Strengthening worker benefits or destroying jobs: Effect of the 2008 Labor Contract Law in China

Chih-Hai Yang [1]

National Central University, Taiwan

ARTICLE INFO

ABSTRACT

This study examines the effect of strict enforcement of the 2008 Labor Contract Law (LCL) on firm employment in China. Although the LCL caused a substantial increase in labor cost, there are no negative repercussions on employment. By contrast, surviving firms continue to increase employment driven by the strong labor demand of the fast-growing Chinese economy. However, compared with non-exposed firms, exposed firms suffered negative repercussions on employment after the enforcement of LCL. Exposed firms exhibited reduced wages after the LCL relative to non-exposed firms, suggesting that wage has a mediation effect on reducing the insurance expenditures of both employers and employees; they also raised productivity considerably after the LCL to absorb the incremental labor costs and survive in the market. However, there are heterogeneous effects of wage and productivity among firms of various ownerships and exporting behaviors.

1. Introduction

Apart from the minimum wage (MW) regulation that increases workers' income and assists workers in receiving an adequate living wage, the welfare package (mainly social insurance) is also crucial for workers. The provision of social insurance promotes labor rights and reduces the potential burden on workers when they become unemployed, require medical treatment, or reach retirement age. Employers must bear a certain proportion of the premium payment based on the individual worker's wage to provide employees social insurance. The increased labor cost could be substantial, thereby lowering employment demand. However, adequate risk protection may boost labor productivity to mitigate the cost disadvantage.

In 2008, China enacted the Labor Contract Law (LCL), which requires employers to provide five types of insurance and places restrictions on dismissing employees by signing a labor contract (Zheng, 2009). Although the employer contributions to five insurances vary slightly across provinces, particularly endowment insurance, the additional mandatory employer-provided benefits reach at least 30% of wages (Giles et al., 2013). Since 2003, the fast-growing industrial sector has experienced an accelerated increase in real wages, even during slack seasons, heralding the arrival of a labor shortage from a period of labor

surplus (Zhang et al., 2011). Because the 2008 LCL regulates the provision of wage-based benefits for all workers, employers must bear the considerable additional expenditure for social insurance contributions, affecting firms' employment behavior.

As depicted in Fig. 1, the average annual wage of workers in the manufacturing sector increased from RMB 8750 in 2000 to RMB 24,408 in 2008, representing a 13.53% annual growth rate. The average wage increased further to RMB 46,431 in 2013, reaching a slightly higher growth rate (of 14.03%) than in the 2008–2013 period. The cost of insurance provision, which accounts for at least 30% of the total wage bill, significantly contributes to the increased labor cost. However, Fig. 1 shows an increasing trend in industrial employment from 2000 to 2013, implying that the LCL's implementation appears to have no effect on employment.

In general, stricter labor regulations impede employment, resulting in higher unemployment (Botero et al., 2004; Feldmann, 2009), at least in the formal sector (Nataraj et al., 2014).[2] Yaniv (2006) emphasizes that the employment effect of labor regulations depends on adequate enforcement to induce compliance. The 2008 LCL enforced the employer provision on social insurance, regulated contract termination, and other provisions. It strictly monitored scheme implementation and imposed penalties for noncompliance. According to the Organization for
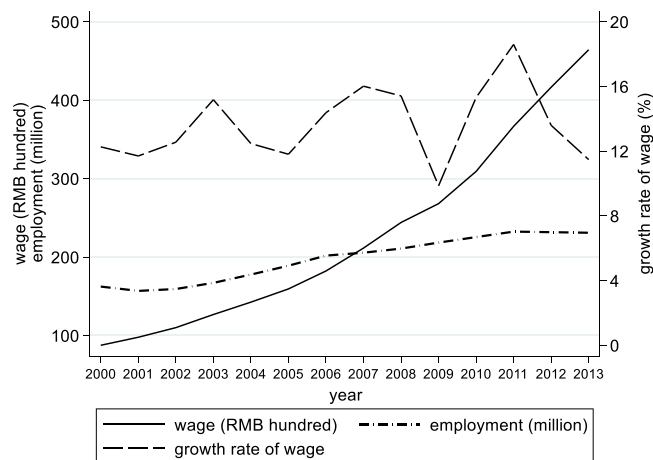

Fig. 1. Average and growth of wages in the manufacturing sector in China, 2000–2013.
Source: China Statistical Yearbook, various issues.

Economic Cooperation and Development's (OECD) definition of the strictness of Employment Protection Legislation (EPL), China's LCL is stricter than most OECD countries (Park et al. 2012). Thus, this regulation has a greater and more direct impact on employment than MW reform, which is based on the Kaitz index, the ratio of the MW to the average wage.[3] If labor regulations cause unemployment, their conception of strengthening worker rights and benefits would come at the expense of unemployment. Therefore, examining the employment effect of labor regulations is critical that inspires the primary concern of this study: whether and how the stringent labor regulation, LCL, influences firm employment in China? The new law's exogenous nature provided the setting for a quasi-natural experiment.

Although the LCL has significant employment effect, studies are scarce and unresolved issues remain. For instance, Park et al. (2012) use manufacturing firms in 2009 to analyze the impact of the 2008 LCL on the employment of production workers. Because the LCL was laxly enforced in 2009 before becoming strictly enforced in late 2010 (Qian et al., 2014), the analysis cannot identify this employment impact during this sample period. Ma and Cheng (2020) examined the issue by conducting a small sample of firm surveys in two provinces from 2014 to 2016, excluding the pre-reform period, and assessing the treatment effect of the LCL. The present study examines how the strict enforcement of the LCL influences employment in Chinese firms using nationwide representative firm-level data from 2005 to 2007 and 2011–2013. In particular, whether firms were subject to this LCL regulation in the pre-LCL periods is taken into account, because competitive firms can decide whether to comply with labor regulations in the absence of a strictly enforced law (Yaniv, 2006). Therefore, the LCL regulation is important for "exposed" firms rather than "non-exposed" firms.

The LCL might execute heterogeneous employment effects across firms with distinct characteristics. In China, ownership and exporting are two key dimensions that distinguish firm behavior and performance. Even though China's economy has shifted from a socialist to a market-based system, state-owned enterprises (SOEs) continue to play a key role in the manufacturing sector. SOEs generally shoulder some social objectives and retain socialistic thinking; they tend to comply with the labor market regulations, despite increased costs due to soft budget constraints (Dong and Putterman, 2003). Most foreign-invested enterprises (FIEs) in China originate from East Asian countries, Europe, and

the US, and they have superior technologies and management knowledge. They are thought to be more capable of bearing the incremental labor costs caused by the LCL and are more likely to respond to institutional pressure in the host country, thereby mitigating the unexpected difficulties from the local bureaucratic administration.

In the 2000 s, export expansion was a key strategy for promoting economic growth in China. For example, commodity exports accounted for 24.51% of industrial output in 2006 and 28.87% in 2010. Encouraged by the policy measure, many low-productivity firms participate in the global production chain and enter the international market through processing export (Yu, 2015), which requires more labor-intensive production. Therefore, the wage elasticity of labor demand in exporters may be higher, implying that incremental labor costs are more relevant to exporters. Gan et al. (2016) also found that rising labor costs negatively correlate with firm exports, with a non-negligible decrease in both export decision and value in the 2000 s. The present study aims to investigate whether the employment effect of the 2008 LCL varies between exporters and non-exporters.

Although the LCL regulation may harm employment, this impact may be mitigated through wage negotiation between employers and employees. Under the LCL rule, workers must contribute co-payments that account for more than 10% of their total wages, resulting in a lower net salary. This may encourage vulnerable groups (youth and low-skilled labor) to bargain with their employers for a package that includes "a lower nominal wage plus bonus," which benefits both parties. Moreover, firms generally strive to increase productivity to cope with labor cost shocks and survive in a difficult business environment (Mayeris et al., 2018). These endogenous wage and productivity mitigation effects are also evaluated to obtain robust results.

The study analyzes how the implementation of the 2008 LCL affects firm employment in China from a legal and economic standpoint, and it adds to the literature in several ways. First, the policy in question is relevant not only to other developing or low-income economies, but also to reforms and trade-offs central to the early evolution of welfare states in high-income countries. Second, it examines the employment impact of a more holistic labor market regulation than the MW regulation, allowing for a better understanding of the policy impact of non-wage labor regulation on a labor market. Third, we explore the possible heterogeneous effects of the LCL across firms based on ownership and exporting status. Fourth, the accompanying mediation effects of wages and productivity promotion under strict labor regulations are analyzed. Results are then obtained using a difference-in-differences (DID) approach, based on large firm-level panel data, to demonstrate the effects of implementing the 2008 LCL.

The remainder of this paper is organized as follows: Section 2 briefly describes the 2008 LCL and provides some information on employer-provided social insurance in the years preceding 2008. A review of the related literature is also provided in this section. Section 3 introduces the firm-level panel dataset and empirical strategy used in this study. Section 4 summarizes and discusses the estimation results. Section 5 describes additional analyses and robustness checks. Finally, Section 6 concludes this paper.

2. Labor Contract Law of 2008 and stylized facts

This section provides a brief overview of the 2008 LCL. We then present some descriptive statistics on firm spending on social insurance in the years preceding the 2008 LCL.

2.1. Brief introduction of the 2008 LCL in China

China implemented the first national MW regulation in 1993, and it was incorporated into China's first Labor Law, promulgated in 1994 and enacted in 1995 (Lin and Yun, 2016). One noteworthy point is that the Labor Law defines both the MW and employment conditions regarding insurance and benefits. Employers are required to provide social

---

[3] In China, the Kaitz index was 0.25–0.38 in the 1990 s (Li and Ma, 2015) and 0.33 in 2013 (Broecke et al., 2017). These numbers suggest that implementing the MW regulations is important for minority of workers who are paid a wage lower than the MW standard.

insurance; however, the government did not coerce firms to follow these rules. In the early 2000 s, the main policy goal was to achieve high economic growth, hinged on abundant and low-cost labor. The rapidly expanding private sector employs a large number of migrant laborers at a low-cost to eliminate inefficiencies in SOEs (Zheng, 2009). Workers (particularly rural migrants) were less aware of their labor rights and had asymmetric bargaining power with employers. Adding high costs may slow firms' growth; therefore, most firms provide only a small amount of social insurance to workers or none at all, necessitating the legislation of the LCL in 2008.

Following China's admission to the World Trade Organization in 2001, the authorities implemented labor-related reforms. One significant measure was to promulgate the new "Minimum Wage Regulations" in 2004, which extended coverage to most firms and significantly increased the penalty for violators (Mayneris et al., 2018). In the 2000 s, the fast-growing industrial sector began to experience workforce shortages in coastal regions. Sweatshops were also brought up, and workers and the general public became concerned about the unfavorable working conditions and wage levels, which resulted in large-scale labor protests and strikes. This development called for further revisions to labor policies (Chan, 2012). Following the revision of the Labor Law in 2006 and 2007, the Chinese government implemented the LCL on January 1, 2008.

Although the holistic benefits of LCL aim to improve worker welfare and lower faced risks, Cheung (2008a, 2008b, 2009) raised a series of comments and questioned the necessity and feasibility of the LCL, arguing that labor contracts are no longer free and stringent labor regulations may impede the relationship between firms and the market. Under the framework of the LCL, employers must follow stringent guidelines of recruiting rules determined by the government; all modified rules are highly favorable to workers (Cheung, 2014). That is, the LCL provides timely assistance to employees while also improving labor standards, thus violating a central principle of the market economy (Qian et al., 2014). Because the government was adamant about implementing this new law, the LCL went into effect in 2008.

The LCL regulates labor relations and protects labor rights in a contract system (Zheng, 2009). It contains 8 chapters and 98 articles and offers five significant amendments and additions to the 1994 Labor Law: a) the requirement of a written labor contract; b) contract termination; c) union power; d) notice and record; and e) other provisions. Article 17 of Chapter 2 specifically states that employers are obligated to provide workers with social insurance, which must be clearly written in the labor contract. These social insurance programs are part of the so-called "five types of insurance," which are wage-based payments made by both employers and employees. These insurances include endowment, medical, unemployment, workplace injury, and maternity insurances. These five insurances are legally required provisions for employers, but employees must also make co-payments. Such social insurance coverage protects workers from the risk of poverty in old age, healthcare expenditure, financial needs resulting from unemployment, unexpected work injury, and a birth allowance.[4]

Considering the differences in economic development levels across provinces, the ratios of employer contributions and worker co-payments are the same in most provinces, although they vary slightly across provinces and over time. For instance, enterprises were obligated to pay 20% of the wage bill for endowment insurance (the largest payment of five insurance) with an 8% co-payment by workers in most provinces, particularly coastal regions, in 2011. However, the corresponding employer contribution to endowment insurance was 16% in Chengdu, an inland city. Moreover, this ratio was increased to 22% for Shanghai and Dongguan (a city in Guangdong province) enterprises in 2014. Several studies have summarized the ratios of employer contribution

and employee co-payment of individual insurance (*e.g.*, Chen and Funke, 2009; Giles et al., 2013; Ma and Cheng, 2020). Because the ratios summarized in the preceding studies vary slightly, we display their average ratios in Table 1.

As shown in Table 1, firms must bear higher labor costs, amounting to 33% of the total salary.[5] According to Giles et al. (2013), employers must contribute roughly 30% of wages to comply with the LCL. Meanwhile, Chen and Funke (2009) estimate this to be 44% of firms' non-wage costs. Ma and Cheng (2020) also estimate that firms paid 43% of the total social insurance contribution ratio in 2015. Since the mid-2000 s, employer contribution has increased in tandem with the nominal wage, potentially undermining the comparative advantage of a low-cost workforce. The availability of non-wage benefits is contingent on effective law enforcement. Thus, the LCL also requires local governments to monitor its implementation (Chapter 6) and imposes severe penalties for failing to provide the required social insurance benefits (Chapter 7).

After the LCL was implemented, almost all workers knew their right to enter into a labor contract with their employers (Gallagher et al., 2015). In a 2009 firm survey conducted by the People's Bank, approximately 96% of respondents believed that enforcement was strict. In 2010, the percentage of large-scale enterprises that signed labor contracts reached 94% (Qian et al., 2014). Correspondingly, local governments implement monitoring activities to ensure that written employment contracts are enforced. The signing rates of written contracts vary across regions and industries (Li and Yang, 2021; Li et al., 2021), influencing the actual increase in labor costs borne by firms. According to China's 2012 Statistical Yearbook of Human Resource and Social Security, 88.2% of *all* business employees have a written employment contract; employees without a written employment contract are self-employed or work in micro-business. Therefore, the LCL was effectively implemented as a binding labor policy reform, at least for non-micro enterprises (Gallagher et al., 2015).

2.2. Stylized fact

We present preliminary statistics on firms' social insurance provision using China's Annual Survey of Industrial Firms (ASIF) from 2005 to 2007. This helps us understand the extent to which firms implemented voluntary worker benefit policies prior to the mandatory legislation of the 2008 LCL.

Panel A of Table 2 shows that among industrial firms, firms with positive social insurance expenditure accounted for 62.35–64.37% in 2005–2007. This means that prior to the 2008 LCL, approximately 36% of firms did not contribute to their employees' social insurance. The average spending increased slightly from RMB 663.603 thousand in 2005 to RMB 700.661 thousand in 2007, implying a low provision rate

Table 1

Employer contribution and worker co-payment of various insurances.

	Employer contribution (%)	Worker co-payment (%)
Insurance		
Endowment insurance	20%	8%
Medical insurance	9%	2%
Unemployment insurance	2%	1%
Employment injury insurance	1.2%	0%
Maternity insurance	0.8%	0%
Total	33%	11%

Note: Summarizing previous studies by the author.

---

[4] A housing provident fund also exists, although the initiation of this fund is not compulsory.

[5] Apart from the social insurance costs, employers are also burdened with other costs. See Chen and Funke (2009) for a detailed discussion.

Table 2
Social Insurance Provision in Firms, 2005–2007.

	2005	2006	2007
All firms			
Number of firms	267,258	296,536	331,914
Firms with positive provision to total firms ratio	64.26%	62.35%	64.37%
Contribution on insurance and fund	663.603	688.797	700.661
Contribution to wage ratio	9.07%	8.62%	8.52%
Ownership			
SOEs (Number of firms)	80,809	80,667	81,590
Firms with positive provision to total firms ratio	67.07%	66.27%	66.81%
Contribution on insurance and fund	1370.064	1496.541	1542.261
Contribution to wage ratio	12.84%	12.25%	11.40%
Private firms (Number of firms)	130,512	155,739	183,604
Firms with positive provision to total firms ratio	55.24%	53.59%	57.02%
Contribution on insurance and fund	237.651	248.566	275.789
Contribution to wage ratio	6.55%	6.39%	6.90%
FIEs (Number of firms)	55,937	60,130	66,720
Firms with positive provision to total firms ratio	81.26%	79.79%	81.63%
Contribution on insurance and fund	636.849	745.386	840.682
Contribution to wage ratio	9.53%	9.54%	9.47%
Exporting			
Exporters (Number of firms)	75,064	78,668	78,544
Firms with positive provision to total firms ratio	75.78%	75.04%	82.95%
Contribution on insurance and fund	1177.252	1320.909	1508.145
Contribution to wage ratio	8.83%	8.83%	9.39%
Non-exporters (Number of firms)	192,194	217,868	253,370
Firms with positive provision to total firms ratio	59.76%	57.77%	58.61%
Contribution on insurance and fund	462.990	460.553	450.343
Contribution to wage ratio	9.17%	8.55%	8.25%

Note: The unit of contribution on insurance and fund is RMB thousand. Firms with positive export value are classified into exporters.

Fig. 2. The Distribution of the Employer Provision to Wage Ratio, 2006. Source: Calculated by the author using the data of 2006 Annual Survey of Industrial Firms (ASIF).

30% or 35% of wages were 7.08% and 4.90%, respectively. This reveals that approximately 94% of firms do not comply with the 2008 LCL rules.

3. Data and identification strategy

3.1. Data source

Firm-level panel data covering the years before and after 2008 are required to examine the impact of the 2008 LCL on employment. The primary data source is the ASIF, a national representative dataset widely used in the literature (Brandt et al., 2014). China's National Bureau of Statistics conducts this annual survey, which includes data for all SOEs and non-SOEs with sales exceeding a certain threshold. The ASIF surveys are divided into three parts: basic information, financial activities, and production data. Firms also report their ownership types and exports, enabling us to categorize firms into three ownership types (SOEs, FIEs, and private firms) and two groups (exporters and non-exporters).[6] Although the level of LCL enforcement may vary across regions, making the law less binding on firms, this issue should be minor in this dataset. As previously stated, 88.2% of *all* business employees have signed labor contracts, whereas employees without a written labor contract primarily work in micro-business, implying that the LCL is less relevant to micro-firms.[7] The ASIF includes firms classified as "above-scale" (non-micro-firms), which account for 71.7–73.6% of industrial employment (Brandt et al., 2014). The vast majority of employees almost certainly have a written employment contract.

To ensure adequate sampling, we stress two notable points. First, the 2008 global economic crisis impacted China, exacerbating concerns about high labor costs, which relaxed enforcement of the 2008 LCL to assist firms during a crisis (Gallagher et al., 2015). The confounding event of the global financial crisis had significant effects on firms, but it did not last long.[8] Qian et al. (2014) found that the LCL became more binding in the late 2010. Thus, we used panel data from 2005 to 2007 and 2011–2013. Another important reason for using this period was that information on employer-provided insurance had been unavailable since 2009. Second, firms surveyed in the ASIF fall into the
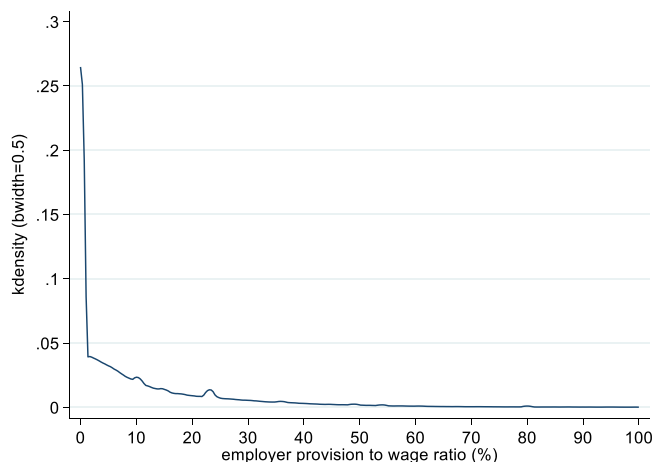
of approximately 9% of employee wage bill (having decreasing slightly).

The patterns of ownership impact the employer's provision of social insurance. Panel B demonstrates that FIEs had the highest ratio (80%) of firms with a positive provision to the total number of firms, followed by SOEs (about 67%), and private firms (about 55%. In terms of expenditure and its ratio to wages, SOEs spend the most on insurance provision, accounting for about 12% of wages, followed by FIEs with a ratio of approximately 9.5%; the corresponding ratio for private firms is lower than 7%. FIEs are more likely to follow Chinese regulations and have sufficient financial resources to provide a better welfare package for employees. Because of soft budget constraints, SOEs can focus on social objectives, resulting in higher spending on social insurance and a higher spending-to-wages ratio.

Because exporting is a major driver of economic growth in China, we categorize firms into exporters and non-exporters to examine potential differences in the behavior of social insurance provisions. We noted that exporters had a higher proportion of firms reporting positive social insurance expenditure, increasing from 75.86% in 2005 to 82.95% in 2007, when compared to non-exporter counterparts (57.77–59.76%). Exporters' contribution to the wage ratio increases, whereas non-exporters' contribution decreases.

Table 2 shows that the average ratio in the years preceding the LCL was only 9%, implying that the 2008 LCL was less binding for most firms. Fig. 2 depicts the distribution of the firms' contribution to the wage ratio.

As illustrated in Fig. 2, the distribution is extremely right-skewed, indicating that most firms contribute only a minor insurance provision relative to wages. In contrast, only a minority of firms provide adequate insurance coverage under the lax standard of the 2008 LCL (30%). Among firms with positive insurance provision (62.35% of the total firms in 2006), the ratios of firms with insurance provision exceeding

---

[6] Firms with more than 50% of equity shares owned by government (foreign inventors) are classified as SOEs (FIEs). Exporters denote firms with a positive export value.

[7] Micro firms tend to negotiate wages with employees directly without signing labor contracts.

[8] China's economic growth rate returned to two digits (10.63%) in 2010 from 9.40% in 2009. The export growth also started to rebound in 2010.

"above-scale" category, with the designated scale increasing from RMB 5 million to RMB 20 million in 2011. It is possible to use RMB 20 million criteria to categorize sampling firms prior to 2011, but this strategy results in a significant loss of samples from 2005 to 2007. To obtain a larger sample size, we included firm observations from 2005 to 2007 and 2011–2013. Then, to obtain the sample used in this study, we deleted observations with an unreasonable value (*e.g.*, zero or negative values for employment, fixed capital, and output; negative values for exports and insurance expenditure).

3.2. Identification strategy

Some firms had a high contribution ratio that exceeded the LCL regulation in previous years, as shown in Table 2. This indicates that the reform is not a binding policy for all firms, but rather a "treatment effect" for some firms. Our primary focus is on examining the effect of the 2008 LCL on employment, particularly firms that provide insurance coverage that is less than what is required by the LCL. In other words, we compare the relative employment effects of the "treated" and "non-treated" firms before and after the 2008 LCL. The DID approach serves as an appropriate method. The empirical model is specified as follows by dividing the sample into two groups, namely "exposed" and "non-exposed" to the restrictive wage-based cost regulation:

$$\ln emp_{ijpt} = \alpha_1 LCL_t + \alpha_2 Exposed_{it} + \alpha_3 Exposed_{it}$$
$$\times LCL_t + \gamma X_{i,t-1} + v_j + \omega_p + \sigma_t + \varepsilon_{ijpt} \qquad (1)$$

where the outcome variable emp_{ijpt} is employment of firm i in sector j in province p at year t. LCL is a dummy for observation in the post-reform period. *Exposed* is a dummy for firms with an insurance provision ratio lower than that required in the LCL prior to 2008 is exposed. The employment effects within the exposed and non-exposed groups are $\alpha_1 + \alpha_3$ and α_1, respectively. The coefficient α_3 is the main concern in this approach. It compares the employment gap between exposed and non-exposed firms in the post-LCL period to the gap in the pre-LCL period. X is a vector of firm characteristics that influence employee recruitment, primarily sales (the logarithm of sales), capital intensity (the logarithm of fixed capital–labor ratio), productivity (Solow residual productivity), profit-to-output ratio, exporter dummy, and SOE and FIE ownership dummies. As highlighted by Mayeris et al. (2018), time-variant firm characteristics enter the equation in the one-year lagged form to mitigate the endogeneity issue that some characteristics may help determine the firms' subsequent performance. Terms v, ω, and σ denote the vector of industry, province, and year-fixed effects, respectively, which capture any time-invariant and macroeconomic shocks influencing employment. Finally, ε is the error term.

Some noteworthy points should be discussed and clarified concerning the key variable of interest, *Exposed* (*Non-exposed*). Unlike the MW regulation, which has a distinct threshold value, the LCL regulation does not have a distinct ratio of employers' provision contribution. Thus, it is critical to adequately define the *Exposed* variable. This study employs various measures for the "exposed" variable based on the sum of the statutory insurance provision to total salary ratios. Extant studies, for example, Chen and Funke (2009), Giles et al. (2013), and Ma and Cheng (2020), estimate this ratio to be 30% at least and probably reaches higher than 40%. Therefore, if firms have an insurance provision to wage ratio of less than 35%, the "Exposed" variable can be defined as a dummy variable equaling 1. We also define "lax" and "strict" measures when this ratio is less than 30% and 40%, respectively. Table 3 summarizes the variable definitions and basic statistics.

4. Results and discussion

4.1. Effect of insurance provision on employment

Before analyzing the impact of the LCL on the exposed firms'

Table 3
Variable Definitions and Basic Statistics.

Variable	Definition	Mean (S.D)
emp	the number of employees	404.694 (1572.651)
exposed	dummy: 1 = firms exposed to the 2008 LCL, 0 =otherwise (>35%)	0.944 (0.229)
sales	firms' sales (RMB million)	265.577 (2207.413)
capital intensity	Measured by the fixed capital to labor ratio (RMB thousand/employee)	419.073 (34193.701)
productivity	Solow-residual TFP	5.018 (0.885)
profitr	Profit to sales ratio	0.053 (2.150)
foreign ownership.	Foreign ownership dummy: 1 =FIEs, 0 =otherwise	0.234 (0.423)
state owned	State-owned enterprises dummy: 1 =SOEs, 0 =otherwise	0.281 (0.449)
exporter	Exporter dummy: 1 =exporters, 0 =non-exporters	0.288 (0.453)
wage	annual wage bill (RMB million)	14.078 (127.623)

Note: The basic statistics of exposed is calculated using the 2005–2007 data, other variables are calculated based on the full sample period.

employment, we first examine whether the insurance provision matters to employment in the pre-LCL period, 2005–2007. Table 4 shows the results from the estimation of Eq. (1) without *LCL* variable and its interaction term with *Exposed*. As the key variable *Exposed* is invariant within the short period, its estimate will be dropped in the fixed effect (FE) model. Thus, we adopt the random effect (RE) of panel data model to implement estimations.[9]

We obtain a positive and significant coefficient on *Exposed* variable after controlling for initial firm characteristics in columns (1) – (3) which use different criteria to identify the "exposed" firms. This suggests that when all other factors are equal, the exposed firms hire more workers than their non-exposed counterparts in the pre-LCL period. In terms of column (1), the average employment gap between the exposed and non-exposed firms is 1.41% (= $e^{0.014}$-1). This gap rises to 1.61% (= $e^{0.016}$-1) between the highly exposed and the non-exposed firms using a strict threshold 40%, as shown in column (3). Before the strict enforcement of the LCL, the costly insurance provision is not compulsory. A majority of exposed firms can recruit more workers at a lower (or without) insurance cost on the one hand. On the other hand, the abundant workforce of rural migrants might be less aware of labor rights and have less bargaining power with regard to wages; they thus accept job offers without any social insurance coverage or with a relatively lower insurance provision.[10]

When segmenting firms by ownership, the employment gap between the exposed and non-exposed firms was only significant in private firms (4.08%). The exposed private firms can save insurance provision and hire more workers than their non-exposed counterparts, *ceteris paribus*. In contrast, SOEs and FIEs tend to comply with the regulation, thereby resulting in a smaller gap. As for the influence of exporting activity, it demonstrates a larger and significant employment gap in non-exporters (2.74%). China's exports concentrated on labor-intensive products and processing exports in the mid-2000 s. Exporters require low-cost workers for mass production so that they can earn a small profit margin in the global value chain. However, they, which are composed of

---

[9] The estimates on firm characteristic variables in all estimations are shown on the on-line appendix.
[10] Estimates on other covariates show that firms with more sales or higher productivity associate with more employment, whereas capital intensity and profit are negatively related to employment. Moreover, SOEs and FIEs exhibit more employment than their private firm counterparts; exporters hire more workers than non-exporters, *ceteris paribus*. These results are similar in almost all estimations of this study.

Table 4

Employment Gap between Exposed and Non-exposed Firms in the pre-LCL Period, 2005–2007.

Dep. var. = employment sample	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All RE	All RE	All RE	SOEs RE	Private RE	FIE RE	Exporter RE	Non-exporter RE
Exposed (35%)	0.014***	0.014***	0.016***	− 0.005	0.040***	− 0.002	− 0.009	0.027***
Exposed (30%)	(0.003)	(0.003)		(0.005)	(0.004)	(0.007)	(0.006)	(0.004)
Exposed (40%)			(0.003)					
Firm characteristics (−1)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-square	0.838	0.838	0.838	0.855	0.779	0.845	0.873	0.796
Observations	252,727	252,727	252,727	73,645	117,924	61,158	77,804	174,923

Note: Figures in parentheses are firm-clustered standard errors. *** $p < 0.01$. Firm characteristics include sales (the logarithm of sales), capital intensity (the logarithm of fixed capital–labor ratio), productivity (Solow residual productivity), profit-to-output ratio, exporter dummy, and SOE and FIE ownership dummies. There are 37 two-digit industry and 29 province dummies, respectively.

a large proportion of FIEs, are generally required to comply with the regulations regarding labor rights and working conditions by international outsourcing firms. Therefore, insurance provision is less relevant to their employment.

The above analysis highlights the importance of "exposed" on employment in the pre-LCL period that there is a positive relationship between employment and the lack of insurance provision. Specifically, the positive nexus was mainly driven by private firms and non-exporters. One point worth noting is that insurance provision was not mandatory before the 2008 LCL, so firms might self-select to not comply with the regulation regarding insurance provision. The above findings and interpretations only demonstrate descriptive facts in the pre-LCL era rather than causal relations.

4.2. Enforcement of LCL and employment

The implementation of the LCL enforces the exposed firms to comply with the strict rule from 2011 onward, forcing them to bear a considerable increase in non-wage costs. Table 5 shows the estimation results

Table 5

LCL and Employment.

Dep. var. = employment	(1)	(2)	(3)	(4)
	FE	RE	RE	RE
LCL	0.347***	0.137***	0.124***	0.150***
	(0.004)	(0.003)	(0.003)	(0.004)
Exposed (35%)	dropped	0.034***		
		(0.003)		
Exposed (30%)			0.024***	
			(0.003)	
Exposed (40%)				0.045***
				(0.003)
Exposed*LCL	− 0.122***	− 0.096***	− 0.080***	− 0.111***
	(0.004)			
Firm characteristics (−1)	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R-square	0.356	0.674	0.673	0.674
Observations	705,631	705,631	705,631	705,631

Note: Figures in parentheses are firm-clustered standard errors. *** $p < 0.01$. Firm characteristics include sales (the logarithm of sales), capital intensity (the logarithm of fixed capital–labor ratio), productivity (Solow residual productivity), profit-to-output ratio, exporter dummy, and SOE and FIE ownership dummies. There are 37 two-digit industry and 29 province dummies, respectively. On column (1), most province dummies cannot be estimated and are dropped. There are 37 two-digit industry and 29 province dummies, respectively.

of Eq. (1) using the entire sample that contains the years before and after 2008.[11] The estimates are mainly obtained using the RE of panel data model for the following reasons. First, the effects of time-invariant or rarely changed variables will be absorbed by the individual fixed effect in the FE model, whereas the RE model can give the estimates of time-invariant variables' coefficients. The exposed-related variable, *Exposed*, is almost time invariant that should be reported and discussed in this study. Second, though the correlated random effect and hybrid models can provide both between and within estimates, their main drawback is handing the interaction term (Schunck, 2013), particularly the interaction term between two time-invariant or rarely changed variables, such as the *Exposed×LCL* in this study. Third, through Monte-Carlo simulations, Bell and Jones (2015) claim the RE model being adequate for panel with time-invariant variables because it can provide that FE promises.

As displayed in column (1), the estimate of *Exposed* is dropped in the FE model. The FE model also achieves a much lower *R*-square than that of the RE model in column (2), suggesting that other time-invariant (rarely changed) variables are relevant to employment, *e.g.*, industry and regions. These baseline models in columns (2) – (4) demonstrate several notable findings. First, the positive coefficient on the *LCL* variable in columns (2) – (4) indicates that, all else being equal, firms tend to hire more workers after the LCL, even though its enforcement raised firms' labor costs. Based on estimates in column (2), the corresponding increase in employment of exposed and non-exposed firms are 4.19% ($\alpha_1 + \alpha_3$) and 14.68%, respectively. If the threshold is assumed to be lax (strict), the employment effect is smaller (larger), as displayed in column (3) [column (4)]. This finding echoes Chen and Funke (2009) conjecture that the LCL may only have a small impact upon employment in the fast-growing Chinese economy, while it seems to refute the argument in Cheung (2009).

Second and crucially, the interaction between the exposed dummy and the LCL dummy is significantly negative, implying a significant additional dis-employment effect on the exposed firms after the LCL being strictly enforced. To cope with the hike in non-wage costs from 2011 onwards, despite the exposed firms continue to hire more workers, they reacted by hiring relatively fewer workers on average than the non-exposed firms. The estimated magnitude of decreased employment is 10.04% in column (2). In the pre-LCL period, exposed firms hire more workers than non-exposed firm due to the advantage of saving insurance provision, *ceteris paribus*. The substantial increase of insurance provision

---

[11] The ASIF does not allow us to clearly identify the mobility of firms. A firm appears in year t but disappears in year t + 1 is probably attributed to the reduced sale which is below the surveyed threshold rather than exits the market. Using only surviving firms to estimate the DID could introduce selection bias in the results.

for *all* employees, enforcing them to experience a much smaller employment growth than their non-exposed counterparts.

Although the total employment effect is positive, one cannot infer an employment effect brought by the LCL. The increase in employment is probably driven by the fast-growing of China's manufacturing sector that serves the global manufacturing center. From the policy perspective, the LCL was enacted at an adequate timing in the process of economic development. Thus, it strengthened worker well-being without destroying jobs.

4.3. Robustness checks

The analysis above indicates a dis-employment effect of the LCL on the exposed firms, relative to their non-exposed counterparts. Identification based on DID relies on a key underlying assumption, the parallel trends assumption, that the control and treatment groups share a similar time trend prior to the policy shock, after controlling for observable features. To test whether this assumption holds, we conduct a DID event study by using the 2007 as the base year and plot the yearly policy effects in Fig. 3.

As depicted in Fig. 3, the estimation values of yearly effect for 2005 and 2006 are negative and close to zero, while the 95% confidence intervals failed to cover zero in 2006. These results provide weak support for the DID assumption and validate the DID approach used in this analysis.[12] Crucially, we find the estimates of years 2011–2013 are significantly negative which are consistent with the baseline regression in column (2) of Table 5.

To obtain reliable results, we also conduct robustness checks by dealing with three issues and present estimation results in Table 6. The first issue is the specification error. The above analyses use 35% as the cutoff of insurance provision to classify exposed and non-exposed firms, as well as use the 30% and 40% cutoff as a lax and a strict measure, respectively. However, firms whose insurance provisions are around the same cutoff may receive a similar impact by the LCL, no matter the cutoff value. To reduce potential specification errors, we exclude firms whose insurance provision was between 30% and 40% before LCL and classify firms above 40% (below 30%) as non-exposed (exposed). Estimations in column (1) show that, after circumventing the specification error, both estimates on *LCL* and *Exposed* continue to be significantly positive. Crucially, the interaction term associates is negative and
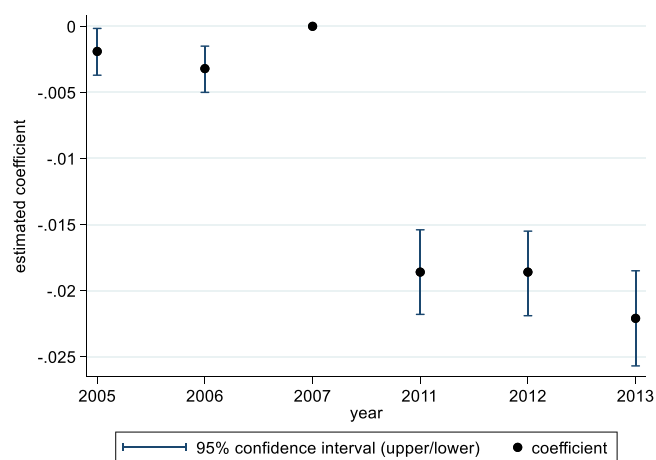

Fig. 3. Trends of Employment in the Pre-LCL Periods.

significant, reaffirming the above finding that there is dis-employment effect caused by the LCL enforcement on the exposed firms.

The second one is the sampling issue. As the surveyed threshold increased from 5 million RMB to 20 million since 2011, we drop observations with sales less than 20 million RMB and then report the estimation result in column (2). We also use firms with at least 4 periods that contain observations in both the pre- and post-LCL periods to conduct estimations and display the result in column (3). Dealing with the sampling issue, estimates in columns (2) and (3) show that *LCL*, *Exposed*, and *Exposed*LCL* continue to associate with a significant coefficient, but the economic magnitude in column (2) is smaller than that in column (2) of Table 5, implying that the dis-employment effect of exposed firms is smaller for large firms.

The third issue is the sample selection bias. Firms may endogenously choose whether to comply with the rules of the insurance provisions, implying that firms are not randomly distributed. In other words, firms complying with insurance provision exhibit considerable differences in firm characteristics compared with their non-complying counterparts. These confounding factors may prevent the estimated employment effect of the LCL from being effective. To mitigate the sample selection issue, we use the approach of propensity score matching DID (PSM-DID) to conduct a robustness check.[13] In the estimation process of PSM-DID, the first-stage logit model of PSM is relating *Exposed* dummy to all the one-year lagged firm characteristics and other dummies, as discussed in Eq. (1). As depicted in Fig. 4, the standardized bias of most variables are significantly reduced, suggesting that the matching procedure is effective. The estimates of PSM-DID are shown in columns (4) – (6) which are similar to those in columns (2) – (4) of Table 5 with a small change in the economic magnitude of employment effects. The above robustness checks suggest that our results are robust.

In sum, this study finds that the exposed firms tended to hire more workers before the 2008 LCL, *ceteris paribus*, while there was a negative repercussion on employment for them since the strict enforcement of LCL. The implementation of the LCL compels the exposed firms to comply with the strict rule from 2011 onward, leading to a considerable increase in non-wage labor costs. The goal of LCL of raising workers' welfare by providing more social security was achieved, but at the expense of reducing employment in the short run.

4.4. Heterogeneous effects of ownerships and exporting

As indicated in Werner et al. (2005), ownership structure matters to firms' employment and compensation strategy. The above analysis shows that the performance of SOEs, FIEs, and private firms varied considerably in the provision of social insurance before the 2008 LCL, implying that the response to the non-wage labor shock by firms with various types of ownership may exhibit varying patterns. Moreover, there is a widely concern that the LCL may adversely impact export-oriented enterprises due to the rise in production costs and further impact their international competitiveness. Table 7 reports estimation results by ownership and exporting activity.

Drawn from estimates in columns (1) – (3), we find SOE to demonstrate an adverse employment strategy relative to non-SOEs, in response to the introduction of the LCL. In SOEs and private firms, the total employment effect is positive in both exposed and non-exposed groups. Despite the non-exposed FIEs continue to hire more workers, the LCL executes a negative repercussions on employment to exposed FIEs, reaching 3.25%. Specifically, the enforcement of the LCL does not

---

[12] The estimated coefficient for year 2005 is not significant at the 1% statistical level, but the corresponding estimate on year 2006 is significantly negative at the 1% statistical level.

[13] The PSM-DID can mitigate the selection bias, but it may not well tackle the endogeneity problem. Adopting the instrumental variable (IV) approach is a feasible method to deal with the endogeneity problem, while it is difficult to identify an adequate and effective IV. For example, complying with insurance provision is probably relevant to the employer's personality which cannot be quantified precisely.

Table 6
LCL and Employment – Robustness Checks.

Dep. var. = employment	(1) Drop provision ratio between 30%–40%	(2) Sale> =20 million RMB	(3) Time span > =4	(4) PSM-DID	(5) PSM-DID	(6) PSM-DID
LCL	0.150***	0.079***	0.122***	0.137***	0.124***	0.150***
Exposed (35%)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)
Exposed (30%)	0.045***	0.016***	0.027***	0.033***	0.024***	0.045***
Exposed (40%)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Exposed*LCL	− 0.105*** (0.004)	− 0.063*** (0.004)	− 0.096*** (0.004)	− 0.096*** (0.004)	− 0.080*** (0.003)	− 0.111*** (0.004)
Firm characteristics (−1)	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
R-square	0.827	0.644	0.683	0.674	0.673	0.674
Observations	695,782	649,298	693,615	705,631	705,631	705,631

Note: Figures in parentheses are firm-clustered standard errors. *** $p < 0.01$. Firm characteristics include sales (the logarithm of sales), capital intensity (the logarithm of fixed capital–labor ratio), productivity (Solow residual productivity), profit-to-output ratio, exporter dummy, and SOE and FIE ownership dummies. There are 37 two-digit industry and 29 province dummies, respectively.
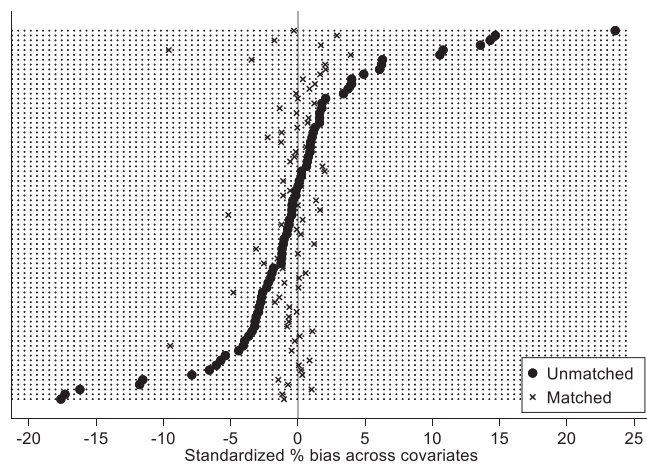

Fig. 4. Matching Quality of PSM.

induces SOEs to exhibit a counter-economic employment response to the LCL. Another possible interpretation is related to the emergence of the "state advances and private retreats" phenomenon after the 2008 financial crisis. An advancing state sector may expand the size of the SOEs in the economy, while it worsens resource allocation within the state sector (Du et al., 2014).[14]

Columns (4) and (5) indicate the possible employment repercussion of the LCL varies between exporters and non-exporters. The insignificant coefficient on the *Exposed* dummy in column (4) indicates that the exposed exporters overall have similar employment to that of the non-exposed exporters. Regarding the total employment effect, the non-exposed exporters perform better in employment pursuant to the enforcement of the LCL that increased 2.53%. In contrast, exposed exporters suffer a dis-employment effect caused by the LCL and demonstrate a total employment effect of − 4.19%. In the non-exporters, the additional dis-employment effect after the LCL is found in exposed firms compared to their non-exposed counterparts, while both exposed and non-exposed firms exhibit a positive and considerable total employment effect. This employment-enhancement effect is probably attributed to

Table 7
LCL and employment: ownerships and exporting activity.

Dep. var. = employment	(1) SOEs	(2) Private	(3) FIEs	(4) Exporters	(5) Non-exporters
LCL	0.019*** (0.002)	0.303*** (0.005)	0.071*** (0.007)	0.025*** (0.006)	0.195*** (0.004)
Exposed (35%)	− 0.053*** (0.006)	0.104*** (0.005)	0.028*** (0.007)	0.002 (0.006)	0.035*** (0.004)
Exposed*LCL	0.079*** (0.008)	− 0.144*** (0.005)	− 0.103*** (0.007)	− 0.066*** (0.007)	− 0.076*** (0.004)
Firm characteristics (−1)	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
R-square	0.678	0.621	0.716	0.729	0.628
Observations	197,625	342,038	165,968	205,713	499,918

Note: Figures in parentheses are firm-clustered standard errors. *** $p < 0.01$. Firm characteristics include sales (the logarithm of sales), capital intensity (the logarithm of fixed capital–labor ratio), productivity (Solow residual productivity), profit-to-output ratio, exporter dummy, and SOE and FIE ownership dummies. There are 37 two-digit industry and 29 province dummies, respectively.

produce a negative impact of employment growth on the exposed SOEs, compared to their non-exposed counterparts. This result contradicts conventional economic assumptions. SOEs have a distinct recruiting strategy, which does not depend on workers' potential performance, and some vacancies hinge on managers' preferences or requests from local (central) government officials. The opacity in recruiting procedures, accompanied by a non-profit-maximization management philosophy,

China's expanding domestic demand polices in late 2000 s, resulting in non-exporters to have a strong labor demand. One notable point is that

---

[14] A large stimulus program that was launched in 2008 also enabled SOEs to better maintain their leverage levels and have better access to both short- and long-term debt than private firms (Johansson and Feng, 2016).

both estimates (absolute value) of the interaction term in columns (4) and (5) are smaller than that in column (1) of Table 5, implying that the parallel assumption could be violated in one or both specifications (Callaway and Sant'Anna, 2021). Based on the estimates of treatment effect on employment for exporters and non-exporters, the average treatment effect will be − 7.57% (weighted by their sample ratios, (−0.066 *0.29) + (−0.076 *0.71) = −0.073).

5. Mediation effects of wages and productivity

5.1. Mediation effect of wages on employment

According to the stipulations of the LCL, employers should enroll workers in the major social insurance programs automatically upon signing the labor contract; the insured workers should contribute part of the premium payment, which accounts for more than 10% of the nominal wage (Giles et al., 2013). Thus, both employers and employees may have incentives to negotiate a compensation package that replaces the high nominal wage by a lower nominal wage plus some allowances. This situation is particularly relevant to certain vulnerable groups such as the youth and low-skilled laborers, because their wage level is lower. To examine this possible mediation effect of wages on reducing the burden of insurance payment, we estimate the following equation.

$$\ln wage_{ijpt} = \alpha_1 LCL_t + \alpha_2 Exposed_i + \alpha_3 Exposed_t \times LCL_t + \beta X_{i,t-1} + v_j + \omega_p + \lambda_t + \varepsilon_{ijpt} \tag{2}$$

where the dependent variable ln$wage_{ijpt}$ is the annual wage bill of firm i in sector j in province p in year t. Firm characteristics included are the same as those in Eq. (1), while the logarithm of sale is replaced by logarithm of number of employees. If this mediation effect exists, the estimated coefficient of the interaction term should be significantly negative. Table 8 presents the estimation results.

Using the entire sample, results in column (1) show a significantly negative coefficient on the interaction term *Exposed*LCL*, indicating that the exposed firms pay lower wages, 2.33%, than their non-exposed counterparts after the LCL was enforced, *ceteris paribus*. This result supports our conjecture that wage plays a mediation effect to soften the pressure of incremental expenditures on social insurances. The LCL enforced the exposed firms to offer insurance provisions to all employees from 2011 onward, inducing them to incur substantial incremental expenditure. A positive total employment effect of the LCL is found in exposed firms (column (2) in Table 5), which implies that exposed firms have tried to reduce workers' nominal wages to save the required non-wage costs.

By separating firms into groups of various ownerships (columns (2)–(4)) and differentiating exporters from non-exporters (columns (5)–(6)), we observe that results are similar to those using the entire sample, while there is heterogeneous effect of wage across firm groups. Several notable findings emerge. Controlling for initial firm characteristics, we find that exposed SOEs and exposed FIEs reduce more expenditure on wages after the reform relative to their non-exposed counterparts, reaching respectively 2.33% and 8.33%; the mediation effect of wages is not significant in private firms. Overall, the average treatment effect is 2.33% for exposed firms. In terms of exporting activity, the mediation effect of wages is witnessed in exposed exporters rather than exposed non-exporters, based on the estimated coefficients on the interaction term in columns (5) and (6).

There are some distinct features in the Chinese manufacturing sector that may matter to the above results. Private firms are smaller (firm scale), in terms of the number of employees, reaching only around half the strength of their SOE and FIE counterparts. They are also more labor intensive, implying a lower wage per worker. Combining all these characteristics, we observe that the total incremental expenditure on insurance provision for compliance with the LCL is smaller for private firms. In combination with a stronger labor demand, the mediation

effect of wages is thus insignificant. Regarding the exports in China, more than 50% of the exporting firms are FIEs, whereas non-exporters comprise a large number of private firms. This composition pattern may result in an insignificant mediation effect of wages among non-exporters. As firm characteristics have been controlled in estimating Eq. (2), the other possible reason is that SOEs and FIEs provide more "other" worker welfare benefits that serve as another type of wage compensation.[15]

5.2. Do exposed firms promote productivity under the LCL?

When suffering the labor cost shock, firms may react to the hike by promoting productivity. Mayeris et al. (2018) have found that surviving firms exposed to the 2004 minimum wage regulation improved their productivity significantly after the 2004 MW reform, allowing them to absorb the cost shock with limited job losses.[16] The analysis in Table 4 shows that the total employment effect of the exposed firms is positive, implying that they may improve productivity considerably. To test this conjecture, we estimate the following equation.

$$tfp_{ijpt} = \alpha_1 LCL_t + \alpha_2 Exposed_i + \alpha_3 Exposed_t \times LCL_t + \beta X_{i,t-1} + v_j + \omega_p + \lambda_t + \varepsilon_{ijpt} \tag{3}$$

The firm outcome *tfp* is the Solow-residual productivity.[17] Firm characteristics are the same as those used in Eq. (2), except one-year lagged productivity. Table 9 presents the estimation results.

Estimates in column (1), obtained using the entire sample, show that the interaction term is associated with a significantly positive coefficient, indicating that the 2008 LCL led the exposed surviving firms to increase productivity relative to non-exposed firms, for coping with the increased non-wage labor costs.[18] The total productivity effect of exposed firms is 3.77% (= $e^{-0.043+0.080}$-1). The result is in accordance with the findings of Mayeris et al. (2018), that Chinese firms improve their productivity to overcome the challenges posed by the 2004 MW reform, if they are not compelled to exit the market. However, it is surprising to find the non-exposed firms to demonstrate a decline in productivity, despite their productivity remains higher than exposed firms, as indicated by the estimated coefficient of *Exposed* dummy.

To unravel the above puzzle, we conduct estimations by separating firms into SOEs, private firms, and FIEs, and show results in columns (2) – (4). Estimates of SOEs and private firms are similar to those of the entire sample. Notably, the decline in productivity of non-exposed firms is mainly attributed to SOEs. Exposed domestic firms (SOEs and private) respond to the impact of the LCL by achieving a larger increase in productivity than their non-exposed counterparts. FIEs demonstrate a various scenario that both exposed and non-exposed firms experience productivity growth, helping them mitigate the labor cost shock brought by the strict enforcement of the LCL. As discussed previously, this

---

[15] In 2007, the average annual welfare expenditures of SOEs and FIEs were, respectively, RMB 888 thousand and RMB 832 thousand, whereas the corresponding number for private firms was RMB 252 thousand. In terms of welfare per worker, private firms also exhibit a small number.

[16] Wang et al. (2020) argue that more labor-intensive industries and firms are more likely to adopt the relocation strategy instead of upgrading to cope with the rising labor costs.

[17] There is no information regarding intermediate inputs and investments from 2010 onward, preventing us from calculating the total factor productivity based on methods developed in Olley and Pakes (1996) or Levinsohn and Petrin (2003). By estimating and discussing the performance of several alternative TFP estimators, Van Beveren (2012) finds that the traditional Solow-residual TFP performs similarly to semi-parametric estimators.

[18] The estimate of the treatment effect on productivity for exposed firms is 8.03%. However, according the estimates on exporters (column (5)) and non-exporters (column (6)), the average treatment effect of productivity decreases slightly to 6.38%.

Table 8
LCL and wage.

Dep. var. = ln (wage)	(1)	(2)	(3)	(4)	(5)	(6)
	Entire sample	SOEs	Private	FIEs	Exporters	Non-exporters
LCL	0.342*** (0.003)	0.398*** (0.006)	0.342*** (0.005)	0.343*** (0.007)	0.339*** (0.006)	0.353*** (0.004)
Exposed (35%)	0.053*** (0.004)	0.049*** (0.007)	0.046*** (0.006)	0.091*** (0.008)	0.045*** (0.007)	0.049*** (0.005)
Exposed*LCL	− 0.023*** (0.004)	− 0.023*** (0.006)	0.005 (0.005)	− 0.080*** (0.007)	− 0.057*** (0.006)	− 0.006 (0.004)
Firm characteristics (−1)	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
R-square	0.704	0.772	0.614	0.722	0.765	0.646
Observations	705,634	197,625	342,041	165,968	205,713	499,921

Note: Figures in parentheses are firm-clustered standard errors. *** $p < 0.01$. Firm characteristics include employment (the logarithm of employment), capital intensity (the logarithm of fixed capital–labor ratio), productivity (Solow residual productivity), profit-to-output ratio, exporter dummy, and SOE and FIE ownership dummies. There are 37 two-digit industry and 29 province dummies, respectively.

Table 9
LCL and productivity.

Dep. var. = Solow-residual productivity	(1)	(2)	(3)	(4)	(5)	(6)
	Entire sample	SOEs	Private	FIEs	Exporters	Non-exporters
LCL	− 0.043*** (0.003)	− 0.106*** (0.006)	− 0.031*** (0.005)	0.039*** (0.007)	0.050*** (0.006)	− 0.064*** (0.004)
Exposed (35%)	− 0.100*** (0.005)	− 0.095*** (0.008)	− 0.092*** (0.006)	− 0.091*** (0.010)	− 0.082*** (0.008)	− 0.098*** (0.005)
Exposed*LCL	0.080*** (0.003)	0.066*** (0.006)	0.075*** (0.005)	0.052*** (0.007)	0.040*** (0.006)	0.073*** (0.004)
Firm characteristics (−1)	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
R-square	0.093	0.137	0.104	0.060	0.058	0.115
Observations	705,634	197,625	342,038	165,968	205,713	499,921

Note: Figures in parentheses are firm-clustered standard errors. *** $p < 0.01$. Firm characteristics include sales (the logarithm of sales), capital intensity (the logarithm of fixed capital–labor ratio), profit-to-output ratio, exporter dummy, and SOE and FIE ownership dummies. There are 37 two-digit industry and 29 province dummies, respectively.

productivity improvement can be quickly achieved by the technological support from their parent companies. Separating firms into exporters and non-exporters, estimation results of exporters are similar to those of FIEs. Both exposed and non-exposed exporters experience a considerable productivity improvement to cope with the labor cost shock.

We also note that the sum of estimated coefficients on *Exposed* dummy on its own and its interaction term with LCL is negative in columns (2) – (6). The exposed firms remain less productive than its non-exposed counterparts in various firm groups, despite trying to improve productivity. Crucially, the market discipline brought by the enforcement of LCL effectively imposed pressure on the exposed firms to promote productivity to survive in the market.

6. Concluding remarks

Prior to the introduction of the 2008 LCL, the provision of social insurance by firms was not strictly imposed; many firms did not provide social insurance or offered insufficient provision to workers. The exposed firms are compelled to spend a substantial amount on incremental non-wage labor costs after the strict enforcement of the LCL from 2011 onward.

This study examines the employment effect of the 2008 LCL. Based on unbalanced firm-level panel datasets of 2005–2007 and 2011–2013, we use the difference-in-differences technique to implement empirical estimations. Results demonstrate that the exposed firms hired more workers than the non-exposed firms before the 2008 LCL, benefitted from savings in expenditure on social insurance provision. After the strict enforcement of the LCL, both exposed and non-exposed firms exhibited an increase in employment, even though the incurred incremental labor costs due to the LCL were substantial. It is probably driven by the strong labor demand of the fast-growing Chinese economy. However, the exposed firms experienced negative repercussions on

employment due to the large increase in non-wage labor costs compared to non-exposed firms, except for the exposed SOEs, which have a distinct recruitment strategy as compared to that of the other firms.

We find that wages continue to increase after the 2008 LCL with a substantial rate, casting the end of low production cost in China. Facing this challenge of stringent labor regulation, exposed firms exhibited a lower wage than their non-exposed counterparts after the 2008 LCL, suggesting that wages may have a mediation effect. By negotiating a compensation package with a lower nominal wage but with other additional benefits, both employers and employees (particularly the vulnerable groups) can reduce the negative impacts of the burden of insurance provision and copayment, respectively. Improving productivity is another method of coping with the shock of increased non-wage labor costs. We find that the exposed firms improved productivity considerably after the 2008 LCL, compared to non-exposed firms. Overall, the 2008 LCL in China improved workers' welfare without reducing employment. It also induced the surviving firms to promote their productivity, while this induced productivity effect is more relevant to FIEs and exporters rather than domestic firms and non-exporters.

Research involving human participants and/or animals

This research does not involve Human Participants and/or Animals.

Statements and declarations

The author Chih-Hai Yang declares that he has no conflict of interest. This article does not contain any studies with human participants or animals performed by the author.

Conflict of interest

The author declares that he has no conflict of interest.

Data Availability

The authors do not have permission to share data. The datasets used in this study are confidential and are not publicly available. The data supporting the findings of this study are available from the corresponding author, upon reasonable request.

Acknowledgement

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.irle.2022.106121.

References

Acharya, V.V., Baghai, R.P., Subramanian, K.V., 2013. Labor laws and innovation. J. Law Econ. 56 (4), 997–1037.

Bell, A., Jones, K., 2015. Explaining fixed effects: random effects modeling of time-series cross-sectional and panel data. Polit. Sci. Res. Methods 3 (1), 133–153.

Botero, J.C., Djankov, S., Porta, R.L., Lopez-de-Silanes, F., Shleifer, A., 2004. The regulation of labor. Q. J. Econ. 119 (4), 1339–1382.

Brandt, L., Van Biesebroeck, J., Zhang, Y., 2014. Challenges of working with the Chinese NBS firm-level data. China Econ. Rev. 30 (3), 339–352.

Broecke, S., Forti, A., Vandeweyer, M., 2017. The effect of minimum wages on employment in emerging economies: a survey and meta-analysis. Oxf. Dev. Stud. 45 (3), 366–391.

Callaway, B., Sant'Anna, P.H., 2021. Difference-in-differences with multiple time periods. J. Econ. 225 (2), 200–230.

Chan, K.C., 2012. The Challenge of Labour in China: Strikes and the Changing Labour Regime in Global Factories. Routledge, Oxford, UK.

Chen, Y.F., Funke, M., 2009. China's new labour contract law: no harm to employment? China Econ. Rev. 20 (3), 558–572.

Cheung, S., 2008a. The perplexity of labor contract law. Econ. Manag. Dig. 2008 (1), 12–13 (in Chinese).

Cheung, S., 2008b. The labor contract law revisited. Econ. Manag. Dig. 2008 (4), 42–43 (in Chinese).

Cheung, S., 2009. Steve Cheung's Viewpoints on the labor contract law. Law Soc. Sci. 2009 (1), 1–36 (in Chinese).

Cheung, S., 2014. The economic system of China. Man Econ. 1 (1), 1–49.

Dong, X.Y., Putterman, L., 2003. Soft budget constraints, social burdens, and labor redundancy in China's state industry. J. Comp. Econ. 31, 110–133.

Du, J., Liu, X., Zhou, Y., 2014. State advances and private retreats? Evidence of aggregate productivity decomposition in China. China Econ. Rev. 31, 459–474.

Feldmann, H., 2009. The unemployment effects of labor regulation around the world. J. Comp. Econ. 37 (1), 76–90.

Gallagher, M., Giles, J., Park, A., Wang, M., 2015. China's 2008 labor contract law: implementation and implications for China's workers. Hum. Relat. 68 (2), 197–235.

Gan, L., Hernandez, M.A., Ma, S., 2016. The higher costs of doing business in China: minimum wages and firms' export behavior. J. Int. Econ. 100, 81–94.

Giles, J., Wang, D., Park, A., 2013. Expanding social insurance coverage in urban China. In: Giulietti, C., Tatsiramos, K., Zimmermann, K.F. (Eds.), Labor Market Issues in China. Emerald Group Publishing, U.K.

Johansson, A., Feng, X., 2016. The state advances, the private sector retreats? Firm effects of China's great stimulus programme. Camb. J. Econ. 40 (6), 1635–1668.

Levinsohn, J., Petrin, A., 2003. Estimating production functions using inputs to control for unobservables. Rev. Econ. Stud. 70 (2), 317–342.

Li, B., Yang, X., 2021. Labor protection and the quality of firms' export products - A quasi-experiment based on the implementation of labor contract Law. Econ. Perspect. 2021 (7), 99–115 (in Chinese).

Li, D., Zhang, Y., Wu, X., Yu, D., 2021. Policy enforcement and segregated labor market: The heterogeneous long-term effects of China's labor contract law. Open Times 2021 (5), 174–193 (in Chinese).

Li, S., Ma, X., 2015. Impact of minimum wage on gender wage gaps in urban China. IZA J. Labor. Dev. 4. Article 20.

Lin, C., Yun, M.S., 2016. The effects of the minimum wage on earnings inequality: Evidence from China. In: Cappellari, L., Polachek, S.W., Tatsiramos, K. (Eds.), Income Inequality around the World, volume 44. Emerald Publishing Ltd, pp. 179–212.

Ma, X., Cheng, J., 2020. The impact of social insurance contributions on firms employment and wages: Evidence from China employer-employee matching survey data. Asian Dev. Policy R. 8 (1), 42–60.

Mayneris, F., Poncet, S., Zhang, T., 2018. Improving or disappearing: firm-level adjustments to minimum wages in China. J. Dev. Econ. 135, 20–42.

Nataraj, S., Perez-Arce, F., Kumar, K., Srinivasan, S., 2014. The impact of labor market regulation on employment in low-income countries: a meta-analysis. J. Econ. Surv. 28 (3), 551–572.

Olley, G.S., Pakes, A., 1996. The dynamics of productivity in the telecommunications equipment industry. Econometrica 64 (6), 1263–1297.

Park, A., Giles, J., Du, Y., 2012. Labor regulation and enterprise employment in China. World Bank Working Paper, 77738.

Qian, W., Dong, Y., Ye, J., 2014. Rethinking the labour contract law of China. Uni. Warsas J. Comp. Law 1 (2), 98–108.

Schunck, R., 2013. Within and between estimates in random-effects models: advantages and drawbacks of correlated random effects and hybrid models. Stata J. 13 (1), 65–76.

Van Beveren, I., 2012. Total factor productivity estimation: a practical review. J. Econ. Surv. 26 (1), 98–128.

Wang, F., Xia, J., Xu, J., 2020. To upgrade or to relocate? Explaining heterogeneous responses of Chinese light manufacturing firms to rising labor costs. China Econ. Rev. 60, 101333.

Werner, S., Tosi, H.L., Gomez-Mejia, L., 2005. Organizational governance and employee pay: how ownership structure affects the firm's compensation strategy. Strateg. Mange.-. J. 26 (4), 377–384.

Yaniv, G., 2006. On the employment effect of noncompliance with the minimum wage law. Int. Rev. Law Econ. 26 (4), 557–564.

Yu, M., 2015. Processing trade, tariff reductions and firm productivity: evidence from Chinese firms. Econ. J. 125 (585), 943–988.

Zhang, X., Yang, J., Wang, S., 2011. China has reached the Lewis turning point. China Econ. Rev. 22 (4), 542–554.

Zheng, Y.L., 2009. It's not what is on paper, but what is in practice: China's new Labor Contract Law and the enforcement problem. Wash. Uni. Glo. Stud. Law Rev. 8 (3), 595–617.