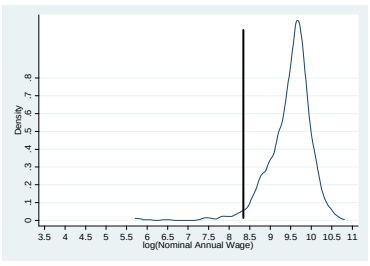
Hebei 2004 2005





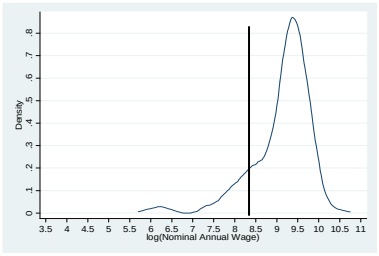


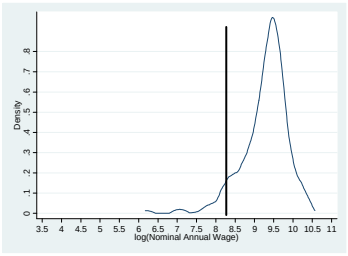
2006

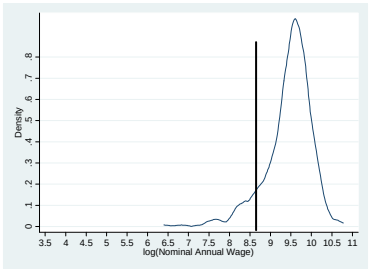


2007

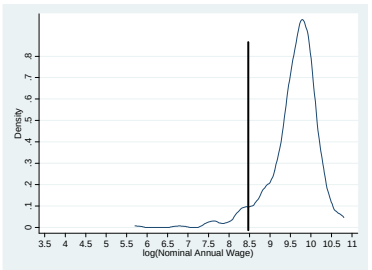
Shanxi 2004 2005





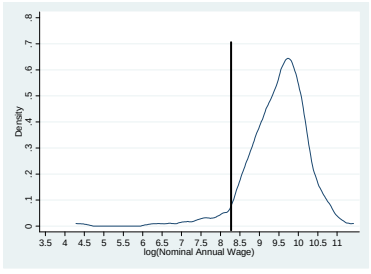


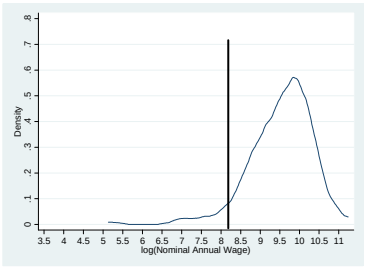
2006

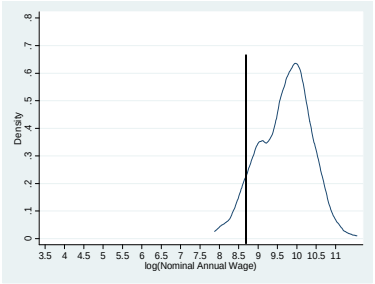


2007

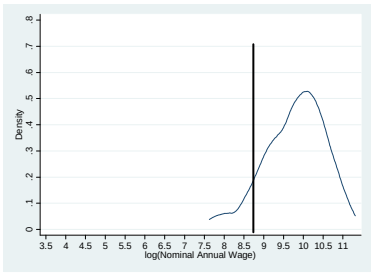
Fujian 2004 2005





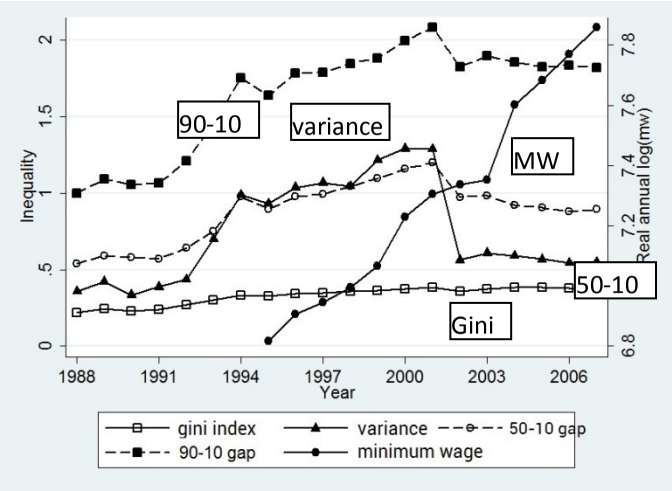


2006

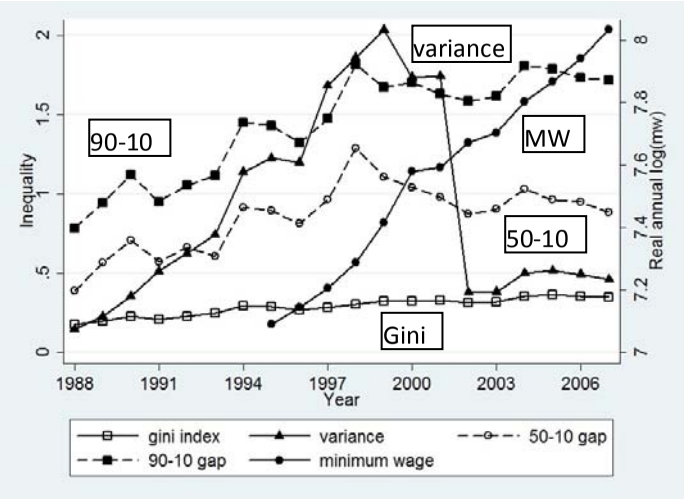


2007

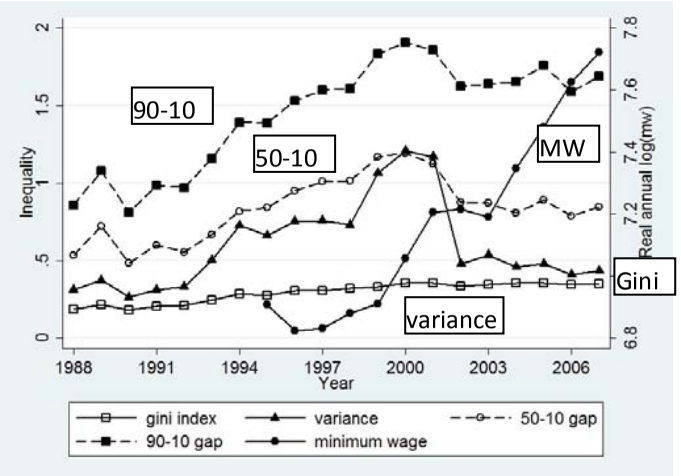
Figure 4.1d: Hebei, Shanxi, and Fujian, 2004-2007, nominal log wage distribution and log MW.



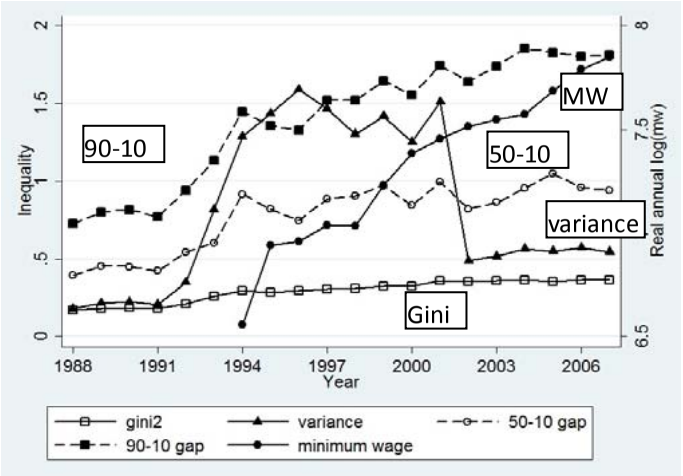
a.All sample provinces: minimum wages are between 1995 and 2007.



b. Beijing municipality: minimum wages are between 1995 and 2007.

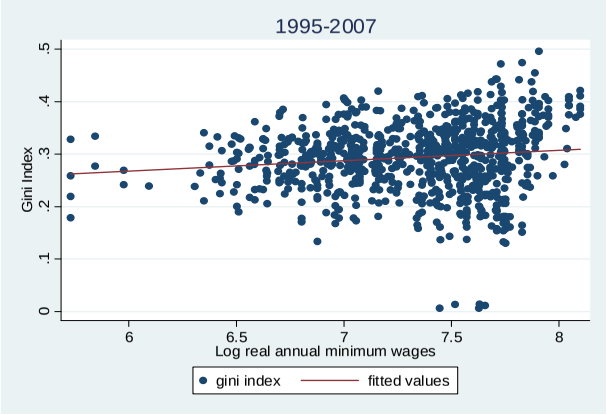


c. Liaoning province: minimum wages are between 1995 and 2007.

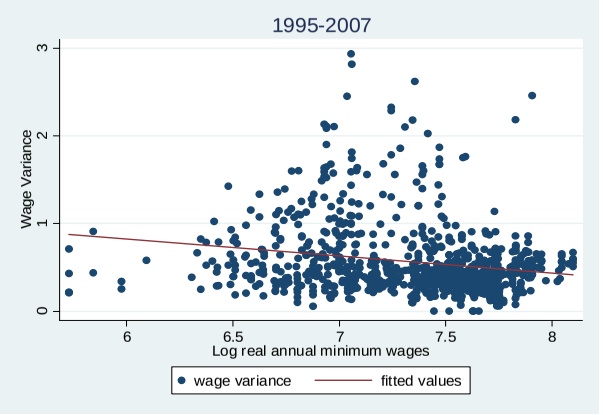


d. Zhejiang province: minimum wages are between 1994 and 2007.

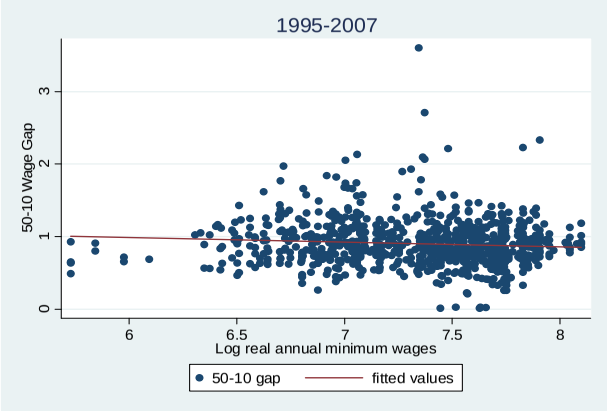
Figure 4.2: Inequality indices and real annual log minimum wages over years, 1988-2007.



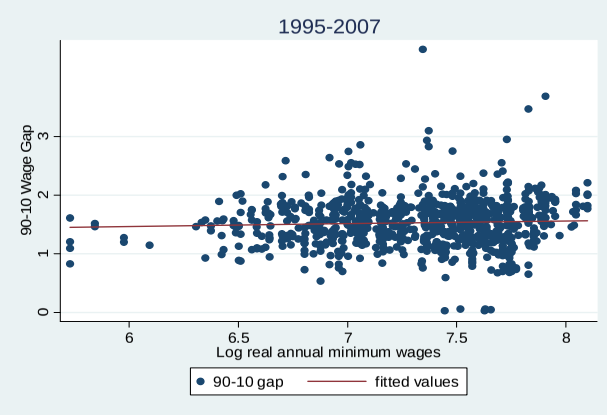
Gini index and minimum wages.



Wage variance and minimum wages.



50-10 wage gap and minimum wages.



90-10 wage gap and minimum wages.

Figure 4.3: Inequality indices and log real annual minimum wages, 1995-2007.

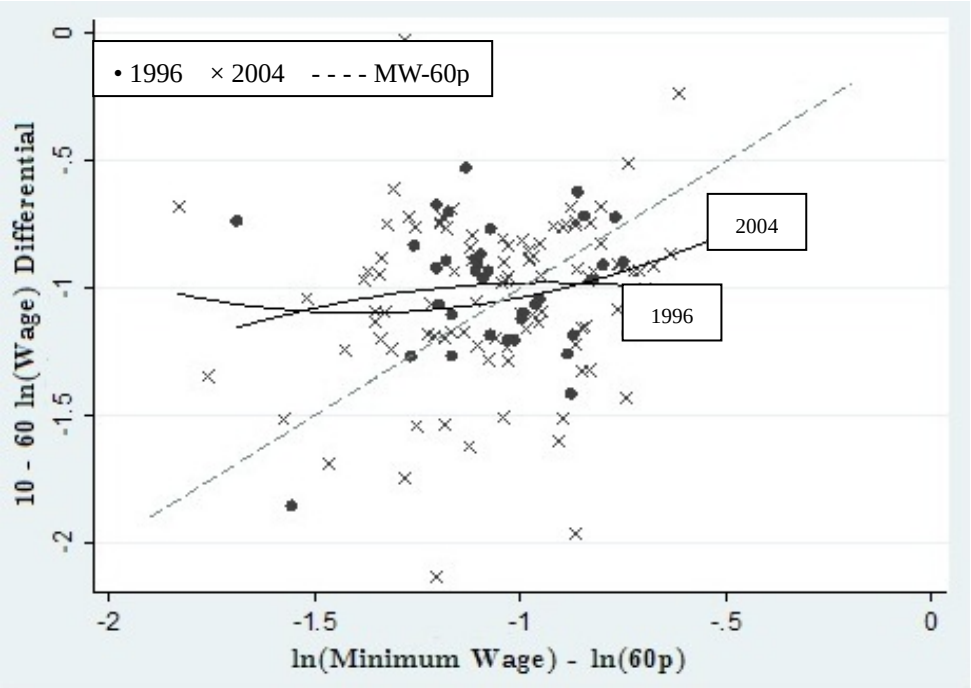


Figure 4.4: Wages inequality and the minimum wage by municipality, 1996 & 2004.

Notes: The solid lines are fitted lines obtained from regressions of 10-60 wage gaps on the effective minimum wage and its square. The dashed line is a 45 degree line. Black marks are for 1996, and *x*s are 2004.

Table 4.1: Characteristics and Row Percentages of Workers Earning the Minimum Wage, 1995-2007

Variables		Non-Compliant	Minimum	More than Minimum
Percent of Total (%)		7.24	0.05	92.7
Eastern Region (%)		7.67	0.06	92.26
Percent of Male (%)		4.88	0.02	95.09
Percent of Female (%)		10.04	0.09	89.87
Age (%)				
	Age 16-29	9.71	0.07	90.22
	Age 30-49	5.31	0.05	94.64
	Age 50-64	10.89	0.06	89.06
	Age Above 65	47.96	0	52.04
Educational Attainment (%)				
	Primary School or Below	13.78	0.07	86.15
	Junior High School	10.52	0.09	89.39
	Senior and Vocational High School	7.03	0.06	92.92
	College or Above	2.97	0.01	97.02
Industry (%)				
	Mining and Manufacturing	6.85	0.04	93.11
	Construction	6.2	0.02	93.78
	Transportation and IT	4.58	0.03	95.39
	Commerce, Hotel, and Restaurant	11.18	0.09	88.73
	Finance and Real Estate	4.94	0.03	95.02
	Scientific Research and Public Facility	3.57	0.02	96.41
	Commercial and Personal Service	16.24	0.17	83.59
	Education and Public Service	3.43	0.02	96.55
	Government and Social Organization	4	0.05	95.95
	International Organization and Others	24.52	0.09	75.39
Occupation (%)				
	Professional and Technician	2.73	0.01	97.26
	Official and Manager	0.8	0.01	99.19
	Clerical	5.3	0.03	94.68
	Commercial and Service Staff	16.28	0.18	83.54
	Manual Worker	7.92	0.05	92.03
	Armyman and Others	23.49	0.14	76.37
Ownership (%)				
	State-owned	3.92	0.03	96.05
	Collective-owned	10.44	0.09	89.47
	Mixed Ownership	7.88	0.03	92.09
	Private Ownership	18.67	0.2	81.13
	Others	38.24	0.22	61.53
Observations		161271	11683	87	149501

Notes: Variable definitions for later regressions, including those in Chapter 5 (please refer to Chapter 3 and its tables for more details).

ln*mw:* ln (minimum wage), a variable at municipal level; its means is 8.30.

ln*mw* lagged: ln (minimum wage) with one year lagged; its means is 8.23.

kaitz : Kaitz ratio,Kaitz = ln(MW) - ln(average wage), a variable at municipal level; its means is -0.71

kaitz lagged: Kaitz ratio with one year lagged; its mean is -0.68

employment rate : employment-population ratio, the municipal employment divided by the municipal population in each year, a variable at municipal level; its mean is 0.61 (see Table 5.1 for more details).

ln*wage* : ln(mean annual wage), a variable at municipal level. Once the year fixed-effects are controlled, it is in nominal term. Here its mean in real term is 4489.97 (See Table 3.2).

female : the proportion of female workers to the whole employment in each municipality, a variable at municipal level; its mean is 0.45.

education : the average education level in each municipality (seven levels including illiterate and semi-illiterate, primary school, junior high school, vocational high school, senior high school, college, university and postgraduate), a variable at municipal level; its mean is 4.0, indicating the level of vocational high school.

manufacture : the proportion of workers in the manufacture industry to the whole employment for each municipality, a variable at municipal level; its means is 0.34 (for the ten industry categories, please refer to the table above and Chapter 3).

construction : the proportion of workers in the construction industry to the whole employment for each municipality, a variable at municipal level; its mean is 0.03.

service : the proportion of workers in the service industry to the whole employment for each municipality, a variable at municipal level; its mean is 0.62.

enrolment : the ratio of college students to the whole sample in each municipality per year, a variable at municipal level; its mean is 0.20.

soe: the proportion of workers in SOE to the whole employment for each municipality, a variable at municipal level; its mean is 0.57 (for the five ownership categories, please refer to the table above and Chapter 3).

unemployment: the ratio of unemployed people to the sum of employed plus unemployed people, calculated from this UHS sample, a variable at municipal level; its mean is 0.05.

migrant: this measure is from China Statistic Yearbook, a variable at provincial level. It indicates the ratio of migrant workers imported by all enterprises to all urban employment of each province. Its mean is 0.29.

Table 4.2: Regressions on Compliance Ratio

	Pooled OLS	Municipality Panel				1995-2003	2004-2007
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ln*mw*	-0.181***	-0.131***	-0.0973***	-0.155***	-0.0956***	-0.0692***	-0.170***
	(0.0143)	(0.0171)	(0.0155)	(0.0215)	(0.0218)	(0.0127)	(0.0520)
ln*wage*	0.204***	0.213***	—	0.216***	—	—	—
	(0.0145)	(0.0181)	—	(0.0176)	—	—	—
female	0.0367	-0.031	-0.109*	-0.0278	-0.111*	0.0533	-0.219**
	(0.0445)	(0.0555)	(0.0618)	(0.0547)	(0.0626)	(0.0784)	(0.1030)
manufacture	0.0152	-0.036	-0.0438	-0.0352	-0.0272	-0.0157	5.54E-05
	(0.0143)	(0.0295)	(0.0352)	(0.0314)	(0.0382)	(0.0632)	(0.0620)
construction	0.0102	-0.0825	-0.0761	-0.0947	-0.0947	-0.0253	-0.147
	(0.0562)	(0.0752)	(0.1060)	(0.0735)	(0.1060)	(0.1260)	(0.2050)
service	0.0869***	0.0365	-0.0385	0.0405	-0.0374	-0.00705	-0.0544
	(0.0248)	(0.0359)	(0.0379)	(0.0354)	(0.0375)	(0.0593)	(0.0509)
soe	0.0970***	0.00933	0.0610**	0.00788	0.0748**	0.0424	0.0857**
	(0.0201)	(0.0225)	(0.0293)	(0.0249)	(0.0307)	(0.0451)	(0.0424)
unemploymt	-0.103*	-0.0137	-0.137*	-0.0163	-0.132	-0.184	0.0422
	(0.0553)	(0.0830)	(0.0799)	(0.0839)	(0.0844)	(0.1110)	(0.1030)
migrant	-0.00349	-0.0459	-0.0337	-0.0344	-0.0138	0.109	-0.0984
	(0.0158)	(0.0451)	(0.0519)	(0.0463)	(0.0521)	(0.0894)	(0.0683)
constant	0.447***	0.143	1.675***	0.297	1.638***	1.361***	2.415***
	(0.0804)	(0.1710)	(0.1330)	(0.2010)	(0.1800)	(0.1070)	(0.4590)
Municipal effects	No	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region*year	No	No	No	Yes	Yes	No	No
Municipality	180	170	170	170	170	99	101
R-squared	0.597	0.508	0.016	0.505	0.019	0.131	0.033
-within	—	0.474	0.208	0.486	0.228	0.281	0.175
-between	—	0.498	0.011	0.498	0.009	0.081	0.02
Observations	845	845	845	845	845	442	403

Notes: Dependent variable is *compliance ratio* defined as % workers paid more than or equal to the MW in each municipality. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 4.3: Regressions on the Minimum Wage

	Pooled OLS		Municipal Panel	
VARIABLES	(1)	(2)	(3)	(4)
compliance ratio		-1.5976***		-0.8787***
		(0.1834)		(0.1440)
ln*wage*	0.3753***	0.5919***	0.1083***	0.2828***
	(0.0212)	(0.0264)	(0.0296)	(0.0447)
female	-0.2666**	-0.1309	-0.1721	-0.1794*
	(0.1214)	(0.1204)	(0.1067)	(0.1065)
manufacture	0.2024***	0.1682***	0.0627	0.0238
	(0.0461)	(0.0388)	(0.0627)	(0.0539)
construction	-0.1733	-0.1069	-0.2160	-0.2636
	(0.2446)	(0.2045)	(0.2944)	(0.2706)
service	0.1684***	0.2584***	-0.0489	-0.0112
	(0.0489)	(0.0528)	(0.0637)	(0.0679)
soe	-0.2165***	0.0011	-0.0170	-0.0068
	(0.0407)	(0.0405)	(0.0451)	(0.0449)
unemploymt	-0.7009***	-0.6631***	0.0387	0.0222
	(0.1259)	(0.1190)	(0.1350)	(0.1562)
migrant	0.2770***	0.1913***	0.3370***	0.2578***
	(0.0642)	(0.0528)	(0.0811)	(0.0693)
constant	4.4990***	3.9117***	6.6716***	6.0275***
	(0.2091)	(0.1718)	(0.2673)	(0.3041)
Municipal effects	No	No	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Municipality	180	180	180	180
R-squared	0.8633	0.9028	0.7833	0.8511
-within	—	—	0.8653	0.8808
-between	—	—	0.7717	0.8606
Observations	845	845	845	845

Notes: Dependent variable is ln(*annual minimum wages*) in each municipality. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 4.4: Inequality and Minimum Wages at the Municipal Level - Summary (full equations are given in Tables 4a-c)

Minimum Wage Measure	Gini Index		Variance		50-10 Gap		90-10 Gap	
Sample period: 1995 - 2007	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year
Minimum wage	-0.088***	-0.073***	-0.245*	-0.372**	-0.518***	-0.478***	-0.602***	-0.514***
	(0.027)	(0.028)	(0.141)	(0.164)	(0.132)	(0.151)	(0.165)	(0.174)
Minimum wage lagged	-0.008*	-0.007*	-0.058*	-0.059*	-0.022	-0.015	-0.024	-0.013
	(0.004)	(0.004)	(0.031)	(0.035)	(0.025)	(0.026)	(0.027)	(0.027)
Sum current and lagged	-0.096	-0.080	-0.303	-0.431	-0.540	-0.493	-0.626	-0.527
Observations	170	170	170	170	170	170	170	170
Sample period: 1995 - 2003	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year
Minimum wage	-0.118***	-0.090**	-0.073	0.018	-0.454***	-0.329	-0.685***	-0.534**
	(0.037)	(0.043)	(0.208)	(0.275)	(0.162)	(0.204)	(0.204)	(0.248)
Minimum wage lagged	-0.006	-0.007*	-0.088***	-0.093***	-0.013	-0.011	-0.015	-0.015
	(0.004)	(0.004)	(0.030)	(0.034)	(0.024)	(0.026)	(0.024)	(0.026)
Sum current and lagged	-0.124	-0.097	-0.160	-0.074	-0.467	-0.340	-0.700	-0.549
Observations	89	89	89	89	89	89	89	89
Sample period: 2004 - 2007	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year
Minimum wage	-0.045*	-0.059**	-0.401**	-0.482***	-0.859***	-0.893***	-0.657***	-0.714***
	(0.026)	(0.024)	(0.188)	(0.179)	(0.210)	(0.193)	(0.216)	(0.209)
Minimum wage lagged	0.002	0.004	0.050	0.065	0.033	0.043	0.058	0.063
	(0.008)	(0.008)	(0.049)	(0.050)	(0.079)	(0.081)	(0.076)	(0.080)
Sum current and lagged	-0.043	-0.055	-0.351	-0.417	-0.826	-0.850	-0.599	-0.651
Observations	101	101	101	101	101	101	101	101

Notes: The dependent variables are Gini index, variances, 50-10 gaps, and 90-10 gaps. Each number corresponds to a minimum wage effect from a regression in Table 4.4a, 4.4b, and 4.4c. Two specifications are adopted, with one including municipal and year fixed effects, and the other one including an extra region*year effects (region-specific time effects). The upper panel corresponds to Table 4.4a, the middle panel corresponds to Table 4.4b, and the bottom panel corresponds to Table 4.4c. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Calculated from the minimum wage estimates of Table 4.4a, 4.4b, & 4.4c.

Table 4.4a: Regressions of Minimum Wages on Inequality Indices at the Municipal Level, 1995-2007

	Gini index		Variance		50-10 Gap		90-10 Gap	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln*mw*	-0.0875***	-0.0728***	-0.245*	-0.372**	-0.518***	-0.478***	-0.602***	-0.514***
	(0.0270)	(0.0277)	(0.141)	(0.164)	(0.132)	(0.151)	(0.165)	(0.174)
ln*mw* lagged	-0.00828*	-0.00734*	-0.0578*	-0.0592*	-0.0217	-0.0149	-0.0237	-0.0126
	(0.00449)	(0.00413)	(0.0307)	(0.0350)	(0.0250)	(0.0260)	(0.0267)	(0.0265)
compliance	-0.435***	-0.428***	-1.060	-1.178	-2.893**	-2.867**	-3.504***	-3.432***
	(0.138)	(0.134)	(0.734)	(0.735)	(1.129)	(1.124)	(1.153)	(1.140)
ln*wage*	0.00846	-0.00247	-1.495***	-1.440***	-0.411	-0.431	-0.315	-0.374
	(0.0414)	(0.0421)	(0.265)	(0.264)	(0.253)	(0.266)	(0.297)	(0.308)
education	-0.00195	-0.00391	0.272**	0.259**	0.279***	0.270**	0.196	0.192
	(0.0208)	(0.0208)	(0.124)	(0.126)	(0.102)	(0.111)	(0.131)	(0.139)
female	0.0603	0.0445	-0.425	-0.384	-0.411	-0.457	-0.0762	-0.152
	(0.0647)	(0.0618)	(0.489)	(0.517)	(0.530)	(0.536)	(0.595)	(0.596)
manufacture	0.0663*	0.0908**	0.212	0.135	0.243	0.295	0.551*	0.645*
	(0.0376)	(0.0376)	(0.264)	(0.282)	(0.281)	(0.302)	(0.318)	(0.328)
construction	0.0293	-0.0120	-1.215	-1.085	-0.176	-0.216	0.0296	-0.0284
	(0.0842)	(0.0887)	(0.764)	(0.748)	(0.819)	(0.840)	(0.739)	(0.757)
service	-0.0371	-0.0440	-0.538**	-0.529**	-0.153	-0.181	-0.123	-0.170
	(0.0480)	(0.0480)	(0.238)	(0.231)	(0.187)	(0.190)	(0.285)	(0.294)
soe	-0.0272	-0.00524	0.284	0.287	0.0218	0.0650	-0.144	-0.0771
	(0.0299)	(0.0320)	(0.194)	(0.197)	(0.152)	(0.163)	(0.194)	(0.204)
unemploymt	0.193**	0.178**	0.464	0.497	0.455	0.413	1.249**	1.173**
	(0.0808)	(0.0826)	(0.537)	(0.540)	(0.477)	(0.482)	(0.563)	(0.567)
migrant	-0.0512	-0.0628	0.310	0.454	-0.0597	-0.172	-0.398**	-0.423*
	(0.0370)	(0.0391)	(0.355)	(0.424)	(0.206)	(0.240)	(0.200)	(0.244)
constant	1.297***	1.249***	15.62***	16.29***	10.05***	9.852***	11.13***	10.74***
	(0.224)	(0.233)	(1.923)	(1.869)	(1.464)	(1.465)	(1.744)	(1.688)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region*year	No	Yes	No	Yes	No	Yes	No	Yes
Number of municipalities	170	170	170	170	170	170	170	170
R-squared	0.130	0.107	0.026	0.029	0.093	0.084	0.118	0.112
-within	0.455	0.484	0.630	0.648	0.414	0.424	0.485	0.498
-between	0.106	0.089	0.001	0.000	0.063	0.055	0.090	0.085
Observations	544	544	544	544	544	544	544	544

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4.4b: Regressions of Minimum Wages on Inequality Indices at the Municipal Level, 1995-2003

	Gini index		Variance		50-10 Gap		90-10 Gap	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln*mw*	-0.118***	-0.0899**	-0.0729	0.0182	-0.454***	-0.329	-0.685***	-0.534**
	(0.0368)	(0.0429)	(0.208)	(0.275)	(0.162)	(0.204)	(0.204)	(0.248)
ln*mw* lagged	-0.00558	-0.00683*	-0.0875***	-0.0926***	-0.0128	-0.0110	-0.0149	-0.0154
	(0.00362)	(0.00357)	(0.0298)	(0.0341)	(0.0239)	(0.0262)	(0.0236)	(0.0258)
compliance	-0.778***	-0.754***	-0.373	-0.324	-4.366***	-4.185***	-5.726***	-5.536***
	(0.117)	(0.123)	(1.048)	(1.091)	(0.842)	(0.855)	(0.854)	(0.860)
ln*wage*	0.0862**	0.0669*	-1.961***	-1.946***	-0.0971	-0.157	0.205	0.0990
	(0.0330)	(0.0376)	(0.304)	(0.308)	(0.166)	(0.169)	(0.199)	(0.213)
education	-0.00741	-0.00798	0.475***	0.491***	0.307***	0.330***	0.145	0.152
	(0.0264)	(0.0269)	(0.173)	(0.155)	(0.108)	(0.106)	(0.134)	(0.137)
female	-0.0443	-0.0558	-1.961**	-2.235***	-1.826***	-1.917***	-1.862**	-1.933**
	(0.127)	(0.118)	(0.843)	(0.820)	(0.643)	(0.675)	(0.722)	(0.764)
manufacture	-0.00196	0.0389	-0.196	-0.172	-0.00590	0.148	0.112	0.270
	(0.0352)	(0.0406)	(0.426)	(0.440)	(0.260)	(0.292)	(0.251)	(0.302)
construction	-0.00123	-0.0470	-2.108*	-2.401**	-1.403	-1.538	-0.731	-0.746
	(0.121)	(0.138)	(1.136)	(1.195)	(0.876)	(0.937)	(0.892)	(0.965)
service	-0.0624	-0.0818	-1.312***	-1.258**	0.145	0.126	-0.134	-0.261
	(0.0683)	(0.0723)	(0.497)	(0.480)	(0.301)	(0.301)	(0.385)	(0.418)
soe	-0.0423	-0.0123	0.755***	0.864***	0.404**	0.472**	0.0890	0.169
	(0.0322)	(0.0355)	(0.274)	(0.286)	(0.189)	(0.217)	(0.192)	(0.217)
unemploymt	0.0868	0.0367	-0.703	-0.466	-0.0566	-0.0389	0.159	-0.0606
	(0.0872)	(0.0822)	(0.717)	(0.762)	(0.523)	(0.559)	(0.571)	(0.616)
migrant	-0.149*	-0.186**	0.193	0.345	-0.482	-0.649	-1.103**	-1.212**
	(0.0806)	(0.0819)	(0.555)	(0.645)	(0.433)	(0.485)	(0.458)	(0.516)
constant	1.322***	1.241***	17.95***	17.09***	8.741***	8.010***	10.71***	10.22***
	(0.343)	(0.351)	(2.764)	(2.940)	(2.154)	(2.295)	(2.495)	(2.531)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region*year	No	Yes	No	Yes	No	Yes	No	Yes
Number of municipalities	89	89	89	89	89	89	89	89
R-squared	0.175	0.195	0.019	0.037	0.274	0.280	0.234	0.242
-within	0.575	0.617	0.705	0.728	0.615	0.629	0.650	0.671
-between	0.054	0.095	0.004	0.009	0.214	0.211	0.146	0.158
Observations	245	245	245	245	245	245	245	245

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4.4c: Regressions of Minimum Wages on Inequality Indices at the Municipal Level, 2004-2007

	Gini index		Variance		50-10 Gap		90-10 Gap	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln*mw*	-0.0452*	-0.0588**	-0.401**	-0.482***	-0.859***	-0.893***	-0.657***	-0.714***
	(0.0264)	(0.0241)	(0.188)	(0.179)	(0.210)	(0.193)	(0.216)	(0.209)
ln*mw* lagged	0.00214	0.00407	0.0497	0.0654	0.0329	0.0428	0.0584	0.0633
	(0.00754)	(0.00757)	(0.0488)	(0.0501)	(0.0786)	(0.0805)	(0.0763)	(0.0802)
compliance	-0.215**	-0.218**	-1.509	-1.530	-2.268	-2.279	-2.358*	-2.350*
	(0.108)	(0.103)	(0.985)	(0.949)	(1.457)	(1.424)	(1.286)	(1.261)
ln*wage*	-0.0906**	-0.0946**	-0.630*	-0.653**	-0.600	-0.609	-0.809	-0.827
	(0.0378)	(0.0379)	(0.321)	(0.326)	(0.570)	(0.582)	(0.542)	(0.540)
education	-0.00913	-0.00697	0.0833	0.0882	0.263	0.259	0.209	0.241
	(0.0163)	(0.0167)	(0.106)	(0.109)	(0.199)	(0.219)	(0.197)	(0.214)
female	0.0673	0.0658	0.0341	0.0205	-0.314	-0.323	0.107	0.0973
	(0.0536)	(0.0542)	(0.361)	(0.372)	(0.794)	(0.809)	(0.762)	(0.770)
manufacture	0.100***	0.107***	0.471	0.507*	0.651	0.666	1.066**	1.098**
	(0.0361)	(0.0357)	(0.290)	(0.301)	(0.456)	(0.484)	(0.407)	(0.426)
construction	-0.0296	-0.000376	0.00273	0.178	1.655	1.730	0.574	0.773
	(0.110)	(0.116)	(0.984)	(1.022)	(1.707)	(1.689)	(1.439)	(1.453)
service	0.0338	0.0334	0.0954	0.0880	0.158	0.151	0.397**	0.400**
	(0.0205)	(0.0207)	(0.114)	(0.107)	(0.180)	(0.181)	(0.183)	(0.187)
soe	-0.0581**	-0.0494*	-0.202	-0.139	-0.0158	0.0193	-0.234	-0.228
	(0.0260)	(0.0279)	(0.134)	(0.153)	(0.196)	(0.246)	(0.214)	(0.249)
unemploymt	0.0721	0.0702	-0.265	-0.276	0.00629	0.00134	0.568	0.574
	(0.0615)	(0.0617)	(0.454)	(0.475)	(0.576)	(0.581)	(0.538)	(0.551)
migrant	-0.00729	0.0276	-0.179	-0.00645	0.105	0.150	-0.0877	0.217
	(0.0398)	(0.0437)	(0.195)	(0.294)	(0.262)	(0.358)	(0.243)	(0.364)
constant	1.708***	1.820***	10.34***	11.00***	14.24***	14.52***	15.07***	15.44***
	(0.312)	(0.312)	(2.487)	(2.579)	(4.329)	(4.371)	(4.391)	(4.202)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region*year	No	Yes	No	Yes	No	Yes	No	Yes
Number of municipalities	101	101	101	101	101	101	101	101
R-squared	0.148	0.127	0.069	0.060	0.029	0.027	0.072	0.070
-within	0.567	0.579	0.482	0.498	0.348	0.350	0.490	0.495
-between	0.109	0.086	0.023	0.015	0.004	0.003	0.031	0.028
Observations	299	299	299	299	299	299	299	299

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4.5: Inequality and Minimum Wages at the Province Level

Minimum Wage Measure	Gini Index		Variance		50-10 Gap		90-10 Gap	
Sample period: 1995 - 2007	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year
Minimum wage	0.020	0.045	-0.752***	-1.115***	-0.523**	-0.489***	-0.315*	-0.217
	(0.031)	(0.028)	(0.237)	(0.243)	(0.191)	(0.145)	(0.174)	(0.159)
Minimum wage lagged	-0.011	-0.014**	0.068	0.068	0.032	0.045	-0.024	-0.023
	(0.006)	(0.006)	(0.065)	(0.073)	(0.032)	(0.037)	(0.034)	(0.047)
Sum current and lagged	0.009	0.031	-0.684	-1.047	-0.491	-0.444	-0.339	-0.240
Observations	95	95	95	95	95	95	95	95
Sample period: 1995 - 2003	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year
Minimum wage	0.013	0.095	-0.083	-0.938	-0.407*	-0.569*	-0.323	-0.130
	(0.080)	(0.092)	(0.691)	(1.154)	(0.200)	(0.241)	(0.301)	(0.199)
Minimum wage lagged	-0.013	-0.023*	0.079	0.159	-0.005	0.002	-0.046	-0.072
	(0.010)	(0.009)	(0.045)	(0.094)	(0.026)	(0.040)	(0.042)	(0.059)
Sum current and lagged	0.000	0.072	-0.004	-0.779	-0.412	-0.567	-0.369	-0.202
Observations	51	51	51	51	51	51	51	51
Sample period: 2004 - 2007	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year
Minimum wage	0.023	0.012	-0.376***	-0.286**	-0.960***	-0.818***	-0.657**	-0.623*
	(0.021)	(0.035)	(0.106)	(0.124)	(0.294)	(0.276)	(0.266)	(0.297)
Minimum wage lagged	-0.038**	-0.041**	0.170***	0.153***	0.204	0.245	0.237	0.317
	(0.014)	(0.017)	(0.043)	(0.049)	(0.144)	(0.196)	(0.169)	(0.229)
Sum current and lagged	-0.015	-0.029	-0.206	-0.133	-0.756	-0.573	-0.420	-0.306
Observations	44	44	44	44	44	44	44	44
Sample period: 2004 - 2007	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year	Incl.Year	Incl.Region*year
Minimum wage	-0.025	-0.025	0.058	-0.157	-0.892	-1.357	0.210	-0.159
	(0.044)	(0.048)	(0.508)	(0.566)	(0.666)	(0.749)	(0.713)	(0.845)
Minimum wage lagged	-0.0544*	-0.0491**	-0.313***	-0.279**	-0.343	-0.310	-0.534**	-0.490***
	(0.025)	(0.016)	(0.094)	(0.099)	(0.245)	(0.200)	(0.172)	(0.139)
Sum current and lagged	-0.079	-0.074	-0.255	-0.436	-1.235	-1.667	-0.324	-0.649
Observations	44	44	44	44	44	44	44	44

Notes: The dependent variables are Gini index, variances, 50-10 gaps, and 90-10 gaps. Each number corresponds to a minimum wage effect from a regression which has the same specification as Table 4.4a-c. Two specifications are adopted as well, with one including municipal and year fixed effects, and the other one including an extra region*year effects (region-specific time effects). The upper panel corresponds to the period 1995-2007, the first middle panel corresponds to the period 1995-2003, the second middle panel corresponds to the period 2004-2007, and the bottom panel corresponds to the period 2004-2007 using data from the statistics yearbooks. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Calculated from the minimum wage estimates of full regressions which are offered by request.

Table 4.6: The Impact of the Minimum Wage on Wage Differentials: 1995-2007. Panel Estimates

Dependent variable	(1)	(2)	(3)	(4)
p10-p60	0.256**	0.308	0.883***	1.418*
p20-p60	0.286*	0.350	0.6***	0.959*
p30-p60	0.186	0.243	0.385**	0.685
p40-p60	0.131**	0.179**	0.224***	0.382**
p50-p60	0.06*	0.082	0.101**	0.190
p70-p60	0.099	0.186	0.082	0.232*
F-test	[12.96***]	[8.79*]	[3.27*]	[9.77*]
p80-p60	0.169	0.305	0.139	0.416*
F-test	[4.73**]	[9.67*]	[2.25]	[43.48**]
p90-p60	0.194	0.370	0.169	0.572**
F-test	[1.73]	[12.35*]	[1.46]	[59.16**]
Municipal effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Province*year	No	Yes	No	Yes
Municipal controls	No	No	Yes	Yes
Observations	843	843	843	843

Notes: Each entry in the table is corresponding to a separate regression. Each row corresponds to a different dependent variable, and each column corresponds to a different specification. Minimum wage effects are reported at sample means. Specifically, each entry is calculated as the first derivative of each explained variable with respect to the effective minimum wage at the weighted sample mean. For example, the third entry in the first row 0.883 is calculated from column (1) in Table 4.6a: $\beta p1 + 2\times\beta p2\times[MW - W60] = 2.5526 + 2*0.7590*(-1.1) = 0.883$. Here -1.1 is the weighted sample mean of effective minimum wage squared. Significance levels are the higher of the effective minimum or its square. F-test refers to an F-test on both the minimum and its square. Values of F-tests are shown in square brackets and asterisks indicate significance levels. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Source: Calculated from the minimum wage estimates of Table 4.6a and other regressions offered as required.

Table 4.6a. The Impact of the Minimum Wage on Wage Differentials: 1995-2007, Panel Estimates

	p10-p60	p20-p60	p30-p60	p40-p60	p50-p60	p70-p60	p80-p60	p90-p60
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
effective mw	2.5526***	1.6495***	1.0722**	0.6467***	0.3105**	0.0261	-0.0020	-0.1891
	(0.5590)	(0.4999)	(0.3921)	(0.1627)	(0.1237)	(0.1636)	(0.2933)	(0.5243)
effective mw squared	0.7590***	0.4770**	0.3123**	0.1924**	0.0951*	-0.0255	-0.0639	-0.1629
	(0.2106)	(0.1873)	(0.1437)	(0.0660)	(0.0519)	(0.0886)	(0.1480)	(0.2437)
compliance	3.4697***	1.7843***	0.9364*	0.6593***	0.2203**	-0.1412	-0.3432	-0.3008
	(0.3015)	(0.3587)	(0.4502)	(0.2159)	(0.0891)	(0.1018)	(0.2248)	(0.3038)
lnwage	0.4762*	0.1561	0.1297	0.0136	0.0291	0.0425	0.1047	0.1263
	(0.2467)	(0.1631)	(0.1457)	(0.0601)	(0.0289)	(0.0491)	(0.0731)	(0.0777)
education	0.0019	0.0612	-0.0169	0.0098	-0.0123	-0.0157	-0.0508	-0.0134
	(0.0803)	(0.0725)	(0.0480)	(0.0248)	(0.0276)	(0.0295)	(0.0293)	(0.0521)
female	-0.1758	-0.1540	-0.0290	-0.0239	-0.0264	0.2313**	0.3637*	0.3913
	(0.4940)	(0.3145)	(0.1685)	(0.0706)	(0.0630)	(0.0908)	(0.2057)	(0.2628)
manufacture	0.1562	0.0135	0.0047	0.0375	0.0219	0.0346	0.1317	0.2048
	(0.3185)	(0.1776)	(0.0883)	(0.0351)	(0.0485)	(0.0505)	(0.0754)	(0.1298)
construction	-0.0761	-0.4078	-0.1382	0.3171	0.1161	0.1453	0.3081*	0.5036
	(0.5939)	(0.5864)	(0.4752)	(0.2681)	(0.1631)	(0.1239)	(0.1683)	(0.3430)
service	0.1223	0.0232	-0.1818*	-0.0727	-0.0252	0.0176	0.0454	0.0623
	(0.2949)	(0.1367)	(0.0902)	(0.0658)	(0.0698)	(0.0557)	(0.0824)	(0.1219)
soe	0.0893	0.0798	0.0769	0.0003	0.0087	-0.0472	-0.0833	-0.1990*
	(0.1445)	(0.0766)	(0.0782)	(0.0685)	(0.0237)	(0.0325)	(0.0580)	(0.1074)
unemploymt	-0.4151	-0.3984	-0.0880	0.1478	-0.0146	0.2591***	0.2506	0.3638
	(0.6020)	(0.3127)	(0.1799)	(0.1683)	(0.1856)	(0.0612)	(0.1643)	(0.3365)
migrant	-0.1182	-0.2587	-0.1794	-0.1756	-0.0658	-0.0511	-0.2131***	-0.2937***
	(0.2812)	(0.1958)	(0.1243)	(0.1304)	(0.0490)	(0.0459)	(0.0479)	(0.0885)
constant	-6.1639***	-2.3469**	-1.3323	-0.4343	-0.2870	-0.0524	-0.1963	-0.3922
	(1.8857)	(0.9381)	(0.7677)	(0.3743)	(0.1884)	(0.4183)	(0.4892)	(0.5669)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	843	843	843	843	843	843	843	843
R-squared	0.7640	0.7548	0.7148	0.7355	0.5720	0.6184	0.7372	0.7892

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4.7: The Impact of the Minimum Wage on Wage Differentials: IV Estimates and Robustness Checks

Dependent variable	All	1995-2003	2004-2007	Males	Females
	(1)	(2)	(3)	(4)	(5)
p10-p60	0.789***	0.743***	0.962***	0.955***	0.562***
p20-p60	0.494***	0.425***	0.698**	0.421***	0.350***
p30-p60	0.310***	0.283***	0.45**	0.243*	0.249***
p40-p60	0.193***	0.161***	0.25**	0.209**	0.161***
p50-p60	0.082***	0.073***	0.086**	0.159	0.175***
p70-p60	-0.015	-0.003	-0.007	0.076	0.002
F-test	[1.45]	[3.43]	[0.50]	[1.76]	[0.01]
p80-p60	-0.023	-0.041	0.053	0.038	0.037
F-test	[2.41]	[2.12]	[2.22]	[2.89]	[1.16]
p90-p60	0.035	-0.043	0.141	-0.006	0.223*
F-test	[0.51]	[3.47]	[3.18]	[5.58*]	[14.84***]
Municipal effects	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes
Municipal controls	Yes	Yes	Yes	Yes	Yes
Observations	843	843	843	843	843

Notes: Each entry in the table is corresponding to a separate regression. Each row corresponds to a different dependent variable, and each column corresponds to a different specification. Minimum wage effects are reported at sample means. Specifically, each entry is calculated as the first derivative of each explained variable with respect to the effective minimum wage at the weighted sample mean. For example, the first entry 0.789 is calculated from column (1) in Table 4.7a: $\beta p1 + 2\times\beta p2\times[MW - W60] = 2.4973 + 2*0.7763*(-1.1) = 0.789$. Here -1.1 is the weighted sample mean of effective minimum wage squared. Significance levels are the higher of the effective minimum or its square. F-test refers to an F-test on both the minimum and its square. Values of F-tests are shown in square brackets and asterisks indicate significance levels. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Source: Calculated from the minimum wage estimates of Table 4.7a and other regressions offered as required.

Table 4.7a: The Impact of the Minimum Wage on Wage Differentials: 1995-2007. IV Estimates

VARIABLES	p10-p60 (1)	p20-p60 (2)	p30-p60 (3)	p40-p60 (4)	p50-p60 (5)	p70-p60 (6)	p80-p60 (7)	p90-p60 (8)
effective mw	2.4973***	1.6655***	1.0944***	0.8376***	0.4172***	-0.1150	-0.3263	0.0403
	(0.2083)	(0.3782)	(0.2341)	(0.1719)	(0.0935)	(0.1002)	(0.2158)	(0.4729)
effective mw squared	0.7763***	0.5326***	0.3567***	0.2931***	0.1523***	-0.0454	-0.1377	0.0022
	(0.1022)	(0.1636)	(0.0967)	(0.0708)	(0.0403)	(0.0426)	(0.0889)	(0.2024)
compliance	4.6990***	2.8181***	1.9205***	1.1257***	0.4227***	-0.2529***	-0.4694***	-0.6581***
	(0.2411)	(0.1177)	(0.1843)	(0.1053)	(0.0679)	(0.0477)	(0.0806)	(0.1072)
lnwage	0.0020	-0.0666*	-0.0715***	-0.0530**	-0.0182	0.0377***	0.0635***	0.1236***
	(0.0313)	(0.0381)	(0.0275)	(0.0206)	(0.0129)	(0.0086)	(0.0221)	(0.0289)
education	-0.0159	-0.0158	0.0103	0.0108	-0.0000	-0.0359***	-0.0527***	-0.1064***
	(0.0458)	(0.0486)	(0.0313)	(0.0269)	(0.0202)	(0.0115)	(0.0201)	(0.0384)
female	0.1326	0.2371*	0.2491*	0.1495	0.1274*	0.0417	0.0507	0.0486
	(0.2789)	(0.1346)	(0.1357)	(0.1617)	(0.0753)	(0.0527)	(0.0866)	(0.1594)
manufacture	0.2065*	0.0439	0.0068	-0.0245	-0.0199	0.0653**	0.1605***	0.2168***
	(0.1085)	(0.0872)	(0.0582)	(0.0447)	(0.0269)	(0.0263)	(0.0524)	(0.0728)
construction	0.1437	-0.4206	-0.2801	0.0010	0.0269	-0.0391	0.0570	0.2023
	(0.2479)	(0.2745)	(0.1884)	(0.1072)	(0.0773)	(0.1021)	(0.1303)	(0.2123)
service	-0.0897	-0.1819	-0.1965*	-0.1505**	-0.0723**	0.0376	0.1105	0.1098*
	(0.0934)	(0.1186)	(0.1007)	(0.0623)	(0.0361)	(0.0375)	(0.0700)	(0.0600)
soe	0.1873***	0.1812***	0.1685***	0.1268***	0.0922***	-0.1204***	-0.2490***	-0.3601***
	(0.0690)	(0.0626)	(0.0651)	(0.0385)	(0.0227)	(0.0119)	(0.0272)	(0.0550)
unemploymt	-0.5035*	-0.6823***	-0.5561***	-0.3012**	-0.1533*	0.2670***	0.5347***	0.6026***
	(0.2735)	(0.1839)	(0.1110)	(0.1213)	(0.0918)	(0.0498)	(0.1012)	(0.1491)
migrant	0.0920	0.0518	0.0227	0.0037	0.0017	-0.0261	-0.0337	-0.1251
	(0.1275)	(0.1060)	(0.1006)	(0.0616)	(0.0406)	(0.0333)	(0.0684)	(0.1131)
constant	-3.7719***	-1.6075***	-1.0274***	-0.4418*	-0.1958*	0.1412**	0.2369***	0.5827*
	(0.3287)	(0.3139)	(0.2272)	(0.2324)	(0.1009)	(0.0620)	(0.0853)	(0.3461)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	843	843	843	843	843	843	843	843
R-squared	0.5474	0.4725	0.4061	0.3734	0.2310	0.3121	0.4405	0.4758

Notes: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4.8: Minimum Wages Spillover Effects by Percentiles, Individual Data - Summary (full results are given in Tables 4.8a-c below)

Minimum Wage Measure	p10		p20		p30		p40		p50		p60	
Sample period: 1995 - 2007	Incl.Year	Incl.Prov.*year	Incl.Year	Incl.Prov.*year	Incl.Year	Incl.Prov.*year	Incl.Year	Incl.Prov.*year	Incl.Year	Incl.Prov.*year	Incl.Year	Incl.Prov.*year
Minimum wage	0.178	0.647**	0.230**	0.528**	0.081	0.203**	0.011	0.025*	-0.006	-0.070	-0.013	-0.091
	(0.153)	(0.084)	(0.082)	(0.054)	(0.047)	(0.024)	(0.022)	(0.007)	(0.020)	(0.030)	(0.021)	(0.049)
Minimum wage lagged	-0.029	-0.029**	-0.006	-0.006	0.004	0.004	0.000	-0.001	0.001	0.001	0.000	-0.001
	(0.051)	(0.004)	(0.005)	(0.003)	(0.005)	(0.002)	(0.006)	(0.002)	(0.002)	(0.001)	(0.004)	(0.003)
Sum current and lagged	0.149	0.618	0.224	0.522	0.085	0.207	0.011	0.024	-0.005	-0.069	-0.013	-0.092
Observations	9,115	9,115	8,780	8,780	8821	8821	8717	8717	8670	8670	8906	8906
Sample period: 1995 - 2003	Incl.Year	Incl.Prov.*year	Incl.Year	Incl.Prov.*year	Incl.Year	Incl.Prov.*year	Incl.Year	Incl.Prov.*year	Incl.Year	Incl.Prov.*year	Incl.Year	Incl.Prov.*year
Minimum wage	0.145	0.359	0.204***	0.527*	0.077	0.256	0.012	0.050	0.006	-0.060	-0.003	-0.075
	(0.144)	(0.080)	(0.054)	(0.074)	(0.058)	(0.043)	(0.049)	(0.008)	(0.033)	(0.040)	(0.023)	(0.066)
Minimum wage lagged	-0.068	-0.056***	-0.011	-0.009*	0.002	0.002	0.002	-0.000	-0.000	-0.001	-0.002	-0.002
	(0.064)	(0.000)	(0.008)	(0.001)	(0.006)	(0.003)	(0.008)	(0.003)	(0.004)	(0.001)	(0.004)	(0.005)
Sum current and lagged	0.077	0.303	0.193	0.518	0.079	0.258	0.014	0.050	0.006	-0.061	-0.005	-0.077
Observations	4,666	4,666	4,550	4,550	4,562	4,562	4,524	4,524	4,503	4,503	4,591	4,591
Sample period: 2004 - 2007	Incl.Year	Incl.Prov.*year	Incl.Year	Incl.Prov.*year	Incl.Year	Incl.Prov.*year	Incl.Year	Incl.Prov.*year	Incl.Year	Incl.Prov.*year	Incl.Year	Incl.Prov.*year
Minimum wage	0.998***	1.178	0.415***	0.429*	0.106***	0.046	-0.035	0.051	-0.133*	-0.048	-0.150**	-0.169
	(0.268)	(0.335)	(0.129)	(0.067)	(0.028)	(0.053)	(0.038)	(0.019)	(0.060)	(0.014)	(0.062)	(0.052)
Minimum wage lagged	0.017	0.018	-0.004	-0.004	0.008*	0.008*	0.001	-0.000	0.005	0.005	0.003	0.001
	(0.023)	(0.016)	(0.010)	(0.007)	(0.004)	(0.001)	(0.006)	(0.008)	(0.005)	(0.002)	(0.006)	(0.001)
Sum current and lagged	1.015	1.196	0.411	0.425	0.114	0.054	-0.034	0.051	-0.128	-0.043	-0.147	-0.168
Observations	4,449	4,449	4,230	4,230	4,259	4,259	4,193	4,193	4,167	4,167	4,315	4,315

Notes: The dependent variables are individual wages at the 10-60th percentile. Each number corresponds to a minimum wage effect from a regression which has the same specification as Table 4.8a-c. Two specifications are adopted as well, with one including municipal and year fixed effects, and the other one including an extra province*year effects (region-specific time effects). The upper panel corresponds to the period 1995-2007, the middle panel corresponds to the period 1995-2003, and the bottom panel corresponds to the period 2004-2007. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Standard errors in *Year* specifications are clustered by province, while in *Province*year* specifications are clustered by region.

Source: Calculated from the minimum wage estimates of Table 4.8a, 4.8b, and 4.8c.

Table 4.8a: Minimum Wages Spillover Effects by Percentiles, 1995-2007

	p10		p20		p30		p40		p50		p60	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ln*mw*	0.1782	0.6470**	0.2295**	0.5278**	0.0807	0.2029**	0.0105	0.0247*	-0.0064	-0.0697	-0.0129	-0.0910
	(0.1528)	(0.0843)	(0.0822)	(0.0543)	(0.0468)	(0.0243)	(0.0224)	(0.0074)	(0.0196)	(0.0303)	(0.0206)	(0.0487)
ln*mw* lagged	-0.0287	-0.0294**	-0.0060	-0.0060	0.0036	0.0036	0.0001	-0.0009	0.0007	0.0007	0.0004	-0.0006
	(0.0511)	(0.0045)	(0.0053)	(0.0031)	(0.0051)	(0.0018)	(0.0064)	(0.0021)	(0.0019)	(0.0008)	(0.0037)	(0.0029)
compliance	2.1795	2.7173**	2.4455***	2.4322***	1.0964***	1.0506***	0.3485**	0.2758*	-0.1397	-0.1491	-0.5018**	-0.4545**
	(1.2503)	(0.3476)	(0.1604)	(0.1258)	(0.1669)	(0.1012)	(0.1620)	(0.0718)	(0.2155)	(0.1042)	(0.2020)	(0.0643)
ln*wage*	2.2645***	2.0644**	0.4995***	0.5365**	0.5877***	0.5898**	0.6749***	0.6801***	0.7381***	0.7254***	0.7805***	0.7615***
	(0.1521)	(0.2708)	(0.0838)	(0.0723)	(0.0755)	(0.0741)	(0.0334)	(0.0245)	(0.0292)	(0.0143)	(0.0213)	(0.0258)
experience	0.0743***	0.0745***	0.0029***	0.0027**	0.0015**	0.0012**	0.0010**	0.0009*	0.0001	-0.0000	-0.0007	-0.0006*
	(0.0136)	(0.0062)	(0.0006)	(0.0003)	(0.0005)	(0.0001)	(0.0003)	(0.0002)	(0.0002)	(0.0001)	(0.0005)	(0.0002)
expersq	-0.0015***	-0.0016**	-0.0001***	-0.0001**	-0.0000**	-0.0000**	-0.0000***	-0.0000**	-0.0000	0.0000	0.0000*	0.0000**
	(0.0003)	(0.0002)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
education	0.0611**	0.0617*	0.0071***	0.0069***	0.0066***	0.0056**	0.0012	0.0010	0.0043**	0.0041	0.0035**	0.0033**
	(0.0229)	(0.0207)	(0.0021)	(0.0006)	(0.0014)	(0.0010)	(0.0009)	(0.0004)	(0.0016)	(0.0015)	(0.0015)	(0.0004)
female	0.1852***	0.1838**	-0.0086**	-0.0090	-0.0075***	-0.0081**	-0.0055**	-0.0058**	-0.0018	-0.0025	-0.0031*	-0.0028
	(0.0515)	(0.0277)	(0.0038)	(0.0045)	(0.0017)	(0.0018)	(0.0020)	(0.0008)	(0.0020)	(0.0013)	(0.0017)	(0.0020)
soe	0.5620***	0.5574**	0.0170***	0.0138***	0.0099***	0.0079	0.0065***	0.0061**	0.0068***	0.0076**	0.0083*	0.0088**
	(0.1040)	(0.0651)	(0.0038)	(0.0009)	(0.0023)	(0.0028)	(0.0015)	(0.0006)	(0.0021)	(0.0010)	(0.0041)	(0.0013)
constant	-16.7725***	-18.3595**	-0.0199	-2.6520***	1.7379***	0.8070	2.3753***	2.1919***	2.5024***	2.8970***	2.6220***	3.3621***
	(1.1999)	(1.9407)	(0.4270)	(0.1259)	(0.4437)	(0.3599)	(0.2131)	(0.2171)	(0.1597)	(0.0372)	(0.1790)	(0.1429)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province*year	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	9,115	9,115	8,780	8,780	8,821	8,821	8,717	8,717	8,670	8,670	8,906	8,906
R-squared	0.5666	0.5735	0.9375	0.9416	0.9678	0.9707	0.9779	0.9799	0.9813	0.9830	0.9828	0.9846

Notes: Dependent variables are percentiles in the first row. Standard errors are in parentheses.
Standard errors in (1), (3), (5), (7), (9), and (11) are clustered by province, while the left are clustered by region. *** p<0.01, ** p<0.05, * p<0.1.

Table 4.8b: Minimum Wages Spillover Effects by Percentiles, 1995-2003

	p10		p20		p30		p40		p50		p60	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ln*mw*	0.1449	0.3589	0.2044***	0.5270*	0.0774	0.2561	0.0118	0.0503	0.0056	-0.0601	-0.0034	-0.0752
	(0.1445)	(0.0795)	(0.0543)	(0.0736)	(0.0577)	(0.0426)	(0.0490)	(0.0081)	(0.0331)	(0.0396)	(0.0229)	(0.0661)
ln*mw* lagged	-0.0675	-0.0556***	-0.0107	-0.0090*	0.0022	0.0018	0.0016	-0.0002	-0.0003	-0.0011	-0.0019	-0.0017
	(0.0644)	(0.0004)	(0.0079)	(0.0008)	(0.0056)	(0.0028)	(0.0080)	(0.0025)	(0.0035)	(0.0010)	(0.0044)	(0.0049)
compliance	2.1189	1.9369*	2.5377***	2.6605***	1.1038**	1.1727*	0.2174	0.2381	-0.1681	-0.1332	-0.5322	-0.3931
	(1.8969)	(0.2884)	(0.1590)	(0.0006)	(0.3438)	(0.1270)	(0.4860)	(0.2163)	(0.5166)	(0.1176)	(0.4864)	(0.0667)
ln*wage*	2.3773***	2.2784*	0.5645***	0.5362**	0.5743***	0.5377	0.6428***	0.6359*	0.6761***	0.6780**	0.6993***	0.6977***
	(0.2815)	(0.3519)	(0.0300)	(0.0368)	(0.0915)	(0.0853)	(0.0829)	(0.0709)	(0.0792)	(0.0188)	(0.0836)	(0.0059)
experience	0.1330***	0.1328**	0.0035***	0.0034***	0.0018**	0.0015**	0.0009	0.0009	-0.0004	-0.0004	-0.0017***	-0.0013**
	(0.0122)	(0.0075)	(0.0008)	(0.0000)	(0.0006)	(0.0000)	(0.0006)	(0.0006)	(0.0003)	(0.0002)	(0.0004)	(0.0000)
expersq	-0.0032***	-0.0032**	-0.0001***	-0.0001*	-0.0000**	-0.0000*	-0.0000	-0.0000	0.0000	0.0000	0.0000***	0.0000*
	(0.0003)	(0.0002)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
education	0.0867***	0.0922	0.0074	0.0079	0.0041*	0.0027	0.0008	0.0001	0.0034*	0.0030	0.0016	0.0017*
	(0.0200)	(0.0233)	(0.0039)	(0.0023)	(0.0017)	(0.0011)	(0.0010)	(0.0010)	(0.0014)	(0.0019)	(0.0013)	(0.0002)
female	0.2366**	0.2377*	-0.0081*	-0.0093	-0.0088***	-0.0101	-0.0022	-0.0027	0.0035	0.0018	-0.0009	0.0002
	(0.0779)	(0.0200)	(0.0040)	(0.0052)	(0.0019)	(0.0023)	(0.0023)	(0.0008)	(0.0026)	(0.0009)	(0.0016)	(0.0017)
soe	0.7717***	0.7680**	0.0149**	0.0122***	0.0080*	0.0056	0.0071***	0.0060**	0.0071	0.0062	0.0105*	0.0101*
	(0.1699)	(0.0259)	(0.0046)	(0.0001)	(0.0036)	(0.0061)	(0.0012)	(0.0003)	(0.0042)	(0.0031)	(0.0045)	(0.0009)
constant	-18.5558***	-20.5904	-0.6062	-2.9869*	1.8354**	0.8075	2.8030***	2.4293*	3.0850***	3.5462*	3.4219***	3.6648*
	(3.3929)	(3.8363)	(0.4599)	(0.3004)	(0.6069)	(0.3324)	(0.4478)	(0.3164)	(0.5712)	(0.3729)	(0.6950)	(0.4690)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province*year	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	4,666	4,666	4,550	4,550	4,562	4,562	4,524	4,524	4,503	4,503	4,591	4,591
R-squared	0.4773	0.4823	0.9180	0.9236	0.9621	0.9665	0.9746	0.9775	0.9786	0.9810	0.9786	0.9811

Notes: Dependent variables are percentiles in the first row. Standard errors are in parentheses.
Standard errors in (1), (3), (5), (7), (9), and (11) are clustered by province, while the left are clustered by region. *** p<0.01, ** p<0.05, * p<0.1.

Table 4.8c: Minimum Wages Spillover Effects by Percentiles, 2004-2007

	p10		p20		p30		p40		p50		p60	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ln*mw*	0.9984***	1.1778	0.4146***	0.4288*	0.1059***	0.0459	-0.0355	0.0512	-0.1334*	-0.0478	-0.1497**	-0.1695
	(0.2683)	(0.3350)	(0.1291)	(0.0673)	(0.0281)	(0.0533)	(0.0384)	(0.0190)	(0.0602)	(0.0145)	(0.0617)	(0.0522)
ln*mw* lagged	0.0174	0.0182	-0.0039	-0.0041	0.0077*	0.0082*	0.0006	-0.0002	0.0053	0.0052	0.0027	0.0014
	(0.0226)	(0.0163)	(0.0105)	(0.0067)	(0.0042)	(0.0011)	(0.0064)	(0.0081)	(0.0048)	(0.0022)	(0.0056)	(0.0014)
compliance	4.3667***	4.4641*	2.1806***	2.1796*	0.9423***	0.9190	0.3804***	0.3287	-0.2247*	-0.1826	-0.5471***	-0.5753
	(0.5918)	(0.6898)	(0.1324)	(0.1840)	(0.1194)	(0.2284)	(0.0753)	(0.0789)	(0.1151)	(0.2099)	(0.0995)	(0.1152)
ln*wage*	0.5559***	0.5872	0.4649***	0.4954	0.7783***	0.7545	0.8431***	0.8327**	0.9201***	0.8834**	0.9540***	0.9566*
	(0.1162)	(0.1216)	(0.1146)	(0.2099)	(0.0664)	(0.1869)	(0.0391)	(0.0391)	(0.0698)	(0.0457)	(0.0511)	(0.0791)
experience	0.0148***	0.0152**	0.0014**	0.0015	0.0011	0.0011	0.0011**	0.0010	0.0005	0.0004	0.0002	0.0002
	(0.0020)	(0.0005)	(0.0005)	(0.0007)	(0.0007)	(0.0003)	(0.0004)	(0.0004)	(0.0005)	(0.0002)	(0.0004)	(0.0003)
expersq	-0.0004***	-0.0004**	-0.0000***	-0.0000	-0.0000	-0.0000	-0.0000***	-0.0000	-0.0000	-0.0000	0.0000	0.0000
	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
education	-0.0182	-0.0173	0.0077***	0.0071	0.0078***	0.0078*	0.0021	0.0022	0.0044**	0.0050	0.0057**	0.0057*
	(0.0164)	(0.0164)	(0.0019)	(0.0012)	(0.0021)	(0.0009)	(0.0019)	(0.0015)	(0.0017)	(0.0010)	(0.0018)	(0.0007)
female	0.0224	0.0227	-0.0088*	-0.0088	-0.0065*	-0.0064	-0.0078**	-0.0082	-0.0067*	-0.0069	-0.0057***	-0.0054
	(0.0220)	(0.0359)	(0.0045)	(0.0048)	(0.0031)	(0.0018)	(0.0032)	(0.0013)	(0.0036)	(0.0033)	(0.0018)	(0.0023)
soe	0.0671**	0.0629	0.0160**	0.0147*	0.0113**	0.0107***	0.0049	0.0045	0.0070**	0.0077	0.0042	0.0056
	(0.0261)	(0.0108)	(0.0055)	(0.0023)	(0.0036)	(0.0001)	(0.0031)	(0.0023)	(0.0024)	(0.0014)	(0.0029)	(0.0017)
constant	-9.7938***	-11.4839*	-1.0802	-1.4249	-0.1425	0.4702	1.2027**	0.6312	1.9718**	1.5365	2.2524***	2.5668*
	(2.0200)	(1.0508)	(0.6608)	(1.1973)	(0.6347)	(1.1398)	(0.5075)	(0.1855)	(0.7123)	(0.4947)	(0.6315)	(0.3890)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province*year	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	4,449	4,449	4,230	4,230	4,259	4,259	4,193	4,193	4,167	4,167	4,315	4,315
R-squared	0.3661	0.3725	0.8598	0.8637	0.9166	0.9196	0.9408	0.9433	0.9496	0.9510	0.9567	0.9584

Notes: Dependent variables are percentiles in the first row. Standard errors are in parentheses.

Standard errors in (1), (3), (5), (7), (9), and (11) are clustered by province, while the left are clustered by region. *** p<0.01, ** p<0.05, * p<0.1.

Table 4.9: Minimum Wages Spillover Effects by Percentiles, 2004-2007 Individual Panel Data - Summary
(Example results are given in Tables 4.9a below)

Minimum Wage Measure	p10	p20	p30	p40
Minimum wage	0.135**	0.105**	0.088**	0.079**
	(0.058)	(0.044)	(0.038)	(0.032)
Minimum wage lagged	0.034	0.084***	0.007	0.027
	(0.025)	(0.023)	(0.017)	(0.020)
Sum current and lagged	0.169	0.189	0.095	0.106
Observations	53,549	46,574	45,576	45,529
	p50	p60	p70	p80
Minimum wage	0.037	0.001	-0.020	-0.065
	(0.035)	(0.020)	(0.026)	(0.041)
Minimum wage lagged	0.030	0.064**	0.042	0.058
	(0.030)	(0.022)	(0.033)	(0.041)
Sum current and lagged	0.067	0.065	0.022	-0.007
Observations	45,968	46,898	46,333	45,791

Notes: The dependent variables are individual wages at the 10-80th percentile. Each number corresponds to a minimum wage effect from a regression which has the same specification as Table 4.9a. Province-clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Calculated from the minimum wage estimates of Table 4.9a.

Table 4.9a: Minimum Wages Spillover Effects by Percentiles, 2004-2007 Individual Panel Data

	p10	p20	p30	p40	p50	p60	p70	p80
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln*mw*	0.135**	0.105**	0.088**	0.079**	0.037	0.001	-0.020	-0.065
	(0.058)	(0.044)	(0.038)	(0.032)	(0.035)	(0.020)	(0.026)	(0.041)
ln*mw* lagged	0.034	0.084***	0.007	0.027	0.030	0.064**	0.042	0.058
	(0.025)	(0.023)	(0.017)	(0.020)	(0.030)	(0.022)	(0.033)	(0.041)
compliance	0.791***	0.480*	0.053	0.041	-0.163	-0.382**	-0.456***	-0.599***
	(0.141)	(0.223)	(0.128)	(0.197)	(0.185)	(0.158)	(0.100)	(0.172)
ln*wage*	0.160	0.292***	0.450***	0.401***	0.483***	0.599***	0.558***	0.548***
	(0.090)	(0.061)	(0.072)	(0.081)	(0.076)	(0.079)	(0.072)	(0.042)
experience	0.002	0.001	-0.002	0.003	0.002	0.001	0.003	0.001
	(0.003)	(0.003)	(0.001)	(0.003)	(0.002)	(0.002)	(0.004)	(0.003)
expersq	-0.000	-0.000	0.000	-0.000	-0.000	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
soe	0.022	0.009	-0.008	-0.006	-0.010	0.002	-0.014*	-0.009
	(0.017)	(0.015)	(0.007)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
constant	2.708**	1.977***	1.744**	2.263***	2.104***	1.381*	2.227**	2.797***
	(1.001)	(0.387)	(0.710)	(0.595)	(0.578)	(0.655)	(0.711)	(0.709)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	53,549	46,574	45,576	45,529	45,968	46,898	46,333	45,791
R-squared	0.799	0.928	0.936	0.941	0.936	0.927	0.911	0.882

Notes: Dependent variables are percentiles in the first row. All regressions include industry and occupation dummies, as well as individual and year fixed effects. Province-clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

5. THE MINIMUM WAGE AND EMPLOYMENT

5.1. Introduction

The welfare and employment implications of the minimum wage are of vital importance. This is especially true when one takes into account the possibility that a rising minimum wage may reduce employment of low-wage workers (or increase employment of uncovered workers), though these effects are not clear cut (see, for example, Salverda and Mayhew's multi-country study, 2009). Indeed, as has already been found, China's minimum wages have affected wage distribution and they may, therefore, also have had employment effects. This chapter on employment effects can be seen as a complement to the previous chapter. The combination of Chapters 4 and 5 will give a fuller picture of the effect of minimum wages in China.

Theories predict mixed employment effects of the minimum wage, and so empirical investigation is important. This is especially relevant for China. First of all, as a large developing country, it displays considerable regional diversity in its economy. Of its three regions, the eastern, coastal region is the prosperous area; it almost has a free market economy with relatively little government intervention and it is the main area that rural migrants flow into. Conversely, the western region covers the poorest inland areas with a low level of marketisation of the economy. The situation of the central region is between that of the east and the west. Such regional diversity implies the possibility of different responses of employment to the minimum wage in different areas, and these regional differences are taken into consideration in the later empirical sections.

Secondly, informal sectors are different from formal sectors in urban areas. Most of the workers in informal sectors are rural migrants, and they provide an "unlimited" supply of labour moving from rural areas to urban areas, given the dual-economy structure of China (Cai and Wang, 2010). The labour market for these informal sectors can be taken as competitive, both for labour supply (unlimited rural migrants) and labour demand (many small informal businesses). Correspondingly, some monopsonistic power exists in the labour market for formal sectors, such as large SOE employers. A further consequence is that, relative to formal employers, informal employers are harder to police, and thus, are less likely to comply with the minimum wage. The formal employers (larger firms and SOEs) are more likely to comply. For this reason, the compliant and non-compliant workers (paid less than the minimum wage) are discussed separately in the later sections since non-compliant workers are reasonably numerous (as seen in Chapter 4).

Third, the role of SOEs is important, and their reaction to the minimum wage policy is of interest for several reasons. In the first place SOEs may exhibit monopsonistic power in the labour market. Specifically, they may face a rising price for labour since they consider social external costs and wage equity more than their private counterparts (Wang and Gunderson, 2011). Thus, rising minimum wages could push up SOEs' employment. SOEs also laid off a large number of workers during the reform period around 2000, with SOE employment decreasing by around 5 percent each year during 1997-2005 (Ni *et al*., 2011). This decline may confound measurement of employment effect of minimum wages in the same period. A further point is SOEs are not completely profit driven and need to protect the interests of low-wage workers, so the disemployment effect is not necessarily their response to the minimum wage. In sum, employment effects of the minimum wage are

likely to be complex in the Chinese context.

This chapter uses individual annual data from the UHS during 1995-007, a period of minimum wage policy change, to examine the employment effect of the minimum wage. It is the second study regarding this topic at the municipal level, with the first being Fang and Lin (2013). However, my study covers a much longer period (1995-2007) than theirs (2004-2009), and also examines non-compliance in more detail. My main findings are that China's minimum wages have definite negative effects on urban employment in both the short run and the long run, and these effects are stronger on full-compliance groups than on total employment. The main groups adversely affected are young workers, women workers, and those aged 50 and above which is in line with the literature. The above conclusions are sharper after 2004 when the minimum wage policy was reinforced.

This chapter is organised as follows. Section 5.2 reviews basic theories and predictions for competitive and monopsonistic markets, as well as for formal and informal sectors in developing countries. The empirical specifications are developed here too. Section 5.3 presents empirical evidence from baseline models considering the compliance issues. Section 5.4 presents a dynamic and long-run perspective result using the System-GMM method. This method is also helpful in dealing with the potential endogeneity of minimum wages. Employment effects across age and gender cohorts are examined in section 5.5, including further robustness checks. Section 5.6 concludes the chapter with some discussion of policy implications.

5.2. Theory and model specification

This section reviews standard models describing employment effects of the minimum wage. First, the conventional textbook model for a competitive market is presented where the minimum wage causes unskilled employment to fall. Then the model of monopsonistic markets is discussed, showing the opposite effect (at least for reasonably small minimum wage increases). Next, a simplified model of minimum wage effects for formal and informal sectors is illustrated. Finally, the regression specification is discussed.

For a competitive market, a standard textbook model normally includes three basic assumptions (Brown *et al.*, 1982; Neumark and Wascher, 2008, p.39 and pp.50-53). First, the (unskilled) market is competitive, with only formal employment. This assumption guarantees that all workers are covered[1] by the minimum wage without non-compliance. Second, all unskilled workers are homogeneous. They have identical skills and effort levels, which are exogenous; therefore, and these factors in the model do not need to be considered. Third, each firm wants to minimise its cost both before and after the minimum wage is set. Under the basic assumptions, Figure 5.1, based on Brown *et al.* (1982), gives the change in unskilled employment[2].

In a competitive market, the employment effects of the minimum wage are expected to

[1] In this study, the terms formal/informal sectors versus covered/uncovered versus compliant/non-compliant are taken to have the same meaning. Strictly speaking, formal/informal sectors are normally measured by whether the worker's household registration is accepted by her enterprise, and/or whether she pays taxes. Workers in formal sectors are normally covered by the minimum wage since they are being treated legally, and hence they are "covered" and "compliant" as well. Nevertheless, in practice, some workers in informal sectors may be covered by the minimum wage and therefore be in the compliant group. In general however, workers in informal sectors are more likely to be non-compliant, and hence uncovered, and so the three concepts go together.

[2] In Figure 5.1, the adjustment to a new equilibrium is omitted. Note that conventional economic reasoning leads to the conclusion that the long-run demand curve will be more elastic than the short run. One important empirical case is from Canada during 1975-1993 by Baker *et al*. (1999), who find that a 10% increase in the minimum wage reduces teenage employment by 2.5% (i.e. an elasticity of -0.25), and that it takes about six years for this result to be revealed.

be negative. In Figure 5.1, when a minimum wage is set above the original equilibrium wage W_0, labour demand will decrease. This situation is most likely in unskilled labour markets, where wages are low to start with, so the minimum wage is binding. The new level of employment is E_m, and the difference between E_0 and E_m indicates the fall in employment. Furthermore, the disemployment effect may be more severe than first thought, because the long-run labour demand curve is more elastic than the short-run (see Baker *et al*., 1999). Overall, a disemployment effect under minimum wages is expected in a competitive unskilled labour market.

Turning to the monopsonistic market model, the employment effect is expected to be positive for small increases in the minimum wage (Brown *et al.*, 1982; Neumark and Wascher, 2008, pp.53-57, Ashenfelter *et al*., 2010). Figure 5.2, based on Brown *et al.* (1982), gives an illustration of this result. For a firm with monopsony power, its marginal cost is always higher than the labour supply curve it faces, i.e. its average cost. Initially, the intersection of the demand curve and the marginal cost curve decides the original equilibrium employment E_0 and the corresponding equilibrium wage rate W_0. When the minimum wage is set, three situations can be distinguished. First, the minimum wage is higher than W_0 but lower than W_2, the equilibrium wage obtained in a competitive market. MW_1 in the figure is for this case. The new employment would be E_1, which is higher than the original E_0, but lower than the level under a competitive market. As long as MW_1 is between W_0 and W_2, employment will increase. When the minimum wage is set at W_2, the employment will be equal to the level under a competitive market, i.e. E_2, which corresponds to E_0 in Figure 5.1. This is the second situation. In the last situation, the minimum wage is higher than W_2; therefore employment begins to fall, just as happens in

Figure 5.1. The reach of the monopsony model has been extended by Manning (2003), who argues that "thin" labour markets, and difficulties for workers in moving between jobs confer widespread monopsony power. Overall, in a monopsonistic market, employment is expected to rise or to be less negatively affected, corresponding to a "small" increase in minimum wages.

For China, the situation is complicated as is discussed in the introduction (section 5.1) by the coexistence of formal and informal sectors in urban areas. Formal sectors are markets where compliance is high. In contrast, the informal sectors have low compliance. Therefore, the compliance issue needs to be considered, as we do next.

Figure 5.3 presents a conventional economic analysis (see Gramlich *et al*., 1976, also Boeri *et al*., 2011). Here, W_0 is assumed to be the wage prevailing in both sectors prior to the introduction of the minimum wage, W_M. In the covered sector, the introduction of the minimum wage reduces employment to L_C. Some of the unemployed workers will attempt to find jobs in the uncovered sector, pushing the supply curve there to S'_U. In the uncovered sector, wages in this simple competitive model should go down to W_U and employment increases to L_U. However, a "lighthouse effect"[3], whereby the setting of W_M influences wages positively in the uncovered sector, has also been found in some countries (see Chapter 2, also Boeri *et al*., 2011), in which case an increase in uncovered employment will not occur or be less than the prediction. Overall, this model points to the need to analyse covered and uncovered employment separately, and the conventional prediction is for

[3] The mechanism of the "lighthouse effect" is conventionally interpreted as a kind of wage signal from formal sectors to informal sectors. See Boeri *et al*. (2011).

negative employment effects in the covered sector, matched with possible positive effects in the uncovered sector.

In this chapter, a fixed-effect panel data model is used to investigate possible employment effects, specified as below:

$$\ln(EmpRate)_{mt} =$$

$$\alpha + \beta_1 \cdot \ln MW_{mt} + \beta_2 \cdot \ln MW_{mt-1} + \gamma_1 \cdot \ln W_{mt} + \gamma_2 \cdot \ln W_{mt-1} + \boldsymbol{\lambda' \cdot X_{mt}} + \boldsymbol{\eta_1' D_t} + \boldsymbol{\eta_2' D_m} + \varepsilon_{mt}, \quad (1)$$

where the dependent variable is the log employment-to-population ratio for a particular worker group (including unskilled categories such as young workers) for municipality *m* in year *t*. Note that the analysis uses municipalities as data points, so the dependent variable is obtained from municipal employment divided by the municipal population in each year. Among the independent variables, MW_{mt} and MW_{mt-1} is the minimum wage rate and its one-year lag in log form, and W_{mt} and W_{mt-1} is the municipal average wages and its lag, included to allow for the effect of municipal prosperity on employment. Other variables are shown by $\boldsymbol{X_{mt}}$, which represents a set of control variables to describe local labour market conditions, and vector $\boldsymbol{\lambda'}$ the corresponding coefficients. $\boldsymbol{D_t}$ and $\boldsymbol{D_m}$ are vectors of fixed effects for years and municipalities, with $\boldsymbol{\eta_1'}$ and $\boldsymbol{\eta_2'}$ their corresponding coefficients. The year and municipal fixed effects help alleviate endogeneity of the minimum wage variables, e.g. a rich municipality might have expanding employment and rising minimum wages, but the expanding employment is in fact not "caused" by the minimum wage. ε_{mt} is the error term.

A common simplification used in equation (1) is to express the minimum wage in terms of the Kaitz ratio; that is, the ratio of the minimum wage to the average wage, in log terms: Kaitz = ln(*MW*) - ln(*W*). This simplification implies that the coefficient on the *MW* term is equal opposite to the coefficient on the wage. Sometimes this restriction is not true, and for completeness, the average wage term is included alone as well. The final model used for this chapter is below:

$\ln(EmpRate)_{mt} =$

$$\alpha + \beta_1 \cdot \text{Kaitz}_{mt} + \beta_2 \cdot \text{Kaitz}_{mt-1} + \gamma \cdot \ln W_{mt} + \boldsymbol{\lambda}' \cdot \boldsymbol{X}_{mt} + \boldsymbol{\eta}_1' \boldsymbol{D}_t + \boldsymbol{\eta}_2' \boldsymbol{D}_m + \varepsilon_{mt}, \quad (2)$$

The coefficients β_1 and β_2 are, therefore, of interest, and they are expected to be negative in total for competitive markets for workers whose employers comply with the minimum wage (i.e. the covered sector), but perhaps positive for non-compliant workers (the uncovered sector). However, for monopsonistic markets, the total effects of β_1 and β_2 are positive by theoretical prediction. Nevertheless, caution is needed in interpreting any positive sign of β_1 and β_2 as being induced by monopsonistic power since there is no direct measure of monopsony in this study, though the SOE variable is meant to control for "large" firm power.

Finally, the sample used in this chapter is different from Chapter 4 in that employment is defined as people in full-employment aged between 16 and 65 with reported annual wages. This restriction follows conventional practice, but means that individuals aged over 65 are excluded even though a sub-minimum wage and non-compliance is widely seen in this group (around 48% in the sample, see Table 4.1 in Chapter 4). Nevertheless the over-65s in

work represent only 3.7% (see Table 5.1a in Chapter 5) of the population over 65, so their exclusion does not change the main conclusion[4]. The sample further excludes self-employed people and individuals employed in the farming industry, including fishing, forestry and ranching. The sample period is still from 1995 to 2007.

5.3. Empirical results

In this section, the dependent variable, the employment-to-population ratio, as well as the main independent variable, the minimum wage, is discussed first. In particular, the properties of the Kaitz index of the minimum wage, is discussed. Then results of three specifications are given: one including the minimum wage and its lag, the second including extra-municipal controls, and the third using instrumental variable techniques. Finally, results for different cohorts, regions and periods are investigated.

Tables 5.1a-c report summary statistics of dependent variables across different cohorts, regions and periods. The employment rate for any given group is measured in a municipality-specific way, as employment of that group in a municipality divided by municipality population for that group. In Table 5.1a, for the sample as a whole, the overall employment-to-population ratio is 0.61, and three regional rates are similar (0.61 for the east, 0.62 for the west and 0.60 for the central region). For different periods, employment rates for 1995-2003 are higher than those for 2004-2007, suggesting a decreasing trend in employment rates since the economic reform began in 1978. As regards gender, the female employment rate, 0.55, is on average lower than the male, 0.68, which is the usual result

[4] Including working people above 65 in the same regressions reported in the text gives similar signs and significance levels.

given women's greater non-market-work family commitments. As regards age, apart from the above 65's (excluded in the main analysis), the youth category (16-29) has the lowest employment rate (0.44) on average, which is less than half of the prime-age category's rate (0.89). Considering also the higher proportion of youth paid at or below the minimum (9.8%) compared with the prime-age category (4.9%) in Table 4.1, it is evident that the youth group in China as elsewhere (see Neumark and Wascher 2008, p.83), are likely to be most affected by the minimum wage.

Moreover, each employment-to-population ratio in Table 5.1a can be divided into two parts, i.e. a compliant employment rate in Table 5.1b and a non-compliant rate in Table 5.1c. For example, the overall employment rate for the whole sample is 0.61 in Table 5.1a, which is the sum of 0.55 (the compliant employment rate) in Table 5.1b and 0.06 (the non-compliant employment rate) in Table 5.1c.

Thus in Tables 5.1b and 5.1c, there are some changes across regions, years and cohorts in compliant and non-compliant employment rates. There is little regional difference in compliant employment rates, but period differences exist. Specifically, compliant employment rates during 2004-2007 (0.51) are lower than those during 1995-2003 (0.59) and the non-compliant employment rates during 2004-2007 (0.062) are correspondingly higher than those during 1995-2003 (0.058). Below we will test for whether this fall in compliance can be linked to the strengthening of minimum wages during 2004-2007.

As regards gender and age groups, Table 5.2b shows that compliant employment rates for females (0.47) are lower than those for males (0.63). The youth category also has the lowest compliant employment rates (0.40), as might be expected. Non-compliant employment

rates generally move in the opposite direction.

Table 5.2 links to the minimum wage directly. For the key variable, the minimum wage, this section uses the Kaitz index as the measure, defined as the difference between log minimum wages and log mean wages in each municipality. In the literature on the minimum wage in China, almost all relevant studies simply adopt the real minimum wage. This measure is simple but does not follow standard practice in the international literature (Neumark and Wascher, 2008, pp.28-29; Wang and Gunderson, 2011 and 2012; Fang and Lin, 2013) which uses the Kaitz index. We therefore take the Kaitz index as a starting point in this study. Our results can then be compared with the literature. In addition, use of the Kaitz index removes issues of deflating the minimum wage (see Neumark and Wascher, 2008, p.62). However, as noted above, use of the Kaitz index does constrain the coefficient on the average wage to being equal and opposite to that on the minimum wage itself. Sometimes this restriction will not be true, and so for comparison, the municipal average wage term is also included separately in the regressions.

As can be seen from Table 5.2, the minimum wage is negatively correlated with the total employment rate (-0.432), and the negative link is even stronger for the lagged minimum wage (-0.441). Interestingly, the Kaitz index is also negatively correlated with the log minimum wage (-0.566), which goes along with the fact that cities that set high minimum wages have higher average wages (0.877), as we have already seen in Chapter 4 (Table 4.3). The end result is a positive correlation between the Kaitz index and the various employment rates. However, as will become apparent, in the full multivariate analysis below, the link between the Kaitz and employment rates generally turns negative (just as

does the link between the minimum wage proper and employment rates).

For the empirical parts in this section (section 5.3), results are reported for the full sample, the eastern region and, as usual, the two periods before and after 2004. Results across further groupings (by gender and age[5]) are reported and discussed in a later section (section 5.5). For all these sub-samples, results for groups that comply with the minimum wage versus those that do not comply are considered separately as well[6]. Compliant firms are likely to be more "formal" (e.g. the SOE category[7]), while non-compliant firms will be the informal, small, grey-market type. Thus, of the compliant and non-compliant worker groups are examined separately to investigate the possible different employment effects of the minimum wage in formal and informal sectors (see Figure 5.3).

The employment effects 1995-2007, Tables 5.3a-c

The set of Tables 5.3a-c shows results of the minimum wage regression on employment rates for the entire sample and the youth sub-sample for 1995-2007, for all sample regions. All dependent variables are the corresponding log employment-to-population ratios. Columns (1) – (3) refer to the whole sample while columns (4) – (6) refer to the sub-sample of young adults. Both samples include three specifications: the first column only includes the Kaitz index and its lag, controlling municipal and time fixed effects. Standard errors clustered by province are reported in parentheses. The second column adds extra municipal

[5] Young adults are more broadly defined than usual, as workers aged from 16 to 29. Since part-time jobs – commonly taken by teenagers – are unusual in China, Fang and Lin (2013) widen the young worker category to include young adults, and we follow suit.

[6] Non-compliant (compliant) dependent variables are defined as ratios of employed workers with wages less than (equal to or larger than) the municipal minimum wage divided by total municipal employment.

[7] Cities with higher SOE employment rates (i.e. SOE employment as a proportion of the municipal workforce) have higher compliance, as shown by the high correlation coefficient between the SOE employment rate and compliance ratios, 0.29.

controls as shown in the table. The third column additionally involves instrumental variables (IV), instrumenting the Kaitz index with the quasi-Kaitz index calculated from the data in the *China Labour Statistical Year Books*. The quasi-Kaitz index, the same as in Chapter 4, is defined as the difference between the municipal minimum wage and the provincial mean wage. Here, the IV technique is used to alleviate possible endogeneity problems caused by simultaneity between the minimum wage and unemployment (for example, where high municipal unemployment causes the setting of lower minimum wages – see Dolton and Bondibene, 2012a).

Taking first Table 5.3a[8], since the key variables on both sides are in log form, the coefficient of the minimum wage represents the elasticity of the employment rate with respect to the minimum wage. We see in column (1), during 1995-2007, when the current minimum wage increases by 10% the total employment rate falls by 1.01% significantly, keeping municipal and time effects constant. The lagged effect would drive the employment rate down by 0.64%, also at the 1% significance level. If municipal controls in column (2) are added, the negative current effect becomes insignificant, while the lagged effect retains its magnitude (0.54% corresponding to a 10% increase in lagged Kaitz ratios) and significance. Finally, if IVs based on column (2) are added, the result does not change much with a 0.84% insignificant employment rise for current effects and a 0.84% significant fall for lagged effects. Overall, significantly negative employment effects for lagged minimum wages are found for the entire sample, and there is no fundamental

[8] All independent variables follow Chapter 4. That is, ln*wage* is average municipal wages in log form; *education* is the average education level in each municipality; *female, soe* and *migrant* is the proportion of female, SOE, and migrant workers in each municipality, respectively; *manufacture, construction* and *service* indicate the proportion of labourers working in the manufacture, construction and service industry in each municipality, respectively. The specific catalogues within each variable are described in Table 4.1 in Chapter 4; and the summary statistics are given in Table 3.2 in Chapter 3.

difference among three specifications.

Looking at the youth group in Table 5.3a, it is noticeable that in column (4) the 10% increase in the current minimum wage has a positive effect, pushing up youth employment by 3.27% significantly. The lagged effect is insignificantly negative (1.49%) and the total effect is positive. However, when municipal controls in column (5) are added, things are different. The positive current effect becomes much smaller and insignificant (0.60%) with the lagged effect remaining almost the same (-1.55%) but at a 10% significance level, and the summed effect now is significantly negative. Moreover, this negative total effect (0.97%) is larger than the corresponding total effect for the entire sample (0.66% in column (2)). It is even larger if only significant effects (0.54% in column (2) versus 1.55% in column (5)) are considered. This larger negative effect for the youth group is consistent with this study's expectation and existing literature on China (Fang and Lin, 2013). The result with IVs in column (6) is similar to that in column (5), and the negative lagged effect is even larger (4.92%). In summary, for the youth employment rate, the minimum wage also exhibits significant negative effects, which are larger than the entire sample once municipal controls are included.

Notice that the municipal control variables in Table 5.3a have plausible signs (where significant), which is reassuring. First, average municipal wages have significantly positive effects on the overall urban employment rate, suggesting a type of "wage curve" (see Blanchflower and Oswald, 1990; Card, 1995). The wage curve literature finds that wages fall as unemployment rises, which is similar to the findings here, using employment-population-rates as the opposite of unemployment. Second, the average

education level in a municipality has significantly positive effects for the employment rate of the entire sample, which is plausible given that higher education generally goes with lower unemployment. Third, the municipal proportion of manufacturing industry and SOEs both have significantly negative effects for the youth employment. This indicates disadvantage for the youth in municipalities with a concentration of SOEs and manufacturing industry (which tend to go together). These sectors are likely to require skills and experience which young workers have not yet attained. Finally, both the municipal proportion of service and construction industry show positive effects, though insignificant, on the employment of the entire sample and the youth, which is plausible considering entrance into such employment is easier here than in other industries.

Since non-compliance is a special phenomenon for developing countries including China, as noted above, a further analysis is necessary. Therefore, workers who are paid in full compliance with the minimum wage (wages are equal to or more than the minimum wage) are separated out from the full sample so the remainder are non-compliant (wages are less than the minimum wage). Table 5.3b shows results for the compliant group and Table 5.3c for the non-compliant. As discussed in section 5.2, simple competitive theory predicts more negative effects for the compliant sample than for the non-compliant, since where the minimum wage "bites" workers will crowd into the non-compliant sector.

In Table 5.3b, the results are consistent with this expectation. In particular, for the entire sample, both current effects and lagged effects for the three specifications display significantly negative effects with larger magnitudes than results for the full sample in Table 5.3a. For example, when the minimum wage increases by 10%, the current effect

would be -2.91% at a 1% significance level (column (2), Table 5.3b), which is much larger than the corresponding effect in Table 5.3a (-0.12%, column (2)). The lagged effect would be -0.45% (column (2), Table 5.3b), similar to that in Table 5.3a (-0.54%, column (2)), and the total effect is -3.36% which is larger than that in Table 5.3a (-0.66%, column (2)). For the youth category as well, there are significant negative effects, particularly when using municipal controls and instruments (columns (5) and (6)).

Overall, negative employment effects can be said to be more pronounced for the compliant group of workers than for the full sample. The implication is that negative employment effects are smaller for the non-compliant group (or even positive, as regressions below show), in line with simple crowding models. For the compliant group, the sum of current and lagged effects for the Kaitz term implies an employment elasticity of -0.2 to -0.3 with respect to the minimum wage, depending on whether specification (2) or (3) is taken. Employment effects are also more negative for young workers in the compliant group, with an implied elasticity of -0.4 to -0.9 depending on specification.

In Table 5.3c for the non-compliant sample, the positive effects are consistent with the simple model as well. For the total sample, there are positive effects in contrast to the compliant sample in Table 5.3b. For example, taking the sum of current and lagged Kaitz coefficients irrespective of significance, it can be seen from column (2) that non-compliant employment would rise by 18.4% if the minimum wage increases by 10%. On the other hand, corresponding compliant employment would drop by 3.36% (column (2), Table 5.3b), and the overall effect (taking the compliant and non-compliant together, see Table 5.3a) is a fall of 0.66% (column (2), Table 5.3a). As for the youth group, the situation is similar with

non-compliant workers showing a positive elasticity and compliant workers showing a negative one. Again, the overall elasticity is negative as already seen, indicating that the positive employment effect for the non-compliant does not outweigh the negative effect for the compliant.

The employment effects in the east: Tables 5.4a-c

A sub-sample for the prosperous eastern region in the set of Tables 5.4a-c is now considered. The east is separately investigated because this is the only region with a continuous sample period from 1995 to 2007, across 13 years. Concentrating on cities in the east will help us to exclude uncontrolled regional diversities better, since the group of eastern regions is more homogeneous than the sample as a whole. We find in fact that the east generally exhibits similar patterns to the whole country, both for the entire sample and for the youth group. That is, significant negative lagged effects are generally found, with similar magnitudes for the whole country. For example, if the lagged minimum wage increases by 10%, the employment of the entire sample with municipal controls for the east would drop by 0.66% significantly (column (2)), which is close to the 0.54% estimate for the whole country in corresponding column (2), Table 5.3a. Youth employment for the east would correspondingly drop by 1.22%, which is a little smaller than the 1.55% for the whole country in column (5) of Table 5.3a.

However, a difference does appear for the IV specification, in that the disemployment effect becomes larger for the entire sample in the east compared with the whole country, while it becomes smaller (summed) for the youth in the east compared with the whole country. For the entire sample in the east, the negative lagged effect is 1.45% in column (3),

larger than the negative effect 0.84% in corresponding column (3), Table 5.3a. The negative effects on the youth (-1.47% taking summed coefficients, column (6), Table 5.4a) are smaller than the 3.47% drop (summed) in column (6), Table 5.3a. This suggests that the disemployment effect of the youth for the east may be a little weaker than that for the whole country, which may be due to the east's greater prosperity, and is consistent with Wang and Gunderson's (2011) and Fang and Lin's (2013) results.

Second, for the compliant sample in Table 5.4b, generally significant negative effects of the minimum wage are still found for employment rates. As was the case in Table 5.3b, these negative effects for the compliant group in Table 5.4b are larger than for the overall sample in Table 5.4a. As regards the non-compliant sample in Table 5.4c, the situation in the east is similar to that found in the whole country, with significant positive effects of the minimum wage on the employment rates. In sum, the effects of the minimum wage in the eastern region are similar when compared to those in the whole country, but with less significance for the youth group perhaps because economic development in this prosperous region offsets some "bite" of the minimum wage.

Before and after 2004: Tables 5.5a-c and Tables 5.6a-c

Finally, the employment effects of the minimum wage in different periods are considered. Since the minimum wage policy was reinforced in 2004, a stronger effect is expected for the period of 2004-2007 than for the period 1995-2003. Thus, the set of Tables 5.5a-c shows regression results for 1995-2003, and the set of Tables 5.6a-c shows results for 2004-2007. Table 5.5 summarises these results.

The summary in Table 5.5 shows that the comparison of results for the compliant sample pre- and post-2004 does accord with the expectation, though it does not for the full sample. Concentrating on column (2), which has the more robust uninstrumented specification, the sum of current and lagged Kaitz coefficients for the compliant group is -0.24 pre-2004, and is considerably larger, -0.32, post-2004. For the compliant youth group the difference is marked as well, with the summed Kaitz coefficients in column (5) being -0.44 pre-2004 and -0.81 post-2004, though insignificant as yet. The non-compliant groups also tend to have larger (positive) coefficients post-2004[9]. On the other hand, the insignificant effect for the youth post-2004, combined with the smaller disemployment effects in the east (Tables 5.4a-b), may be explained by the shortage of labour which happened around 2004 (Cai and Wang, 2010). Overall, if the compliance factor is controlled, there are signs that the minimum wage policy did become stricter post-2004 in that it had larger employment effects.

Overall, this section shows that China's minimum wage generally appears to have significant negative employment effects. The regional difference is not obvious, and at least the east's employment effect is similar to that of the whole country. As for different periods, the pattern after 2004 is somewhat different from that before 2004, showing stronger impacts, particularly for the compliant worker group, which is consistent with this thesis's expectation. For the youth category, the negative effects are somewhat larger than for the entire sample, again as expected, though less so in the prosperous east.

[9] In fact, by checking the non-compliance ratios across periods, it is found that pre-2004 ratios in each year are around 8-9%, while post-2004 ratios are around 10-12%, obviously higher than pre-2004. Furthermore, a check of structure changes is applied for the non-compliance group:

$\ln(EmpRate)_{mt} = \alpha + \beta_1 \cdot MW_{mt} + \beta_2 \cdot MW_{mt-1} + \theta \cdot MW_{mt} \cdot Dummy_{2004} + \boldsymbol{\lambda_1 \cdot X'_{mt}} + \boldsymbol{\lambda_2 \cdot D_t} + \boldsymbol{\lambda_3 \cdot D_m} + \varepsilon_m$,

where $Dummy_{2004}$ is equal to 1 if year>2003, 0 if year$\leqq$2003. Θ is found to be significant, suggesting stricter implementation of the minimum wage after 2004.

5.4. A dynamic and long-run perspective: the System-GMM estimator

This section presents a long-run perspective on the employment effect of minimum wages, using the system generalised method of moments (System-GMM), as programmed in Stata[10]. One consideration behind this approach is that System-GMM models permit use of IV to remove the endogeneity caused by possible reverse causality between employment and minimum wages. In particular, System-GMM estimators can include an autoregressive process for the dependent variable and use IVs constructed from a set of moment conditions. A further consideration is that a lagged dependent variable can be introduced into the model. Therefore the important long-run effects of the minimum wage can be investigated based on the dynamic property of the System-GMM model.

The System-GMM estimator

By employing panel data and taking differences based on equation (2) in section 5.2, the municipal fixed effect can be removed (see Baum 2006, p.233):

$$\triangle \ln(EmpRate)_{mt} = \beta \cdot \triangle Kaitz_{mt} + \gamma \cdot \triangle Kaitz_{mt-1} + \lambda \cdot \triangle X'_{mt} + \eta \cdot \triangle D_t + \varepsilon_{mt}, \qquad (3)$$

In the GMM model, therefore, instrumental variables could be constructed for the first-difference variables in equation (3) under some assumptions[11] from the following moment conditions (Arellano and Bond, 1991):

[10] The estimator used is the Arellano-Bond IV estimator *xtdpdsys* described in Cameron and Trivedi (2010, p.301); see also Baum (2006, section 9.3) on dynamic panel-data models.

[11] That is, ε_{mt} is an AR(#) process with # ≤1. The validity of this assumption is generally confirmed by the literature (see, Blundell and Bond 2000).

$$E\ (\beta \cdot Kaitz_{mt-s} \cdot \triangle \varepsilon_{mt}) = 0, \qquad (4)$$

with $s \geqslant 1$ if the minimum wage is determined by previous employment shocks (predetermined), and $s \geqslant 2$ if the minimum wage is determined by current employment shocks (endogenous). That is, lags of the endogenous variables can instrument the first-differences of the endogenous variables in equation (3).

However, Arellano and Bover (1995) and Blundell and Bond (1998) find that the above instruments may be weak, especially for variables with a strong persistence over time, because the correlation between the lagged variables and the first-differences will be very low for these variables. This weak instrument problem will lead to biased estimation for finite samples. Blundell and Bond (1998, 2000) then supplement the above moment conditions with more moment conditions under some assumptions (a restriction on the initial conditions[12]):

$$E\ (\triangle Kaitz_{mt-s} \cdot (\eta \cdot D_{\mathrm{m}} + \varepsilon_{mt})) = 0, \qquad (5)$$

with $s \geqslant 1$ if the minimum wage is predetermined and $s \geqslant 2$ if the minimum wage is endogenous. That is, lags of the first-differences of the endogenous variables can instrument the level variables in equation (3).

Blundell and Bond (1998, 2000) show that, in the case of endogeneity, the combination of the two sets of moment conditions (4) and (5) gives a more consistent GMM estimator

[12] The restriction is that the initial changes in employment rates and in the endogenous variables are uncorrelated with the fixed effect.

which is labelled as the System-GMM estimator.

Specifically, the model in this section is as below:

$$\ln(EmpRate)_{mt} = \alpha + \beta_1 \cdot Kaitz_{mt} + \beta_2 \cdot Kaitz_{mt-1} + \theta_1 \cdot \ln(EmpRate)_{mt-1} + \theta_2 \cdot \ln(EmpRate)_{mt-2} + \lambda \cdot X'_{mt} + \eta_1 \cdot D_t + \eta_2 \cdot D_m + \varepsilon_{mt}, \quad (6)$$

where $\ln(EmpRate)_{mt-1}$ and $\ln(EmpRate)_{mt-2}$ are the log employment-to-population ratio of the whole population between the ages of 16 and 65 or of the youth group for the municipality *m* in year *t-1*, and year *t-2* respectively. $Kaitz_{mt}$ and $Kaitz_{mt-1}$ are the municipal minimum wage rate and its one-year lag in log form respectively. X'_{mt} represents a vector of control variables to describe local labour market conditions. D_t and D_m are vectors of fixed effects for years and municipalities, and ε_{mt} is the error term.

The dependent variable, $\ln(EmpRate)_{mt}$, is modelled as a second-order autoregressive process (i.e. the maximum lag is a two-year lag) because in most of the GMM regressions below, the AR(3) test does not reject the null hypothesis of no serial correlation in the error term, while the AR(2) test does, suggesting that the suitable maximum lag is two. Therefore, the sum of β_1 and β_2 represents a short-run effect of the minimum wage, while a long-run effect is calculated as $(\beta_1+\beta_2)/(1-\theta_1-\theta_2)$. Since enterprises can adjust their fixed investment and sign new labour contracts with employees in a long run, one expects to see larger effects for a long run than for a short run (see Baker *et al*. (1999) for Canada, noted in Chapter 2's literature review).

Empirical results

Table 5.7 summarises the results from the System-GMM estimator, with full results given in Tables 5.7a-d. As in previous sections, separate results for total employment and for youth by compliance status are reported (Table 5.7a), as well as for the eastern region (Table 5.7b), and for periods before and after 2004 (Tables 5.7c and d).

Let us first consider short-run effects as summarised in Table 5.7. We see that the basic pattern is similar to the results for the panel and IV estimators in section 5.3 (Tables 5.3a-c). The minimum wage has significant negative effects on the total employment, for example, in the first column the estimate is -0.10 (=−0.13+0.03). As we have already seen, there also appear to be larger negative effects for the full-compliance group, for example in the first column for the compliant group the estimate is -0.19. Again, there are positive effects for the non-compliant group, 1.34, suggesting crowding.

However, the stronger disemployment effect for the youth group observed in Tables 5.3a-c does not appear with the System-GMM technique. Taking the second column, for all sample provinces (top panel) we see an insignificant short-run effect, 0.10, becoming more negative for the compliant group, -0.26, but still insignificant. Only post-2004, in the final panel, do we see a significant negative effect for the compliant group, -0.68.

Let us next consider the long-run effects of the minimum wage, also summarised in Table 5.7. As can be seen, long-run effects on total employment rates are generally significant, with plausible signs. Considering the first column, there are negative long-run effects for the total (-0.15) and compliant groups (-0.25). There is also the usual positive effect (1.53) for the non-compliant group. Thus, for total employment, long-run effects are consistent with the pattern of the simple crowding model.

Also consistent is the finding that most long-run effects are larger than short-run effects, suggesting a larger long-run elasticity of employment, which is plausible. On the other hand, there are some implausibly high positive estimates for some non-compliant groups, particularly post 2004 (last panel), where we see an elasticity of 3.87 for the total non-compliant sample, and also high figures for the youth group. This result can perhaps be seen as a kind of overshooting since the non-compliant group is comparatively small.

Finally, if long-run effects pre- and post-2004 (the bottom two panels in Table 5.7; and Tables 5.7c-d) are compared, we see that the post-2004 effects appear larger and more significant, which is reassuringly in line with our previous results. For example, in the first column of Table 5.7, the long run effect for compliant employment in the third panel is -0.13 pre-2004. However, the post-2004 coefficient in the final panel is much larger, -0.28. For the non-compliant group there are positive effects, 1.08 pre-2004 and larger, 3.87, post 2004 (almost too large, as noted). These results suggest that the stricter minimum wage implementation post-2004 makes more compliant workers disemployed, and compresses more people to the non-compliant group.

We now take up the results of the Sargan tests in Table 5.7. The null hypothesis of the Sargan test is that over-identifying restrictions are valid, that is, the instruments as a group appear exogenous. The rejection of the null hypothesis means that the results are not robust (Cameron and Trivedi, 2009, p.185). As can be seen, in Table 5.7, about half of the regressions have insignificant Sargan statistics, suggesting that only half of the results contain valid instruments and are therefore, robust. For example, the first regression with a Sargan test statstic of 263.12*** does not pass the test, so its regression coefficients cannot

be trusted. On the other hand, the second column's top panel for youth has a Sargan statistic of 167.16 which passes the test, so its regression coefficients are acceptable. All the robust results are shadowed in Table 5.7.

Taking the valid set of System-GMM estimators, there are several important robust results for compliant groups, particularly for the 2004-2007 period. For total employment rates, we estimate, -0.26 and -0.28 for short and long run elasticities. For youth we estimate higher figures; -0.68 and -0.94 for short and long run elasticities, suggesting this period has more minimum wage "bite" which is plausible. Furthermore, the finding that post-2004 effects for the youth group are larger than for total employment, is line with the view that minimum wage policy has more impact on employment for young workers. Overall, despite some weak effects in the youth category, System-GMM estimators still offer support for our main conclusions in Section 5.3.

5.5. Robustness checks: Gender and age cohorts

This section offers another robustness check on the employment effect of minimum wages, discussing gender and age differences in turn. Gender differentiation is traditionally important, since the minimum wage covers more women. Age differences, for their part, are also worth further investigation to check employment effects by age, since only the youth category has been singled out so far.

Two points need to be noticed here. First, in this section, all specifications are the panel data regressions with municipal controls, without using IVs and System-GMM estimators. That is, the second specification in Section 5.3 is used (for example, the specification of

column (2) in Table 5.3), since the endogeneity problem appeared modest after controlling both municipal and time fixed effects, together with the municipal controls. Also, the System-GMM estimators were not robust for every regression. The other point is that since there was no obvious regional difference between the east and the whole country (taking all our sample provinces), only the effects for all the sample provinces are checked.

Gender differences

Females are always likely to be a vulnerable group in the labour market, whether in developed or developing countries. In China, Chi and Li (2008) point out that there is a "sticky floor" for women's wages. Therefore, it may be expected that minimum wages will have stronger effects on female employment. Specifically, for the fully-compliant female worker group, we expect a larger negative effect than for males.

Table 5.8a displays the results for both the total sample and the fully-compliant group by gender over 1995-2007. For the total sample, females exhibit a larger negative response to minimum wages than males (comparing columns (1) and (3)), consistent with expectations. Also, once the compliance factor is added, females show an even larger negative response. The sum of the Kaitz effects is -0.686 for women, compared to an insignificant 0.0186 for men.

Table 5.8b shows the results for the post-2004 period after the policy was reinforced. The minimum wage displays stronger effects for women in this period. Corresponding to a 10% increase in the minimum wage, the female employment rate drops significantly by 1.55% in column (7), 8.7 percentage points higher than their counterparts for the whole period

1995-2007 in column (3) (taking only significant effects, instead of summing current and lagged effects). Female workers with full compliance see a decrease in employment rates of 8.8% in column (8), 21 percentage points higher than their counterparts over the 1995-2007 period in column (4). The stronger employment effects for females reinforce the conclusion that the minimum wage has significant effects on employment, and females face more disadvantages than males.

Age differences

Young adults and teenagers are an important target group for minimum wages. They should be most directly influenced by the minimum wage and bear disemployment effects, if there are any. The results in Section 5.4 have presented some evidence on whether young workers are more affected, and now a further investigation of all age cohorts is given.

Table 5.9a presents results for the full 1995-2007 period. We see that for the youth category the disemployment effects for both total and compliant sub-samples are stronger (columns (9) and (10)) than those for the prime age groups (age 30-49) (columns (11) and (12)). Interestingly, even more significant negative effects appear for the older workers. Especially for the fully-compliant older workers, the summed effect is larger than has been found in previous sections (normally between 0.3-0.6), being as high as -1.16 (column 14). Thus it appears that both old and young workers are disadvantaged relative to the prime-age group, as may be expected.

Moreover, it appears that after the minimum wage policy was reinforced in 2004, the negative effects become stronger. Results are given in Table 5.9b, and we see that the

summed effect for the compliant youth group (-0.81, column (16)) is clearly larger than that for the full 1995-2007 period (-0.43, column (10)), though admittedly still insignificant (while the total youth sample exhibits a significant positive effect, this is caused by a large increase in non-compliant youth employment - see above, Table 5.6c). As for the compliant older group, the negative effect is also much higher post 2004 (-1.45, column (20)). Again, though the significant effect for the total older sample disappears (column (19)), this appears to be caused by an increase in the non-compliant group, as happened for the youth group. In sum, the post-2004 effects are stronger for both disadvantaged groups. For the prime-age group (columns (17) and (18)), there is not much difference from the effects pre-2004, which is reasonable since the minimum wage should not influence this group much.

Comparison with existing literature

It is important to compare my results with the existing literature. For ease of reference, Table 5.10 summarises results from the three main studies. In fact, my results in section 5.3 are comparable with these studies. My estimates in section 5.3 (about -0.1 for adults, and up to -0.5 for youth, and higher for compliant groups, Table 5.3a) are a little larger than Fang and Lin's (2013) (-0.09 and -0.24) and Ni's (2011) (-0.234). My IV estimates in section 5.3 are also larger than the non-IV estimates, which is also the finding in Fang and Lin (2013). As for long run analysis, where I find larger effects particularly post-2004 (Table 5.7), there is no comparable work. Also no work has been done, apart from mine, on the distinction between compliant and non-compliant workers in China, or on the extra impact of post-2004 reforms. Nevertheless, as far as comparison is possible, it can be said

that my basic results on the disemployment effects of minimum wages in China are in line with existing research.

As for gender and age analysis, my gender and age effects reported in Tables 5.8 and 5.9 are basically more significant or larger than Fang and Lin's (2013). As regards males, generally Fang and Lin's results are insignificant, but my results tend to be significantly negative, though small, as shown in Table 5.8a. For females, the effects in Table 5.8a (-0.22 to -0.68) are also larger than Fang and Lin's (-0.07 to -0.21). As regards age differences , while my finding of a larger impact for youth than the prime age category in Table 5.9a parallels Fang and Lin's, they have no finding of a large disemployment effect for the over 50s. Some differences between our studies are to be expected if only because we have different data sources. .

5.6. Conclusions

This chapter looked at the employment effect of minimum wages across regions, periods, genders and age cohorts, considering the compliance issue as well. Generally, the minimum wage has a negative effect on China's employment, which is stronger on full-compliance groups where the minimum wage has "bite", and also appears to be stronger in the long-run. There is no obvious regional pattern for the east. As regards gender differences, women display disadvantages under rising minimum wages, with obvious larger negative effects in both total and full-compliance groups than men. As regards age differences, we find that older workers also experience disemployment, perhaps more than young workers. Thus, conventionally disadvantaged groups - women, young people (though this point is less clear in the dynamic System-GMM approach) and older workers - are all disemployed to some

extent by rising minimum wages. All the above conclusions become clearer after 2004 when the minimum wage policy was reinforced.

A summary figure for the (negative) elasticity of employment with respect to the minimum wage is useful, but needs cautious interpretation since several factors are involved. Summaries are provided in Tables 5.5 and 5.7 (which contrasts short and long-run). From Table 5.5's full model without IV, a round figure for the elasticity of employment for compliant workers is about -0.2 pre-2004 and -0.3 post-2004. The figure for compliant youth is higher, approximately -0.4 pre-2004 and -0.8 post-2004. However, it must be remembered that bringing in non-compliant workers, whose employment is encouraged by the minimum wage, reduces the overall negative effect. We thus see extensive crowding effects, with non-compliance providing a safety-valve. This impression is supported in Table 5.7 where allowing for possibly greater long-run adjustment still gives insignificant, though negative, disemployment effects for the total sample. The elasticity here is approximately -0.2, the resultant of significant negative effects for compliant workers counterbalanced by significant positive effects for the non-compliant.

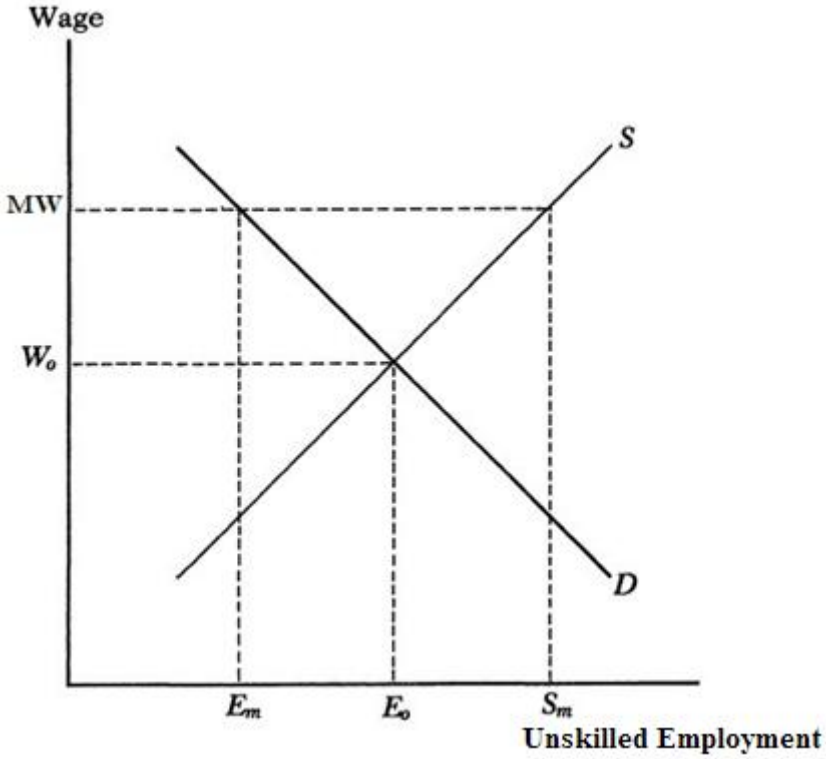
Combined with the results in Chapter 4, the implication is that care is needed when raising minimum wages. The welfare implications for urban areas are not clear. Instituting the minimum wage does increase wages in the lower percentiles significantly. However, it may have a tendency generally to decrease employment - on net, taking account of additional employment of non-compliers counterbalanced by less employment of compliers. Certainly it reduces employment of the compliant group actually paid the minimum wage. The welfare of young people, women and elder people may be reduced, even though they

belong to vulnerable groups who need help most.

This said, the results in this chapter which appear to support the simple crowding model (section 5.2) are only an initial attempt to understand a complex labour market such as that found in China, which has a large non-compliant, informal sector. In fact, a recent study of the minimum wage in Indonesia (Magruder, 2013) not only divides the labour market into formal and informal sectors, as this thesis did, but also divides goods markets into tradable, non-tradable, industrialisable and non-industrialisable sectors. His conclusion is that only the tradeable, non-industrialisable sectors may experience disemployment[13], and, moreover, that the panel fixed effects techniques are not as effective as spatial discontinuity methods in revealing positive employment effects. These results warn us to be careful when considering the minimum wage in a LDC. In summary, more studies are needed on the issue of minimum wages in China and other LDCs, though our results point to the need for care in implementing the minimum wage.

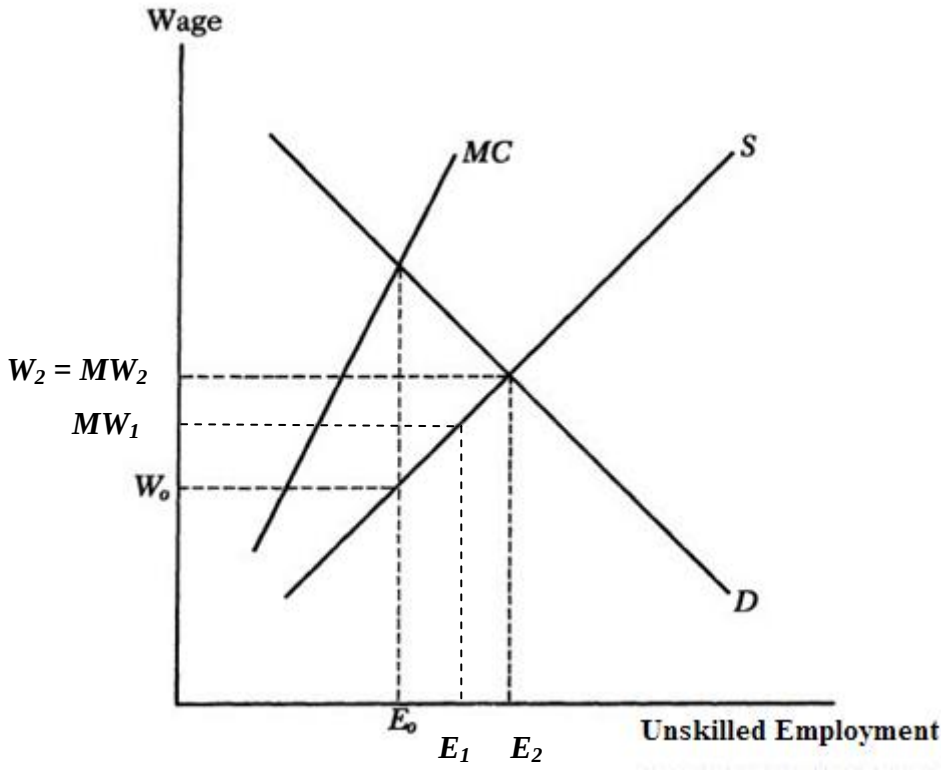
[13] Magruder's "big push" model shows that the minimum wage will have different effects in tradeable sectors (e.g. manufacturing, where the minimum wage should be negative), in non-tradeable-industrialisable sectors (e.g. retail where the minimum should increase the formal sector, decrease the informal, and increase overall employment), and non-tradeable-non-industrialisable sectors (e.g. services, where the minimum could increase employment, but have no effect on formal versus informal employment).

In his study Magruder also describes: "The primary intuition of the big push model, that demand creates an externality which can increase formal sector employment which in turn crowds out the informal sector, is applicable only to industries which were both untradable (or at least with high costs of trade) and which have the potential for formalization [i.e. can be industrialised]. In contrast, industries which are tradable should experience zero or negative employment effects from minimum wages." (p.57)



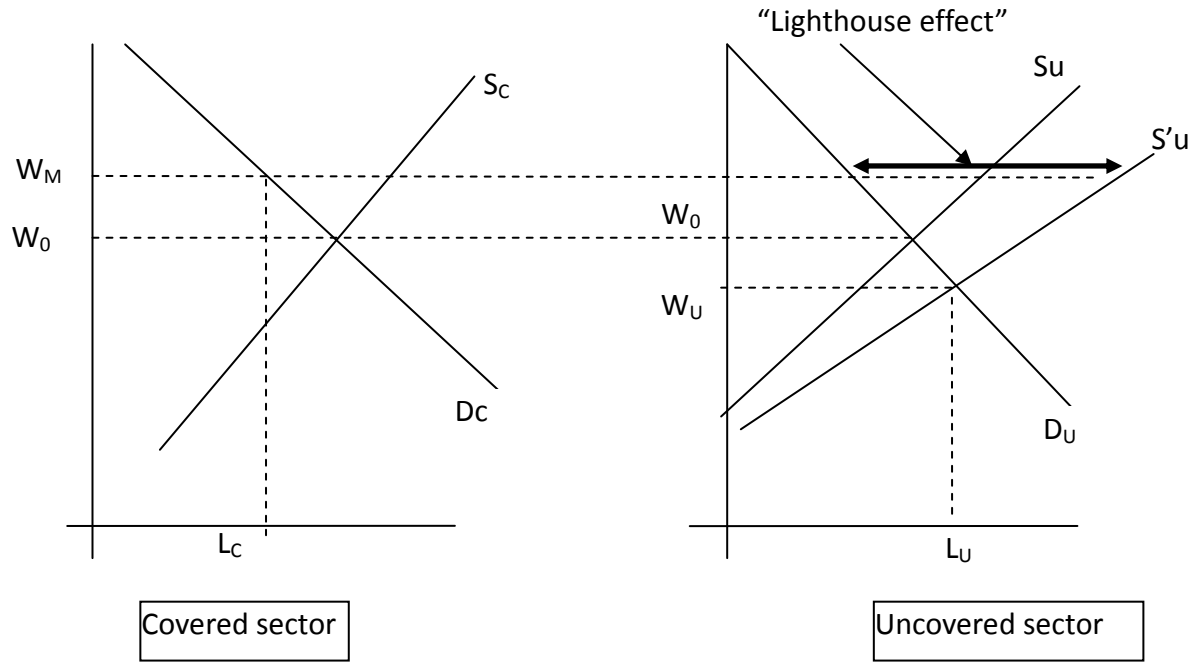
Source: Adapted from Brown *et al.* (1982)

Figure 5.1: The minimum wage in a competitive market



Source: Adapted from Brown *et al.* (1982)

Figure 5.2: the minimum wage in a monopsonistic market



Source: adapted from Gramlich *et al*. (1976) and Boeri *et al*. (2011)

Figure 5.3: Effects of minimum wages with incomplete coverage

Explanation: W_0 is assumed to be the wage prevailing in both sectors prior to the introduction of the minimum, W_M. The introduction of the minimum in the covered sector reduces employment in that sector to L_C. Some of these unemployed workers will attempt to find jobs in the uncovered sector, pushing the supply curve there to S'_U.

In the uncovered sector, wages in the simple competitive model go down to W_U and employment increases to L_U. However, a "lighthouse effect" whereby the setting of W_M influences wages positively in the uncovered sector has also been found in some countries, in which case uncovered employment should decline as well.

Overall, this model points to the need to analyse covered and uncovered employment separately.

Table 5.1a: Summary Statistics For Employment/Population Ratios (EmpRate), 1995-2007

Region	Municipality no.	Total obs.	EmpRate for all	EmpRate for year 95-03	EmpRate for year 04-07	EmpRate for males	EmpRate for females	EmpRate for youth (16-29)	EmpRate for 30-49 aged	EmpRate for 50-65 aged	EmpRate for 65 aged above
East	107	150,727	0.611	0.644	0.565	0.676	0.549	0.457	0.895	0.472	0.040
			(0.082)	(0.082)	(0.056)	(0.072)	(0.101)	(0.111)	(0.060)	(0.118)	(0.054)
Central	36	12,701	0.595	——	0.595	0.668	0.526	0.338	0.884	0.452	0.012
			(0.098)	——	(0.098)	(0.097)	(0.116)	(0.162)	(0.070)	(0.165)	(0.041)
West	37	35,236	0.616	0.616	——	0.676	0 .559	0.427	0.889	0.431	0.031
			(0.096)	(0.096)	——	(0.092)	(0.111)	(0.160)	(0.076)	(0.131)	(0.046)
Total	180	198,664	0.611	0.636	0.570	0.675	0.549	0.444	0.893	0.463	0.037
			(0.086)	(0.087)	(0.066)	(0.078)	(0.104)	(0.129)	(0.064)	(0.125)	(0.053)

Notes: Standard errors are in parentheses. All EmpRates are calculated as the employed people over corresponding population. For example, for youth, EmpRate = Employed youth/ The whole youth population.

Table 5.1b: Summary Statistics For Employment/Population Ratios (EmpRate) for Compliant Groups, 1995-2007

Region	Municipality no.	Total obs.	EmpRate for all	EmpRate for year 95-03	EmpRate for year 04-07	EmpRate for males	EmpRate for females	EmpRate for youth (16-29)	EmpRate for 30-49 aged	EmpRate for 50-65 aged	EmpRate for 65 aged above
East	107	150,727	0.551	0.586	0.503	0.632	0.474	0.396	0.828	0.408	0.020
			(0.089)	(0.087)	(0.065)	(0.075)	(0.112)	(0.109)	(0.086)	(0.114)	(0.031)
Central	36	12,701	0.530	——	0.530	0.618	0.446	0.271	0.806	0.382	0.008
			(0.106)	——	(0.106)	(0.103)	(0.126)	(0.144)	(0.101)	(0.141)	(0.032)
West	37	35,236	0.559	0.559	——	0.631	0 .491	0.352	0.827	0.387	0.010
			(0.099)	(0.099)	——	(0.092)	(0.117)	(0.143)	(0.089)	(0.128)	(0.020)
Total	180	198,664	0.551	0.578	0.508	0.631	0.476	0.381	0.826	0.402	0.017
			(0.092)	(0.092)	(0.074)	(0.081)	(0.114)	(0.123)	(0.088)	(0.119)	(0.030)

Notes: Standard errors are in parentheses. All EmpRates are calculated as the employed and compliant people over corresponding population. For example, for youth, EmpRate = Employed and compliant youth/ The whole youth population.

Table 5.1c: Summary Statistics For Employment/Population Ratios (EmpRate) for Non-compliant Groups, 1995-2007

Region	Municipality no.	Total obs.	EmpRate for all	EmpRate for year 95-03	EmpRate for year 04-07	EmpRate for males	EmpRate for females	EmpRate for youth (16-29)	EmpRate for 30-49 aged	EmpRate for 50-65 aged	EmpRate for 65 aged above
East	107	150,727	0.060	0.058	0.062	0.044	0.075	0.061	0.067	0.064	0.021
			(0.032)	(0.032)	(0.030)	(0.027)	(0.044)	(0.051)	(0.049)	(0.043)	(0.039)
Central	36	12,701	0.065	——	0.065	0.050	0.079	0.066	0.078	0.070	0.004
			(0.045)	——	(0.045)	(0.051)	(0.059)	(0.082)	(0.069)	(0.074)	(0.024)
West	37	35,236	0.057	0.057	——	0.045	0.068	0.075	0.062	0.044	0.021
			(0.032)	(0.032)	——	(0.028)	(0.043)	(0.067)	(0.041)	(0.040)	(0.038)
Total	180	198,664	0.060	0.057	0.063	0.045	0.074	0.063	0.067	0.061	0.020
			(0.033)	(0.032)	(0.033)	(0.029)	(0.045)	(0.057)	(0.049)	(0.046)	(0.038)

Notes: Standard errors are in parentheses. All EmpRates are calculated as the employed and non-compliant people over corresponding population. For example, for youth, EmpRate = Employed and non-compliant youth/ The whole youth population.

Table 5.2: Correlation Coefficients of Ln(*EmpRate*), the Kaitz Index, and Ln(*Nominal Annual MW*), 1995-2007

	Kaitz	Kaitz_lag	Ln(*MW*)	Ln(*MW*)_lag	Ln (*Average Wage*)	Ln(*Emp Rate*) for all	Ln(*Emp Rate*) for males	Ln(*EmpRate*) for females	Ln(*EmpRate*) for youth (16-29)	Ln(*EmpRate*) for 30-49 aged	Ln(*EmpRate*) for 50-65 aged
Kaitz	1.0000										
Kaitz_lag	0.7833	1.0000									
Ln(*MW*)	-0.5664	-0.4780	1.0000								
Ln(*MW*)_lag	-0.5629	-0.4354	0.9740	1.0000							
Ln (*Average Wage*)	-0.8922	-0.7185	0.8774	0.8611	1.0000						
Ln(*EmpRate*) for all	0.1996	0.1023	-0.4322	-0.4413	-0.3531	1.0000					
Ln(*EmpRate*) for males	0.1396	0.0575	-0.3886	-0.3935	-0.2943	0.9026	1.0000				
Ln(*EmpRate*) for females	0.2084	0.1158	-0.3858	-0.3985	-0.3328	0.9503	0.7298	1.0000			
Ln(*EmpRate*) for youth (16-29)	0.2323	0.0766	-0.0922	-0.1127	-0.1850	0.3602	0.3536	0.3316	1.0000		
Ln(*EmpRate*) for 30-49 aged	0.2100	0.0966	-0.2503	-0.2569	-0.2597	0.8101	0.6453	0.8381	0.2972	1.0000	
Ln(*EmpRate*) for 50-65 aged	0.0331	0.0642	-0.1842	-0.1822	-0.1207	0.5952	0.5439	0.5495	0.1084	0.4304	1.0000

Notes: All ln(*EmpRate*) for 50-65 aged are calculated as the employed people over corresponding population. For example, for youth, ln(*EmpRate*) = ln(*Employed youth/ The whole youth population*). The MW is in real terms, as is the average wage.

Table 5.3a: Minimum Wage Effects on the ln(*EmpRate*), 1995-2007: Panel and IV Estimates

VARIABLES	Total (Panel)	Total (Panel)	Total (Panel IV)	Young (Panel)	Young (Panel)	Young (Panel IV)
	(1)	(2)	(3)	(4)	(5)	(6)
kaitz	-0.1010*	-0.0123	0.0843	0.3270***	0.0595	0.1450
	(0.0530)	(0.0612)	(0.0527)	(0.1038)	(0.2421)	(0.2396)
kaitz lagged	-0.0634***	-0.0537***	-0.0844**	-0.1489	-0.1554*	-0.4921***
	(0.0154)	(0.0137)	(0.0332)	(0.0968)	(0.0836)	(0.1283)
ln*wage*		0.0408	0.1180**		-0.2290	-0.2950
		(0.0826)	(0.0556)		(0.2253)	(0.2370)
education		0.4704***	0.4810***		-0.1272	-0.2579
		(0.1056)	(0.0787)		(0.2895)	(0.2828)
female		-0.0805	-0.0882		0.9380	1.1091
		(0.3081)	(0.2238)		(0.8403)	(0.7523)
manufacture		-0.0128	-0.0150		-0.8826***	-0.9200***
		(0.1322)	(0.0746)		(0.1651)	(0.2612)
construction		0.2049	0.2175		0.1948	0.1933
		(0.2874)	(0.1847)		(0.9148)	(0.6959)
service		0.1652	0.1756		0.0924	0.0797
		(0.1562)	(0.1098)		(0.1617)	(0.1837)
soe		-0.0572	-0.0238		-0.5355**	-0.5513***
		(0.1087)	(0.0665)		(0.2226)	(0.2094)
enrolment		-0.6182***	-0.6373***		0.3876	0.5869
		(0.1855)	(0.1747)		(0.9829)	(0.6772)
migrant		-0.0750	-0.1035		0.0171	0.0688
		(0.1308)	(0.0731)		(0.2541)	(0.3264)
constant	-0.4179***	-2.2212**	-3.0051***	-0.6068***	1.8047	2.5484
	(0.0240)	(0.7566)	(0.5336)	(0.1163)	(1.9410)	(2.1958)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	No	Yes	Yes	No	Yes	Yes
Municipality	176	176	176	173	173	173
Observations	676	676	662	664	664	650
R-squared	0.5135	0.5909	0.8665	0.2857	0.3334	0.7529

Notes: Dependent variables are the corresponding ln(*EmpRate*) for the group. Kaitz ratios are defined as *ln (MW) - ln (mean wages)* for each municipality. For other variable definitions, please refer to Table 4.1. Standard errors are in parentheses clustered by provinces. *** p<0.01, ** p<0.05, * p<0.1.

The instruments are the quasi Kaitz index defined as the difference between the log municipal minimum wage and the log provincial mean wage obtained from *China Labour Statistical Year Books*.

Table 5.3b: Minimum Wage Effects on the ln(*EmpRate*) with Full-compliance, 1995-2007: Panel and IV Estimates

VARIABLES	Total (Panel)	Total (Panel)	Total (Panel IV)	Young (Panel)	Young (Panel)	Young (Panel IV)
	(1)	(2)	(3)	(4)	(5)	(6)
kaitz	-0.2293***	-0.2906***	-0.1808***	0.0908	-0.2941	-0.4057*
	(0.0417)	(0.0515)	(0.0593)	(0.0857)	(0.2355)	(0.2319)
kaitz lagged	-0.0566***	-0.0449***	-0.0798***	-0.1357	-0.1387*	-0.4895***
	(0.0134)	(0.0120)	(0.0309)	(0.0795)	(0.0709)	(0.1290)
ln*wage*		-0.0892	-0.0104		-0.4192*	-0.6769***
		(0.0616)	(0.0598)		(0.2334)	(0.2312)
education		0.2085**	0.2387***		0.1087	-0.1916
		(0.0825)	(0.0907)		(0.2104)	(0.2913)
female		-0.5039**	-0.5209***		0.2636	0.4351
		(0.1935)	(0.1979)		(0.7249)	(0.7252)
manufacture		0.0174	0.0117		-0.5466**	-0.6325***
		(0.1721)	(0.0779)		(0.1867)	(0.2364)
construction		-0.0191	0.0212		0.2527	0.1612
		(0.3589)	(0.1853)		(1.1357)	(0.7197)
service		0.1580	0.1922*		0.1098	0.0474
		(0.1496)	(0.1074)		(0.1481)	(0.1810)
soe		-0.0807	-0.0709		-0.5739*	-0.6316***
		(0.1410)	(0.0664)		(0.3224)	(0.1901)
enrolment		-0.1713	-0.1886		0.2851	0.7704
		(0.2365)	(0.1798)		(0.6239)	(0.6817)
migrant		-0.0123	0.0149		0.1039	0.2107
		(0.1282)	(0.0806)		(0.2502)	(0.3033)
constant	-0.5111***	-0.2594	-1.0875*	-0.9074***	2.3674	5.2159**
	(0.0202)	(0.5295)	(0.6428)	(0.0847)	(1.7297)	(2.2184)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	No	Yes	Yes	No	Yes	Yes
Municipality	176	176	176	171	171	171
Observations	676	676	662	656	656	644
R-squared	0.4893	0.5242	0.8703	0.2553	0.2921	0.7829

Notes: See Table 5.3a.

Table 5.3c: Minimum Wage Effects on the ln(*EmpRate*), Non-compliant groups, 1995-2007: Panel and IV Estimates

VARIABLES	Total (Panel)	Total (Panel)	Total (Panel IV)	Young (Panel)	Young (Panel)	Young (Panel IV)
	(1)	(2)	(3)	(4)	(5)	(6)
kaitz	1.2609***	1.9745***	2.1587***	0.5905***	1.6973***	1.2686**
	(0.1757)	(0.3364)	(0.3501)	(0.1582)	(0.4402)	(0.5204)
kaitz lagged	-0.1487**	-0.1332**	0.0430	-0.1091	-0.1366	0.2255
	(0.0606)	(0.0480)	(0.1668)	(0.1076)	(0.0881)	(0.3080)
ln*wage*		0.7343	0.9778***		1.3007***	0.9713*
		(0.4287)	(0.3370)		(0.4057)	(0.5172)
education		0.4893	0.6379**		-0.0625	0.0432
		(0.3340)	(0.3250)		(0.7494)	(0.7111)
female		1.1050	1.0399		4.0691**	3.6901*
		(0.7083)	(0.8156)		(1.8880)	(2.0777)
manufacture		-0.3166	-0.3047		-1.2673**	-1.1867**
		(0.4816)	(0.2767)		(0.4929)	(0.5434)
construction		0.7250	0.6414		2.5938**	1.9330
		(1.0135)	(0.9081)		(0.9295)	(1.3882)
service		0.4738*	0.5297*		-0.4634	-0.4503
		(0.2386)	(0.2868)		(0.4244)	(0.6505)
soe		0.3819	0.4123		0.1780	0.1858
		(0.2808)	(0.3098)		(0.4980)	(0.5388)
enrolment		-0.7383	-0.9254		-1.2591	-1.0777
		(0.8585)	(0.7836)		(1.1160)	(1.6289)
migrant		-0.1894	-0.1869		-0.0434	-0.0075
		(0.4677)	(0.4119)		(0.6695)	(0.6182)
constant	-2.2734***	-10.3632**	-13.2427***	-2.1262***	-13.4376***	-11.6248**
	(0.0742)	(3.8828)	(2.9645)	(0.1763)	(4.1496)	(5.0402)
Municipal effects	Yes	Yes	No	Yes	Yes	No
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	No	Yes	Yes	No	Yes	Yes
Municipality	174	174	174	151	151	151
Observations	654	654	640	510	510	496
R-squared	0.3672	0.3913	0.7991	0.1247	0.1826	0.6649

Notes: See Table 5.3a.

Table 5.4a: MW Effects on the ln(*EmpRate*), East Region, 1995-2007: Panel and IV Estimates

VARIABLES	Total (Panel)	Total (Panel)	Total (Panel IV)	Young (Panel)	Young (Panel)	Young (Panel IV)
	(1)	(2)	(3)	(4)	(5)	(6)
kaitz	-0.0414	-0.0768	0.0673	0.2556**	0.2051	0.4101
	(0.0358)	(0.0720)	(0.0716)	(0.1065)	(0.2169)	(0.2557)
kaitz lagged	-0.0692**	-0.0655**	-0.1446	-0.1064*	-0.1220*	-0.5577*
	(0.0248)	(0.0213)	(0.1010)	(0.0481)	(0.0547)	(0.3208)
ln*wage*		-0.0422	0.0543		-0.0028	-0.0014
		(0.0912)	(0.0820)		(0.1840)	(0.2622)
education		0.4168***	0.4317***		0.0857	-0.0696
		(0.0391)	(0.0998)		(0.1536)	(0.3148)
female		0.0507	0.1498		0.6880	1.2283
		(0.3002)	(0.2991)		(0.6583)	(0.8884)
manufacture		-0.1535	-0.1709*		-0.7842**	-0.8818***
		(0.1743)	(0.1000)		(0.2277)	(0.2841)
construction		-0.3673	-0.4398		-0.6344	-0.9406
		(0.4038)	(0.3334)		(0.5011)	(0.9261)
service		0.1247	0.1251		-0.0893	-0.1146
		(0.2072)	(0.1145)		(0.0684)	(0.1798)
soe		-0.2001	-0.1553		-0.3199	-0.3853
		(0.1462)	(0.1036)		(0.2924)	(0.2572)
enrolment		-0.6734**	-0.7009***		-0.1619	0.0399
		(0.2354)	(0.2400)		(0.6026)	(0.7706)
migrant		0.0989*	0.0449		0.0610	-0.0576
		(0.0507)	(0.0957)		(0.1161)	(0.3423)
constant	-0.3972***	-1.3021*	-2.2605***	-0.5405***	-0.5966	-0.3692
	(0.0224)	(0.6419)	(0.7776)	(0.1143)	(1.2792)	(2.5533)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	No	Yes	Yes	No	Yes\	Yes
Municipality	104	104	104	104	104	104
Observations	430	430	418	429	429	417
R-squared	0.4293	0.5282	0.8204	0.3003	0.3323	0.7365

Notes: See Table 5.3a.

Table 5.4b: MW Effects on the ln(*EmpRate*) with Full-compliance, East Region, 1995-2007: Panel and IV Estimates

VARIABLES	Total (Panel)	Total (Panel)	Total (Panel IV)	Young (Panel)	Young (Panel)	Young (Panel IV)
	(1)	(2)	(3)	(4)	(5)	(6)
kaitz	-0.1741***	-0.2941***	-0.1774**	0.0219	-0.2825	-0.2934
	(0.0496)	(0.0558)	(0.0865)	(0.0868)	(0.1827)	(0.2558)
kaitz lagged	-0.0614**	-0.0463**	-0.1095	-0.0814	-0.0971	-0.7225**
	(0.0210)	(0.0194)	(0.1047)	(0.0541)	(0.0566)	(0.3473)
ln*wage*		-0.1050	-0.0260		-0.2456	-0.5367**
		(0.0800)	(0.0888)		(0.1500)	(0.2692)
education		0.1369**	0.1301		-0.2975**	-0.7453*
		(0.0577)	(0.1373)		(0.1167)	(0.3929)
female		-0.5186**	-0.4562*		0.0286	0.6963
		(0.1702)	(0.2760)		(0.5762)	(0.9725)
manufacture		-0.1574	-0.1791*		-0.6546**	-0.8242***
		(0.2516)	(0.1077)		(0.2371)	(0.2981)
construction		-0.7968**	-0.8948***		-1.2113	-1.8947*
		(0.3027)	(0.3397)		(0.7429)	(1.0455)
service		0.1266	0.1216		0.0192	-0.0466
		(0.2318)	(0.1128)		(0.0780)	(0.1834)
soe		-0.2266	-0.1933*		-0.5603	-0.7231***
		(0.1781)	(0.1017)		(0.4867)	(0.2516)
enrolment		-0.1135	-0.1044		0.8662	1.5724*
		(0.3387)	(0.2706)		(0.6566)	(0.8986)
migrant		0.2075	0.1615		0.2314	0.1203
		(0.1232)	(0.1131)		(0.2039)	(0.3093)
constant	-0.4830***	0.2921	-0.3065	-0.7997***	2.6627**	5.3274*
	(0.0244)	(0.4357)	(1.0531)	(0.0727)	(0.8360)	(2.8544)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	No	Yes	Yes	No	Yes	Yes
Municipality	104	104	104	103	103	103
Observations	430	430	418	426	426	414
R-squared	0.3892	0.4865	0.8329	0.2530	0.2931	0.7532

Notes: See Table 5.3a.

Table 5.4c: MW Effects on the ln(*EmpRate*), Non-compliant groups, East Region, 1995-2007: Panel and IV Estimates

VARIABLES	Total (Panel)	Total (Panel)	Total (Panel IV)	Young (Panel)	Young (Panel)	Young (Panel IV)
	(1)	(2)	(3)	(4)	(5)	(6)
kaitz	1.4666***	1.9666***	2.2406***	0.5698*	1.5069***	1.2246*
	(0.1467)	(0.4484)	(0.5887)	(0.2577)	(0.2427)	(0.6269)
kaitz lagged	-0.2027	-0.1876*	-0.2296	-0.1458	-0.1649	0.7239
	(0.1073)	(0.0807)	(0.5347)	(0.1180)	(0.1222)	(0.7063)
ln*wage*		0.4936	0.7234		1.3360***	1.3870**
		(0.5425)	(0.5147)		(0.2021)	(0.6250)
education		0.4447*	0.4982		-0.8275	-0.8721
		(0.2252)	(0.4562)		(0.9854)	(0.8612)
female		0.1758	0.2882		0.7314	-0.9928
		(0.6639)	(1.2907)		(1.4470)	(2.2119)
manufacture		-0.4706	-0.5049		-1.8971***	-1.5852**
		(0.7762)	(0.4134)		(0.4786)	(0.7240)
construction		2.4491***	2.1450		1.9552	1.2602
		(0.6625)	(1.4896)		(1.1752)	(2.0364)
service		0.7364***	0.7535*		-0.7594	-0.4866
		(0.2057)	(0.3878)		(0.4234)	(0.7937)
soe		0.3738**	0.4069		0.5242	0.7747
		(0.1360)	(0.4479)		(0.3692)	(0.6630)
enrollment		-0.2296	-0.2658		-1.7701	-1.0661
		(0.4065)	(1.0752)		(1.2685)	(1.8337)
migrant		-0.1658	-0.1823		1.0500**	1.3707**
		(0.8276)	(0.5609)		(0.3383)	(0.6963)
constant	-2.2805***	-8.0182*	-8.1393*	-2.2694***	-9.7280**	-11.8902*
	(0.0776)	(4.0966)	(4.4385)	(0.1709)	(3.7209)	(6.5662)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	No	Yes	Yes	No	Yes	Yes
Municipality	103	103	103	94	94	94
Observations	416	416	404	342	342	330
R-squared	0.4362	0.4681	0.8186	0.1551	0.2458	0.6818

Notes: See Table 5.3a.

Table 5.5: Summary of MW Effects on the ln(*EmpRate*) , Pre- and Post 2004

		Total	Total	Total	Young	Young	Young
1995-2003		(1)	(2)	(3)	(4)	(5)	(6)
Sum: kaitz + lagged kaitz	Total sample	-0.20	-0.06	0.15	0.14	-0.24	-0.50
	Compliant	-0.28	-0.24	-0.14	0.01	-0.44	-0.77
	Non-compliant	0.92	1.57	1.95	0.23	1.25	0.65
2004-1007							
Sum: kaitz + lagged kaitz	Total sample	0.03	-0.06	0.02	0.35	0.84	0.28
	Compliant	-0.30	-0.32	-0.19	-0.60	-0.81	-0.47
	Non-compliant	2.12	2.28	3.20	1.72	2.77	2.37

Table 5.5a: MW Effects on the ln(*EmpRate*), 1995-2003: Panel and IV Estimates

VARIABLES	Total (Panel)	Total (Panel)	Total (Panel IV)	Young (Panel)	Young (Panel)	Young (Panel IV)
	(1)	(2)	(3)	(4)	(5)	(6)
kaitz	-0.1664**	-0.0351	0.2642***	0.3125*	-0.0759	-0.0403
	(0.0451)	(0.1599)	(0.1003)	(0.1530)	(0.5055)	(0.5017)
kaitz lagged	-0.0305*	-0.0224	-0.1161***	-0.1735	-0.1674	-0.4641***
	(0.0128)	(0.0121)	(0.0352)	(0.1206)	(0.0960)	(0.1508)
ln*wage*		0.0592	0.3039***		-0.3282	-0.4320
		(0.1760)	(0.0936)		(0.4985)	(0.4587)
education		0.4451**	0.4484***		-0.2743	-0.4682
		(0.1505)	(0.0914)		(0.3428)	(0.3611)
female		-0.3505	-0.3964		2.4642	2.2469*
		(0.5805)	(0.3193)		(1.6669)	(1.2995)
manufacture		0.1437**	0.1695**		-0.5354**	-0.6010*
		(0.0586)	(0.0829)		(0.1917)	(0.3327)
construction		0.1059	0.1902		0.5507	0.6108
		(0.2677)	(0.1899)		(1.0777)	(0.7473)
service		0.1569*	0.2114**		0.3876	0.2260
		(0.0774)	(0.0895)		(0.3712)	(0.3959)
soe		0.0694	0.1123*		-0.6185	-0.7234***
		(0.0914)	(0.0587)		(0.3494)	(0.2722)
enrolment		-0.5936*	-0.5632***		0.7470	1.2165
		(0.2782)	(0.2144)		(1.5218)	(0.9169)
migrant		-0.4503***	-0.4228***		-0.4023	-0.2893
		(0.1196)	(0.1341)		(0.4131)	(0.5933)
constant	-0.4250***	-2.1868	-4.0058***	-0.5682***	2.2499	4.1094
	(0.0235)	(1.5937)	(0.7726)	(0.1102)	(2.6993)	(4.2101)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	No	Yes	Yes	No	Yes	Yes
Municipality	95	95	95	94	94	94
Observations	354	354	342	353	353	341
R-squared	0.6924	0.7619	0.8646	0.3482	0.4050	0.6483

Notes: See Table 5.3a

Table 5.5b: MW Effects on the ln(*EmpRate*) with Full-compliance, 1995-2003: Panel and IV Estimates

VARIABLES	Total (Panel)	Total (Panel)	Total (Panel IV)	Young (Panel)	Young (Panel)	Young (Panel IV)
	(1)	(2)	(3)	(4)	(5)	(6)
kaitz	-0.2466***	-0.2121	-0.0393	0.1317	-0.3299	-0.3601
	(0.0242)	(0.1360)	(0.0898)	(0.1111)	(0.4585)	(0.4453)
kaitz lagged	-0.0333*	-0.0255	-0.0969***	-0.1177	-0.1097	-0.4078***
	(0.0150)	(0.0137)	(0.0311)	(0.0980)	(0.0812)	(0.1523)
ln*wage*		0.0021	0.1363		-0.4738	-0.6412
		(0.1635)	(0.0854)		(0.4481)	(0.4063)
education		0.2082	0.1941**		0.0200	-0.3059
		(0.1345)	(0.0809)		(0.4114)	(0.4135)
female		-0.4952	-0.5526**		0.9886	0.7028
		(0.3649)	(0.2431)		(1.1305)	(1.0378)
manufacture		0.1407*	0.1479**		-0.2284	-0.3783
		(0.0604)	(0.0676)		(0.2205)	(0.3186)
construction		0.0065	0.0529		0.4037	0.4231
		(0.3078)	(0.1694)		(1.3687)	(0.7956)
service		0.1825*	0.2056**		0.4088	0.2082
		(0.0840)	(0.0828)		(0.3423)	(0.3772)
soe		-0.0108	0.0165		-0.7364*	-0.8621***
		(0.1026)	(0.0535)		(0.3453)	(0.2507)
enrolment		-0.0799	-0.0230		0.8119	1.4415
		(0.2037)	(0.1825)		(0.8979)	(0.8968)
migrant		-0.2808**	-0.2584**		-0.1984	-0.0386
		(0.1086)	(0.1262)		(0.4228)	(0.5541)
constant	-0.5002***	-1.0007	-1.3595*	-0.8092***	2.7578	5.2353
	(0.0212)	(1.1966)	(0.7748)	(0.1003)	(2.6445)	(4.0581)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	No	Yes	Yes	No	Yes	Yes
Municipality	95	95	95	93	93	93
Observations	354	354	342	351	351	339
R-squared	0.7442	0.7750	0.8931	0.3399	0.3864	0.6968

Notes: See Table 5.3a.

Table 5.5c: MW Effects on the ln(*EmpRate*), Non-compliant groups, 1995-2003: Panel and IV Estimates

VARIABLES	Total (Panel)	Total (Panel)	Total (Panel IV)	Young (Panel)	Young (Panel)	Young (Panel IV)
	(1)	(2)	(3)	(4)	(5)	(6)
kaitz	1.0700***	1.6991**	2.0964***	0.3188**	1.4107***	0.3927
	(0.2116)	(0.5304)	(0.5098)	(0.1146)	(0.3672)	(0.8756)
kaitz lagged	-0.1479	-0.1319	-0.1452	-0.0935	-0.1637	0.2549
	(0.1043)	(0.1053)	(0.1718)	(0.1315)	(0.1054)	(0.3493)
ln*wage*		0.5991	0.9900**		1.1503*	0.3030
		(0.4603)	(0.4732)		(0.5914)	(0.7761)
education		0.4690	0.5740		-0.4063	-0.2722
		(0.4172)	(0.4300)		(0.6229)	(0.9195)
female		0.9035	1.0223		7.0392***	6.8233***
		(1.4451)	(1.1623)		(1.3162)	(2.5156)
manufacture		0.1273	0.1829		-1.3746*	-1.3833**
		(0.1254)	(0.3572)		(0.6820)	(0.6202)
construction		-0.1638	-0.4214		1.7075**	0.7599
		(0.9600)	(0.9626)		(0.6621)	(1.4505)
service		0.7452	0.8848*		-1.3990*	-1.4158*
		(0.4212)	(0.4837)		(0.6859)	(0.7801)
soe		0.8183*	0.8654**		0.7634	0.7247
		(0.3838)	(0.4179)		(0.6096)	(0.5850)
enrolment		-1.1049	-1.2552		-0.6072	-0.5348
		(1.2004)	(0.9219)		(1.8472)	(2.1634)
migrant		0.1431	0.1075		-1.5251*	-1.8018
		(0.5005)	(0.6639)		(0.6323)	(1.1173)
constant	-2.3614***	-9.7692**	-13.2576***	-2.3261***	-12.6537**	-7.2589
	(0.0437)	(3.5407)	(3.9651)	(0.2589)	(4.0378)	(7.7474)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	No	Yes	Yes	No	Yes	Yes
Municipality	92	92	92	76	76	76
Observations	344	344	332	292	292	280
R-squared	0.3828	0.4096	0.8070	0.1203	0.2225	0.6308

Notes: See Table 5.3a.

Table 5.6a: MW Effects on the ln(*EmpRate*), 2004-2007: Panel and IV Estimates

VARIABLES	Total (Panel)	Total (Panel)	Total (Panel IV)	Young (Panel)	Young (Panel)	Young (Panel IV)
	(1)	(2)	(3)	(4)	(5)	(6)
kaitz	0.0640	-0.0385	-0.0246	0.3638	0.5452***	0.4178**
	(0.0364)	(0.0256)	(0.0407)	(0.2710)	(0.1576)	(0.2021)
kaitz lagged	-0.0346	-0.0233	0.0465	-0.0152	0.2941	-0.1350
	(0.0587)	(0.0477)	(0.0694)	(0.1174)	(0.3586)	(0.3056)
ln*wage*		-0.1527***	-0.1271**		0.3875	0.0652
		(0.0216)	(0.0575)		(0.3001)	(0.2890)
education		0.4337***	0.4049***		-0.9146	0.3948
		(0.0707)	(0.0952)		(1.3323)	(0.4767)
female		0.2309	0.0796		3.8181	0.4282
		(0.1940)	(0.2098)		(3.2021)	(0.9657)
manufacture		0.1987	0.2526**		0.2695	-1.3278**
		(0.1289)	(0.1264)		(1.8786)	(0.5883)
construction		0.5998	0.6593		-1.3907	-2.4036
		(0.6027)	(0.4148)		(2.7078)	(1.7502)
service		0.0287	0.0089		-0.0731	-0.2356
		(0.0319)	(0.0524)		(0.2384)	(0.2330)
soe		-0.1125**	-0.1285**		-1.6420	-0.3711
		(0.0452)	(0.0648)		(1.3164)	(0.3608)
enrolment		-0.3844	-0.2738		2.2216	0.2640
		(0.2377)	(0.3042)		(2.3972)	(0.9947)
migrant		0.2689***	0.2822***		0.2959	0.4724
		(0.0624)	(0.0806)		(0.3635)	(0.3651)
constant	-0.5019***	-0.9308**	-1.1413**	-0.6782**	-2.1640	-2.3880
	(0.0366)	(0.3282)	(0.5283)	(0.2591)	(5.2243)	(3.2820)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	No	Yes	Yes	No	Yes	Yes
Municipality	101	101	101	101	101	101
Observations	322	322	320	320	320	309
R-squared	0.0493	0.2886	0.9433	0.1588	0.2196	0.8775

Notes: See Table 5.3a.

Table 5.6b: MW Effects on the ln(*EmpRate*) with Full-compliance, 2004-2007: Panel and IV Estimates

VARIABLES	Total (Panel)	Total (Panel)	Total (Panel IV)	Young (Panel)	Young (Panel)	Young (Panel IV)
	(1)	(2)	(3)	(4)	(5)	(6)
kaitz	-0.2597***	-0.3424***	-0.2308***	-0.2772	-0.7449	-0.1756
	(0.0757)	(0.0915)	(0.0518)	(0.1843)	(0.6524)	(0.2266)
kaitz lagged	-0.0387	0.0233	0.0434	-0.3240*	-0.0650	-0.2932
	(0.0552)	(0.0513)	(0.0773)	(0.1649)	(0.5371)	(0.3198)
ln*wage*		-0.1771***	-0.1455**		2.3568*	0.2799
		(0.0553)	(0.0643)		(1.1044)	(0.2844)
education		0.2599*	0.3568***		2.9064**	0.2342
		(0.1297)	(0.1051)		(1.1350)	(0.4168)
female		-0.3430	-0.4827		-0.4681	0.9111
		(0.3553)	(0.3341)		(2.4018)	(1.1405)
manufacture		0.6367***	0.5572***		-2.5060**	-0.6305
		(0.1635)	(0.1505)		(0.9186)	(0.5196)
construction		0.6455	0.6929		-4.7487*	-1.5616
		(0.6267)	(0.4306)		(2.4998)	(1.6585)
service		0.0617	0.0866*		-0.2842	-0.0596
		(0.0649)	(0.0507)		(0.4559)	(0.2357)
soe		-0.0417	-0.0814		1.1298	-0.3568
		(0.0787)	(0.0705)		(1.2292)	(0.3413)
enrolment		-0.0471	-0.1550		-6.1841**	0.5865
		(0.2701)	(0.2916)		(2.4951)	(1.0798)
migrant		0.1255	0.2289**		-0.1846	0.2421
		(0.1170)	(0.0986)		(1.1161)	(0.3905)
constant	-0.8196***	-0.2410	-0.8378	-1.6560***	-33.1726***	-4.9145*
	(0.0784)	(0.6785)	(0.6277)	(0.2599)	(10.1183)	(2.8494)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	No	Yes	Yes	No	Yes	Yes
Municipality	101	101	101	101	101	101
Observations	322	322	320	320	320	305
R-squared	0.1403	0.2625	0.9373	0.1364	0.2528	0.8828

Notes: See Table 5.3a.

Table 5.6c: MW Effects on the ln(*EmpRate*), Non-compliant groups, 2004-2007: Panel and IV Estimates

VARIABLES	Total (Panel)	Total (Panel)	Total (Panel IV)	Young (Panel)	Young (Panel)	Young (Panel IV)
	(1)	(2)	(3)	(4)	(5)	(6)
kaitz	2.0319***	2.2492***	2.3481***	1.5481***	2.6872**	2.4510***
	(0.1198)	(0.4306)	(0.3494)	(0.4675)	(0.9381)	(0.6544)
kaitz lagged	0.0836	0.0288	0.8529**	0.1688	0.0791	-0.0845
	(0.2769)	(0.2496)	(0.4172)	(0.4040)	(0.3218)	(0.6902)
ln*wage*		0.4616	0.5694		2.0613	1.7372**
		(0.6102)	(0.4262)		(1.1678)	(0.8444)
education		1.2743**	1.2796*		2.6148*	2.5576**
		(0.5527)	(0.6871)		(1.3140)	(1.1291)
female		1.1021	-0.8578		-4.5834**	-4.4280
		(0.9514)	(1.6977)		(1.9150)	(3.1166)
manufacture		-2.6821**	-2.1006**		-2.0463	-2.0804
		(1.0753)	(0.8875)		(1.1668)	(1.3298)
construction		3.2168	4.1472*		-2.4392	-2.5568
		(2.7177)	(2.1326)		(4.2903)	(3.8059)
service		-0.0393	-0.0792		1.0297	1.1638
		(0.2028)	(0.3778)		(1.1324)	(0.9099)
soe		-0.5239	-0.7402*		-0.5367	-0.5938
		(0.5746)	(0.4431)		(1.0624)	(0.9292)
enrollment		-3.5487**	-2.5113		-6.2204*	-6.2594**
		(1.1900)	(1.9314)		(2.9825)	(3.0579)
migrant		0.4873	1.0304*		0.2912	0.4499
		(0.5206)	(0.5978)		(0.8823)	(0.9319)
constant	-1.2889***	-9.2728	-9.2970**	-1.2927**	-26.0222*	-22.3918***
	(0.2610)	(6.2635)	(3.8776)	(0.4487)	(12.9965)	(8.6878)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Municipal controls	No	Yes	Yes	No	Yes	Yes
Municipality	100	100	100	100	100	100
Observations	310	310	308	320	320	306
R-squared	0.3472	0.4156	0.8276	0.1428	0.2349	0.8084

Notes: See Table 5.3a.

Table 5.7: Summary of MW Effects on the ln(*EmpRate*) , Short Run vs. Long Run Elasticities, System-GMM Estimator

			Total, full spec.	Young, full spec.
Table 5.7a: All Sample Provinces	Total sample	Short Run	-0.10***	0.10
		Long Run	-0.15**	0.13
			(0.0644)	(0.3444)
		Sargan Test	263.12***	167.16
	Compliant	Short Run	-0.19***	-0.26
		Long Run	-0.25***	-0.42
			(0.0588)	(0.3328)
		Sargan Test	264.23***	181.34
	Non-compliant	Short Run	1.34***	0.76
		Long Run	1.54***	0.64
			(0.3112)	(0.4007)
		Sargan Test	173.62	153.47*
Table 5.7b: Eastern Sample Provinces	Total sample	Short Run	-0.28***	0.00
		Long Run	-0.41***	0.00
			(0.0876)	(0.4417)
		Sargan Test	221.72***	191.38*
	Compliant	Short Run	-0.30***	-0.36
		Long Run	-0.41***	-0.79
			(0.0861)	(0.6235)
		Sargan Test	226.85***	180.23
	Non-compliant	Short Run	0.91***	0.84
		Long Run	0.88**	0.87
			(0.3636)	(0.7240)
		Sargan Test	161.52	133.13
Table 5.7c: 1995-2003	Total sample	Short Run	-0.06***	0.33
		Long Run	-0.09	0.49
			(0.0695)	(0.3903)
		Sargan Test	131.65***	113.73*
	Compliant	Short Run	-0.08***	-0.36
		Long Run	-0.13*	-0.27
			(0.0777)	(0.4879)
		Sargan Test	114.07*	100.66
	Non-compliant	Short Run	0.91***	0.33
		Long Run	1.08**	0.23
			(0.3815)	(0.3685)
		Sargan Test	86.99	99.11
Table 5.7d: 2004-2007	Total sample	Short Run	-0.16	0.67
		Long Run	-0.21	1.13
			(0.1663)	(1.4274)
		Sargan Test	86.85*	58.16
	Compliant	Short Run	-0.26**	-0.68*
		Long Run	-0.28**	-0.94
			(0.1347)	(0.7521)
		Sargan Test	82.10	74.01
	Non-compliant	Short Run	3.15***	2.36**
		Long Run	3.87***	1.86*
			(1.1430)	(1.0493)
		Sargan Test	67.45	47.59*

Notes: The first panel corresponds to Table 5.7a, the second corresponds to Table 5.7b, the third is Table 5.7c, and the fourth is Table 5.7d. Each figure for the short-run is the sum of the Kaitz ratio and its lag. Each figure for the long-run is calculated as: (Kaitz+Kaitz lagged)/(1-employment lagged-employment lagged 2) in each regression. The null hypothesis for the Sargan test is that overidentifying restrictions are valid. The rejection of the null hypothesis means that the results are not robust enough. The valid results are shadowed.

Table 5.7a: MW Effects on the ln(*EmpRate*) by Compliance, 1995-2007: System-GMM Estimates

VARIABLES	Total				Full Compliance				Noncompliance			
	(1) Total	(2) Total	(3) Young	(4) Young	(5) Total	(6) Total	(7) Young	(8) Young	(9) Total	(10) Total	(11) Young	(12) Young
kaitz	-0.1648***	-0.1325***	0.4936**	0.1829	-0.2178***	-0.2209***	0.3958**	-0.1230	1.2431***	1.5668***	0.0146	0.4093
	(0.0363)	(0.0429)	(0.1925)	(0.2558)	(0.0358)	(0.0441)	(0.1693)	(0.2122)	(0.1961)	(0.2919)	(0.3826)	(0.4733)
lag.kaitz	0.0838**	0.0343	-0.3076*	-0.0849	0.0038	0.0338	-0.3617**	-0.1374	-0.0436	-0.2271	0.3467	0.3513
	(0.0331)	(0.0214)	(0.1765)	(0.1247)	(0.0337)	(0.0231)	(0.1441)	(0.1038)	(0.1896)	(0.1594)	(0.3402)	(0.2635)
*l.*ln*(EmpRate)*	0.4690***	0.3727***	0.2319***	0.1384**	0.3223***	0.3159***	0.2827***	0.2564***	0.0848	0.1504***	-0.0071	-0.0987
	(0.0384)	(0.0329)	(0.0648)	(0.0617)	(0.0374)	(0.0322)	(0.0590)	(0.0545)	(0.0589)	(0.0546)	(0.0763)	(0.0685)
*l2.*ln*(EmpRate)*	-0.0737**	-0.0358	0.1512***	0.1200***	-0.0543**	-0.0598**	0.1266***	0.1195***	-0.0476	-0.0189	-0.0305	-0.0881
	(0.0361)	(0.0309)	(0.0335)	(0.0331)	(0.0274)	(0.0257)	(0.0487)	(0.0457)	(0.0412)	(0.0406)	(0.0718)	(0.0644)
ln*wage*		-0.0453		-0.0402		-0.0251		-0.2392		0.4389		0.3136
		(0.0393)		(0.2387)		(0.0403)		(0.1915)		(0.2681)		(0.4138)
education		0.4237***		-0.0457		0.3461***		0.3038		-0.1616		-1.7419**
		(0.0567)		(0.3151)		(0.0616)		(0.2855)		(0.4123)		(0.7302)
female		-0.0207		3.6247***		-0.3283*		-0.4974		1.5446		5.8628**
		(0.1948)		(1.1357)		(0.1847)		(0.9402)		(1.2904)		(2.8054)
manufacture		0.2506***		-0.5839*		0.2665***		-0.0662		-0.1926		-2.2822***
		(0.0576)		(0.3491)		(0.0648)		(0.2682)		(0.4522)		(0.7446)
construction		0.4404**		-0.1943		0.2557		0.6416		-0.4382		-2.1949
		(0.2018)		(1.1759)		(0.2116)		(1.0212)		(1.4511)		(2.4056)
service		0.0693		0.2205		0.1275**		0.2783		0.4617		-0.5504
		(0.0526)		(0.3049)		(0.0559)		(0.2417)		(0.4030)		(0.8434)
soe		-0.0469		-0.7823***		-0.0382		-0.4440*		0.0214		0.3649
		(0.0493)		(0.2857)		(0.0504)		(0.2438)		(0.3372)		(0.5643)
enrolment		-0.4489***		0.0016		-0.3058*		0.0703		0.3862		1.2819
		(0.1527)		(0.8697)		(0.1606)		(0.7547)		(1.0744)		(1.8318)
migrant		0.0576		0.6588*		0.1115*		0.6207**		-0.6669		-2.0206***
		(0.0639)		(0.3690)		(0.0656)		(0.3061)		(0.4212)		(0.7773)
constant	-0.4253***	-1.6102***	-0.2783	-1.5873	-0.5711***	-1.5571***	-0.4776***	0.4358	-1.5686***	-5.3847**	-2.1908***	-0.4218
	(0.0474)	(0.3860)	(0.1705)	(2.1785)	(0.0489)	(0.4027)	(0.1622)	(1.7764)	(0.2096)	(2.5355)	(0.4440)	(3.7709)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality	128	128	124	124	128	128	123	123	122	122	83	83
Observations	487	487	474	474	487	487	464	464	447	447	293	293

Notes: Dependent variables are corresponding ln(*EmpRate*) in the first row. Kaitz ratios are defined as *ln (MW) - ln (mean wages)* for each municipality. ln(*EmpRate*) lagged and ln(*EmpRate*) lagged two periods are separately expressed as l.ln(*EmpRate*) and l2.ln(*EmpRate*) to save space. Standard errors are in parentheses clustered by provinces. *** p<0.01, ** p<0.05, * p<0.1.

Table 5.7b: MW Effects on the ln(*EmpRate*) by Compliance, East, 1995-2007: System-GMM Estimates

VARIABLES	Total				Full Compliance				Noncompliance			
	(1) Total	(2) Total	(3) Young	(4) Young	(5) Total	(6) Total	(7) Young	(8) Young	(9) Total	(10) Total	(11) Young	(12) Young
kaitz	-0.0586*	-0.2239***	0.1932	0.1475	-0.1354***	-0.2776***	-0.0001	-0.2194	1.2449***	1.1331***	0.5373	0.7709
	(0.0325)	(0.0572)	(0.1394)	(0.2719)	(0.0367)	(0.0594)	(0.1377)	(0.2629)	(0.2121)	(0.3652)	(0.3889)	(0.6347)
kaitz lagged	-0.0504*	-0.0578**	-0.2803**	-0.1448	-0.0772**	-0.0190	-0.2504**	-0.1416	0.2372	-0.2236	0.2576	0.0650
	(0.0305)	(0.0237)	(0.1231)	(0.1049)	(0.0351)	(0.0257)	(0.1204)	(0.1074)	(0.2266)	(0.2001)	(0.3329)	(0.2945)
*l.*ln*(EmpRate)*	0.4289***	0.4027***	0.3262***	0.3196***	0.3183***	0.2968***	0.4049***	0.4072***	-0.0328	0.0505	0.0891	-0.0073
	(0.0425)	(0.0382)	(0.0600)	(0.0588)	(0.0429)	(0.0367)	(0.0625)	(0.0599)	(0.0664)	(0.0630)	(0.0917)	(0.0798)
*l2.*ln*(EmpRate)*	-0.1049***	-0.0946***	0.0475	0.0450	-0.0039	-0.0129	0.1390***	0.1332***	-0.1368***	-0.0810	0.0816	0.0440
	(0.0348)	(0.0318)	(0.0516)	(0.0548)	(0.0329)	(0.0300)	(0.0481)	(0.0506)	(0.0517)	(0.0538)	(0.0861)	(0.0760)
ln*wage*		-0.2013***		-0.0015		-0.1298**		-0.1373		-0.3436		0.2404
		(0.0522)		(0.2455)		(0.0542)		(0.2370)		(0.3381)		(0.5918)
education		0.2791***		-0.0899		0.2774***		-0.1330		-1.1182**		-1.5615**
		(0.0678)		(0.2884)		(0.0672)		(0.2974)		(0.4810)		(0.7753)
female		0.2338		-0.0198		-0.2583		-0.1350		-1.1696		3.0272
		(0.2117)		(1.0156)		(0.2219)		(0.9950)		(1.6284)		(3.2211)
manufacture		0.0678		-0.4498		0.0832		0.0941		-0.7949*		-2.2578***
		(0.0622)		(0.2740)		(0.0627)		(0.2432)		(0.4661)		(0.8108)
construction		-0.4374*		0.1956		-0.7991***		-0.0759		1.1220		-2.4092
		(0.2365)		(1.1163)		(0.2495)		(1.0925)		(1.8530)		(3.3139)
service		-0.0132		-0.1750		0.0025		0.2349		0.7490*		-0.5113
		(0.0573)		(0.2383)		(0.0578)		(0.2280)		(0.4310)		(0.9790)
soe		-0.0455		-0.5105*		-0.0323		-0.6268**		-0.2472		0.3341
		(0.0574)		(0.2606)		(0.0611)		(0.2634)		(0.4005)		(0.7214)
enrolment		-0.2397		0.4139		-0.0861		1.0731		1.8232		-0.2555
		(0.1962)		(0.8281)		(0.1898)		(0.7902)		(1.2765)		(1.9978)
migrant		0.1090		0.1056		0.1499*		-0.1371		0.3013		-1.2877
		(0.0837)		(0.3647)		(0.0877)		(0.3505)		(0.5581)		(0.9180)
constant	-0.4724***	0.2145	-0.5150***	0.2252	-0.5546***	-0.2546	-0.5895***	1.3048	-2.4439***	5.6525*	-1.6660***	1.4950
	(0.0449)	(0.5163)	(0.1374)	(2.4169)	(0.0477)	(0.5317)	(0.1482)	(2.3679)	(0.2455)	(3.2137)	(0.4444)	(5.2520)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality	77	77	77	77	77	77	77	77	74	74	55	55
Observations	313	313	310	310	313	313	306	306	287	287	201	201

Notes: See Table 5.7a.

Table 5.7c: MW Effects on the ln(*EmpRate*) by Compliance, 1995-2003: System-GMM Estimates

VARIABLES	Total				Full Compliance				Noncompliance			
	(1) Total	(2) Total	(3) Young	(4) Young	(5) Total	(6) Total	(7) Young	(8) Young	(9) Total	(10) Total	(11) Young	(12) Young
kaitz	-0.2242***	-0.1457***	0.6363***	0.4039	-0.2692***	-0.1731***	0.4828**	-0.2194	1.1325***	1.1810***	0.2875	0.0899
	(0.0436)	(0.0476)	(0.2071)	(0.2709)	(0.0402)	(0.0469)	(0.2163)	(0.2629)	(0.2328)	(0.3516)	(0.4247)	(0.5491)
kaitz lagged	0.1744***	0.0868***	-0.4393**	-0.0693	0.1378***	0.0920***	-0.4585**	-0.1416	-0.1726	-0.2757	0.0537	0.2359
	(0.0433)	(0.0280)	(0.1943)	(0.1386)	(0.0439)	(0.0307)	(0.1846)	(0.1074)	(0.2005)	(0.1849)	(0.3733)	(0.2864)
l.ln*(EmpRate)*	0.6199***	0.3719***	0.2135***	0.1780**	0.5109***	0.3750***	0.3144***	0.4072***	0.0796	0.0970	-0.1634*	-0.2809***
	(0.0709)	(0.0575)	(0.0749)	(0.0694)	(0.0792)	(0.0629)	(0.0759)	(0.0599)	(0.0771)	(0.0717)	(0.0902)	(0.0796)
l2.ln*(EmpRate)*	-0.0750	-0.0601	0.1304	0.1348*	0.0066	0.0078	0.1762**	0.1332***	0.0489	0.0650	-0.0475	-0.1415*
	(0.0642)	(0.0521)	(0.0809)	(0.0754)	(0.0468)	(0.0424)	(0.0832)	(0.0506)	(0.0559)	(0.0533)	(0.0907)	(0.0806)
ln*wage*		-0.0017		0.2112		0.0608		-0.1373		0.1334		0.1067
		(0.0451)		(0.2594)		(0.0446)		(0.2370)		(0.3178)		(0.4618)
education		0.4495***		-0.6513*		0.1417*		-0.1330		0.3226		-1.9925*
		(0.0720)		(0.3739)		(0.0784)		(0.2974)		(0.5735)		(1.0175)
female		-0.0293		1.2180		-0.7203***		-0.1350		3.4314*		7.7816**
		(0.2682)		(1.4906)		(0.2397)		(0.9950)		(1.8473)		(3.2247)
manufacture		0.2680***		-0.5659		0.2159***		0.0941		0.5062		-1.3967*
		(0.0759)		(0.3975)		(0.0764)		(0.2432)		(0.5503)		(0.8208)
construction		0.4024*		0.4086		0.3774		-0.0759		0.4807		-0.7936
		(0.2426)		(1.3898)		(0.2414)		(1.0925)		(1.7775)		(2.6410)
service		0.3728***		1.0936**		0.4402***		0.2349		0.9251		-0.2952
		(0.0886)		(0.4645)		(0.0851)		(0.2280)		(0.6047)		(1.0353)
soe		0.0568		-0.4344		0.0341		-0.6268**		0.8741*		1.2697*
		(0.0646)		(0.3531)		(0.0602)		(0.2634)		(0.4498)		(0.6983)
enrolment		-0.4820**		1.3041		0.0645		1.0731		-0.0519		3.3904
		(0.1929)		(1.1123)		(0.1970)		(0.7902)		(1.4643)		(2.4124)
migrant		-0.1455		0.6768		-0.0965		-0.1371		-0.8034		-2.3402**
		(0.0930)		(0.4834)		(0.0878)		(0.3505)		(0.6175)		(0.9783)
constant	-0.2714***	-2.0740***	-0.5485***	-0.3298	-0.3631***	-1.2238***	-0.6751***	1.3048	-2.0267***	-6.8764**	-3.1137***	-1.7158
	(0.0744)	(0.4292)	(0.1798)	(2.2225)	(0.0813)	(0.4064)	(0.1470)	(2.3679)	(0.2775)	(3.0273)	(0.4413)	(4.5270)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality	36	36	36	36	36	36	36	36	36	36	33	33
Observations	246	246	246	246	246	246	244	244	233	233	180	180

Notes: See Table 5.7a.

Table 5.7d: MW Effects on the ln(*EmpRate*) by Compliance, 2004-2007: System-GMM Estimates

VARIABLES	Total				Full Compliance				Noncompliance			
	(1) Total	(2) Total	(3) Young	(4) Young	(5) Total	(6) Total	(7) Young	(8) Young	(9) Total	(10) Total	(11) Young	(12) Young
kaitz	0.0463	-0.1024	-0.3667	0.3329	-0.1337	-0.2326**	-0.1866	-0.2808	1.7798***	2.8452***	-0.9352	2.3433**
	(0.0769)	(0.1086)	(0.5335)	(0.6558)	(0.0847)	(0.1186)	(0.3411)	(0.4210)	(0.5286)	(0.7348)	(0.9644)	(1.0665)
kaitz lagged	-0.0384	-0.0556	0.1299	0.3328	-0.1410**	-0.0305	-0.0857	-0.3964*	0.6971	0.3040	0.6652	0.0131
	(0.0624)	(0.0499)	(0.4325)	(0.3687)	(0.0604)	(0.0441)	(0.2851)	(0.2230)	(0.4806)	(0.4387)	(0.8127)	(0.5528)
*l.*ln*(EmpRate)*	0.4230***	0.3321***	0.4309***	0.2697*	0.2671***	0.2073***	0.3255***	0.2249**	0.0296	0.2118**	0.3879**	-0.1177
	(0.0535)	(0.0554)	(0.1424)	(0.1610)	(0.0472)	(0.0419)	(0.0979)	(0.0973)	(0.1006)	(0.1002)	(0.1700)	(0.1312)
*l2.*ln*(EmpRate)*	-0.0865**	-0.0819**	0.1416***	0.1389***	-0.1032***	-0.1404***	0.0834	0.0560	-0.1387**	-0.0256	-0.0577	-0.1519
	(0.0431)	(0.0416)	(0.0439)	(0.0476)	(0.0382)	(0.0362)	(0.0607)	(0.0622)	(0.0657)	(0.0707)	(0.1242)	(0.0985)
ln*wage*		-0.2251**		0.1071		-0.1636		-0.1874		1.1200*		1.5489
		(0.0960)		(0.5683)		(0.1071)		(0.3719)		(0.6425)		(1.1658)
education		0.3699***		0.8060		0.5279***		0.7406		-0.1125		-1.0224
		(0.1048)		(0.7081)		(0.1165)		(0.4521)		(0.7587)		(1.1225)
female		0.0502		4.3298*		0.0616		-0.8401		-2.1145		-7.6752
		(0.3455)		(2.3947)		(0.3140)		(1.5108)		(1.9910)		(6.1709)
manufacture		0.1746*		-0.5141		0.1789		0.0415		-1.0933		-6.1664***
		(0.1043)		(0.7732)		(0.1272)		(0.3850)		(0.8794)		(1.4354)
construction		0.4177		1.5857		-0.0220		1.4712		3.4641		-9.0912
		(0.3564)		(2.4411)		(0.3981)		(1.5638)		(2.6537)		(6.2850)
service		-0.0627		-0.5184		-0.0484		-0.2360		0.0878		-2.4082
		(0.0661)		(0.4814)		(0.0773)		(0.2858)		(0.5603)		(1.5273)
soe		-0.0165		-1.2454**		0.0861		-0.4230		-0.8190		-1.0286
		(0.0793)		(0.5380)		(0.0920)		(0.3578)		(0.5425)		(0.9507)
enrolment		-0.3054		-0.9977		-0.6126**		-0.4877		-1.1246		-4.8564
		(0.2708)		(1.7945)		(0.3000)		(1.2603)		(2.2042)		(3.1111)
migrant		0.3688***		0.5195		0.5544***		0.3340		-0.9138		-1.6290
		(0.1087)		(0.6483)		(0.1195)		(0.4498)		(0.6625)		(1.3355)
constant	-0.3602***	0.0418	-0.5910	-5.3371	-0.6965***	-1.4183	-0.8358**	-1.7836	-1.3411**	-7.4131	-1.7132**	-2.6809
	(0.0758)	(0.9378)	(0.5737)	(5.3772)	(0.0900)	(1.0610)	(0.3523)	(3.5039)	(0.5254)	(6.1516)	(0.7832)	(9.6374)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality	101	101	97	97	101	101	96	96	95	95	55	55
Observations	241	241	228	228	241	241	220	220	214	214	113	113

Notes: See Table 5.7a.

Table 5.8a: MW Effects on the ln(*EmpRate*) by Gender, 1995-2007: Panel Estimates

VARIABLES	Male	Male	Female	Female
	(1) Total	(2) Full Compliance	(3) Total	(4) Full Compliance
kaitz	0.0227	0.0606	-0.1564	-0.6652**
	(0.0445)	(0.1990)	(0.0890)	(0.2605)
kaitz lagged	-0.0568***	-0.0420**	-0.0687***	-0.0194
	(0.0118)	(0.0170)	(0.0189)	(0.0397)
sum	-0.0341	0.0186	-0.2251	-0.6846
ln*wage*	0.0770	0.1388	-0.0974	-0.3293
	(0.0487)	(0.1588)	(0.1190)	(0.2078)
education	0.2169***	0.3429**	0.2675*	0.1434
	(0.0636)	(0.1227)	(0.1362)	(0.1538)
female	0.6442**	0.6476**	-0.3202	-1.2311***
	(0.2448)	(0.2523)	(0.3443)	(0.3885)
manufacture	-0.0415	-0.0545	0.0122	0.0233
	(0.0598)	(0.0948)	(0.2448)	(0.3455)
construction	0.3961	0.3398	-0.5637	-0.6469
	(0.2501)	(0.2447)	(0.4668)	(0.5517)
service	0.1113	0.1928	0.1446	0.0075
	(0.0850)	(0.1561)	(0.2406)	(0.3027)
soe	-0.0878	-0.1819	0.0280	0.0724
	(0.0763)	(0.1225)	(0.1482)	(0.2247)
enrolment	-0.4176***	-0.4179***	-0.0580	0.0449
	(0.1159)	(0.0843)	(0.2631)	(0.3067)
migrant	-0.0510	0.0950	0.0813	-0.1057
	(0.1258)	(0.2421)	(0.1027)	(0.2939)
constant	-1.8400***	-2.8312*	-0.5026	1.9787
	(0.4903)	(1.4597)	(0.8832)	(1.8329)
Municipal effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Municipality	176	176	176	176
Observations	676	676	676	676
R-squared	0.4630	0.0604	0.4670	0.1983

Notes: Dependent variables are corresponding ln(*EmpRate*) in the first row. Kaitz ratios are defined as *log (MW) - log (mean wages)* for each municipality. Standard errors are in parentheses clustered by provinces. *** p<0.01, ** p<0.05, * p<0.1.

Table 5.8b: MW Effects on the ln(*EmpRate*) by Gender, 2004-07: Panel Estimates

VARIABLES	Male	Male	Female	Female
	(5) Total	(6) Full Compliance	(7) Total	(8) Full Compliance
kaitz	0.0185	0.2668	-0.1553***	-0.8799*
	(0.0732)	(0.3410)	(0.0410)	(0.4295)
kaitz lagged	-0.0157	0.2153	0.0313	0.1455
	(0.0453)	(0.1756)	(0.0809)	(0.0865)
sum	0.0028	0.4821	-0.1240	-0.7344
ln*wage*	-0.0481	-0.0591	-0.3402***	-0.1873
	(0.0494)	(0.1898)	(0.0876)	(0.2890)
education	0.1325	0.5615	0.3763***	-0.3985
	(0.1543)	(0.3402)	(0.0935)	(0.5226)
female	0.6516	-0.1721	-0.4179	-1.2475
	(0.4212)	(0.9163)	(0.3728)	(0.8790)
manufacture	0.0710	0.0566	0.7187*	1.5970**
	(0.0966)	(0.3324)	(0.3787)	(0.6015)
construction	0.8882	1.2176*	0.2740	-0.2756
	(0.4966)	(0.5835)	(1.0615)	(1.0427)
service	0.0192	0.0989	0.0736	-0.2253
	(0.0466)	(0.1806)	(0.1100)	(0.4173)
soe	-0.1505***	-0.3450	-0.1494**	0.2201
	(0.0460)	(0.2751)	(0.0593)	(0.2733)
enrollment	0.0061	-0.1142	-0.0552	1.3848**
	(0.3344)	(0.4037)	(0.4423)	(0.5187)
migrant	0.1813**	0.5626	0.4924***	-0.2600
	(0.0709)	(0.4806)	(0.0908)	(0.5650)
constant	-0.7328	-1.5214	1.0044	1.6937
	(0.8506)	(2.0285)	(0.8834)	(2.6131)
Municipal effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Municipality	101	101	101	101
Observations	322	322	322	322
R-squared	0.2707	0.0374	0.2114	0.1106

Notes: See Table 5.8a.

Table 5.9a: MW Effects on the ln(*EmpRate*) by Age Category, 1995-2007: Panel Estimates

VARIABLES	Age 16-29		Age 30-49		Age 50-65	
	(9) Total	(10) Full Compliance	(11) Total	(12) Full Compliance	(13) Total	(14) Full Compliance
kaitz	0.0595	-0.2941	0.0723	-0.3436	-0.3668**	-1.0530**
	(0.2421)	(0.2355)	(0.0411)	(0.2389)	(0.1376)	(0.4215)
kaitz lagged	-0.1554*	-0.1387*	-0.0112	0.0349	-0.0147	-0.1040
	(0.0836)	(0.0709)	(0.0065)	(0.0385)	(0.0340)	(0.0606)
sum	-0.0959	-0.4328	0.0611	-0.3087	-0.3815	-1.1570
ln*wage*	-0.2290	-0.4192*	0.1093	-0.1330	-0.2063	-0.6550
	(0.2253)	(0.2334)	(0.0626)	(0.1639)	(0.2009)	(0.4059)
education	-0.1272	0.1087	0.1927*	0.0270	0.6929**	0.2178
	(0.2895)	(0.2104)	(0.1071)	(0.1381)	(0.2944)	(0.5052)
female	0.9380	0.2636	-0.2149	-0.4914	0.9344	0.8432
	(0.8403)	(0.7249)	(0.1923)	(0.3814)	(0.9704)	(1.3485)
manufacture	-0.8826***	-0.5466**	0.0891	0.0450	-0.2771	-0.2823
	(0.1651)	(0.1867)	(0.0769)	(0.1211)	(0.2971)	(0.3957)
construction	0.1948	0.2527	-0.0643	-0.4194	-0.4472	0.3581
	(0.9148)	(1.1357)	(0.2531)	(0.3661)	(0.5385)	(0.5997)
service	0.0924	0.1098	0.0571	-0.1358	0.0638	-0.1121
	(0.1617)	(0.1481)	(0.0500)	(0.2305)	(0.1875)	(0.3821)
soe	-0.5355**	-0.5739*	0.0794	0.0858	-0.2169	-0.5008
	(0.2226)	(0.3224)	(0.0880)	(0.1513)	(0.2154)	(0.3437)
enrollment	0.3876	0.2851	-0.1520	-0.0182	-0.9952	0.3483
	(0.9829)	(0.6239)	(0.2155)	(0.2797)	(0.7020)	(1.4013)
migrant	0.0171	0.1039	-0.0729	-0.3600	-0.1329	-0.2866
	(0.2541)	(0.2502)	(0.0896)	(0.2689)	(0.3203)	(0.4307)
constant	1.8047	2.3674	-1.5585**	1.0322	-1.8430	2.9851
	(1.9410)	(1.7297)	(0.6388)	(1.6224)	(1.9982)	(4.5221)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Municipality	173	171	176	176	175	175
Observations	664	656	701	701	697	697
R-squared	0.3334	0.2921	0.4667	0.0857	0.1019	0.1043

Notes: Dependent variables are corresponding ln(*EmpRate*) in the first row. Kaitz ratios are defined as *log (MW) - log (mean wages)* for each municipality. Standard errors are in parentheses clustered by provinces. *** p<0.01, ** p<0.05, * p<0.1.

Table 5.9b: MW Effects on the ln(*EmpRate*) by Age Category, 2004-2007: Panel Estimates

VARIABLES	Age 16-29		Age 30-49		Age 50-65	
	(15) Total	(16) Full Compliance	(17) Total	(18) Full Compliance	(19) Total	(20) Full Compliance
kaitz	0.5452***	-0.7449	0.0594	-0.5103	-0.3104	-1.5086*
	(0.1576)	(0.6524)	(0.0429)	(0.3608)	(0.2109)	(0.7548)
kaitz lagged	0.2941	-0.0650	0.0111	0.2102	0.4764	0.0551
	(0.3586)	(0.5371)	(0.0434)	(0.1569)	(0.3613)	(0.6054)
sum	0.8393	-0.8099	0.0705	-0.3001	0.1660	-1.4535
ln*wage*	0.3875	2.3568*	-0.0366	0.0029	-0.6387	-1.2384
	(0.3001)	(1.1044)	(0.0348)	(0.1943)	(0.3981)	(0.8982)
education	-0.9146	2.9064**	0.1050	-0.6012	0.0402	-1.1901
	(1.3323)	(1.1350)	(0.0619)	(0.5319)	(0.3473)	(1.6570)
female	3.8181	-0.4681	-0.1073	-0.6185	0.1987	1.2675
	(3.2021)	(2.4018)	(0.1732)	(0.7802)	(1.2574)	(2.6844)
manufacture	0.2695	-2.5060**	0.2543***	1.0321	0.1448	-0.1243
	(1.8786)	(0.9186)	(0.0487)	(0.5855)	(0.9481)	(1.3345)
construction	-1.3907	-4.7487*	-0.1161	-0.2748	2.8757**	4.1221
	(2.7078)	(2.4998)	(0.2747)	(0.3177)	(1.2887)	(2.6546)
service	-0.0731	-0.2842	0.0165	-0.2901	-0.3370	-0.5731
	(0.2384)	(0.4559)	(0.0293)	(0.4289)	(0.4378)	(0.6409)
soe	-1.6420	1.1298	0.0368	0.2413	-0.0389	0.0071
	(1.3164)	(1.2292)	(0.0401)	(0.1935)	(0.3127)	(0.6902)
enrollment	2.2216	-6.1841**	0.0661	1.3116*	1.8577	6.1417
	(2.3972)	(2.4951)	(0.2395)	(0.7177)	(1.4160)	(4.1376)
migrant	0.2959	-0.1846	0.1494**	-0.5860	-0.0083	-0.7088
	(0.3635)	(1.1161)	(0.0647)	(0.4672)	(0.4531)	(1.0385)
constant	-2.1640	-33.1726***	-0.2426	1.4918	4.2731	11.7717
	(5.2243)	(10.1183)	(0.3534)	(1.7243)	(3.1036)	(8.2411)
Municipal effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Municipality	101	101	101	101	100	100
Observations	320	320	322	322	319	319
R-squared	0.2196	0.2528	0.2299	0.0746	0.0859	0.1062

Notes: See Table 5.9a.

Table 5.10: Estimated Effect of a 10% Increase in the Minimum Wage on Employment: Studies Using Province/municipality*

Source	Data	MW variable	Control variables	Table	Percent changes in employment due to 10% minimum wage increase
Fang & Lin, 2013	UHS 2002-2009	Kaitz ratio: ln (*MW-to-average-wage ratio*)	Municipal GDP/capita,CPI, and FDI; year and municipal fixed-effects.	Table 4	Entire sample: 0.73-0.86% (negative) Young (15-29): 1.98-2.44% (negative) Entire sample, east: 0.67-0.68% (negative) Young, east: 1.54-3.34% (negative)
				Table 5	Male : insignificant Female : -0.68 to -2.09%
				Table 7	Rural migrants, east: insignificantly positive
				Table 8	Rural migrants, east: insignificantly positive Young migrants: -1.06% to insignificantly
				Table 9	IV young: -0.92% and insignificantly positive IV young, east: 1.9-2.15% (negative)
Wang & Gunderson, 2011	2000-07 provincial panel data from yearbooks.	MW/provincial average wage per year	Provincial unemployment rate; share of the rural working age population; provincial and year fixed-effects.	Table 2	Rural migrants, east: insignificantly positive
Ni *et al* ., 2011	2000-05 provincial panel data from yearbooks.	MW level	Provincial GDP and CPI, population 15 and above, provincial fixed-effects.	Table 3	Entire sample: insignificantly positive Entire sample, east: -2.34%
				Table 10	Male: insignificantly positive
				Table 11	Female: insignificantly positive

* Only significant effects are listed and counted in.

6. THE MINIMUM WAGE AND THE GENDER WAGE GAP

6.1. Introduction

Traditionally, empirical research has focused on decomposing the gender wage gap into two components: the composition and the unexplained effects. The composition effect is explained by the different characteristics between genders, such as education and experience, representing productive factors. The unexplained effect captures different returns, or prices, for the same endowment between genders. This unexplained effect is sometimes thought of as measuring "discrimination"; that is, lower pay to women who have the same measurable productivity level as men. However, it is better described as the "unexplained effect" because it might also include mis-measurement and omitted variable bias. The unexplained effect can also be called the structural effect since its source is due to distinctive gender wage structures.

The gender wage gap in China has continued to widen since the economic reform in the 1980s, when a market economy gradually replaces a planned economy (Table 6.2 below shows that the average gap rose from 21% in 1995 to 32% in 2007). This rising gender gap is caused by increases in both composition effects and discrimination/structural effects. As for the composition effect, productive factors become more and more important under competitive wage settings (Ge and Yang, 2012). This fact highlights the different endowments of males and females. As for the discrimination effect, before the reform, gender equality was maintained by state control on wage levels for state-owned and collective enterprises, which is one important factor in explaining the much smaller gender differentials when compared with developed countries in the same period.

After the reform, this artificial equality (in other words, "discrimination" in favour of women) was broken by the introduction of marketisation or decentralisation of wage setting (Ng, 2007). Firms and individuals have more autonomy to decide their respective demand and supply. One example is the dramatic drop in the female employment ratio in the 2000s. Overall, these developments mean that gender wage differentials have become an important topic for China.

This chapter further relates the gender gap to the minimum wage based on two considerations. First, during the process of this rising gender gap, females at the "sticky floor" (Chi and Li, 2008) are the most disadvantaged group compared with their counterparts at higher wage percentiles. Almost all relevant studies report this observation (Bishop *et al*., 2005; Ge, 2007; Chi and Li, 2008; Chen and Duan, 2009; Ge and Zeng, 2011). Women with low skills compose another disadvantaged group (Gustafsson and Li, 2000; Zhang *et al*., 2008), who are inclined to be trapped at the wage floor as well. At the same time, as noted in Chapter 4, there are significant effects of the minimum wage on compression of wage distribution. Thus, the question whether or not minimum wages help women at the wage floor is an interesting one to investigate.

Government policies such as the minimum wage may influence the gender wage gap both through workforce "composition" (the skill composition of the female workforce is generally lower than that of the male's and so more women may be affected) and wage "structure" effects (changing the returns to productive characteristics). In other words, since more females earn at the minimum wage level raising minimum wages, therefore, will affect more women relative to men, and reduce the wage gap via this workforce composition effect. As for the structural effect

(discrimination), if an increase in the minimum wage has more of an effect on women's pay, as is likely since they work more for the small, low-paying firms, this too will narrow the gap.

This chapter applies the unconditional quantile regression method (Firpo *et al*., 2009)[1] to decompose the gender wage gap, using our standard dataset (see Chapter 3 above), the 1995-2007 China Urban Household Survey (UHS). It presents a moving picture over a ten-year period for the gender gap across the earnings distribution. The previous decomposition studies (e.g. Zhang *et al*., 2008; Chi and Li, 2008) have not investigated minimum wage effects. Thus, this is the first study to examine the effect of the minimum wage on the gender wage gap in China using decomposition analysis.

This chapter finds that the gender wage gap in China has been rising, but at a slower pace since 2000. The overall "discrimination" residual first increases then decreases after 2001. Since the gap is wider at the bottom deciles, the evidence points to a "sticky floor" for women. However, the situation for women at the wage floor has relatively improved in recent years, since the gender gap at the lower end of the wage distribution has shrunk while the gap in the middle and at the upper end widened after 2003. The strengthening of the minimum wage after 2004 appears responsible for a large part of this improvement at the lower deciles. In particular, for females at the bottom decile, the minimum wage is powerful, and works both through the composition effect (because more women are covered by the minimum wage), and the structure effect (since, at the lower deciles, the impact of the minimum wage on women's pay is stronger than that for men).

[1] The RIF regression command in this chapter is from Fortin's Stata command *rifreg*. Detailed information can be found in the *rifreg* help file. See her website: http://faculty.arts.ubc.ca/nfortin/datahead.html

The remaining of the chapter is arranged as follows: section 6.2 gives descriptive statistics about the gender wage gap, combined with relevant information on the minimum wage. Section 6.3 illustrates Firpo *et al*.'s (2009) unconditional quantile regression method. Section 6.4 shows the empirical results from annual data, and section 6.5 presents results of the robustness test using monthly data. Section 6.6 concludes the chapter.

6.2. Descriptive statistics

This section gives descriptive statistics of the sample data used in this chapter. The sample is similar to that in Chapter 4, and it contains full-time employees aged between 16 and 65 in non-farming jobs. The sample period is from 1995 to 2007, when the minimum wage covers the whole country. All independent variables are calculated at aggregated level of municipalities based on this trimmed sample.

Figure 6.1 shows the gender employment gap by age in 1996 and 2004 respectively. Notice that the sample in these two figures is different from that used later in the empirical sections. It comprises all people aged 16 and over including unemployed people, students and the retired; it also covers all industries including farming. Thus, a general picture of the employment activities in these two years is presented. The largest difference in employment between males and females appears in the 50 to 60 age range which becomes much smaller after the age of 60. This is understandable since in China the statutory retirement age for female workers is 55, compared to 60 for males. However, one obvious difference between 1996 and 2004 is the advent of a prime-age employment gap. In 1996, the gap only shows after about age 40. In 2004, female employment rarely exceeds male employment across all ages; furthermore, the employment gap

appears at as early as around age 28, which is a common childbearing age in China. Thus, it would be interesting to investigate further whether this reduction in the employment of women from 1996 to 2004 leads to any improvement in the wages of female employees.

Table 6.1 presents statistics on individual characteristics by gender in 1996 and 2004, as well as means for the whole sample period. It is based on the same sample adopted in the empirical sections. Following Alaniz *et al*. (2011), the percentage of workers earning within 120% of the minimum wage is also shown to reduce the impact of measurement errors. In the table, it can be seen that females within 120% of the minimum wage form a higher proportion of the workforce than is the case for males, indicating more females are directly influenced by minimum wages than males. Moreover, the proportion is higher in 2004, which may be caused by stricter enforcement of the law. On average, the percentage of females at or close to the minimum wage is about 10 percentage points higher than that of males (19.52% versus 9.04%). As for other characteristics, female workers appear to have less working experience and education. At the same time, more females are in service occupations, but more males are manual workers. Both occupations are inclined to be affected by minimum wages, and so further decomposition is needed to analyse the effect by gender.

In summary, Table 6.1 illustrates that minimum wages may affect more female than male workers, indicating that the minimum wage is likely to lower the gender wage gap at the lower end of the wage distribution. Notice that statistics in Figure 6.1 and Table 6.1 are very similar to those in Chi and Li (2008). Chi and Li (2008) do not analyse the minimum wage effect, but they use the same UHS data as this chapter. Thus, the similarity of their wage distribution results is

reassuring for the analysis below.

6.3. Methodology

This section discusses the two methodologies used in this chapter. One is the traditional Oaxaca (1973) and Blinder (1973) decomposition, and the other is the unconditional quantile regression decomposition from Firpo *et al*. (2009, FFL hereafter). These two methods share the same idea in that both of them use labour market characteristics as the explained part, and returns to these characteristics as the unexplained part, i.e. discrimination. The only difference is that the method from Oaxaca (1973) and Blinder (1973) decomposes at the mean, while the FFL method permits decomposition at the quantiles. The Oaxaca (1973) and Blinder (1973) composition, therefore, is discussed first, and can be seen as a benchmark; then the FFL method is discussed. Finally, a conclusion will be drawn.

In the method from Oaxaca (1973) and Blinder (1973), the wage differentials between the two groups are decomposed into two parts. Suppose that there are two wage equations for men and women:

$$\ln \overline{W}^f = \alpha^f + \beta^f \cdot \overline{X}^f$$

$$\ln \overline{W}^m = \alpha^m + \beta^m \cdot \overline{X}^m,$$

where superscripts m and f indicate males and females, and α is the constant, β denotes the coefficients. These equations can be estimated using normal OLS. Under the Oaxaca (1973) and Blinder (1973) decomposition, the difference between the average wages of these two groups is

decomposed into two parts as below:

$$\ln\overline{W}^{m} - \ln \overline{W}^{f} = \beta^{m}\cdot(\overline{X}^{m} - \overline{X}^{f}) + [(\alpha^{m} - \alpha^{f}) + \overline{X}^{f}\cdot(\beta^{m} - \beta^{f})].$$

One part is $\beta^{m}\cdot(\overline{X}^{m} - \overline{X}^{f})$; that is, the gender wage differential attributable to differences in average male/female productive characteristics given the same wage structure (the coefficients for these characteristics) - in this case following the male wage structure (the coefficients estimated from the male wage equation). This part, which is based on the gender differences in productive factors, is known as the *composition effect*. The other part is $[(\alpha^{m} - \alpha^{f}) + \overline{X}^{f}\cdot(\beta^{m} - \beta^{f})]$, that is, the gender wage differentials arising from the wage structure (differences in coefficients of the two estimated wage equations) holding productive characteristics constant (in this case using the average female characteristics as a reference). Since the wage differential associated with this part is due to wage structures (the pay-offs for different productive characteristics male and female receive from the market) this part is often called the *structural effect* and considered to be caused by discrimination. Notice under OLS regressions, all estimators are at their averages, and hence both effects are the average effects over the gender group. There are several extensions of the Oaxaca (1973) and Blinder (1973) decomposition, and the most basic and original version is adopted in this chapter as a basis for comparison with the FFL method.

The advantage of the FFL method is to decompose the group gap over the wage distribution, instead of at the mean only (FFL, 2009). One may argue that the quantile regression method developed by Koenker and Bassett (1978) can be used to get estimators. However, their quantile regressions express the influence of X on the *conditional* statistics of Y, while FFL's model is on *unconditional* statistics, which is more reasonable. For example, it is preferable to know the

response of female wages to a given increase in minimum wages in the population (unconditional effects), rather than the response just for a sample with specific covariates (conditional effects). It is true that normally regression coefficients can be interpreted as unconditional effects, because in linear regression models the conditional mean $E(Y \mid X) = X\beta$ leads to $E(Y) = E(X)\beta$, so that the unconditional response of Y can be acquired by averaging it over X (Chi and Li, 2008). However, this property does not hold for non-linear models, such as quantile regression models. Thus, one of the contributions of the FFL method is to permit this study to obtain the unconditional response of Y. The estimated coefficients and decomposition results are, therefore, more general.

The key to obtaining the unconditional effect of explained variables is the application of the Recentred Influence Function (RIF hereafter) in the FFL method. The RIF is based on the influence function, which is used as a measure of robustness of a general function form to outlier data in empirical applications (FFL, 2009). It describes "the influence of an individual observation on a distributional statistic of interest such as a quantile" (Chi and Li, 2008). The recentred version of the influence function, i.e. RIF, provides a linear approximation to a non-linear function of the distribution, through collecting the leading term of a von Mises expansion (FFL, 2009). This RIF regression contains the same conditional property as the OLS regression, so that the results can be interpreted in the same way as in traditional decompositions such as the method from Oaxaca (1973) and Blinder (1973).

There are two steps in the FFL method. The first step is to decompose the gender wage gap across distributions into two effects: composition effects and structural effects. A counterfactual female earning distribution has to be constructed based on what women would earn if they had

the same returns to market characteristics as men. Then the difference between the male distribution and this counterfactual must be attributable to women's different characteristics (the composition effect), and the difference between the counterfactual and women's actual distribution represents the unexplained gap (the structural effect). In particular, suppose v (W) is a quantile of the wage distribution W, then the gender wage differentials at quantile τ can be expressed as below:

$$v(W^m) - v(W^f) = [v(W^m) - v(W^c)] + [v(W^c) - v(W^f)],$$

where superscripts m and f denote males and females respectively. c indicates the counterfactual wages of women, showing how much females would earn if women had the same returns to characteristics as men. Thus, the underlying idea is the same as in the Oaxaca (1973) and Blinder (1973) decomposition. Notice that FFL do not set the specific form of the wage distribution, and the re-weighting factor can be obtained by a logit/probit model, or other models with suitable properties suggested by FFL (2009). As noted above, the re-weighting factor is obtained by computing the quantile treatment effect estimators using Firpo's STATA command *rifreg*.

The second step of the FFL method is to further decompose the raw gender wage gap into the effects of each covariate at quantile τ. With the help of RIF regressions, the linear approximation of the wage distribution at each quantile of interest is obtained. Specifically, for each year:

$$RIF(W^m; \hat{q}_\tau) = X^m \hat{\beta}^m$$

$$RIF(W^f; \hat{q}_\tau) = X^f \hat{\beta}^f$$

$$RIF(W^c;\hat{q}_\tau) = X^c\hat{\beta}^c,$$

where RIF represents the RIF regressions. $\hat{\beta}$ denotes the estimate of the unconditional quantile partial effect, which can be interpreted in the same way for an OLS regression. Based on the results above, the decomposition for each covariate is finally achieved below, ignoring approximation errors resulting from the RIF linearity (Chi and Li, 2008):

$$\hat{q}_\tau(W^m) - \hat{q}_\tau(W^f) = (\bar{X}^m\hat{\beta}^m - \bar{X}^f\hat{\beta}^c) + [\bar{X}^f(\hat{\beta}^c - \hat{\beta}^f)].$$

As with the method from Oaxaca (1973) and Blinder (1973), this equation decomposes the gender wage gap at quantile τ into two components. The first part is the composition effect, explained by different gender characteristics. The second part is the structural effect, explained by different gender returns to characteristics. In what follows, both the FFL method and the method of Oaxaca (1973) and Blinder (1973) will be used to decompose gender wage differentials with special attention paid to the impact of the minimum wage on the decomposition.

6.4. Empirical results

This section starts by presenting the kernel density distributions for both genders in 1996 and 2004, to give a basic idea of the distributional differences between men and women. It is this distributional gap that is decomposed into composition and structural effects across years. Finally, with the help of RIF regressions, these two effects are further decomposed into the separate effects of each covariate.

Figure 6.2 show the kernel density distributions for both genders in 1996 and 2004[2]. Clear differences are observed. For 1996, the wage gap is slightly larger at the lower end of the wage distribution, which is consistent with Bishop *et al*. (2005), Ng (2007), Chi and Li (2008) and Ge and Zeng (2011). However, for 2004 the wage gap widens relatively at the middle, but shrinks relatively at the lower end of the distribution. This observation is consistent with Chen and Duan (2009). Figure 6.3 contrasts 1996 and 2004, and we see how the overall gender wage gap across the distribution has widened from around 20% in 1996 to 35% in 2004. At the same time, we can see that dashed trend line for 2004 is less steep than in 1996, indicating that the relative position of women at the lower end improved over the period, suggesting the influence of factors such as the minimum wage.

The results of the first step of the FFL method, as well as those of the Oaxaca (1973) and Blinder (1973) decomposition are shown in Table 6.2 and Figure 6.4. Only selected quantiles are presented in order to save space. First, taking the Oaxaca (1973) and Blinder (1973) decomposition results, while the gender wage gap increases from 1995 to 2007, the increases appear to be mainly caused by the sharp rise of the composition effect (denoted by the hollow circle line) after 2001. The structural effect started to fall after 2001. In other words, it appears that the share of the structural (discrimination) effect in the total wage gap has been declining in recent years despite the rise of the overall gap.

Second, looking further at the decomposition results for selected quantiles using the FFL

[2] Our sample period is 1995-2007. However, in 1995 some sample cities did not have their minimum wages yet, so 1996 is chosen instead of 1995. On the other hand, 2004 is the first year when the minimum wage policy was strictly implemented. Thus, 1996 and 2004 are picked out for the figures.

method, there is an obvious difference between the gender gap at the 10th percentile and other percentiles. Specifically, beginning from 2002, the gender gap decreases dramatically at the 10th percentile, while the gaps at the 30th percentile or above exhibit a sharp rise first and then flatten out. This observation suggests that the increase in the gaps at the middle and upper end of the distribution are responsible for the overall rise of the gender gap. There has been an improvement for women at the bottom end of the earnings distribution, suggesting the possible influence of the minimum wage on gender gap noted in Chapter 4.

Third, composition effects increase at all percentiles from around 2002 and 2003, while structural effects, i.e. discrimination, decrease around the same period. Overall, though the gender wage differentials at the lower end of the distribution are the largest among all quantile gaps to start with, they shrink in relative term to gaps at other percentiles in recent years, suggesting an improvement in the situation of women at the "sticky floor".

Finally the decomposition results from each covariate are obtained with the help of RIF regressions. First, results from the RIF regressions at selected quantiles are attached as appendices after this chapter (Appendices 6a and 6b[3]). As is our practice in this chapter, only results for 1996 and 2004 are shown in order to save space. Second, since the focus of this chapter is the minimum wage factor, Table 6.3 and Figure 6.5 only show the individual effect of minimum wages across (effects for all covariates are shown in Appendices 6a and 6b). Furthermore, based on Chapter 4's finding that minimum wages have a spill-over effect up to the

[3] It is interesting to note from Appendix Tables 6a and b that the minimum wage much more marked effects in raising women's than men's wages at the bottom percentile than at the median, where the effects are similar (as we have already observed in Chapter 4). The larger benefit that women in the lower percentiles receive from minimum wages lead to the large negative structure effects of minimum wages (the minimum reduces the gender gap) shown in Table 6.3.

50th percentiles, minimum wage effects are only shown up to the 50th percentile.

The results in Figure 6.5 and Table 6.3 indicate that the minimum wage indeed reduces the gender wage gap at the lower end of the wage distribution. For the Oaxaca (1973) and Blinder (1973) decomposition, overall effects of minimum wages across the years appear only through structural effects, since composition effects are almost zero (Note how the FFL decomposition when calculated at the 50th percentile resembles the Oaxaca (1973) and Blinder (1973) decomposition which is taken at the averages.). Notice, however, how this structural effect increases sharply for 2004-2007, when the minimum wage institution was reinforced.

Considering the quantile results from the FFL decomposition, both the structural and the composition effects impact the gender gap. Firstly, the total effect of the minimum wage at each quantile tend to increase in absolute size (become more negative) after 2004, showing that the minimum is becoming more effective in reducing the wage gap. Second, while the structure effect is responsible for most of the total across the quantiles, the pattern for the 10th percentile is quite different. That is, beginning from 2003, the composition effect exceeds the structure effect and can almost explain the total effect at each year. The 20th percentile has a similar trend, but not as clearly as the 10th. This observation suggests that after 2003, the minimum wage affects the gender gap at the bottom of the wage distribution because more women than men become covered by the minimum wage, which is reasonable (Table 6.1 also shows that women's coverage rises from 15% to 25%, while men's remains steady at about 10%).

In conclusion, the FFL decomposition reveals the significant effect of the minimum wage in decreasing the gender gap at the lower percentiles of the wage distribution. The overall gender

wage gap over the period 1995-2007 is increasing, but at a slower pace after 2002 than before. The increase before 2002 is largely explained by the different returns between genders, i.e. discrimination. However, beginning from 2002, the discrimination component drops or becomes stable, and more gender wage gaps can be explained by the different characteristics between genders than before (coverage by the minimum being a "characteristic"). This is especially true for the 10th percentile where, beginning from 2003, the effects of increased coverage of the minimum wage for the unskilled are seen.

6.5. Conclusion

In this chapter, the role of minimum wages is investigated in the gender wage gap of China using the UHS annual data for the period 1995-2007. The FFL decomposition method (Firpo *et al*., 2009) is employed since it allows analysis of the entire wage distribution, not only the average. This is important as the minimum wage is more likely to affect the wage gaps at the lower deciles. The findings include that the gender wage gap keeps rising, but flattens out after 2000, indicating that a relatively stable wage structure has been established after the move to more competitive markets in the 1990s. Overall discrimination appears first to increase then decrease after 2001, which shows the role of marketisation in a transition economy. It has been said (e.g. Zhang *et al*., 2008) that decentralisation and diversity in wage settings initially raise gender discrimination in the labour market. But gradually the profits of firms practicing discrimination will fall, which finally decreases discrimination in the market (in Figure 6.4 the composition effects are stable but with decreasing trends after 2002). This overall downward trend of the gender gap in China is consistent with Appleton *et al*. (2005), Zhang *et al*. (2008), and Chen and Duan (2009).

As for the role of minimum wages, first, in the gender gap there is an obvious sticky floor, since the gender gap is greatest at the lower deciles. This observation is consistent with Chi and Li (2008) and Zhang *et al*. (2008). The difference of the findings of this study from Chi and Li's (2008) is that in this study the situation of women at the wage floor has improved relatively in recent years, since the gender gap at the lower end of the wage distribution has shrunk while the gap in the middle and at the upper end has widened since 2003. This difference may be caused by different samples in the two studies.

In fact, the minimum wage appears to be responsible for a large part of the improved situation of women at lower wage percentiles. In particular, for females at the bottom decile, before 2004 the minimum wage compressed the gender gap mainly through a structural effect (since, in the lower pay deciles, the pay of women was more affected by the minimum than that of men); after 2004, it also works through a composition effect, since the minimum wage covers more women - one possible reason perhaps being stricter enforcement of the minimum wage.

The preliminary results in this chapter thus support those in Chapter 4, in that the minimum wage is shown to reduce the gender wage gap. In fact, my finding that the minimum wage reduces the gender pay gap has been overlooked in the leading studies of Chi and Li (2008) and Zhang *et al*. (2008). More research is needed to establish just how much wider the gap would be without the minimum wage, but the large size of the composition and structural effects associated with the minimum wage (see Appendix tables 6c and 6d) point to its importance.

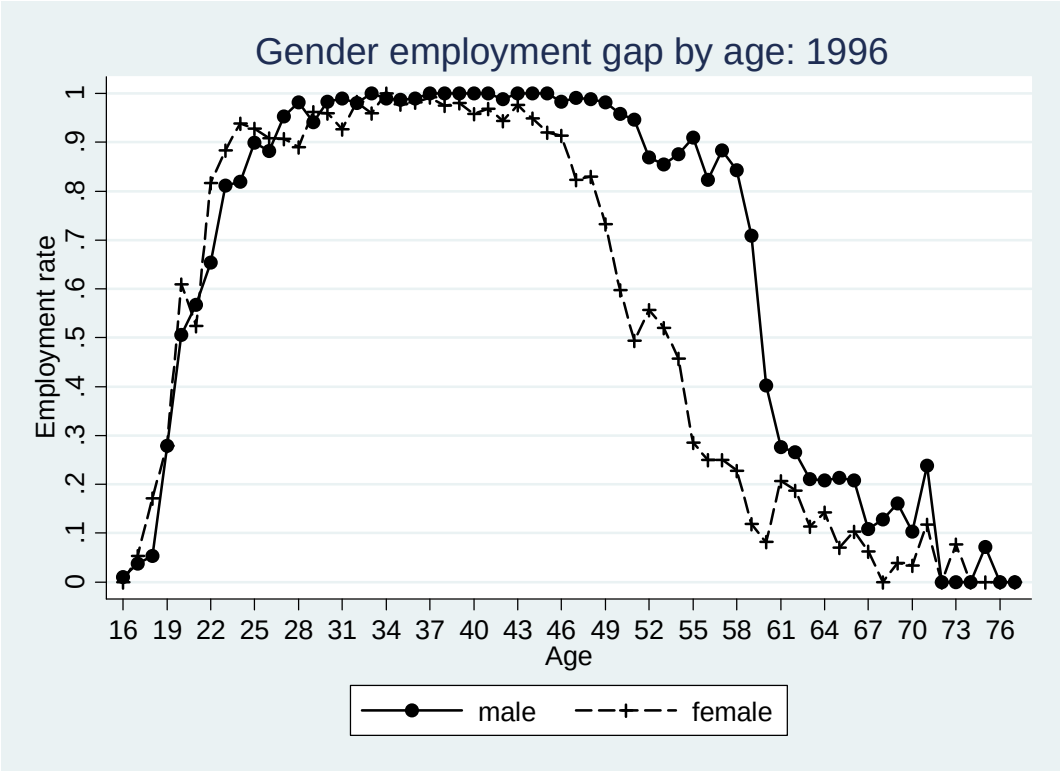


Figure 6.1a: gender employment gap by age, 1996

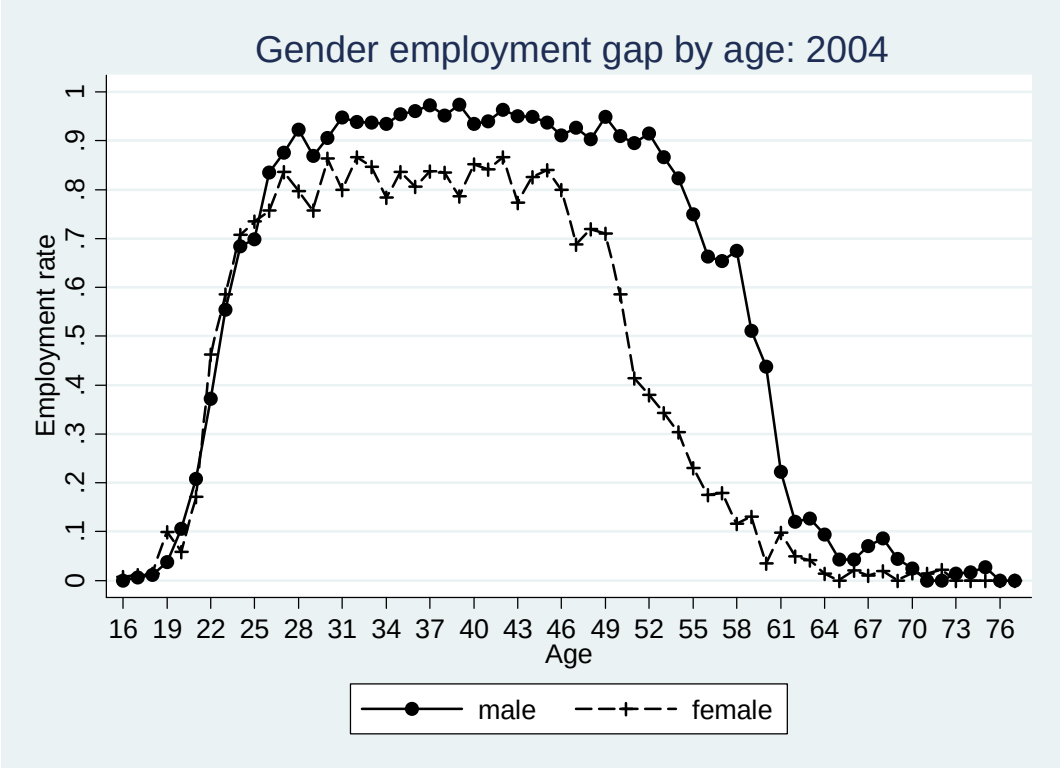
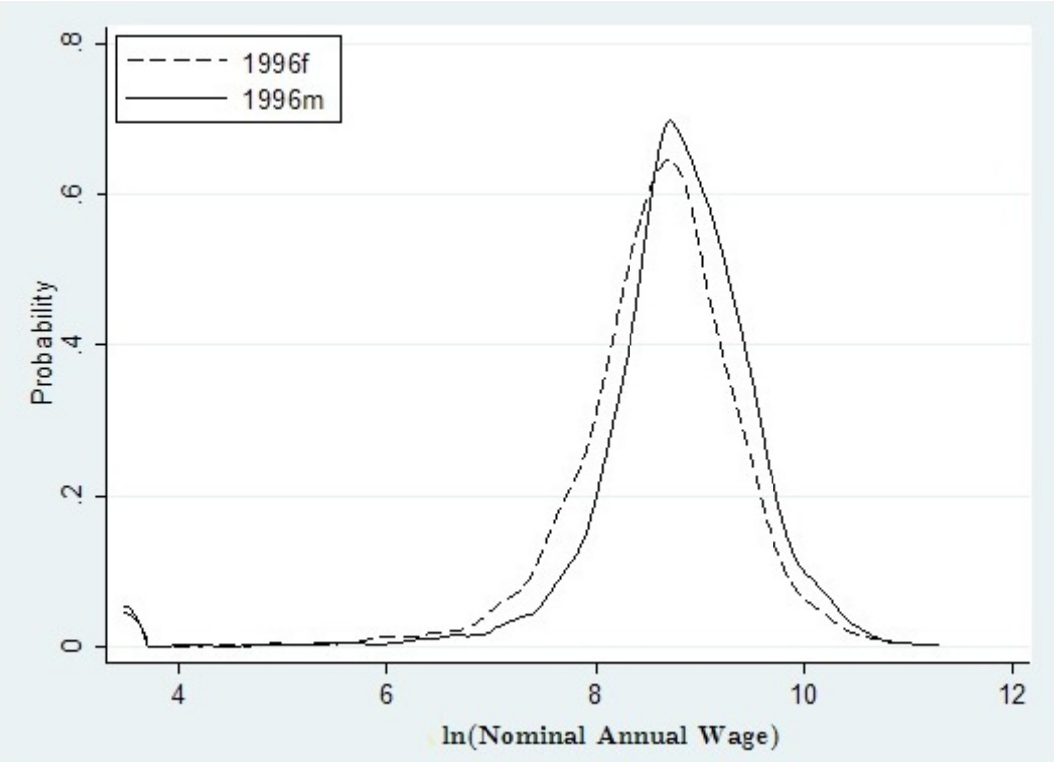
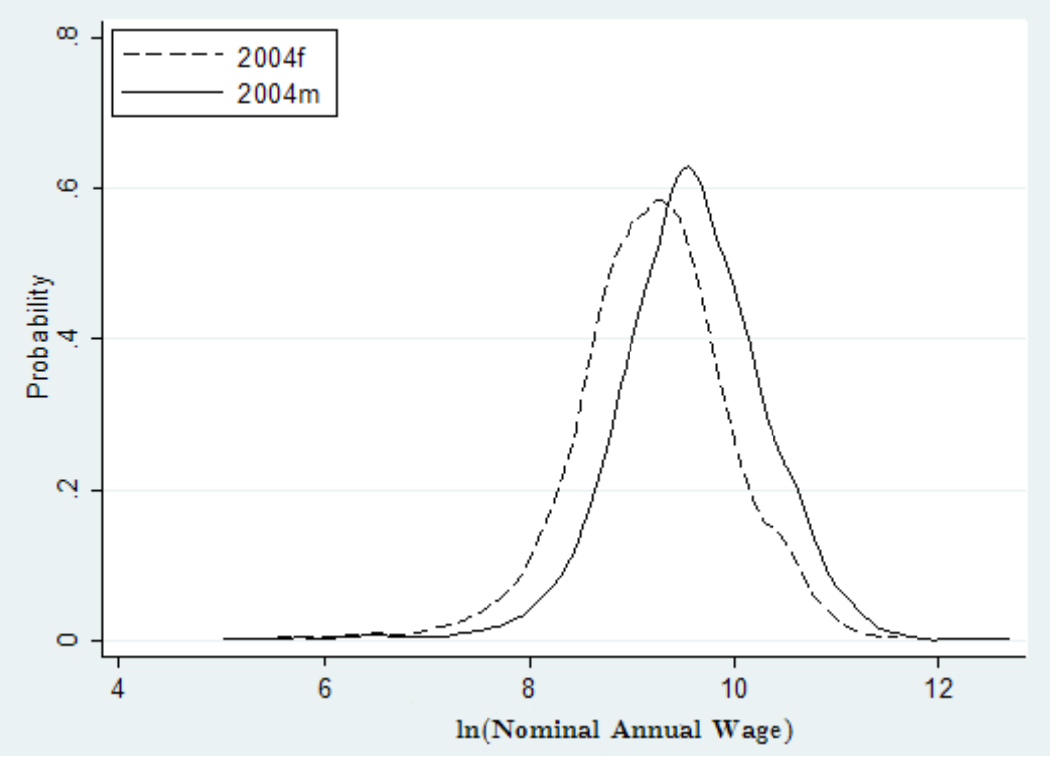


Figure 6.1b: gender employment gap by age, 2004



1996



2004

Figure 6.2: kernel density estimates of the annual log-wages distribution by gender, 1996 & 2004. *f* denotes females, and *m* denotes males.

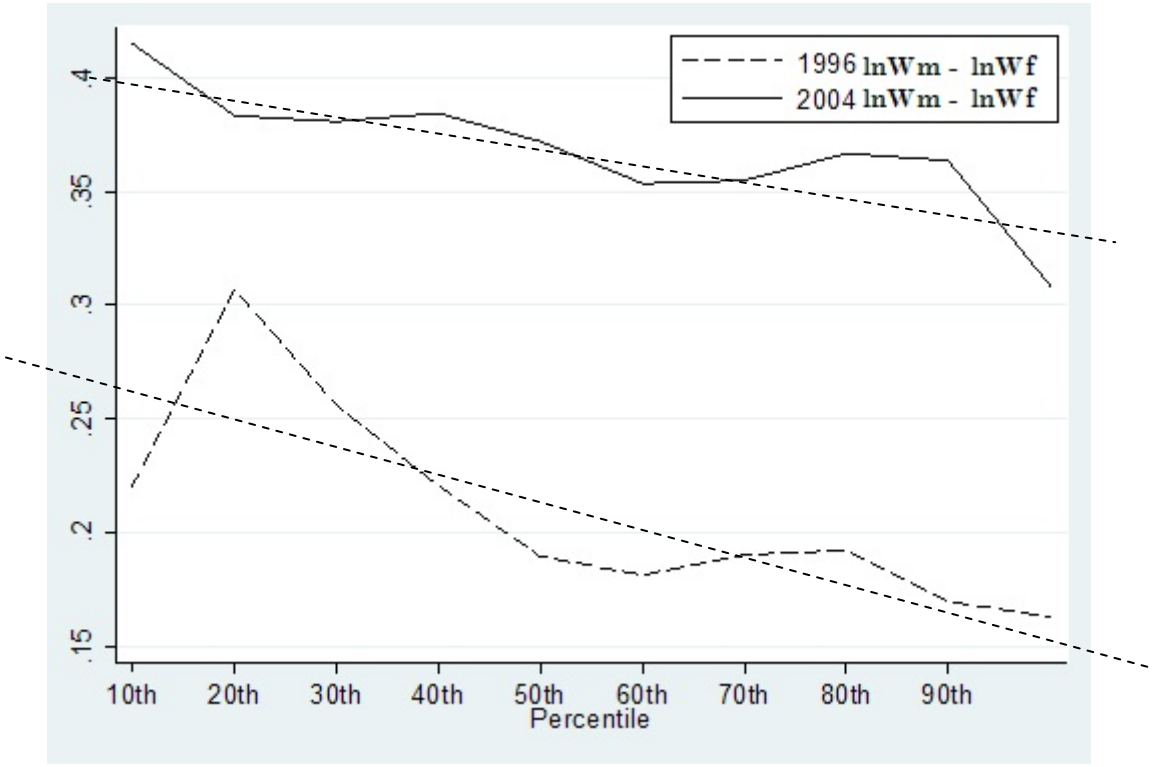


Figure 6.3: raw gender wage differentials by quantile, 1996 & 2004.
lnWm – lnWf indicates the difference in log-wages between genders.

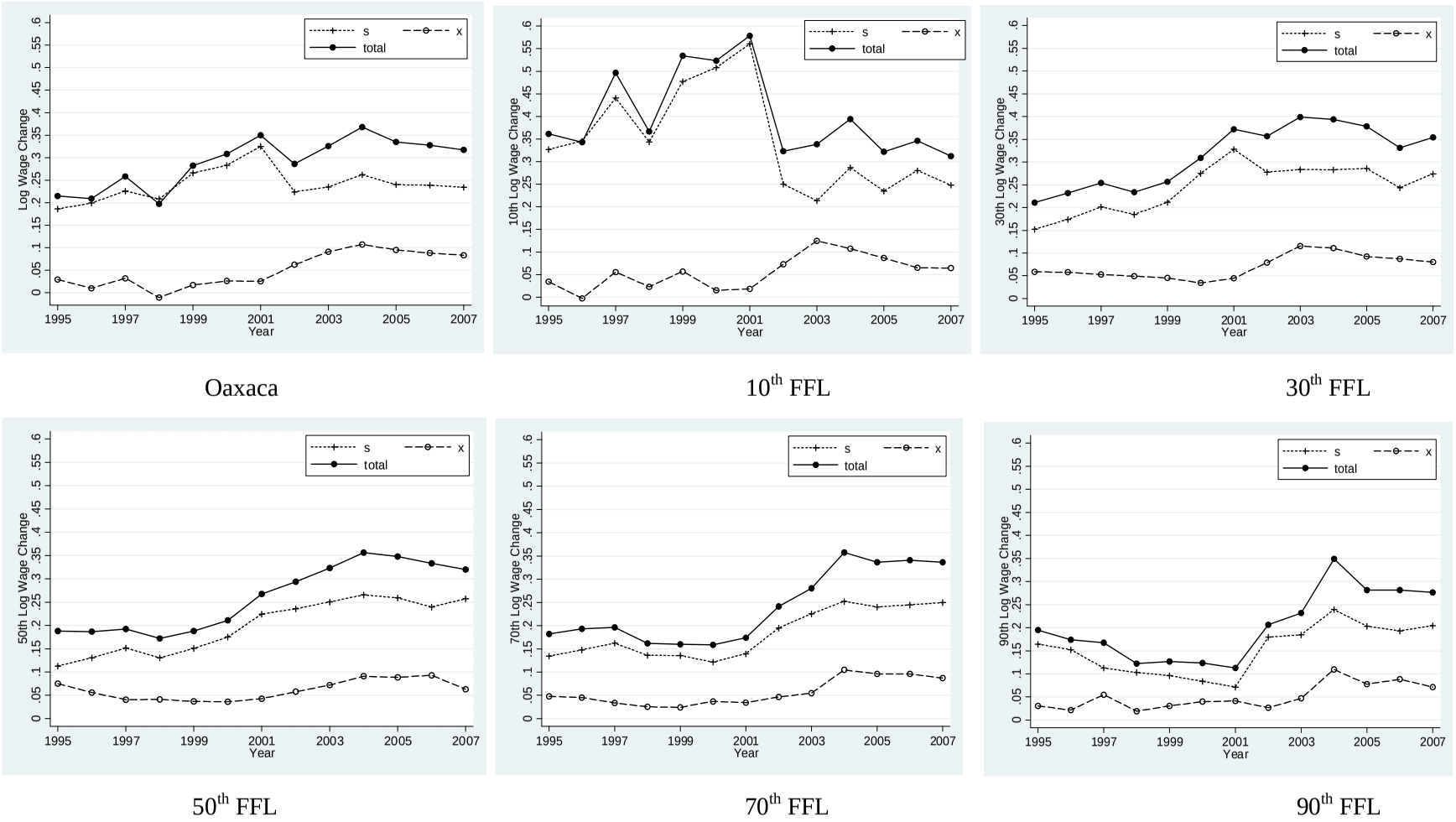
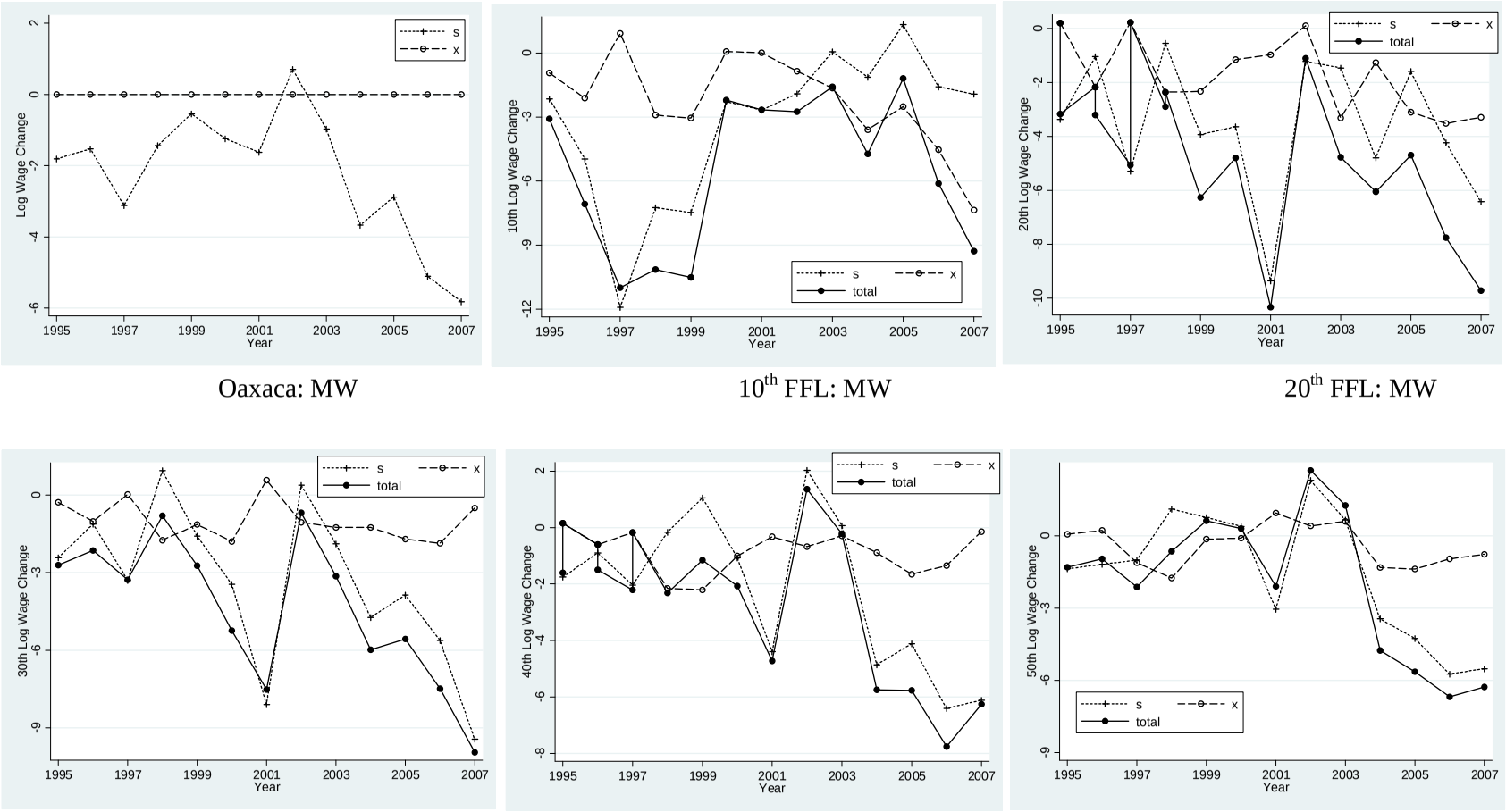


Figure 6.4: Decomposition of gender real wage differentials by percentiles, 1995-2007

Notes: *S* indicates structure effects, and *x* indicates composition effects; *total* summarizes the two effects.



Oaxaca: MW | 10^{th} FFL: MW | 20^{th} FFL: MW

30^{th} FFL: MW | 40^{th} FFL: MW | 50^{th} FFL: MW

Figure 6.5: Minimum wage effects in the gender earnings gap at selected quantiles, 1995-2007
Notes: *S* indicates structure effects, and *x* indicates composition effects; *total* summarizes the two effects.

Table 6.1: Labour Market Characteristics by Gender, 1995-2007

	1996		2004		1995-2007	
	Male	Female	Male	Female	Male	Female
MW*120% or below	8.77%	15.46%	10.54%	24.88%	9.04%	19.52%
Year of working experience	21.33	18.19	22.03	18.34	22.08	18.50
Education						
College	26.87%	15.82%	35.13%	27.36%	32.74%	25.90%
High School	37.73%	44.75%	38.85%	45.36%	37.52%	44.06%
Junior high & below	35.40%	39.42%	26.02%	27.28%	29.74%	30.00%
	100%	100%	100%	100%	100%	100%
Industry						
Manufacturing	40.43%	39.15%	32.98%	26.90%	35.27%	29.88%
Construction	4.70%	3.73%	4.19%	1.47%	4.45%	2.20%
Transportation & communication	6.79%	4.53%	11.48%	4.92%	10.32%	5.25%
Wholesale, retail, food & hotel	12.60%	18.70%	9.64%	16.58%	10.09%	16.35%
Education, cultural, health care, sports, and social service	9.57%	14.39%	9.44%	14.35%	10.02%	14.97%
Science, research, technical service	2.97%	2.05%	4.12%	3.22%	3.31%	2.27%
Other personal and private service	4.98%	4.87%	7.67%	13.90%	6.49%	12.20%
Finance, insurance & real estate	2.56%	2.17%	5.49%	5.58%	4.38%	4.40%
Government	14.14%	8.75%	14.85%	13.06%	14.48%	10.66%
Others	1.27%	1.65%	0.15%	0.02%	1.18%	1.83%
	100%	100%	100%	100%	100%	100%
Occupation						
Professional & technical	21.51%	23.54%	18.93%	18.68%	19.16%	19.93%
Managerial	10.95%	3.58%	7.06%	2.10%	8.52%	2.65%
Clerical	22.47%	21.70%	31.36%	31.21%	27.58%	28.02%
Service	6.57%	16.19%	12.86%	26.19%	10.48%	23.54%
Manual	37.84%	33.95%	28.16%	20.15%	32.53%	23.95%
Others	0.66%	1.04%	1.63%	1.67%	1.73%	1.91%
	100%	100%	100%	100%	100%	100%
Ownership						
State-owned	81.88%	71.14%	64.47%	50.45%	60.20%	55.17%
Collective	10.51%	20.36%	7.14%	11.71%	5.65%	8.88%
Others	7.62%	8.51%	28.39%	37.84%	17.37%	19.56%
	100%	100%	100%	100%	100%	100%
Region						
East	69.91%	70.19%	83.15%	82.67%	75.77%	75.94%
Central	-	-	16.85%	17.33%	6.36%	6.11%
West	30.09%	29.81%	-	-	17.87%	17.94%
	100%	100%	100%	100%	100%	100%
Number of observations	3636	3267	5995	4962	47865	40840

Table 6.2: Decomposition of the Gender Earnings Gap at Selected Quantiles, 1995-2007

	Oaxaca	10th	30th	50th	70th	90th
1995						
Observed raw gap	0.215	0.362	0.211	0.188	0.182	0.195
Composition effect	0.029	0.035	0.059	0.075	0.048	0.031
Structure effect	0.186	0.327	0.152	0.113	0.134	0.165
1996						
Observed raw gap	0.209	0.343	0.232	0.186	0.193	0.174
Composition effect	0.010	-0.003	0.058	0.056	0.045	0.021
Structure effect	0.199	0.346	0.174	0.130	0.148	0.152
1997						
Observed raw gap	0.258	0.497	0.254	0.192	0.196	0.168
Composition effect	0.032	0.056	0.053	0.041	0.034	0.055
Structure effect	0.226	0.441	0.202	0.152	0.162	0.113
1998						
Observed raw gap	0.197	0.367	0.234	0.172	0.162	0.122
Composition effect	-0.011	0.023	0.049	0.041	0.025	0.019
Structure effect	0.208	0.344	0.185	0.130	0.136	0.103
1999						
Observed raw gap	0.282	0.534	0.257	0.188	0.160	0.127
Composition effect	0.017	0.057	0.045	0.037	0.024	0.031
Structure effect	0.266	0.477	0.211	0.151	0.136	0.096
2000						
Observed raw gap	0.308	0.523	0.309	0.211	0.159	0.124
Composition effect	0.026	0.015	0.034	0.036	0.037	0.040
Structure effect	0.283	0.508	0.275	0.175	0.122	0.084
2001						
Observed raw gap	0.350	0.579	0.372	0.268	0.174	0.113
Composition effect	0.025	0.018	0.044	0.043	0.034	0.041
Structure effect	0.325	0.560	0.328	0.225	0.140	0.072
2002						
Observed raw gap	0.286	0.323	0.357	0.293	0.241	0.206
Composition effect	0.062	0.073	0.079	0.058	0.047	0.027
Structure effect	0.224	0.250	0.278	0.236	0.195	0.180
2003						
Observed raw gap	0.326	0.338	0.399	0.323	0.280	0.232
Composition effect	0.091	0.125	0.115	0.072	0.055	0.047
Structure effect	0.235	0.214	0.284	0.251	0.226	0.185
2004						
Observed raw gap	0.368	0.394	0.394	0.356	0.357	0.349
Composition effect	0.107	0.108	0.111	0.091	0.105	0.110
Structure effect	0.262	0.287	0.283	0.266	0.252	0.239
2005						
Observed raw gap	0.335	0.322	0.378	0.348	0.336	0.281
Composition effect	0.095	0.087	0.092	0.088	0.096	0.078
Structure effect	0.240	0.235	0.286	0.259	0.240	0.204
2006						
Observed raw gap	0.328	0.346	0.331	0.333	0.341	0.282
Composition effect	0.088	0.065	0.088	0.093	0.096	0.088
Structure effect	0.239	0.280	0.244	0.240	0.245	0.193
2007						
Observed raw gap	0.317	0.312	0.354	0.320	0.337	0.276
Composition effect	0.083	0.064	0.080	0.063	0.087	0.072
Structure effect	0.234	0.248	0.274	0.257	0.249	0.205

Table 6.3: MW Effects in the Gender Earnings Gap at Selected Quantiles, 1995-2007

	Oaxaca	10th	20th	30th	40th	50th
1995						
MW total effect	-1.811	-3.081	-3.165	-2.705	-1.599	-1.296
MW composition effect	-0.001	-0.936	0.206	-0.285	0.154	0.069
MW structure effect	-1.810	-2.145	-3.370	-2.419	-1.753	-1.365
1996						
MW total effect	-1.530	-7.080	-3.199	-2.145	-1.496	-0.956
MW composition effect	-0.001	-2.116	-2.165	-1.023	-0.602	0.226
MW structure effect	-1.529	-4.964	-1.034	-1.122	-0.894	-1.182
1997						
MW total effect	-3.121	-11.000	-5.063	-3.272	-2.207	-2.119
MW composition effect	-0.001	0.921	0.224	0.024	-0.170	-1.115
MW structure effect	-3.120	-11.922	-5.287	-3.296	-2.037	-1.004
1998						
MW total effect	-1.440	-10.152	-2.900	-0.806	-2.315	-0.636
MW composition effect	-0.002	-2.903	-2.358	-1.745	-2.156	-1.754
MW structure effect	-1.438	-7.249	-0.542	0.938	-0.159	1.118
1999						
MW total effect	-0.546	-10.520	-6.258	-2.732	-1.149	0.631
MW composition effect	-0.004	-3.049	-2.327	-1.142	-2.203	-0.135
MW structure effect	-0.542	-7.471	-3.931	-1.590	1.054	0.766
2000						
MW total effect	-1.244	-2.204	-4.789	-5.241	-2.070	0.298
MW composition effect	-0.003	0.074	-1.151	-1.792	-1.006	-0.098
MW structure effect	-1.241	-2.278	-3.638	-3.448	-1.064	0.396
2001						
MW total effect	-1.631	-2.661	-10.330	-7.519	-4.720	-2.096
MW composition effect	-0.005	0.011	-0.971	0.572	-0.325	0.950
MW structure effect	-1.626	-2.672	-9.359	-8.091	-4.395	-3.046
2002						
MW total effect	0.704	-2.752	-1.109	-0.683	1.356	2.712
MW composition effect	-0.002	-0.847	0.107	-1.060	-0.671	0.411
MW structure effect	0.706	-1.905	-1.216	0.376	2.027	2.302
2003						
MW total effect	-0.971	-1.589	-4.771	-3.138	-0.216	1.265
MW composition effect	-0.001	-1.643	-3.312	-1.252	-0.292	0.603
MW structure effect	-0.970	0.054	-1.459	-1.886	0.076	0.662
2004						
MW total effect	-3.675	-4.724	-6.051	-5.983	-5.744	-4.755
MW composition effect	0.000	-3.594	-1.258	-1.253	-0.885	-1.310
MW structure effect	-3.675	-1.129	-4.793	-4.730	-4.859	-3.445
2005						
MW total effect	-2.878	-1.187	-4.691	-5.565	-5.764	-5.642
MW composition effect	0.000	-2.512	-3.099	-1.700	-1.649	-1.381
MW structure effect	-2.878	1.325	-1.592	-3.865	-4.115	-4.261
2006						
MW total effect	-5.107	-6.117	-7.748	-7.483	-7.751	-6.693
MW composition effect	0.001	-4.535	-3.520	-1.865	-1.347	-0.956
MW structure effect	-5.108	-1.581	-4.228	-5.618	-6.404	-5.737
2007						
MW total effect	-5.818	-9.288	-9.711	-9.945	-6.253	-6.276
MW composition effect	0.000	-7.360	-3.288	-0.505	-0.142	-0.762
MW structure effect	-5.818	-1.929	-6.423	-9.439	-6.111	-5.514

Appendix 6a: Unconditional Quantile Regression Estimates by Gender, 1996

VARIABLES	Male			Female		
	10th	50th	70th	10th	50th	70th
minimum wage	0.7648**	0.5269***	0.1116	1.7256***	0.5982***	0.3729***
	(0.3231)	(0.1202)	(0.1120)	(0.3572)	(0.1393)	(0.1282)
average wage	-0.0985	0.3687***	1.0063***	-0.7800***	0.2977***	0.7572***
	(0.2359)	(0.0948)	(0.0909)	(0.2506)	(0.1096)	(0.0985)
compliance	3.8645***	1.2474***	-0.6006	7.1193***	1.9119***	0.0497
	(1.1337)	(0.4427)	(0.4479)	(1.2492)	(0.4939)	(0.4458)
college	0.1431*	0.1728***	0.1531***	0.0741	0.1365***	0.1536***
	(0.0832)	(0.0351)	(0.0388)	(0.0859)	(0.0433)	(0.0464)
high school	0.1790**	0.0544**	0.0533*	0.0359	0.0712**	0.0871***
	(0.0700)	(0.0274)	(0.0294)	(0.0721)	(0.0289)	(0.0292)
soe	1.2815***	0.2033***	0.0770	0.9274***	0.1873***	0.0980
	(0.1548)	(0.0464)	(0.0554)	(0.1420)	(0.0537)	(0.0601)
collective	0.9933***	0.0085	-0.0713	0.3598**	-0.0465	-0.0433
	(0.1802)	(0.0551)	(0.0647)	(0.1584)	(0.0576)	(0.0634)
construction	0.0479	0.1149**	0.1660***	0.2669**	0.0931	-0.0466
	(0.1290)	(0.0532)	(0.0614)	(0.1152)	(0.0651)	(0.0556)
transportation	0.1260	0.1232***	0.2231***	0.0527	0.1812***	0.2269***
	(0.0998)	(0.0444)	(0.0536)	(0.1211)	(0.0600)	(0.0652)
wholesales	-0.1897*	0.0031	0.0588	-0.2142**	0.0218	0.0741*
	(0.1112)	(0.0351)	(0.0392)	(0.1042)	(0.0402)	(0.0406)
education	0.0644	0.0912**	0.1314***	-0.0524	0.1729***	0.1418***
	(0.0842)	(0.0394)	(0.0451)	(0.0846)	(0.0436)	(0.0454)
research	-0.0631	0.0654	0.1693**	-0.1479	-0.0058	-0.0247
	(0.1541)	(0.0644)	(0.0743)	(0.1768)	(0.0775)	(0.0791)
personal service	0.2208**	0.1220**	0.1542***	-0.3641**	0.1150**	0.0742
	(0.1085)	(0.0519)	(0.0594)	(0.1521)	(0.0565)	(0.0575)
government	0.1935**	0.0432	0.0369	-0.2651***	0.1311***	0.0858*
	(0.0757)	(0.0367)	(0.0413)	(0.0989)	(0.0475)	(0.0499)
finance	0.4848***	0.3125***	0.3465***	0.1257	0.3349***	0.3915***
	(0.1511)	(0.0690)	(0.0774)	(0.1780)	(0.0845)	(0.0920)
other industry	0.2239	-0.0029	0.0113	-0.0309	0.0842	0.0528
	(0.3399)	(0.1175)	(0.1325)	(0.3105)	(0.0982)	(0.1128)
professional	0.3444***	0.0464	0.0777*	0.4404***	0.1440***	0.0819*

	(0.0856)	(0.0359)	(0.0404)	(0.0886)	(0.0417)	(0.0427)
manager	0.3217***	0.0912**	0.0894*	0.6384***	0.3052***	0.3085***
	(0.0834)	(0.0437)	(0.0495)	(0.0981)	(0.0692)	(0.0821)
clerical	0.0450	-0.0134	-0.0017	0.1326	0.0602	0.0750**
	(0.0823)	(0.0315)	(0.0346)	(0.0897)	(0.0371)	(0.0379)
service	0.0770	-0.0476	-0.0910*	0.2079*	0.0247	-0.0537
	(0.1541)	(0.0490)	(0.0535)	(0.1171)	(0.0447)	(0.0440)
other occupation	-0.8571	-0.1515	-0.0941	-0.7019	-0.1364	-0.2190*
	(0.5259)	(0.1399)	(0.1559)	(0.4583)	(0.1337)	(0.1260)
east	0.1574	0.1992***	0.1950***	0.0540	0.2320***	0.1538**
	(0.1233)	(0.0569)	(0.0680)	(0.1253)	(0.0636)	(0.0701)
age	0.3411***	0.0604***	0.0515***	0.2723***	0.0808***	0.0569***
	(0.0235)	(0.0067)	(0.0075)	(0.0256)	(0.0084)	(0.0088)
agesq	-0.0042***	-0.0006***	-0.0005***	-0.0038***	-0.0010***	-0.0007***
	(0.0003)	(0.0001)	(0.0001)	(0.0003)	(0.0001)	(0.0001)
municipal control	0.0002	0.0001	0.0009**	0.0012*	0.0007**	0.0009**
	(0.0007)	(0.0003)	(0.0004)	(0.0006)	(0.0004)	(0.0004)
constant	-9.1226***	-1.5284***	-1.3154***	-11.3262***	-2.6026***	-1.9903***
	(1.3025)	(0.4175)	(0.4309)	(1.4763)	(0.4675)	(0.4671)
Observations	3,667	3,667	3,667	3,275	3,275	3,275
R-squared	0.245	0.340	0.375	0.214	0.347	0.378

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Specific industries include: (i) mining, manufacturing, and power production and supply. This is the base group. (ii) Construction; (iii) transportation, postal service, and information technology; (iv) wholesales, retail sales, hotel, and restaurant; (v) education, health care, social security and welfares, culture, sports, and entertainment; (vi) scientific research, technical service, water conservancy management, geological exploration, and environment and public facility; (vii) commercial and personal service; (viii) government and social organizations; (ix) finance and real estate; (x) other industries.

Appendix 6b: Unconditional Quantile Regression Estimates by Gender, 2004

VARIABLES	Male			Female		
	10th	50th	70th	10th	50th	70th
minimum wage	0.7995***	-0.3623***	-0.5307***	1.4148***	0.2691**	-0.1039
	(0.1759)	(0.0956)	(0.1101)	(0.2182)	(0.1148)	(0.1106)
average wage	0.2532**	1.2787***	1.6281***	-0.0538	0.6559***	1.0079***
	(0.1201)	(0.0703)	(0.0818)	(0.1527)	(0.0852)	(0.0840)
compliance	2.5023***	-2.1286***	-3.1723***	4.8455***	0.2713	-1.4758***
	(0.4934)	(0.2368)	(0.2563)	(0.6125)	(0.2869)	(0.2601)
college	0.3386***	0.2428***	0.3583***	0.3101***	0.3994***	0.4433***
	(0.0505)	(0.0283)	(0.0326)	(0.0602)	(0.0353)	(0.0348)
high school	0.2368***	0.0780***	0.1138***	0.2134***	0.1684***	0.1156***
	(0.0481)	(0.0238)	(0.0258)	(0.0554)	(0.0275)	(0.0236)
soe	0.2588***	0.2041***	0.1688***	0.2195***	0.3459***	0.3145***
	(0.0434)	(0.0223)	(0.0254)	(0.0475)	(0.0273)	(0.0265)
collective	-0.0992	-0.0721**	-0.0607*	0.1206*	-0.0152	-0.0281
	(0.0846)	(0.0355)	(0.0363)	(0.0715)	(0.0368)	(0.0299)
construction	0.0295	0.0395	0.1021**	0.0167	-0.0824	-0.1382
	(0.0907)	(0.0441)	(0.0502)	(0.1587)	(0.0984)	(0.0855)
transportation	0.1596***	0.2153***	0.1587***	0.1771**	0.2090***	0.1714***
	(0.0515)	(0.0322)	(0.0367)	(0.0789)	(0.0525)	(0.0589)
wholesales	-0.0881	0.0360	-0.0246	-0.0351	-0.0275	0.0482
	(0.0739)	(0.0355)	(0.0395)	(0.0816)	(0.0433)	(0.0424)
education	0.0705	0.1397***	0.0914**	0.0624	0.1422***	0.1738***
	(0.0550)	(0.0340)	(0.0413)	(0.0701)	(0.0409)	(0.0441)
research	-0.0688	0.1917***	0.2503***	0.0646	0.0954	0.1743**
	(0.0765)	(0.0438)	(0.0572)	(0.0816)	(0.0645)	(0.0706)
personal service	-0.1242*	-0.0011	-0.0174	-0.0372	-0.1435***	-0.0460
	(0.0742)	(0.0371)	(0.0415)	(0.0797)	(0.0425)	(0.0418)
government	0.0662	0.1631***	0.1679***	0.1459**	0.0347	0.0596
	(0.0462)	(0.0314)	(0.0381)	(0.0650)	(0.0448)	(0.0471)
finance	0.0220	0.1303***	0.1229**	0.0941	0.1427***	0.2918***
	(0.0698)	(0.0419)	(0.0497)	(0.0856)	(0.0537)	(0.0580)
other industry	-0.4295	0.6373***	0.5810*	-0.2347***	0.3850***	0.9758***

	(0.4371)	(0.1778)	(0.3051)	(0.0778)	(0.0469)	(0.0498)
professional	0.1445***	0.2389***	0.2148***	0.1995***	0.3710***	0.3493***
	(0.0525)	(0.0313)	(0.0358)	(0.0737)	(0.0438)	(0.0442)
manager	0.2504***	0.3688***	0.3839***	0.2366**	0.3695***	0.4802***
	(0.0554)	(0.0409)	(0.0520)	(0.1033)	(0.0769)	(0.0923)
clerical	0.1722***	0.1906***	0.1739***	0.1355*	0.2473***	0.1637***
	(0.0484)	(0.0275)	(0.0309)	(0.0699)	(0.0412)	(0.0400)
service	-0.2566***	-0.1542***	-0.0963***	-0.1675**	-0.0139	-0.0194
	(0.0740)	(0.0336)	(0.0362)	(0.0809)	(0.0433)	(0.0416)
other occupation	-0.3772**	-0.1281*	0.0065	-0.6410***	-0.0975	-0.1296**
	(0.1746)	(0.0673)	(0.0776)	(0.2254)	(0.0799)	(0.0604)
east	0.0155	0.1145***	0.1739***	0.0806	0.0224	0.1034***
	(0.0555)	(0.0282)	(0.0295)	(0.0705)	(0.0331)	(0.0319)
experience	0.1156***	0.0591***	0.0529***	0.1115***	0.0468***	0.0474***
	(0.0146)	(0.0063)	(0.0071)	(0.0196)	(0.0094)	(0.0084)
expersq	-0.0013***	-0.0007***	-0.0006***	-0.0014***	-0.0006***	-0.0006***
	(0.0002)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)
municipal control	0.0006	0.0012***	0.0015***	0.0012**	0.0010***	0.0021***
	(0.0004)	(0.0002)	(0.0003)	(0.0005)	(0.0003)	(0.0003)
constant	-5.5196***	0.6085	0.2156	-9.8206***	-1.0386*	0.5141
	(1.0781)	(0.4836)	(0.5347)	(1.3135)	(0.5792)	(0.5423)
Observations	6,027	6,027	6,027	4,970	4,970	4,970
R-squared	0.132	0.282	0.271	0.132	0.293	0.294

Notes: See Appendix 6a

Appendix 6c: Decomposition of the Gender Wage Gap into Specific Variables at Selected Quantiles, 1996

VARIABLES	The composition effect				The structure effect			
	Oaxaca	10th	50th	70th	Oaxaca	10th	50th	70th
minimum wage	-0.001	-2.116	0.226	-0.900	-1.529	-4.964	-1.182	-0.767
average wage	-0.013	2.329	0.133	0.828	1.598	2.869	0.692	0.996
compliance	0.002	-1.255	-0.252	-0.194	-1.163	-1.973	-0.328	-0.315
college	0.020	0.003	0.005	0.012	0.013	0.009	0.018	0.005
high school	-0.008	-0.025	-0.020	-0.015	0.031	0.064	0.008	-0.004
junior or below	-	-	-	-	-	-	-	-
soe	0.114	0.650	0.122	0.124	0.198	-0.474	-0.101	-0.142
collective	-0.079	0.073	0.028	0.036	0.062	-0.062	-0.019	-0.035
other ownership	-	-	-	-	-	-	-	-
manufacturing	-	-	-	-	-	-	-	-
construction	0.000	0.002	0.001	-0.001	-0.001	-0.012	0.001	0.010
transportation	0.004	0.005	0.001	0.003	-0.000	0.000	-0.001	0.001
wholesales	-0.002	0.001	-0.014	-0.004	0.010	0.008	0.010	-0.003
education	-0.002	-0.003	-0.001	-0.009	-0.007	0.012	-0.013	0.001
research	0.000	-0.001	0.002	0.001	0.002	0.002	0.000	0.004
personal service	0.000	0.004	0.000	0.000	0.003	0.020	0.000	0.004
government	0.003	0.012	0.001	-0.006	0.011	0.036	-0.004	0.002
finance	0.001	0.003	0.001	0.001	0.002	0.005	-0.001	-0.001
other industry	-0.000	0.001	-0.001	0.001	-0.002	0.001	0.000	-0.001
professional	-0.003	0.006	0.006	0.011	-0.024	-0.030	-0.033	-0.014
manager	0.015	0.027	0.005	0.009	-0.011	-0.013	-0.009	-0.010
clerical	-0.000	-0.010	-0.001	0.010	-0.021	-0.001	-0.015	-0.026
service	0.009	-0.009	0.001	0.005	-0.020	-0.014	-0.008	-0.002
manual labor	-	-	-	-	-	-	-	-
other occupation	-0.000	0.005	0.001	0.000	0.009	-0.001	0.000	0.002
east	-0.000	0.020	-0.054	-0.024	-0.008	0.074	0.035	0.046
central and west	-	-	-	-	-	-	-	-
experience	0.447	2.376	0.218	-0.310	-0.985	-1.005	-1.195	0.040
expersq	-0.500	-1.509	-0.144	0.095	0.862	1.112	0.727	0.091
municipal control	-0.000	0.023	-0.015	-0.029	-0.044	-0.117	-0.051	0.020
constant	-	-0.615	-0.193	0.401	1.214	4.799	1.599	0.244

Notes: See Table 6a.

Appendix 6d: Decomposition of the Gender Wage Gap into Specific Variables at Selected Quantiles, 2004

VARIABLES	The composition effect				The structure effect			
	Oaxaca	10th	50th	70th	Oaxaca	10th	50th	70th
minimum wage	0.000	-3.594	-1.310	-0.560	-3.675	-1.129	-3.445	-2.588
average wage	-0.003	2.248	0.853	-0.385	3.745	0.236	4.373	5.436
compliance	0.001	-1.377	-0.458	0.179	-1.516	-0.629	-1.672	-1.623
college	0.027	0.023	0.014	0.023	-0.024	0.006	-0.037	-0.016
high school	-0.009	-0.012	-0.016	-0.011	-0.020	0.003	-0.030	0.004
junior or below	-	-	-	-	-	-	-	-
soe	0.028	0.030	0.037	0.035	-0.057	0.040	-0.079	-0.086
collective	0.003	-0.001	0.006	0.003	-0.011	-0.018	-0.008	-0.004
other ownership	-	-	-	-	-	-	-	-
manufacturing	-	-	-	-	-	-	-	-
construction	0. 001	-0.002	0.001	0.004	0.001	0.002	0.002	0.003
transportation	0.012	0.011	0.016	0.011	0.002	-0.001	-0.002	-0.001
wholesales	0.003	-0.003	0.005	0.004	-0.006	0.000	0.003	-0.014
education	-0.005	-0.004	0.001	0.000	-0.003	0.005	-0.008	-0.016
research	0.001	0.003	0.005	0.005	0.000	-0.009	0.000	0.001
personal service	0.003	0.014	0.007	0.006	-0.002	-0.018	0.013	-0.001
government	0.002	0.011	0.015	0.016	0.007	-0.019	0.004	0.001
finance	-0.000	-0.002	0.003	0.002	-0.004	-0.002	-0.004	-0.012
other industry	0.000	-0.001	0.001	0.001	-0.000	0.000	0.000	0.000
professional	0.001	0.014	-0.005	-0.008	-0.018	-0.026	-0.019	-0.017
manager	0.017	0.015	0.018	0.017	-0.001	-0.003	0.000	-0.001
clerical	0.000	0.014	-0.007	-0.007	0.005	-0.002	-0.011	0.009
service	0.017	0.027	0.018	0.015	-0.019	-0.018	-0.033	-0.022
manual labor	-	-	-	-	-	-	-	-
other occupation	0.000	0.001	0.000	0.001	-0.001	0.005	-0.001	0.002
east	0.001	-0.037	0.038	0.043	0.012	-0.016	0.035	0.019
central and west	-	-	-	-	-	-	-	-
experience	0.235	0.958	-0.309	-0.117	0.079	-0.540	0.750	0.319
expersq	-0.229	-0.682	0.114	0.042	0.122	0.493	-0.256	-0.099
municipal control	0.000	-0.024	0.003	0.003	-0.043	-0.017	0.011	-0.043
constant	-	2.477	1.040	0.784	1.690	1.943	0.681	-0.998

Notes: See Appendix 6a.

7. CONCLUSION

This study has looked at China's minimum wage system and has shed light on several related controversies, particularly its impacts on wages and employment. Chapter 3 considered the data used in this study; Chapter 4 looked at the wage effects of the minimum wage; Chapter 5 investigated its employment effects; and Chapter 6 studied the gender wage gap and its relation to the minimum wage.

China's minimum wage was first instituted in 1993 and it was revised and reinforced in 2004. The minimum wage is defined as the minimum labour income that the employee earns in normal labouring hours (*Minimum Wages Regulations*, 2004), and is intended to apply to all employed people including disabled workers. As noted in Chapter 3, the minimum wage is set by the provincial governments and is agreed by the central government. Also, each province further sets several levels of minimum wages, and each municipality can choose a specific level according to its own economic conditions. Thus, there are more than 100 levels of minimum wage every year, providing greater variation in the minimum wage than in most other countries. Although China's minimum wage system essentially follows international practice, as a developing country it has its own characteristics, with non-compliance being one of the most important. On average, non-compliance in this study's data is around 7% (see Table 4.1), and is a factor that cannot be overlooked. Consequently, China's minimum wage system can provide distinct experiences to add to the existing literature on the minimum wage.

This study investigates three questions. The first is the wage effects of the minimum wage (Chapter 4). Does the minimum wage help to reduce overall wage inequality in China, given its aim of helping the poor? If it does, what is the main channel for the minimum wage to work, i.e. are there wage effects specifically for unskilled workers, or for women? Do minimum wage effects spillover up the distribution, as in other countries? What about the informal sector and non-compliance? What about the "lighthouse effect", given that approximately 7% of the workforce is not paid the minimum wage, yet may still be influenced by it?

The second question concerns the employment effects of the minimum wage (Chapter 5). Since wage effects and employment effects go side by side, it is natural to ask if there is a reduction in employment caused by China's minimum wage. Does the minimum wage mainly affect vulnerable groups, such as youth, older labourers and women? How should the informal sector and non-compliance be considered? How does the long-run elasticity of the minimum wage compare with the short-run elasticity? How to consider the potential endogenous relationship between the minimum wage and employment? Are disemployment effects, if any, greater with the strengthening of the minimum wage system post-2004?

The last question relates to the gender wage gap and the minimum wage (Chapter 6). Since more women are covered by the minimum wage than men, what happens to the gender wage gap under the minimum wage system? Since females have disadvantages relative to males in productivity characteristics such as education and experience, is the gender wage gap mainly

caused by these differences (composition effects) or by the different returns to these characteristics (structure effects)? Are the composition and structure effects for unskilled workers at the bottom decile of the wage distribution similar to the effects further up? How much impact does the minimum wage have on these composition and structure effects?

Furthermore, since the minimum wage institution was reinforced in 2004, were its effects in the above three areas stronger after 2004? A set of individual panel data can be generated from the sample data to provide richer information. What different results can be obtained from this panel data when investigating wage effects of the minimum wage, as well as the gender wage gap?

7.1. Summary of results

This study is based on a unique municipal-level minimum wage dataset, as is discussed in Chapter 3. These data were collected personally from official publications. Such municipal-level data on the minimum wage provide more variation (see Fang and Lin, 2013) than the more usually used provincial-level data (e.g. Wang and Gunderson, 2012). The other dataset is a sub-sample from the Urban Household Survey (UHS), which contains annual data for workers in six provinces from 1990 to 2007, and monthly data for workers in eleven provinces from 2004 to 2007. The UHS is a long-standing nationally representative official survey, and hence is the best source of workforce data covering the past two decades.

Taking up first the questions of the wage effects of the minimum wage, the main conclusion

in Chapter 4 is that minimum wages have had a significant impact on wage inequality. The data for this topic are individual annual data for 1995-2007 (Individual monthly panel data are used for sensitivity tests). The empirical approach is based on Lee's (1999) method and its extension (Bosch and Manacorda, 2010), which establishes a direct relation between effective minimum wages and wage percentiles.

The impact of the minimum wage on inequality certainly appears economically important. Our estimates imply that a 10% increase in the minimum wage raises the wage at the lowest 10^{th} percentile by up to 6% (Table 4.8). It also reduces the 10-60 wage gap by almost 10% in some specifications (see Tables 4.6 and 4.7), and has spillover effects spreading up to the 40^{th} or 50^{th} percentile of the wage distribution (Teuling's (2000) model predicts this result, which is similar to Aeberhardt *et al.*'s (2012) results for France). Interestingly, the fact that the minimum wage raises wages of workers at the lowest 10^{th} percentile suggests the existence of lighthouse effects pushing up wages even of workers not directly covered. All the above effects are stronger during 2004-2007 when the minimum wage system was reinforced, approximately doubling the pre-2004 wage effects (see Table 4.8).

Given the appreciable effects of minimum wages on the wage distribution, we would expect minimum wages to impact employment, and these employment effects form the subject matter of Chapter 5. Here our main conclusion is that minimum wages have lowered employment in formal (compliant) firms, an effect which is largely counterbalanced by employment increases in the non-compliant sector. The large, heterogeneous Chinese market

thus presents a more complicated picture than other countries (e.g. the US controversy, starting with Card and Kreuger (1994), and continuing with Dube (2011) and Neumark and Wascher (2013)).The data for this section is based on municipal level observations over 1995-2007, summarised from individual annual data for this period.

Estimation of the elasticity of employment with respect to the minimum wage is of great policy importance, but estimates need cautious interpretation since several factors are involved, as shown in Chapter 5. A summary table of our range of estimates under different conditions is given in Table 7.1. Let us start with the first columns relating to the full sample with all ages taken together. The first row gives the short-run elasticity for the total sample (compliant and non-compliant together) over the full period 1995-2007, and we see a significant negative elasticity ranging from -0.10 to -0.07. Immediately below the corresponding long-run elasticities are given, ranging from -0.20 to -0.11, which is somewhat higher as expected. These are our basic results.

As can be seen, compliant workers exhibit higher negative elasticities, -0.34 to -0.19 in the short-run, and -0.28 in the long-run. However, these negative employment effects are counter-balanced to some extent by large positive elasticities for the non-compliant group. Since this group is quite small, the overall result is negative, as shown in our first entries. Thus, our elasticity estimate for the whole sample over the whole period is around -0.1 to -0.2. This figure is somewhat higher than Fang and Lin's (2013) estimate (see Table 5.10), which is approximately -0.1, but it is not out of line with much of the international literature as

summarised by Neumark and Wascher (2008).

The second panel in the table takes the 2004-2007 period, after the minimum wage system was strengthened, and we expect larger effects to parallel the larger wage effects. However, the picture is not simple. We do see larger negative effects for the compliant group, with elasticities ranging from -0.32 to -0.19 in the short-run, and similar values in the long-run. At the same time, we also see large positive elasticities, even as high as 4.15 for the non-compliant group. The overall effect, for the total sample, is around zero in the short run, though with signs of a negative effect (ranging from -0.64 to -0.05). Thus it appears that the strengthened minimum wage system after 2004 did not reduce employment much, but rather caused a reduction of legal work, crowding workers into low-paying jobs, which of course was not the point of the law. Nevertheless, perhaps such crowding was a price worth paying to retain jobs.

Let us turn next to the findings for the youth group, which are more mixed. These results are presented in the second column of Table 7.1. We see that the short-run elasticity estimates over the full 1995-2007 period are significantly negative, ranging from -0.35 to -0.19, paralleling the negative effect for the full sample, but larger as may be expected. However, the long-run effect to not fall into the expected pattern, being smaller (-0.11 to 0.32). The elasticities for the compliant group tend to be negative, while those for non-compliant are positive, as we have already observed when all ages are taken together, but the picture is not as neat. Matters are somewhat clearer in the 2004-2007 panel, where we see that both short

and long-run elasticities for the compliant group are negative, however none are significant. Overall, we can say that a conclusion of a negative employment elasticity for the youth worker group does not yet have a firm foundation. This finding is at variance of course with the literature, which generally finds more marked effects (e.g. Neumark and Wascher, 2008) on youth employment. Clearly more research is required here.

As regards gender differences, women display disadvantages under rising minimum wages, with obvious larger negative effects in both total and full-compliance groups than men. As regards age differences, we find that older workers also experience disemployment, perhaps more than young workers. Thus, conventionally disadvantaged groups - women, young people and older workers - are all disemployed to some extent by rising minimum wages.

We take up our third set of questions, relating to the effects of the minimum wage on the gender wage gap, analysed in Chapter 6. Our main conclusion here is that the minimum wage system plays an important role in reducing the trend for the gender gap to widen. The findings here are the first for China, where no study of the gender gap has so far fully incorporated the minimum wage (Chi and Li (2008) and Zhang *et al*. (2008) overlook it). The data for this topic is individual annual data during 1995-2007. The gender gap decomposition is based on an unconditional quantile regression method (see FFL (2009), whose Stata command was used in this study).

We find that the gender wage gap in China has been rising, but at a slower pace since 2000 (Figures 6.3 and 6.4) for women in the bottom percentiles – perhaps due to the minimum

wage. Certainly we find that the minimum wage raises pay of women in the bottom 10th percentile more than men (a structure effect). In addition, after 2003 more women than men become covered (a composition effect), which is reasonable (Table 6.1 shows that women's coverage rises from 15% to 25%, while men's remains steady at about 10%). More research is needed to establish just how much wider the gap would be without the minimum wage, but the large size of the composition and structural effects associated with the minimum wage point to its importance.

Overall, it seems that the welfare implications of higher minimum wages are not clear cut in China. We have found the minimum wage does significantly reduce both the wage distribution and the gender wage gap. However, there seems to be corresponding cost in that workers either lose their jobs – or might be crowded into non-compliant employment. Put simply, in the crowding model (see Boeri *et al*., 2011), as the supply of labour to informal sectors rises, wages fall. It should also be noted that our data do not cover rural migrants in informal sectors who are likely to be first to lose their jobs. Thus, our estimates of the (negative) employment elasticity of the minimum wage could be over-optimistic. More research is needed into this aspect.

7.2. Research implications

Since the welfare implications of the minimum wage are not clear cut, the adjustment of minimum wages should be undertaken with caution. The social costs of rising wages for these low-wage workers may include disemployment, even though it is true that our results for

groups generally considered to be most influenced by the minimum wage, such as the youth, older labourers and women, are mixed. In practice, non-compliance acts as a buffer since it cannot be eliminated without much more policing. Total disemployment effects (compliant and non-compliant sectors) will be smaller than they would be without non-compliance, which means a relatively smaller social cost.

Thus, more research into non-compliance is needed; in particular examining rural migrants in the informal sector. The wage changes and the labour mobility between formal and informal sectors caused by the minimum wage may lead to another research perspective. Only by combining the study of rural areas with the relevant studies for formal sectors or urban residents, can there be a complete picture of the minimum wage policy in China. My thesis here marks a beginning.

One additional recommendation is that the minimum wage and income (rather than earnings) inequality in China should be investigated further as income sources are much more complicated than wages. Income inequality also appears to have been rising more dramatically than wage inequality[1]. Moreover, people who receive the minimum wage sometimes are not those in the poorest households (see literature review from Brown, 1999, pp.2150-2152, and also the recent work by MacCurdy, 2015). Furthermore, no study

[1] This is a common view when discussing China's social reality since the income gap grows much faster than the wage gap. For example, see news from the South China Morning Post (Hong Kong): "the China Family Panel Studies figure also confirmed a staggering income gap, with the top 5 percent of households' income last year being 234 times that of the lowest 5 per cent…"
(http://www.scmp.com/news/china/article/1285732/chinas-income-inequality-slowly-improving-survey-finds)

published in English has yet analysed income inequality and the minimum wage in China (there are several Chinese studies, e.g. Luo (2007c) concluding the minimum wage can reduce the income gap between rural and urban areas). These two topics are left for future study.

Finally, as noted above, our results for specific sub-groups, in particular youth and women are mixed. More research is needed into the youth sub-group, which formed only a part of this thesis's more general study, which aimed to cover all age groups. The same can be said the minimum wage effects for women. Our study marks a beginning, in that the estimates suggest that the minimum wage reduces the gender wage gap substantially, but more work remains to be done to establish the full extent of its effects.

Table 7.1 Employment-Rate Elasticities with respect to the Minimum Wage

			All ages Range		Young Range	
1995-2007	Total sample	Short Run	-0.10* to	-0.07*	-0.35* to	-0.19*
		Long Run	-0.20* to	-0.11*	-011 to	0.32*
	Compliant	Short Run	-0.34* to	-0.19*	-0.90* to	0.03*
		Long Run	-0.28* to	-0.28*	-0.14 to	-0.11
	Non-compliant	Short Run	1.20* to	2.20*	0.36 to	1.56*
		Long Run	1.21* to	1.49*	0.52* to	0.85*
	Female	Total	-0.22*		—	
		Compliant	-0.68*			
	Age 50-65	Total	-0.38*		—	
		Compliant	-1.16*			
2004-2007	Total sample	Short Run	-0.02 to	0.062	-0.24 to	0.84*
		Long Run	-0.64* to	-0.05	-0.84* to	-0.71
	Compliant	Short Run	-0.32* to	-0.19*	-0.81 to	-0.27
		Long Run	-0.30* to	-0.23*	-0.75 to	-0.40
	Non-compliant	Short Run	3.2* to	2.28*	-0.27 to	2.40*
		Long Run	2.41* to	4.15*	-1.02 to	0.96
	Female	Total	-0.12*		—	
		Compliant	-0.73*			
	Age 50-65	Total	0.16		—	
		Compliant	-1.45*			

Source: Chapter 5
Note: * denotes a significant result, not significance level

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