Minimum Wage Regulation and Firm Export Capability: A Chinese Case

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ABSTRACT Based on a research design of an event study, we addressed the question of how the 2004 minimum wage policy has affected the export capability of firms in China. We constructed a panel dataset including 40,013 firms from 2000 to 2006. The results demonstrated that minimum-wage regulation has significantly increased the wage and employment of sampled firms, which further affected their labor productivity and export performance. The findings revealed the vital role of efficiency wage mechanisms in determining the operational performance of Chinese firms; their market advantage was built on the capability of operational efficiency rather than solely on labor cost benefit. To explain these findings, we illustrated how the rural-urban segmentation and the inefficiency of the incentive system formed the social context of the Chinese labor market and how the interplay between these social factors and economic aspects of minimum wage regulation affected the competitive advantage of the Chinese firms.

Keywords Minimum wage regulation; Export capability; Efficiency wage; Low-cost advantage

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INTRODUCTION

The regulation and development of labor resources is an important aspect of governmental policies designed to increase competitiveness (Hitt, Ireland, & Hoskisson, 2007; Porter, 1990). Among the various kinds of policies, minimum wage regulation has been adopted in most countries as a means to protect the workers' welfare, but its potential impact on firms has always been regarded as debatable and suspicious (Brown, Gilroy, & Kohen, 1982; Card & Krueger, 1995; Neumark & Wascher, 2008; Stigler, 1946). In transitional economies like China, the workers in the lower layers of society contribute substantially but are often poorly rewarded (Ceglowski & Golub, 2007). This low cost labor is recognized as a strong competitive advantage of Chinese firms and products, especially those in the labor-intensive industries (Li, Qian, & Gaber, 2007; Park, Li, & Tse, 2006). Low cost labor is also a key micro-foundation of the rapid growth of the Chinese economy (Stalk & Young, 2004). During the past two decades, China has dominated the export market in many industries such as clothes, textiles, toys, household appliances, and consumer electronics, and "Made in China" labels are ubiquitous throughout the world (Zhang & Su, 2009; Zeng & Williamson, 2007). In December 2009, *Time* magazine named four young migrant workers in China the collective runners-up for "*Person of the Year*," reminding us of the fact that those who help achieve an 8% growth rate of Chinese economy and an economic stimulus for everyone else are the numerous hard-working but low-paid employees (Ramzy, 2009). The credit belonged to the tens of millions of workers who have left their homes, and often their families, to find work in the factories of China's booming coastal cities.

2

Recently, the Chinese government enacted some policies and regulations to protect the rights and benefits of these low-income workers, which quickly stimulated many concerns from researchers and practitioners about whether these enactments would reduce the advantage of Chinese firms (Cooke, 2005; Kroeber, 2010; Zeng & Williamson, 2007). Among the new policies, the implementation of a minimum wage received the most attention (Ding, 2010; Luo, 2007; Wang & Gunderson, 2011, Zhou, 2007). In January 2004, the government issued the "Regulations on Minimum Wages," which legally set the minimum wage in all kinds of firms for the first time. Definitely, this would be beneficial for the low-income workers, but, from the employers' perspective, would this policy lead the firms to reduce their employment? To what extent would it affect the productivity and export capability of Chinese firms? These are questions we intend to address in this study.

Due to data limitations, previous empirical studies of Chinese minimum wage regulation have often been based on data at the industrial or provincial level or small-scale investigations among firms (Ding, 2010; Luo, 2007; Wang & Gunderson, 2011, Zhou, 2007), making the general impacts of such regulations on firms controversial. This would aggravate the doubts on the future competitive advantage of Chinese firms in the global market (Cooke, 2005; Zhou, 2007). However, a counterpart of these doubts is the steady growth of the export volume of Chinese firms (including labor-intensive industries such as clothes and textiles) since the 2004 policy, with only some fluctuations after the recent financial crisis (Chan, 2010). Since "China is intrinsically complex by dint of its size and internal variation" (Child & Tse, 2001: 18), a large-scale empirical investigation is essential to thoroughly address these research problems. To do so, we have spent 11 months constructing a panel dataset including 40,013 Chinese firms with their financial performance and local minimum wage standards between 2000 and 2006.

In the remainder of this paper, we first reviewed the literature on some theoretical

3

arguments and findings about minimum wage regulation. Then, we explained the background of the reform of the minimum wage system in China and specified the monopolistic structure and efficiency wage mechanism of its labor market. Based on the above dataset, we illustrated the implementation of, and compliance with, the 2004 minimum wage policy among Chinese firms and further examined the economic impact of the policy on firms.

We grounded our findings in the specific social context (such as the segmentation of the labor market and the low efficiency of incentive problems in past institutions) of the Chinese labor market, and addressed how these social aspects would interplay with the economic aspects (such as employment and productivity) of minimum wage. The empirical results supported our proposition that the low-cost advantage of Chinese firms was built on their ability to maintain high level of equilibrium between wage and productivity, rather than just resource-based cost benefits. Finally, we discussed some theoretical contributions of these findings to the foregoing literature, as well as the limitations of our study and the possibilities for future studies.

THEORETICAL BACKGROUND AND HYPOTHESES

Minimum Wage System in China

The first minimum wage laws were enacted in New Zealand in 1894 and in Australia in 1896, and the history of the minimum wage in the U.S. can be traced back to legislation enacted by Massachusetts in 1912 (Neumark & Wascher, 2008) and the Roosevelt administration in the early 1930s (Flinn, 2010). Nowadays, over 90% countries have established this basic labor regulation system.

Compared with other markets, the introduction of a minimum wage system into the Chinese labor market occurred in a much more prudent manner (Knight & Song, 2005). The Chinese labor system was established in the 1950s, influenced by the Soviet model (Meng,

4

2000). Under the planned economy, once individuals were recruited into a State-owned Enterprise (SOE), they were given an "iron rice bowl," a life-long employment within the firm (Du & Choi, 2009; Krug & Hendrishke, 2008). After the economic reform and open policy, Private-owned Enterprises (POEs) and Foreign-invested Enterprises (FIEs) elaborated more flexible and efficient labor relationships, and, since the late 1980s, their success made salient the drawbacks of the SOE mode of labor employment.

Seeing these drawbacks, the government sought to relieve SOEs from the burden of lifetime employment and from their heavy social benefit obligations (Guthrie, 1998). In 1986, the "Labor Contract Law" was issued, which allowed the firms to set up short-term employment with their employees. In 1993, the "Company Law" was enacted, which stipulated the rights and obligations of the owners, holders, directorates and supervisory committees under the modern firm system. At that time, many firms began to transform their traditional personnel administrative system into the modern Western-style human resource management system (Cooke, 2005; Du & Choi, 2009). On July 5, 1994, China issued the "Labor Law," which introduced the minimum wage system into many sectors of the labor market, but the compliance was based on voluntary actions of the firms. Then, after an approximately 10-year experimentation, the government issued "Regulations on Minimum Wages" on January 20, 2004, requiring every province/region to establish its minimum wage standards to regulate the paying wage of local firms. It also strengthened the supervision of the policy, and firms that did not comply—hereafter, "non-compliance" firms—would be punished by an amount as high as one to five times of the wages in arrears (Ding, 2010; Wang & Gunderson, 2011).

Even with supervising efforts, non-compliance with minimum wage policy is common in many societies (Neumark & Wascher, 2008). Increases in wages are determined by the willingness and capability of low-paying firms to comply with the regulations. According to

5

an early study in the U.S., the compliance ratio fell from 65% to 55% after the minimum

wage was raised in 1975 (Ashenfelter & Smith, 1979). The enforcing institutions are less

developed in China, hence non-compliance is likely to be higher than that of industrialized

countries (Ding, 2010). Besides this regulatory factor, some economic and normative reasons

also account for compliance with legislation, for example the implementation process of the

reform policy of short-term labor contracts in Chinese firms (Guthrie, 1998). Therefore, we

regard the enforcement of a minimum wage system as a progressive process, and the

enforcement of the 2004 policy would significantly accelerate the compliance of the firms.

Hypothesis 1. There is a significant increase in pay for the employees after the minimum

wage policy took effect in 2004.

Minimum Wage and Employment

Most studies on minimum wage are conducted by economists, and there is a debate

among them between the opponents of the "disemployment effect" and the supporters of "fair

labor standards" (Devereux, 2005). In his seminal article, Stigler (1946: 354) implored

economists to be "outspoken, and singularly agreed" that increases in the minimum wage

would reduce employment. Thus it is elementary for neoclassical economics textbooks to

portray the minimum wage as unambiguously negative for employment (Card & Krueger,

1995). In the neoclassical view, the unrestricted supply and demand forces combine in a

competitive market to determine a unique equilibrium between employment and wage; hence,

the imposition of a minimum wage greater than the market-clearing wage creates true

unemployment, which is defined as individuals who are willing to supply labor at the going

wage rate but unable to find jobs (Flinn, 2010). The wage difference among workers can be

explained mainly by their different human capital, working environment or welfare packages,

but not the profitability of the firm (Neumark & Wascher, 2008). There is much empirical

evidence supporting this "disemployment" effect of minimum wage regulation (Bazen &

6

Skourias, 1997; Neumark & Wascher, 2000). Specifically, Brown, Gilroy and Kohen (1982) formulated an empirical rule that a 10% rise in the minimum wage would bring about a 1-3% fall in employment among low-skilled workers.

From the 1980s onwards, studies went beyond the conventional paradigm to the "fair labor standards" paradigm in some sense. For example, Card and Krueger's (1995) studies of several low-income sectors in the U.S. found that increases in the minimum wage resulted in no discernible rise in unemployment and in some sectors even resulted in a positive employment effect. They attributed these anomalies to the underlying monopsony of the labor market. In a monopolistic market, the firms will optimally set employment below the competitive equilibrium level in order to pay a lower wage than the competitive one (Stigler, 1946). A minimum wage has a positive input in such an environment because it takes the ability to set wages out of the hands of the firms. By removing their legitimacy to keep lower employment, minimum wage requires the firms to raise their payments in the labor market which can further lead to a higher employment level (Flinn, 2010). The firms can be worse off, but they can still earn positive profits depending on the level at which the minimum wage is set.

Despite its long industrialized history, the United Kingdom just began national minimum wage regulation in 1999, and its labor market was often regarded as monopolistic (Gosling, Machin, & Meghir, 2000). For example, a recent study in the United Kingdom found no evidence of the "disemployment" effect, either when the minimum wage was first introduced or when it was upgraded in 2000 and again in 2001 (Stewart, 2004).

With a labor force of more than 800 million, the Chinese labor market often represents a monopolistic structure with large surplus labor in both the rural and urban sectors (Knight & Song, 2005). As a result of the rapid growth of the urban economy and the loosening of regulations on household registration during 1990s, rural people began to seek their jobs in

7

urban areas, especially in the coastal regions (Meng, 2000). The total amount of rural

migrants increased from 105 million in 2002 to 140 million in 2007, with an average annual

increase as about 7 million (Cai & Chan, 2009). Just like the four workers reported by the

Time magazine, rural migrants are often called "peasant laborers" ("*nong min gong*") in

Chinese, indicating their social identity as urban workers whose household is registered in a

rural region (Bian, 2002). Eventually, "rural-urban migration, albeit mainly of a temporary

nature, became a growing, and eventually a major, phenomenon in the Chinese labor market

over the period of economic reform" (Knight & Song, 2005: 36). Such a large population

migration can greatly lower the labor cost of urban firms, providing them a virtually

unlimited supply of labor.

The apparent monopolistic structure of labor market would disprove the

"disemployment effect" in China. Furthermore, as indicated by the Strategic Human

Resource Management (SHRM) approach, strategic reward system with higher wage would

provide firms better market reputation and organizational performance (Becker & Huselid,

2006; Snell & Dean, 1994). In this sense, higher wage can help firms recruit more qualified

workers and create more profits. Therefore, we propose the following hypothesis.

Hypothesis 2. The paying wage has a positive effect on the size of employment of the

firms.

Minimum Wage and Productivity

It has long been known that there must exist multiple wage-productivity equilibriums in

the labor market for minimum wage to attain beneficial effects (Flinn, 2010). Each

equilibrium is proper in the sense that any actor in the equilibrium has no capability to

improve the situation (as a Nash equilibrium), unless aided by environmental shocks.

Minimum wage regulation offers the possibility for the policy maker to break the ongoing

equilibrium and force firms to seek a higher equilibrium.

8

One of the generative motors of multiple equilibriums is the efficiency wage mechanism. This mechanism assumes that the importance of tight coupling of the wage-productivity nexus varies among different sectors and firms (Akerlof & Yellen, 1986). When the coupling relation is loosened or nonexistent, the wage-productivity nexus would represent a low level of equilibrium (Flinn, 2010). The micro-foundation of the efficiency wage mechanism can be illustrated by the shirking model (Akerlof & Yellen, 1986). In most occasions, workers have some discretion concerning their performance. The payment of a wage in excess of market-clearing is an affective way for firms to provide workers with the incentive to work rather than shirk, reinforcing productivity with increased wages (Albrecht & Vroman, 1992; Cubitt & Hargreaves-Heap, 1999; Shapiro & Stiglitz, 1984).

By contrast, the downside risk from shirking labor is usually not limited by the smaller amount of its own labor input: It may include "the wastage of scarce opportunities inherent in the job itself, poor use of other current inputs, or in some cases, the destruction, theft, and wastage of capital assets" (Akerlof & Yellen, 1986: 14). Thus, shirking behavior has many additional costs to lock the wage-productivity nexus into a lower equilibrium.

The inefficiency and shirking problems were found to be very serious in Chinese firms, especially the SOEs operating under the planned economy ideology (Fleisher & Wang, 2001; Groves, Hong, McMillan, & Naughton, 1994; Peng & Health, 1996). Since the economic reforms began in the 1980s, the efficiency wage mechanism was gradually introduced into firms, and conditions were improving (Bai, Lu, & Tao, 2009; Ding, Akhtar, & Ge, 2009; Meng, 2000). A panel study of 359 Chinese firms shows that in 1980 only 4% of the variance in wages was explained by labor productivity, but in 1987 it had risen to 37% (World Bank, 1992). But as path dependency created by institutional persistence (Stinchcombe, 1965; Sydow, Schreyögg, & Koch, 2009), the problems still exist in many firms, dampening their efficiency (Fleisher &Wang, 2001). For example, there were significant differences in

9

operational performance among SOEs, POEs, and FIEs (with return on assets as -0.023, 0.103, 0.023 respectively in 1998), which have persisted across the period from 1998 to 2002 (Xu, Pan, Wu, & Yim, 2006). As a result, different extents of this "liability of history" would lead firms to operate at different levels of the wage-productivity equilibrium. Knight and Li (2005) found that the profitability of Chinese firms is a major factor accounting for their wage difference, and those with better performance can often bring higher rewards to both firms and their employees.

Based on this efficient wage approach, we may predict that compliance with minimum wage regulation is determined by the paying capability rather than the willingness or selfishness of the employers. The firms operating at high levels of equilibrium would find it easier to comply than those at low levels. As a response, the complying behavior may serve as a beneficial market signal for the firms at high equilibrium levels to recruit more qualified workers from labor market, resulting in a higher productivity; such an advantage would be insignificant for the non-compliance firms.

Hypothesis 3a. The productivity of the firms complying with the minimum wage regulation has significantly increased since 2004.

Hypothesis 3b. The productivity of the firms not complying with the minimum wage regulation has not significantly increased since 2004.

Hypothesis 3c. The higher the paying wage over the minimum wage standard, the higher the productivity of the firms.

Minimum Wage and Exports

China's industrialization over the past three decades has relied heavily on low-cost exports (Zhang & Su, 2009; Zeng & Williamson, 2007). Typically, a U.S. or Western European factory worker costs a firm $15 to $30 per hour, while a Chinese worker earns the equivalent of less than $1 per hour (Stalk & Young, 2004). After considering the productivity

10

issue, Ceglowski and Golub (2007) pointed out that Chinese unit labor costs were about 25-40% of U.S. labor costs, which were also lower than that in the Japan, EU, Mexico, Korea and most other newly industrializing countries.

Meanwhile, there are many concerns about the decrease of this competitive advantage of Chinese firms (Cooke, 2005; Kroeber, 2010). For example, *Financial Times* recently reported that the Chinese export-led and labor-intensive firms might be the first to face problems because of the rising labor costs (Marsh, 2011). Does minimum wage regulation inevitably dampen the low-cost advantage of Chinese firms?

Here, we argue that at least two aspects need to be considered: (1) Export-led firms often have higher productivity than others, and they are paying higher wages than the average level in the local region. In other words, they are operating at a higher level of equilibrium. Since their paying wages are already above the required minimum wage standard, the policy does not matter to them. (2) Furthermore, they can even enjoy the market signal benefits created by their compliance, and their relatively higher wages can bring them "cherry-picking" benefits in recruitment among candidates.

For example, the Foxconn Technology Company is a large export-led firm with over 400,000 employees in Shenzhen. Its desired candidates for front line operators are young, rural migrants who are more educated than their predecessors and better suited for assembling modern electronics. Despite the stressful working environment and heavy workloads, the slightly higher wage often makes its candidates much more efficient than others. In fact, the great majority of Foxconn's front line workers fit the above desired profile well (Chan, 2010). More qualified workers would help the firm to maintain its higher productivity and better export performance.

Hypothesis 4a. The export sales of the firms complying with the minimum wage policy have significantly increased since 2004.

11

Hypothesis 4b. The export sales of these firms not complying with the minimum wage policy have not significantly increased since 2004.

Hypothesis 4c. Employment can mediate the relationship between compliance with minimum wage and export performance.

RESEARCH DESIGN

Data Sources and Collection

The raw data of this study are from the annual surveys of industrial firms conducted by the National Bureau of Statistics (NBS) of China for the period of 2000 to 2006. By law, all firms with annual sales of 5 million *yuan* or more are required to participate into the survey, and to report their financial information.[①] This is one of the most representative and authoritative data sources in studying Chinese firms, and has been adopted in several previous studies (Bai, Lu, & Tao, 2009; Chang & Xu, 2008; Xu, Pan, Wu, & Yim, 2006). In terms of the raw data, there are many inconsistent and inaccurate cases in firm identification codes, names, or units of measurement (for example, the sale incomes are measured in thousands of *yuan* in some years but single *yuan* in others); the national standard of the industrial code was also changed in 2003. To assemble the annual data into a panel dataset, we developed specific software programs to aid with data cleaning and combining. The final sample of 280,091 observations is highly comprehensive since it covers the 31 Chinese provinces/regions and 36 industries.

There is no official source of the minimum wage standards of the 31 provinces/regions between 2000 and 2006. We collected these data from the governmental websites or official reports of each province/region. There were also many unexpected difficulties in this process. For example, the beginning time and the adjusting frequency are different in different regions.

[①] The data of 2004 is from the national economic census survey, which includes all the registered firms. Thus, there is a sharp increase of samples in this year. After assembling into the panel data, the number of samples becomes even, that is, 40,031 each year.

12

Most provinces/regions began their minimum wage practices in 2000, while Tibet did not begin doing this until 2004. Some regions will update their standards of minimum wage every year, while others may keep their standards stable for two or three years. Regarding these problems, we have adopted the following principles during our collection and calculation of the standards of minimum wage.

(1) Taking the month standard of minimum wage. There are two recommended standards in adopting the minimum wage policy: One is the month standard, which applies to the full-time employed workers; the other is the hour standard, which applies to the temporary workers. Since the month standard is most commonly adopted in Chinese firms, we focus on this standard in this study.

(2) Taking the high standard of minimum wage. The two municipalities, Beijing and Shanghai, only formulate one minimum wage standard, while other provinces/regions often draw up multiple standards. For example, Shangdong Province has five standards referring to its different cities or counties. It was really hard for us to distinguish each standard adequate for each city/county in each year.

To solve this problem, we first conducted some pilot analyses by taking the high standard and the low standard respectively as our measurement of minimum wage, which achieved the same results. Then, we ran the analysis again just with the samples of Beijing and Shanghai, and the results proved to be similar. Thus, we were assured that the findings were robust to the selection of high/low standards. The following analysis is based on the high standard in each province/region (surely, the standards of Beijing and Shanghai remain the same).

(3) Transforming policy standards into the measuring standards of the study. The month paying wage in each firm is calculated based on the accounting subject "annual gross wages payable to employees," which means that our wage measure is the average value of all 12 months of a certain year. However, one knotty problem is that the real time for the minimum

wage standards taking effect is often changing. For example, the 2001 standard (490 *yuan*) in Shanghai city took effect on 1st July 2001, while that in Anhui Province became effective on 1st January 2001. It would produce strong bias to assess the compliance with minimum wage by taking 490 *yuan* as the month standard for Shanghai firms in 2001, since they were taking a lower previous standard in the first half of the year.

To solve this problem, we transformed the policy standard into a real measuring standard of minimum wage by the following method: Supposing that the 2001 standard of Beijing city was 412 *yuan*, which was followed by the 2002 standard of 465 *yuan* taking effect on 1st July 2002, the averaged minimum wage each firm should pay to its employees in 2002 was 438.5 *yuan* (438.5 = (412*6+465*6) /12). Hence, we can take 438.5 *yuan* as the real measurement of minimum wage in 2002 and compare it with the average month wage paid in each firm. After the transformation, we added the high/low measurements of minimum wage standards into the above panel dataset, matching by the specific province/region and year.

As with many studies in transitional economies, data collections was often very difficult and time-consuming (Brown, Earle, & Telegdy, 2006). In this study, two researchers spent a lot of effort and time here: They began the data collection and cleaning in March 2008 and continued for 11 months till February 2009.

Variables and Measurements

Wage: This means the average amount of monthly wage paid to the employees, coming from the accounting subject "annual gross wages payable." The calculating formula is: *wage = (Annual gross wages payable / Number of employees) /12*, and the unit is *yuan*.

Min_wage: This is the measuring standard of minimum wage in each province/region, based on the principles and calculations mentioned above.

Comp_wage: This variable measures the difference between the paying wage and the minimum wage standard for a certain month in each firm. The calculating formula is:

14

comp_wage = wage - min_wage.

Lab_prd: The labor productivity is adopted in this study, referring to the average output of each employee. The calculating formula is: *Lab_prd = Annual sale incomes / Number of employees*, and the unit is one *yuan*/person.

Exp: This means the export income of each firm in the industrial statistic data, and the unit is a thousand *yuan*.

Ownership: This refers to the registered type of firm ownership in the industrial statistic data, including State-owned enterprises (SOEs) [2], Private-owned enterprises (POEs), Hongkong- Macao-Taiwan-invested enterprises (HMTs), Foreign-invested enterprises (FIEs).

Industry: There are a total of 39 mining and manufacturing industries in the national statistics. After matching the annual data with the panel database, three industries with samples less than 500 were deleted. In other words, 36 industries remained in this study.

Controlled variables: Our regression analysis is based on the fixed effects model with *year* as the category variable, and the changes of four variables (firm size, capital intensity, number of employees, firm age) are controlled in the model. Here, the variable "*Size*" (firm size) is measured by the total assets after applying the logarithm; variable "*Cap_int*" (capital intensity) is measured by the ratio of the fixed assets to the total assets; variable "*Emp_num*" (number of employees) is the reported number of employees at the end of each year; variable "*Firmage*" (firm age) is calculated based on the reporting year and the founding year of the firm.

Analyzing Method

An event study is a statistical method used to assess the impact of an event on the value of a firm. This method can explain the impact of a certain event by comparing some selected characteristics of a firm before and after the focal event (Fama, Fisher, Jensen, & Roll, 1969).

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[2] Here, SOEs include the collective-owned enterprises.

15

We used this method to examine the impact of the 2004 minimum wage policy on the export capability of the firms with the following steps: (1) Defining the event. The 2004 minimum wage policy is the focal event in this study, and the time period from 2000 to 2006 is selected as the "event window" to assess its impact. (2) Selecting the samples. In this study, to control for unobserved temporal factors which may influence the outcomes, we assembled a panel dataset including the seven-year data of 40,013 individual firms. (3) Selecting the testing method. We used productivity and export income to represent the export capability of the firm. Considering the time lag of the policy effect, we examined the significance of the changes of these variables based on a matched-sample t-test method. The samples were classified into two groups; that is, we used a before policy (2000-2003) group and an after policy (2004-2006) group, and then their difference in the above variables was justified. (4) Explanation of the results.

COMPLIANCE WITH MINIMUM WAGE REGULATION

Comparison among Different Ownerships

As mentioned above, most provinces/region began their minimum wage practices in 2000. To reflect the progress of minimum wage implementation, we calculated the non-compliance ratio of firms each year for each kind of ownership (POEs, SOEs, HMT, and FIEs) as well as the total samples. The calculating formula follows: *Ratio of non-compliance = (number of firms with wage level less than minimum wage / total number of firms)*100%.* As Table 1 shows, the non-compliance ratio for the whole samples has steadily dropped from 17.34% in 2000 to 7.25% in 2004, and the change in 2004 is mostly significant; then after a slight rise in 2005 (8.25%), it finally dropped to 7.93% in 2006.

Insert Table 1 about here

The general trend of each kind of ownership is similar to that of the whole samples, except that of SOEs, which is steadily dropping without any rally. As predicted, among the four kinds of ownership, SOEs have the highest non-compliance ratio, and their operational performance was also identified to be the worst in prior studies (Xu, Pan, Wu, & Yim, 2006). The non-compliance ratio of FIEs is much lower than that of the others. This seems to support Fleisher and Wang's (2001) findings that the productivity-enhancing potential of efficiency wages is more fully exploited by FIEs. During this 7-year period, the reduction of the non-compliance ratio is very salient, with the reduced proportion being 62.7% for HMTs, 51.28% for SOEs, 49.4% for POEs, and 45.4% for FIEs.

There are, in total, 34,747 observations of non-compliance, accounting for 12.4% of the total samples. Among these, 57.7% are from SOEs, 19.3% from POEs, 16.8% from HMTs, and 6.2% from FIEs. We further calculated the gap between real paying wage and minimum wage standard for these non-compliance samples; the calculating formula follows: *Non-compliance gap = minimum wage − real paying wage*. As shown in Table 2, the general trend of the non-compliance gap represents a process that initially rises but then descends, and the turning point is 2003-2004. More specifically, it first rises from 117.2 in 2000 to 136.5 in 2003 and then drops to 104.6 in 2004; after a minor fluctuation, it decreases to 101.5 in 2006. The proportion of gap reduction during the 7-year period is not very inspiring, ranging from 2.3% (SOEs) to 18.4% (FIEs).

Insert Table 2 about here

A surprising fact is that HMTs and FIEs have a larger gap of non-compliance than SOEs

17

and POEs[3], and these problems got much better after 2004.

Comparison among Different Industries

As Table 3 shows, the non-compliance ratio of the firms is quite different among different industries, ranging from the lowest 1.7% (fuel gas production and supply industry in 2004 and 2005) to the highest 25.8% (beverage production industry in 2000). As time passes, the ratio is decreasing in all the industries and drops to under 10% in 2006 in most industries. Labor-intensive industries (such as timber processing, bamboo products; agricultural and sideline foods processing; and food production) often have a high ratio; while monopolized industries (such as tobacco products processing; electricity and heating production and supply; and fuel gas production and supply) have a low ratio. The ratio of some export-oriented industries (such as clothing, shoes, hat manufacturing and the textile industry) are relatively in the middle among all the industries.

Insert Table 3 about here

We calculated the ratio of the gap between the average wage of the non-compliance samples and that of the total samples in different industries with the following formula: *Ratio of wage gap = (average wage of total samples – average wage of non-compliance samples) / average wage of total samples* *100%. The results show that there is a large difference between the average paying wage of the non-compliance firms and the average wage in that industry, and the ratio of the gap ranges from the lowest 54.6% (leather, furs, down and related products) to the highest 81.6% (tobacco products processing). The high ratio of the

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[3] This is probably caused by the so-called "round-trip foreign direct investments" in the Chinese market (Huang, 2003). To support the economic reform and open policy, the Chinese government has provided many special incentives to attract foreign investments, including tax concessions, rebates and exemptions, and preferential land rents and prices (These policies were abandoned in 2008). Therefore, to achieve these benefits, some domestic firms or individuals invested in China under disguised foreign identities. Therefore, despite their foreign identities as FIEs or HMTs, these firms actually operate at a low level of wage-productivity equilibrium.

18

gap in the monopolized industries is caused by the high level of the average industrial wage. More importantly, there is no declining trend during these years, even after 2004. The persistence of this trend supports our predictions that industrial firms are running at different levels of wage-productivity equilibrium, and this persistence exists in every industry. The non-compliance with minimum wage policy results from low productivity rather than the selfishness of the employers.

Comparison between Compliance and Non-compliance groups

To explore the difference between the compliance and non-compliance firms, we divided the total samples into two groups: The compliance group included 245,344 samples and the non-compliance group included 34,747 samples. We tracked and compared the performance of the two groups over the 7-year period. Figure 1(a) represents the proportions of the number of entities, export income and employee numbers of the compliance group to the total samples. For the compliance firms, their proportions in the total export income and employee number are higher than that of their number of entities. They make up 93.59% of total exports and 89.72% of total labor in 2000, which increased to 97.95% (export) and 95.19% (labor) in 2006. Therefore, the majority of exports are produced by the firms compliant with the national minimum wage regulation. Such regulation seems to have not affected their employment decisions, since their proportions of employment in the society are increasing rather than descending. In fact, in the Chinese labor market from 2003 to 2008, a total of 50 million net new positions were created in manufacturing industries, and 39 million were created in service industries (Kroeber, 2010).

Insert Figure 1 about here

Furthermore, we calculated the average value of the labor productivity (unit: thousand

19

yuan/person) and number of employees (unit: person) of the two groups. As shown in Figure 1(b), the labor productivity of the two groups have both increased in this period, while the compliance group has better performance in both relative level and growth rate of the labor productivity than the non-compliance group[④]. Regarding the number of employees, the compliance group shows a slightly rising trend, while the non-compliance group represents a descending trend. This is consistent with Xu, Pan, Wu, and Yim's (2006) findings of the persisting pattern of performance gaps among Chinese firms. The reason for this persistence is the "liability of history," and they are actually operating at the different level of wage-productivity equilibrium. Their efficiency of incentive system is different. As a result, the minimum wage regulation has stronger impacts on the firms at low equilibrium level by limiting their level of employment and forcing them to improve their efficiency.

RESULTS

Descriptive Statistics

The data is analyzed with STATA statistical software. Results of the descriptive analysis of means, standard deviations and correlations are shown in Table 4.

Insert Table 4 about here

As Table 4 shows, there is a positive correlation between *Comp_wage* and *Lab_prd* (R-squared = 0.045), a positive correlation between *Comp_wage* and *Exp* (R-squared = 0.142), and a positive correlation between *Lab_prd* and *Exp* (R-squared = 0.015). The correlation between *Comp_wage* and *Emp_num* is negative (R-squared = -0.067).

Hypotheses Testing

[④] Here, the growth of productivity is not necessarily the result of improved efficiency of labor, and other factors such as technical progress, learning effect, economics of scale may also matter (Knight & Song, 1995). We will analyze this issue more rigidly by fixed effects model in the following section.

To examine the changes in wage, productivity and export after the 2004 minimum wage regulation, we conducted a matched-sample t-test on the panel data. As shown in Table 5, the samples are divided into a before 2004 (2000-2003, with 160,052 samples) group and an after 2004 (2004-2006, with 120,039 samples) group. Then, we compared the means of the two groups with reference to five aspects: *comp_wage, comp_prod_y, comp_prod_n, comp_exp_y and comp_exp_n*. Here, *comp_wage* is the difference between the average month wage and the real minimum wage standard; *comp_prod_y* is the averaged productivity of the firms that have complied with the minimum wage policy; *comp_prod_n* is the averaged productivity of the firms that have not complied with the minimum wage policy; *comp_exp_y* is the averaged export volume of the firms that have complied with the minimum wage policy; *comp_exp_n* is the averaged export income of the firms that have not complied with the minimum wage policy.

Insert Table 5 about here

As shown in Table 5, the paying wage significantly increased after 2004 (t-value= -77.3; p-value = 0.000), indicating that the 2004 minimum wage policy had a positive impact on the wage paid to the workers. Thus, H1 is supported.

We conducted a regression analysis with fixed effects model to examine the employment impact of the minimum wage policy. Here, *Emp_num* is the dependent variable, *Comp_wage* is independent variable, and *Firmage*, *Size*, and *Cap_int* are controlled variables. As shown by model 1 in Table 6, *Comp_wage* has significant positive impacts on *Emp_num*; in other words, the higher paying wage, the more employees the firms recruited. The controlled variables, *Firmage*, *Size*, and *Cap_int*, also have positive effects upon employment. Thus, H2

is supported.

As shown in Table 5, there is a significant increase of the average productivity for the complying firms after 2004 (t-value=-41.2; p-value = 0.000), supporting H3a. The productivity of the firms that did not comply has also increased at the significant level of 5% (t-value=-2.3; p-value = 0.013), rejecting H3b. Then, we employed the fixed effects model to test H3c. As shown by model 2 in Table 6, there is positive relation between *Comp_wage* and *Lab_prd*, indicating that paying employees higher wages can help firms to increase their productivity. This is consistent with Fleisher and Wang's (2001) findings that productivity is higher in firms that pay higher wage rates, and H3c is supported. Meanwhile, *Firmage* has insignificant relation with *Lab_prd*, and *Size* has positive effect upon productivity.

Insert Table 6 about here

As shown in Table 5, there was a significant increase of export income for the complying firms after 2004 (t-value=-41.3; p-value = 0.000), supporting H4a. The change of the firms with non-compliance is insignificant (t-value=-0.3; p-value = 0.372), supporting H4b.

Next, we examined the mediating role of employment between wage and export incomes. According to Baron and Kenny's (1986) suggestions, the mediating effect of employment exists only when (1) the wage has positive impact on employment; (2) Employment has positive impact on export; (3) The impact of the wage on exports will decrease after controlling employment. Thus, we examined the above conditions by following steps:

Step 1: taking *Exp* as dependent variable, *Comp_wage* as independent variable, and controlling *Firmage*, *Size*, and *Cap_int* in the model. As shown by the results of Step 1 in

22

Table 7: *Comp_wage* has positive impact on *Exp* (R-squared=0.80, Adj R-squared=0.70), and the first condition is satisfied.

Step 2: taking *Emp_num* as the dependent variable, *Comp_wage* as an independent variable. As shown by the results of Step 2 in Table 7: *Comp_wage* has positive impact on *Emp_num* (R-squared=0.91, Adj R-squared=0.87); in other words, the independent variable has a significant impact on proposed mediating variable.

Step 3: examining the relation between *Comp_wage* and *Exp* after controlling *Emp_num*. As shown by the results of Step 3 in Table 7: *Emp_num* has positive impact on *Exp* (p-value =0.000). *Comp_wage* still has positive impact on *Exp* (R-squared=0.80；Adj R-squared=0.70), but the significant level has decreased (p-value =0.026) compared with that in the Step 1 (p-value =0.000). Thus, *Emp_num* really mediates the relation between *Comp_wage* and *Exp*, and H4c is supported.

Insert Table 7 about here

DISCUSSION AND CONCLUSION

The study examined the implementation of minimum wage policy in China and its impacts on firm employment, productivity and export capability. Different from the neoclassical argument, the results strongly support the efficiency wage approach of minimum wage regulation. That is, the firms complying with minimum wage regulation enjoyed a higher level of productivity, employment and export incomes. These economic aspects of minimum wage are interplaying with the social factors of Chinese labor market in determining the competitive advantages of Chinese firms.

23

Implications for Research and Practice

This study can provide some insight into the minimum wage debate that has troubled researchers for over six decades (Card & Krueger, 1995; Neumark & Wascher, 2008; Stigler, 1946). Most of these arguments are built up on the economic effects of minimum wage such as disemployment and productivity. This study examined the appropriation of these arguments by grounding them in the specific social context of China. Looking from the supply side of the labor market, our findings suggest that the poor bargaining power of low-income workers is sometimes socially constructed. For example, the large disparity of rural-urban income gives rise to increasing inflow of labor migrants from countryside to the cities in China, and such segmentation and discrimination problems are often very prevalent in the labor market of developing countries (Knight & Song, 2005).

As Lewis's (1954) economic development model indicates, the real wage of labor in this context is governed by the rural supply price and will be held stable by the virtually unlimited supply of labor from the rural sector. This shapes the monopolistic structure of the labor market, where firms enjoy strong power, allowing them to depress wages below the "true" market rate. The individual preference and utility of workers in the labor market has to yield to the external structural forces. In such circumstances, the minimum wage policy would simply bring labor prices closer to "fair labor standards," with the effect being a cut in firm profits rather than a reduction in employment. Therefore, different from the neoclassical approach, we hold that a legislated minimum wage has the potential to increase aggregate employment as well as individual welfare.

From the demand side of the market, the efficiency wage mechanism proves to be very important for Chinese firms to operate in a high equilibrium between wage and productivity. The need for this mechanism can be attributed to the long-time dominance of an inefficient incentive system that inspired shirking, and by some sectors of firms, such as the SOEs, that

24

suffer more from the "liability of history" (Peng & Health, 1996). The majority of Chinese

exports are produced by the firms at a higher equilibrium level, indicated by their efficient

operation to transform the low-cost input into low-cost products or services. There are some

competitive mechanisms of resource accumulation and absorption among the firms, which

will become more and more salient with the deepening reform of the market economy.

During the evolutionary process, the variation-selection-retention mechanism determines the

adaptability and survival of these firms in the competitive environment (Aldrich & Ruef,

2006).

    If properly adopted, minimum wage regulation would enhance the ecological selection

effect by continuously raising the cost of labor and enforcing the firms at lower equilibrium

levels to release some of their abstained resources. Since the optimal minimum wage would

vary across social contexts and over time, the difficulty for the government to adopt a

minimum wage is how to determine a relevant level that can select out the inefficient firms

but protect the interests of the majority (Neumark & Wascher, 2008). The Chinese experience

here is "by experiment," that is, "[first] to 'construct' the institutional landscape at a specific

location; and second, to 'construct' the process of institutional innovation" (Krug &

Hendrishke, 2008: 87). All these illustrations as a Chinese case highlight the interplay

between the economic policy and its embedded social context, and "the unique institutional

characteristics of China's transition speak for the theoretical incorporation of specific

socio-economic contexts" (Child & Tse, 2001:5). The labor market contains both economic

and social aspects by its nature, and the economic effects of minimum wage regulation

should be examined carefully in the historical and social context of a society.

    Regarding the arguments about the competitive advantage of Chinese firms, the study

highlights the capability-based view rather than the resource-based view (Teng & Cummings,

2002). Recently, many people have argued that the rapid growth of wages and the cost of

living for workers in the urban cities would reduce the low-cost advantage of Chinese firms (Kroeber, 2010). We question this argument for two reasons: First, due to the segmentation and discrimination problems in the Chinese labor market, the increasing rate of labor cost in urban firms is actually buffered by the huge supply of rural workers. The gap of income and expenditure between rural and urban regions is large, and the rising speed of cost in labor-intensive industries would not be so quick as the growth rate of the urban line. The threats of quality and innovation to the Chinese firms would be more salient than that of labor cost.

Second, the export-led strategy of firms is built up on their high equilibrium between wage and productivity rather than solely resource-based cost benefits (Zhang & Su, 2009). In other words, resources are important, but their development proves to be at least equally important as their availability (Teng & Cummings, 2002). The capabilities of resource development are adopted by the firms to augment and enhance their resources on a regular basis, which can be further classified into dynamic and operational capabilities (Helfat & Winter, 2011).

To discover the secret of the sustained low-cost advantage of Chinese firms, Li, Qian and Gaber (2007) conducted comprehensive interviews of 29 case firms in the labor-intensive industries. They found that low-cost labor was not rare in China, but a successful firm must retain the capability to sustain and develop this advantage.

For example, the CEO of a toy factory mentioned that his success in the founding stage benefited from the low operational cost advantage, but then his company had to develop its capability of rapid product design in responding to the market competition. The growth in domestic markets further enabled the company to enter into global market due to the cost benefit of economies of scale. As a summary of their interviews, Li, Qian, & Gaber (2007: 26) concluded that: "It seems reasonable to suggest that, in addition to location-specific resources,

26

Chinese enterprises possess other valuable resources that enable them to achieve such a large cost advantage and, more importantly, have established effective mechanisms by which to sustain this advantage." Therefore, we hold that a more dynamic, prospective view of the competitive advantage of Chinese firms is essential when considering the impact of minimum wage regulation.

Limitations and Future Studies

The study has some limitations. First, different provinces/regions have different beginning times for the minimum wage practice, and their firms actually have different experiences to cope with when faced with the 2004 minimum wage policy. This problem may affect the decisions to comply with regulations and would bring a potential bias to our findings. Second, we explained our findings by proposing an income difference between rural and urban workers, but it is not empirically examined due to our shortage of firm-level data about the proportion of rural and urban workers. This question is important to comprehensively understand the low-cost advantages of Chinese firms. Thus, we hope some further studies would extend this line of inquiry.

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28

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31

FIGURE 1

Comparison between complying and non-compliance groups
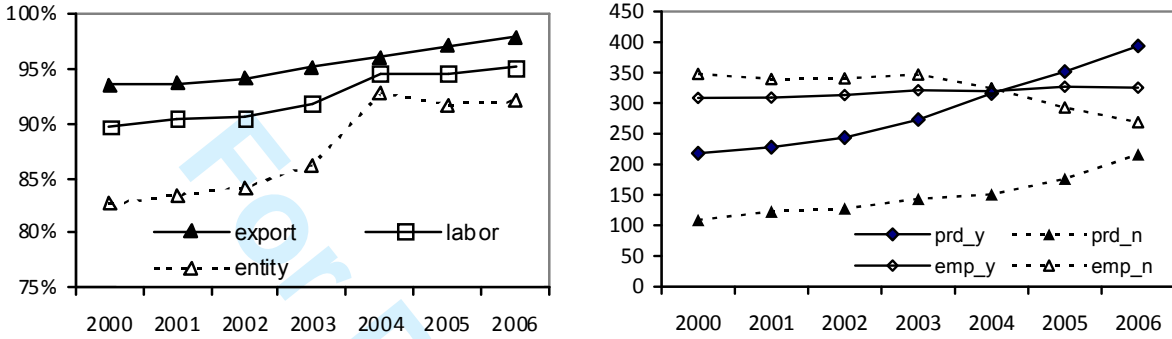
(a) proportion of export and labor

export (labor): Proportion of export income
(employee number) of complying group to the total
entity: Ratio of entity number of complying firms to
the number of total samples

(b) labor productivity and employment

prd_y (prd_n): Averaged value of labor productivity
of complying (non-compliance) group
emp_y (emp_n): Averaged number of employees of
complying (non-compliance) group

32

TABLE 1

Non-compliance ratio of different ownership (unit: %)

Year	2000	2001	2002	2003	2004	2005	2006	Average
POEs	17.69	16.75	16.30	15.00	7.62	9.06	8.95	13.05
SOEs	18.37	18.08	17.53	15.59	7.03	8.79	8.95	13.48
HMTs	12.46	12.77	12.12	9.35	9.55	7.38	4.65	9.75
FIEs	6.89	6.90	7.26	6.88	3.93	4.55	3.76	5.74
Total	17.34	16.50	15.77	13.80	7.25	8.25	7.93	12.41

Notes: n = 280,091 (40,013 in each year)

TABLE 2

Non-compliance gap of different ownership (unit: *yuan*)

Year	2000	2001	2002	2003	2004	2005	2006	Average
POEs	112.5	118.7	127.2	131.6	94.9	93.6	96.0	110.6
SOEs	114.9	120.6	129.4	134.6	119.1	113.8	112.3	120.7
HMTs	147.0	149.8	152.6	156.7	115.3	110.0	121.2	136.1
FIEs	142.7	137.3	143.6	158.5	112.3	107.1	116.5	131.1
Total	117.2	122.7	130.6	136.5	104.6	99.9	101.5	116.1

Note: n = 34,747

TABLE 3 Non-compliance ratio of different industries (unit: %)

Industry	2000	2001	2002	2003	2004	2005	2006	Average
Timber Processing, Bamboo Products	24.3	26.1	26.3	25.4	13.7	11.5	13.1	20.1
Beverage Production	25.8	24.8	25.0	23.4	11.0	12.3	14.3	19.5
Agricultural and Sideline Foods Processing	24.8	25.2	24.9	23.8	9.5	12.4	13.9	19.2
Food Production	27.9	25.2	24.5	20.5	9.8	11.1	11.4	18.6
Non-metal Ores Mining & Dressing	24.3	24.7	22.0	19.9	6.7	8.8	8.4	16.4
Craftwork and Other Manufactures	23.0	20.5	20.5	16.6	11.1	10.4	9.9	16.0
Leather, Furs, Down and Related Products	20.8	21.1	18.8	16.0	11.5	10.1	7.4	15.1
Cultural, Educational and Sports Articles	19.4	18.3	18.1	14.5	12.2	12.0	9.8	14.9
Nonmetal Mineral Products	19.4	19.5	18.7	16.0	7.5	9.5	9.6	14.3
Papermaking and Paper Products	19.4	18.1	18.1	15.6	9.0	10.1	9.3	14.2
Furniture Manufacturing	20.5	19.4	19.1	13.3	10.8	8.7	7.5	14.2
Non-ferrous Metal Ores Mining & Dressing	19.5	18.3	21.3	17.6	5.2	9.3	7.6	14.1
Rubber Products	19.3	18.2	17.1	16.2	8.1	9.2	8.5	13.8
Clothes, Shoes and Hat Manufacture	19.2	18.5	16.5	14.0	9.0	10.3	8.4	13.7
Textile Industry	17.1	17.1	17.9	15.8	7.9	9.6	9.1	13.5
Printing and Record Medium Reproduction	18.0	17.3	15.1	13.3	7.3	7.6	6.7	12.2
Plastic Products	16.6	15.2	14.4	12.7	8.1	7.7	7.1	11.7
Metal Products	15.8	14.9	13.9	11.3	7.7	7.6	6.6	11.1
Raw Chemical Material & Products	14.6	14.7	14.0	13.0	6.1	7.6	7.6	11.1
Smelting & Pressing of Non-ferrous Metals	15.3	14.4	14.4	13.0	5.8	7.4	7.1	11.1
Ferrous Metal Mining & Dressing	15.3	12.3	15.8	13.6	4.1	4.8	8.1	10.6
Medical and Pharmaceutical Products	14.8	13.7	12.8	11.6	5.9	6.6	8.2	10.5
Special Equipment Manufacturing	16.2	14.8	13.7	11.7	5.0	6.0	6.0	10.5
Coal Mining & Dressing	19.9	17.1	13.5	11.3	2.4	4.3	4.8	10.5
Petroleum Processing, and Nuclear Fuel	14.3	12.7	11.5	11.5	6.3	6.7	7.8	10.1
Electric Machines and Apparatuses	13.7	12.6	12.2	10.4	7.6	7.6	6.4	10.1
Smelting & Pressing of Ferrous Metals	12.5	11.1	12.1	9.5	5.5	7.2	7.3	9.3
Ordinary Machinery Manufacturing	14.3	11.9	11.4	9.9	4.5	6.2	6.1	9.2
Chemical Fiber	11.6	12.3	11.3	9.4	6.9	7.1	5.1	9.1
Transport Equipment Manufacturing	13.1	11.9	10.8	9.2	4.5	5.4	5.3	8.6
Communications Equipment and Computer	11.3	10.6	8.6	7.8	7.5	6.7	4.7	8.2
Instruments, Meters, Office Machinery	12.1	10.9	9.8	8.6	4.3	5.0	3.9	7.8
Water Production and Supply	7.4	6.7	6.2	7.3	3.3	4.4	5.6	5.8
Tobacco Products Processing	6.8	6.8	8.9	7.5	5.4	2.2	1.7	5.6
Electricity, Heating Production and Supply	6.7	5.6	5.8	4.8	2.3	4.1	4.2	4.8
Fuel Gas Production and Supply	5.4	6.8	5.1	6.3	1.7	1.7	2.0	4.1
Average	16.7	15.8	15.3	13.4	7.1	7.8	7.5	11.9

Note: n = 280,091

35

TABLE 4
Means, standard deviations and correlations

Variables	Mean	Std dev.	1	2	3	4	5	6	7
1.Comp_wage	584.091	516.505	—						
2.Lab_prd	279279.260	590878.393	.045**	—					
3.Exp	13346.053	36107.110	.142**	.015**	—				
4.Size	17.234	1.301	.029**	.077**	.254**	—			
5.Emp_num	318.576	413.044	-.067**	-.029**	.303**	.553**	—		
6.Firmage	16.056	12.364	-.302**	-.039**	-.036*	.138**	.187**	—	
7.Cap_int	0.350	0.196	-.181**	-.062**	-.062**	.044**	.056**	.068**	—

Note: n = 280,091; *p<0.05; **p<0.01.

36

TABLE 5

Results of matched-sample t-test

Variables	Time	Mean	Std dev.	t-value	p-value
comp_wage	before 2004	520.4	466.1	-77.3	0.000
	after 2004	679.2	591.8		
comp_prod_y	before 2004	252100.3	402287.8	-41.2	0.000
	after 2004	371167.3	723933.4		
comp_prod_n	before 2004	58507.4	67567.5	-2.3	0.013
	after 2004	68605.5	82153.7		
comp_exp_y	before 2004	11807.6	29189.9	-41.3	0.000
	after 2004	17943.9	43122.3		
comp_exp_n	before 2004	3509.7	9560.6	-0.3	0.372
	after 2004	3641.7	9894.7		

Note: n (before 2004) = 160,052; n (after 2004) =120,039.

37

TABLE 6
Impacts of minimum wage on employment and productivity

	Model 1	Model 2
Dependent variable	Emp_num	Lab_prd
Independent variables		
Comp_wage	19.76 (90.58**)	58.02 (315.37**)
Controlled variables		
Firmage	0.93 (33.42**)	-35.92 (-0.93)
Size	70.17 (274.71**)	136685.7 (43.59**)
Cap_int	23.76 (25.36**)	-80133.75 (-8.51**)
R-squared	0.91	0.66
Adj R-squared	0.86	0.50

Note: n = 280,091; *p<0.05; **p<0.01.

38

TABLE 7

Testing the mediating effect of employment

	Step 1	Step 2	Step 3
Dependent variable	Exp	Emp_num	Exp
Independent variables			
Comp_wage	888.56 (33.56**)	19.76 (90.58**)	3.34 (2.23*)
Controlled variables			
Emp_num			3442.18 (85.98**)
R-squared	0.80	0.91	0.80
Adj R-squared	0.70	0.87	0.70

Note: n = 280,091; *p<0.05; **p<0.01.