


## Article

# The Effect of Labor Protection on Firms' Operational Efficiency: Evidence from China's Labor Contract Law Implementation

Mei Xue <sup>1,\*</sup>, Yu Zhou <sup>1,\*</sup>  and Zhouhao Liu <sup>2</sup>

<sup>1</sup> Department of Organization and Human Resources, School of Business, Renmin University of China, Beijing 100872, China; xuemei2022@126.com

<sup>2</sup> Sinochem Oil Marketing Co., Ltd., Beijing 100071, China; liuzhouhao@sinochem.com

\* Correspondence: zhouyuh@ruc.edu.cn; Tel.: +86-186-1116-4992

**Abstract:** We explored the effect of labor protection on firms' operational efficiency, based on empirical data from China. Taking China's Labor Contract Law implementation in 2008 as a quasi-natural experiment, we constructed a difference-in-differences (DID) model to investigate the relationship between labor protection and firms' operational efficiency. Based on a sample of Chinese listed companies in the non-financial sector from 2004–2021, the analysis results show that labor protection can significantly improve a firm's operational efficiency. In addition, we found that the positive effect is more significant among state-owned enterprises and in regions with a higher legal governance degree. This study enriches the research that explores the effects of labor protection on firms' performance by providing more empirical evidence from China, and reveals that labor protection can positively affect a firm's operational performance in the long term.

**Keywords:** labor protection; operational efficiency; China's Labor Contract Law; ownership; legal governance degree



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## 1. Introduction

With the development of stakeholder theory and human capital theory, the study of corporate governance has gradually shifted from the traditional pyramid-top story, which focuses on the agency costs between “key players”, such as executives and shareholders, to a broader exploration towards labor protection and participation [1–6]. Researchers have argued that power and rents are widely dispersed throughout a company and that labor should be considered as one of the three core actors—capital, labor and management—in corporate governance [3,4,7]. Accordingly, governments have reinforced labor legislation to improve labor protection.

However, when we intend to explore the effect of labor protection on firms' performance, the answer may become quite complex. Firstly, there is a high degree of diversity in labor protection institutional background, in terms of employees' firm-level representation rights [8], union organization [9,10] and employees' skill formation [8,11–13] across nations. Secondly, previous studies have reached controversial conclusions about the effects of labor protection on firms' performance. For instance, a number of empirical studies have shown negative effects of labor protection on firms' performance, including a decrease in profitability [14], an increase in debt ratio [15,16], a decline in investment, operating elasticity, and innovation inputs [17–20]. In contrast, a few empirical studies have revealed the positive effects of labor protection on firms' performance, including promoting innovation [21–23], reducing financing costs, and mitigating agency issues [24–26].

Therefore, in order to clarify the comprehensive impact of labor protection on firms' performance, we still need further evidence from multiple perspectives and more countries. Operational efficiency, which captures the ratio of outputs to inputs in the value creation process [27,28], is considered to be one of the key elements in firms' performance, while the

relationship between labor protection and firms' operational efficiency has been overlooked in previous studies. In this paper, we focus on the impact of labor protection on firms' operational efficiency, in the context of China's Labor Contract Law implementation, to provide more evidence from China. Our study on China's labor protection experience will provide insights for emerging economies.

The implementation of China's Labor Contract Law in 2008 is regarded as a milestone in China's labor protection. Compared with the Labor Law implemented in 1995, the Labor Contract Law has significantly strengthened the protection of labor rights and interests in terms of labor contract signing, labor contract duration, employee compensation packages, and employee participation in management [29]. The implementation of the Labor Contract Law provides a suitable institutional changing scenario for us to explore the effects of labor protection on firms. Moreover, institutional changes often require a "fermentation period", during which companies search coping strategies and adapt to the new institutional environment. At present, 14 years have passed since the promulgation of the Labor Contract Law. After a long period of institutional fermentation, the long-term effects of labor protection have gradually emerged, which provide the right conditions for us to explore the long-term effects of labor protection on firms' performance [23].

Taking the Labor Contract Law implementation in 2008 as a quasi-natural experiment, we conducted a difference-in-differences (DID) model to analyze the impact of labor protection on firms' operational efficiency. With reference to previous studies [19,30,31], we set the treated and control groups according to firms' labor intensity, considering that labor-intensive corporates were more dependent on labor, and would be more affected by the impact of enhanced labor protection. Based on a sample of Chinese listed companies in the non-financial sector from 2004–2021, the analysis results show that labor protection can significantly improve a firm's operational efficiency. The positive effect was also verified in a series of robustness tests. In addition, we found that the positive effect is more significant among state-owned enterprises and in regions with a higher legal governance degree.

This study makes several contributions. First, this study enriches the research that explores the effects of labor protection on firms' performance by providing a new perspective of operational efficiency and more empirical evidence from China. Second, this paper enriches the research of corporate governance. The existing literature focuses on "key players"—board directors, major shareholders, or corporate executives—while studies seldom pay much attention to employees. This study took employees as key stakeholders and revealed labor's positive effect on firms' operational performance. Third, from the perspective of policy effect evaluation, we reveal the positive effect of the 2008 Labor Contract Law on economic development and provide micro-level empirical evidence. Previous studies have mostly focused on the negative effects of the Labor Contract Law in the short term, such as increased financial risk [30], decreased operational flexibility [19], increased cost stickiness [32], and insufficient investment [31]. We propose that the firms' adaptive adjustment caused by short-term cost shock may provide an incentive for firms to transform and bring long-term returns.

The rest of the paper is organized as follows: Section 2 presents the institutional background, theoretical grounding and hypotheses development. Section 3 describes the data and estimation strategy, which includes the sample selection, data sources, variables setting and calculation, and model design. Section 4 reports the main empirical results, including the main regression results and robustness tests. Section 5 concludes the paper.

## 2. Institutional Background, Theoretical Grounding and Hypotheses Development

### 2.1. Institutional Background of China's Labor Contract Law Implementation in 2008

China officially implemented the Labor Contract Law on January 1, 2008. Compared with the Labor Law of 1995, the new version has significantly strengthened the protection of employees' rights and interests in Chinese enterprises [29]. Specifically, the improvement of the labor protection is mainly reflected in the following aspects: First, in terms of employee treatment, the law stipulates that the employer shall pay compensation to workers in full

and on time in accordance with the labor contract agreement and state regulations, and if the employer defaults or fails to pay compensation in full, the workers may apply to the local people's court for a payment order according to law. Second, in terms of employment contracts, several changes, such as open-term employment contracts, employment contracts termination and layoff regulations, significantly limit the flexibility of employment and increase the dismissal costs of enterprises [33]. Third, in terms of labor representation rights, employees' right to participate in corporate governance through staff representative conferences or trade unions has been strengthened, which will not only promote employees' supervision and correction of management behaviors that infringe on labor's vital interests, but also enable employees to supervise the behaviors that are detrimental to corporate interests in business decisions [34].

Therefore, the implementation of the Labor Contract Law in 2008 provides a suitable institutional changing background for us to study the impact of labor protection enhancement on corporate operational performance.

## 2.2. Theoretical Grounding

Operational efficiency is a comprehensive indicator, reflecting the quality of microeconomic activities. From the perspective of overall operating conditions, total asset turnover is considered as the key indicator of a firm's operational efficiency, which reflects the overall effort of the enterprise management [35–37], while from the perspective of the productive process, operational efficiency is considered to comprise two dimensions: cost-based efficiency and time-based efficiency, which is associated with “costs of quality, costs of engineering changes, and manufacturing costs” and “delivery speed and reliability, manufacturing lead time, and inventory turnover rate”, respectively [38]. As key actors in the “front line” of production and operation, labor is critical to improving a firm's operational efficiency, while when we regard the question of the effect of labor protection on firms' operational efficiency, the answer may be complex. We discuss the possible impact paths based on the following three perspectives.

### 2.2.1. Cost Perspective

From the cost perspective, enhanced labor protection may have a direct cost “shock” on corporations. On one hand, the protection towards employees' compensation interests may increase corporate labor costs [39–41], and the protection towards employees' tenure may limit corporate employment flexibility [42], both of which may result in negative effects on the firm's operational efficiency. For example, based on the implementation of the Wrongful Discharge Law in the U.S., Bird and Knopf (2009) and Serfling (2016) identified exogenous shocks to labor costs and found that increases in labor costs negatively affect firms' profitability and operational resilience [14,18]. Besley and Burgess (2004) found that labor protection has reduced corporate investment in the institutional context of India [17].

On the other hand, in contrast to the short-term negative effects, firms may generate adaptive transformations by responding positively to the “institutional-change pains”, which may have a positive effect on their operational performance in the long run. For example, based on the implementation of the Labor Contract Law in China, Liu and Liu (2014) found that enhanced labor protection has induced machinery equipment upgrading for responding aggressively to labor cost stickiness [32]. Moreover, Ni and Zhu (2016) found that labor protection is essential for corporations to accelerate technological transformation by innovation, which means to replace labor input and achieve structural transformation of production methods [23].

### 2.2.2. Union Perspective

From the union perspective, enhanced labor protection may have an impact on firms' operational performance by increasing the power of the union. There is high cross-national diversity in union models, which can be differentiated along three ideal types: (1) class, (2) occupation, and (3) enterprise models [9].

Class-based and craft-based unions tend to favor strategies of external control. Specifically, class-based unions, such as political unions and industrial unions, are likely to favor centralized collective bargaining that restricts the discretion of individual firms. Similarly, craft unions may fragment representation within firms and may follow their members' collective interests, regardless of the fate of individual firms [10]. Accordingly, empirical studies have shown that collective bargaining by unions contributes to higher debt ratios [15], higher capital costs [43], lower profitability [44,45] and lower investment [31,46,47], which, in turn, increases the risk of bankruptcy and hinders external financing.

In contrast, enterprise-based unions tend to support internal participation. Specifically, enterprise-based unions recruit members among employees within a particular firm. They are likely to have a common interest in improving their own firm's competitiveness, in order to guarantee prospects of growth and stable employment. Japanese enterprise unions come close to this ideal type, which seek to participate in firm decisions, representing a relatively homogeneous group of core employees within the firm, whose primary interest is to preserve job security within the firm's internal promotion system [10]. Empirical research on this kind of union model is relatively rare; Fang and Ge (2012) found that the bargaining power of China's trade unions is weak, but they help firms form a more standardized management system and promote innovation [22].

### 2.2.3. Employee Perspective

From the employee perspective, enhanced labor protection may have an impact on firms' operational performance by endowing employees' ability and motivation to participate in corporate governance, based on ensuring employees' firm-level representation rights and skill formation.

Representation rights influence employees' relation to corporate governance. From weak to strong forms of intervention, representation rights' strengths can be classified as: rights of information, consultation, codetermination, and unilateral worker control [48] (pp. 8–13). Enhanced labor protection will strengthen employees' representation rights and help to make firms provide formal channels to give labor a voice in the firm's decision making, by providing legal rights to information, consultation, or codetermination in key decisions. Therefore, enhanced representation rights endow employees with the ability to participate in corporate governance.

In addition, skill formation reinforces employee strategies of internal participation in firms' decisions [7,49]. In weak labor protection situations, employers hold the power of dismissal, and employees are in a relatively vulnerable position in the absence of a clear employment agreement. As a result, employees are less inclined to invest in specialized skills and less interested in participating in corporate governance. However, enhanced labor protection may have the potential to address this problem: employers can no longer threaten employees with unfair distribution agreements, such as dismissal, and employees are much more likely to develop specialized skills and more motivated to engage, participating in corporate decisions for guaranteeing prospects of growth and stable employment. Therefore, enhanced representation rights endow employees with the motivation to participate in corporate governance.

Although enhanced labor protection offers employees the ability and motivation to participate in corporate governance, the effects on firms' operational performance may go in different directions. Atanassov and Kim (2009) found that labor protection may have a negative impact on corporate governance [50]. In the situation of weak investor protection and strong employee protection, underperforming managers have incentives to "align" with employees, and avoid layoffs by peddling corporate assets, which damages corporate interests, while Liu and Zhou (2019) found that labor protection has benefits to corporate governance by improving executive compensation performance sensitivity [26].

### 2.3. Hypothesis Development

#### 2.3.1. The Effect of Labor Protection on Firms' Operational Efficiency

The findings of previous studies imply that there may be two opposite paths—facilitating or hindering—through which labor protection impacts firms' operational performance. Besides, the overall effect is highly correlated with the institutional context and with whether labor protection is moderate or excessive. Based on the Chinese institutional context, we propose that enhanced labor protection due to the Labor Contract Law implementation may have a facilitating effect on firms' operational efficiency.

First, from the perspective of cost shocks, previous studies have revealed the heterogeneous effects of Labor Contract Law implementation on firms. In terms of short-term effects, relevant studies show that the Labor Contract Law implementation intensifies the labor cost stickiness of firms [32] and makes them more prone to decreased operational elasticity [19,30] and underinvestment [31]. However, in terms of long-term effects, Huang (2012) argued that the Labor Contract Law would help the development of knowledge-intensive industries and, thus, contribute to the Chinese industries' transformation [33]. Based on field research, Li et al. (2009) argued that for responding to Labor Contract Law, labor-intensive enterprises would replace their price advantages to brand and channel advantages by increasing R&D input and upgrading products and service [51]. Meanwhile, empirical evidence also shows that the long-term positive effects of Labor Contract Law have emerged, which promotes enterprises' transformation through technological innovation [23].

Second, from the perspective of unions, we propose that Labor Contract Law reinforces the supportive role of unions in corporate governance within enterprises. In China, the principal function of the trade union was "to take economic development as its central task", encouraging workers to increase productivity, enforce labor discipline, and conduct extensive propaganda on behalf of management [22,52]. The "monopoly face" of Chinese unions means that conducting various activities, such as collective bargaining to "shock" management from external forces, is fairly weak [22,53]. In some ways, Chinese unions come close to "voice face", which means questioning management decisions and monitoring management practice to ensure that it complies with relevant laws and regulations through internal channels [54] (pp. 34–56). Thus, in terms of trade unions, strengthened labor protection is likely to induce more supportive management assistance than management shocks.

Third, from the perspective of employees, we propose that Labor Contract Law reinforces employees' ability and willingness to participate in corporate governance. Government employment laws that provide more adequate labor protection can enhance the legitimacy and willingness of employees to participate in governance [3,4]. On one hand, according to the Labor Contract Law, employees can participate in the rule-formulating process and management decisions through internal channels, such as trade unions and staff representative conferences. This offers employees legal channels to supervise, complain and correct the management behaviors that infringe on employees' personal interests and the overall interests of the corporation [55]. Meanwhile, Labor Contract Law provides clear regulations on employment terms and employment termination, providing legal protection for employees to obtain a stable employment relationship. Stable employment and interest protection make employees more inclined to view themselves as insiders and stakeholders in the corporation and, thus, actively participate in corporate governance based on concern for corporate development.

Therefore, from the long-term perspective, we propose that enhanced labor protection may have a positive effect on Chinese firms' operational efficiency through promoting enterprises' transformation, and reinforcing the supportive role of unions and employees in corporate governance within enterprises.

**Hypothesis 1 (H1).** *Strengthened labor protection can improve firms' operational efficiency.*



### 2.3.2. The Moderating Role of Legal Governance Degree

In addition, we propose that the relationship between labor protection and firms' operational efficiency may be affected by the regional legal governance degree and the firm's ownership. First, although all regions in China share the same laws, there are large differences in law enforcement efficiency in each region due to historical, economic and cultural reasons [56,57]. The efficiency of law enforcement in the region where the enterprise is located may affect the effectiveness of Labor Contract Law. Specifically, in regions with a higher degree of legal governance, the courts, legal institutions, and industry associations are better developed and can ensure better implementation of the Labor Contract Law. Therefore, we propose the effect of the Labor Contract Law to be more pronounced in regions with a higher degree of legal governance.

**Hypothesis 2 (H2).** *Compared with the regions with a lower degree of legal governance, the effect of labor protection on firms' operational efficiency is greater in regions with a higher degree of legal governance.*

### 2.3.3. The Moderating Role of Ownership

Meanwhile, the enterprises' ownership may affect the enforcement efficiency of Labor Contract Law. First, the institutional system of state-owned enterprises is relatively well developed, which provides a relatively better microenvironment for the Labor Contract Law implementation. In contrast, private enterprises are more inclined to adjust their labor strategies in accordance with the principle of profit maximization [58] and are more likely to search strategies to circumvent Labor Contract Law. For example, enterprises may force employees to resign voluntarily by maliciously transferring their jobs, positions, and salaries to avoid paying them additional dismissal benefits. Moreover, enterprises may ask employees to resign voluntarily first and then re-sign labor contracts through competition to avoid signing open-term labor contracts with them [59].

Second, state-owned enterprises have a relatively better foundation in terms of the employee rights protection system, and they can take advantage of the established channels to protect employees' representation rights and mobilize employees' goodwill to participate in corporate governance after Labor Contract Law implementation. Accordingly, employees can participate more effectively in management supervision and decision making as stakeholders, which will bring positive support to improve the efficiency of corporate operation. Therefore, we propose the following:

**Hypothesis 3 (H3).** *Compared with private enterprises, the effect of labor protection on firms' operational efficiency is greater in state-owned enterprises.*

## 3. Method

### 3.1. Sample and Data

We used the firm-level data of listed companies in China from 2004–2021 for this study. Data on corporate finance, employees, corporate governance structure, and industry affiliation were obtained from the CSMAR (China Stock Market and Accounting Research) database, and the regional legal environment index was drawn from Fan et al. (2011) [60]. Referring to previous studies [23,26,32], we excluded the sample of the financial and insurance industry for their unique asset structures and earnings-generating processes, and the sample of "ST" and "\*ST" which were specially treated for abnormal financial position. We finally obtained 34,722 firm-year observations after eliminating the samples with missing data of important variables. In addition, in order to exclude the effect of extreme values, we shrunk the tails (winsorize) of continuous variables at 1% level.

### 3.2. Model Specification

Labor Contract Law implementation provides a quasi-experimental scene for this study. We set 1 January 2008—the enactment date of the law—as the time boundary, and divided the initial sample into two observation intervals, 2004–2007 and 2008–2017, to analyze the causal relationship between labor protection and firms’ operational efficiency. However, if we directly analyze the difference in firms’ operational efficiency between two observation intervals, we cannot confirm the changes are caused by Labor Contract Law implementation rather than other macro-environment factors. Since labor-intensive enterprises are more dependent on labor, when the impact of enhanced labor protection comes, they are more likely to be affected [23,30]. Therefore, referring to the previous literature, we formed a difference-in-differences (DID) model based on labor intensity to test the effect of labor protection on firms’ operational efficiency.

We considered Labor Contract Law implementation as an exogenous shock. Then, we set firms with high labor intensity as the treated group, and set firms with low labor intensity as the control group. Such a setting allowed the strength of labor protection to differ among firms. We observed the change in firms’ operational efficiency before and after the law implementation (the first difference), and compared this change among samples with different labor intensity (the second difference), so as to identify the impact of enhanced labor protection on firms’ operational efficiency. Based on this, we formed the following DID model to test the impact of labor protection on firms’ operational efficiency.

$$Tur\_X = \beta_0 + \beta_1 Laborp \times LaborInt\_X + \beta_2 Laborp + \beta_3 LaborInt + \beta_4 Size + \beta_5 Growth + \beta_6 Leverage + \beta_7 Wkcapital + \beta_8 Top1 + \beta_9 IDR + \beta_{10} Age + Industry + Year + Province + \varepsilon \quad (1)$$

*Tur\_X* represents firms’ operational efficiency. Referring to previous studies, we chose total asset turnover (*Tur\_asset*) as a proxy for operating efficiency to reflect the firms’ overall operating conditions [37,61,62], and chose inventory turnover (*Tur\_inv*), which was available from our database, as a proxy for operating efficiency to represent the firms’ productive operating conditions [38,61]. Specifically, we used the total asset turnover to represent firms’ operational efficiency in the model testing part, and used the inventory turnover in the robustness testing part to ensure the stability of the test results.

*Laborp* represents the labor protection level, which is also the time variable of DID model. We set a dummy variable to measure the labor protection level. According to the previous theoretical analysis, the Labor Contract Law implemented in 2008 has strengthened the protection of labor rights and interests, so that, for the period of 2004–2007, the variable is 0, while for the period of 2008–2021, the variable is 1.

*LaborInt\_X* represents labor intensity, which is also the state variable of DID model. According to previous studies, labor-intensive corporates show more “path dependence” towards labor condition, and are more likely to be affected by strengthened labor protection [18,19]. We set two dummy variables (*LaborInt* and *LaborInt\_emp*) and two continuous variables (*LaborInt\_log* and *LaborInt\_nolog*) to represent labor intensity. Specifically, we used *LaborInt* to represent firms’ labor intensity in the model testing part and used the other three variables in the robustness testing part to ensure the stability of the test results.

Referring to previous studies [61–64], we set control variables as follows: (1) Firm size (*Size*): we used the natural logarithm of the total assets to measure the scale of the enterprise. (2) Sales growth (*Growth*): we calculated this variable as “(current year’s sales + last year’s sales)/last year’s sales”. (3) Debt ratio (*Leverage*): we calculated this variable as “total debts/total assets”. (4) Working capital (*Wkcapital*): we calculated this variable as “working capital/total assets”. (5) Shareholding ratio of the “top1” shareholder (*Top1*). (6) Board independence (*IDR*): we calculated this variable as “the number of independent directors/the total number of board members”. (7) Length of time on market (*Age*): we calculated this variable as “current year–year of listing +1”. (8) Annual dummy variable (*Year*). (9) Industrial dummy variable (*Industry*): according to the “Industry Classification Guidelines for Listed Companies” issued by the Securities and Futures Commission in

2001, all industries are classified by the first code, except for the manufacturing industry, which is classified by two codes.

To test Hypothesis 2 and Hypothesis 3, we set two grouping variables: ownership and legal governance degree. First, if the corporate is state owned, the value of ownership is 1, otherwise is 0. Second, we used the score of “the development of market intermediary organizations and the legal institutional environment” in Fan et al. (2011) to measure the regional legal governance degree [60]. This index contains the service conditions of lawyers, accountants and other market intermediary organizations, the protection of the legitimate rights of producers and consumers, etc., which can effectively reflect the regional legal governance degree. Referring to Lu et al. (2015), we divided the samples into two groups with high (low) regional legal governance degree according to the index greater than (less than) the median in 2007 [31]. Then we set a dummy variable (LG): if the regional legal governance degree is high, the value is 1, otherwise is 0.

Primary variable settings and calculations are shown in Table 1.

**Table 1.** Variable settings and calculations.

Variable	Definition	Calculation
Main variables		
<i>Tur_asset</i>	Total assets turnover	Operational income/average annual total assets
<i>Laborp</i>	Labor protection level	A dummy variable that indicates the labor protection level. China’s Labor Contract Law was implemented in 2008. Thus, in the period of 2004–2007, the value is 0, in the period of 2008–2021, the value is 1.
<i>LaborInt</i>	Labor intensity	A dummy variable that indicates the firm’s labor intensity. If the firm’s labor intensity <sup>a</sup> is higher than the median within the industry for the year, the value is 1; otherwise, the value is 0.
Grouping variables		
<i>LG</i>	Legal governance degree	A dummy variable that indicates the legal governance degree. If the firm is located in a region where the legal governance degree is higher than the median of all regions in 2007, the value is 1, otherwise the value is 0.
<i>Ownership</i>	Ownership	A dummy variable that indicates the firm’s ownership. If the firm is owned (or mainly owned) by state, the value is 1, otherwise the value is 0.
Control variables		
<i>Size</i>	Size	Logarithm of total assets
<i>Growth</i>	Growth rate	(current year’s sales + last year’s sales)/last year’s sales
<i>Leverage</i>	Debt ratio	Total debts/total assets
<i>Wkcapital</i>	Working capital ratio	Working capital/total assets
<i>Top1</i>	Shareholding ratio of the top1 shareholder	The value can be obtained from the CSMAR database.
<i>IDR</i>	Board independence	The number of independent directors/the total number of board members
<i>Age</i>	Length of time on market	Current year-year of listing + 1

<sup>a</sup> The Firm’s labor intensity is calculated as:  $\ln(\text{cash paid to and for employees})/\ln(\text{operating income})$ .

## 4. Results

### 4.1. Descriptive Analysis

Descriptive statistics of the primary variables, which include sample size, mean, standard deviation, median, minimum, and maximum values, are shown in Table 2. The sample includes 34,722 firm-year observations, covering the 2004–2021 period. Specific



to each variable, the total asset turnover (*Tur\_asset*) ranged from 0.056 to 2.668, with a standard deviation (SD) of 0.462, and was generally consistent with previous operational efficiency studies [37,62]. The labor intensity (*LaborInt*) of corporates ranged from 0 to 1 (mean = 0.499, SD = 0.5), and the level of labor protection (*Laborp*) ranged from 0 to 1 (mean = 0.895, SD = 0.306), indicating that most of the samples in this study were in the post-implementation period of the law. The data distribution of *LaborInt* and *Laborp* was generally consistent with previous labor protection studies [23,26]. In terms of grouping variable, the regional legal governance degree (LG) ranged from 0 to 1 (mean = 0.646, SD = 0.478), and the corporates' ownership (*Ownership*) ranged from 0 to 1 (mean = 0.478, SD = 0.494).

**Table 2.** Descriptive analysis.

Variable	Mean	Std Dev	Median	Minimum	Maximum
<b>Panel A</b>					
<i>Tur_asset</i>	0.6544	0.4624	0.5456	0.0563	2.6684
<i>Laborp</i>	0.8951	0.3064	1	0	1
<i>LaborInt</i>	0.4991	0.5000	0	0	1
<b>Panel B</b>					
LG	0.6462	0.4782	1	0	1
<i>Ownership</i>	0.4782	0.4944	0	0	1
<b>Panel C</b>					
Size	22.0750	1.3577	21.8911	19.3129	26.3264
Growth	1.1491	4.2988	0.0562	−0.9543	32.6686
Leverage	0.4565	0.2175	0.4515	0.0558	1.0548
<i>Wkcapital</i>	0.1847	0.2642	0.1854	−0.5659	0.7724
<i>Top1</i>	0.3483	0.1511	0.3246	0.0876	0.7444
IDR	0.3727	0.0541	0.3333	0.2857	0.5714
Age	11.2714	6.9335	10	0	31

Notes: N = 34,722.

Table 3 shows the correlation coefficient matrix between the main variables. According to Table 3, there were significant correlations between total asset turnover and other variables, indicating that the selected variables in this study were suitable, which provided a reliable basis for the subsequent regression analysis.

**Table 3.** Variable coefficient matrix.

Variables	<i>Tur_asset</i>	<i>Laborp</i>	<i>LaborInt</i>	LG	<i>Ownership</i>	Size	Growth	Leverage	<i>Wkcapital</i>	<i>Top1</i>	IDR	Age
<i>Tur_asset</i>	1											
<i>Laborp</i>	−0.060 ***	1										
<i>LaborInt</i>	−0.239 ***	−0.001	1									
LG	0.055 ***	0.063 ***	0.002	1								
<i>Ownership</i>	0.079 ***	−0.166 ***	0.047 ***	−0.158 ***	1							
Size	0.035 ***	0.180 ***	−0.082 ***	0.012 **	0.284 ***	1						
Growth	0.079 ***	0.082 ***	−0.082 ***	−0.045 ***	0.000	0.212 ***	1					
Leverage	0.110 ***	−0.118 ***	−0.093 ***	−0.100 ***	0.251 ***	0.346 ***	0.115 ***	1				
<i>Wkcapital</i>	−0.038 ***	0.170 ***	0.011 **	0.156 ***	−0.274 ***	−0.232 ***	−0.035 ***	−0.686 ***	1			
<i>Top1</i>	0.096 ***	−0.057 ***	−0.009	0.002	0.249 ***	0.208 ***	−0.011 **	0.037 ***	−0.013 **	1		
IDR	−0.041 ***	0.120 ***	0.026 ***	0.030 ***	−0.085 ***	0.058 ***	0.020 ***	−0.009 *	0.044 ***	0.027 ***	1	
Age	−0.020 ***	0.119 ***	0.000	−0.125 ***	0.375 ***	0.369 ***	0.222 ***	0.311 ***	−0.301 ***	−0.071 ***	−0.005	1

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

#### 4.2. Regression Results

The main empirical results are shown in Table 4. We first tested the effect of labor protection on firms' operational efficiency by estimating Equation (1), and the regression results are shown in Model (1). We used total assets turnover to represent firms' operational efficiency and controlled the fixed effects of year, industry and province. The regression results show that the coefficient  $\beta_1$  of the interaction term of labor protection and labor intensity (*Laborp*  $\times$  *LaborInt*) was significantly positive at the 1% confidence level, which

indicated that the firms' operational efficiency was significantly improved after labor protection was strengthened. Therefore, Hypothesis 1 is supported.

**Table 4.** Empirical results.

Variable	Model (1) <i>Tur_asset</i>	Model (2) <i>Tur_asset</i> (LG = 1)	Model (3) <i>Tur_asset</i> (LG = 0)	Model (4) <i>Tur_asset</i> (Ownership = 1)	Model (5) <i>Tur_asset</i> (Ownership = 0)
<i>Laborp</i> × <i>LaborInt</i>	0.084 *** (0.014)	0.116 *** (0.018)	0.031 (0.020)	0.060 *** (0.018)	0.055 ** (0.022)
<i>Laborp</i>	−0.104 (0.070)	−0.187 ** (0.094)	0.187 ** (0.081)	−0.236 ** (0.097)	0.240 ** (0.120)
<i>LaborInt</i>	−0.271 *** (0.013)	−0.294 *** (0.017)	−0.236 *** (0.019)	−0.305 *** (0.016)	−0.215 *** (0.021)
<i>Size</i>	0.016 *** (0.002)	0.013 *** (0.002)	0.021 *** (0.003)	0.011 *** (0.003)	0.016 *** (0.003)
<i>Growth</i>	0.009 *** (0.001)	0.010 *** (0.001)	0.007 *** (0.001)	0.008 *** (0.001)	0.010 *** (0.001)
<i>Leverage</i>	0.379 *** (0.016)	0.523 *** (0.20)	0.122 *** (0.26)	0.314 *** (0.24)	0.413 *** (0.21)
<i>Wkcapital</i>	0.230 *** (0.013)	0.278 *** (0.016)	0.126 *** (0.021)	0.311 *** (0.020)	0.197 *** (0.016)
<i>Top1</i>	0.327 *** (0.015)	0.287 *** (0.019)	0.396 *** (0.025)	0.341 *** (0.023)	0.204 *** (0.020)
<i>IDR</i>	−0.184 *** (0.039)	−0.184 *** (0.050)	−0.239 *** (0.065)	−0.093 (0.063)	−0.170 *** (0.050)
<i>Age</i>	0.001 *** (0.000)	−0.000 (0.093)	0.005 *** (0.001)	0.005 *** (0.001)	−0.004 *** (0.001)
<i>Year</i>	Yes	Yes	Yes	Yes	Yes
<i>Industry</i>	Yes	Yes	Yes	Yes	Yes
<i>Province</i>	Yes	Yes	Yes	Yes	Yes
<i>Obs</i>	34,722	22,435	12,287	14,778	19,944
<i>Adjusted R</i> <sup>2</sup>	0.299	0.314	0.291	0.386	0.247

Notes: \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Furthermore, we tested the moderating effects of the region's legal governance degree where the enterprise was located (Hypothesis 2) and the enterprise's ownership (Hypothesis 3). Model (2) and Model (3) report the regression results for taking legal governance degree (LG) as a grouping variable. Specifically, Model (2) was based on the group with higher legal governance degree (LG = 1), and Model (3) was based on the group with lower legal governance degree (LG = 0). The regression results show that labor protection positively affected the firms' operational efficiency in the higher legal governance degree subgroup (Model 2:  $\beta_1 = 0.116$ ,  $p < 0.01$ ), while the positive relationship was no longer significant in the lower legal governance degree subgroup (Model 3). The empirical results indicate that legal governance degree has a key influence on the positive relationship between labor protection and the firms' operational efficiency. Hypothesis 2 is supported. The result is consistent with previous studies, which revealed that the effect of China's Labor Contract Law on firms was more pronounced in regions with higher legal governance degree [26,31].

Model (4) and Model (5) report the regression results for taking the enterprise's ownership (Ownership) as a grouping variable. Specifically, Model (4) was based on the group with state-owned enterprises (Ownership = 1), and Model (5) was based on the group with private enterprises (Ownership = 0). The regression results show that labor protection positively affected the firms' operational efficiency in the state-owned enterprises subgroup (Model 4:  $\beta_1 = 0.060$ ,  $p < 0.01$ ), and the positive relationship was also significant in the private enterprises subgroup (Model 5:  $\beta_1 = 0.055$ ,  $p < 0.05$ ), with a relatively lower correlation coefficient and significance. The empirical results indicate that the positive effect

of labor protection on firms' operational efficiency differs slightly between state-owned enterprises and private firms. Hypothesis 3 is partially supported.

#### 4.3. Robust Test

To ensure the robustness of the study findings, we designed a series of robustness tests to demonstrate that the findings were not due to confounding factors, such as omitted variables or systematic differences among firms. The main robustness test results are shown in Table 5.

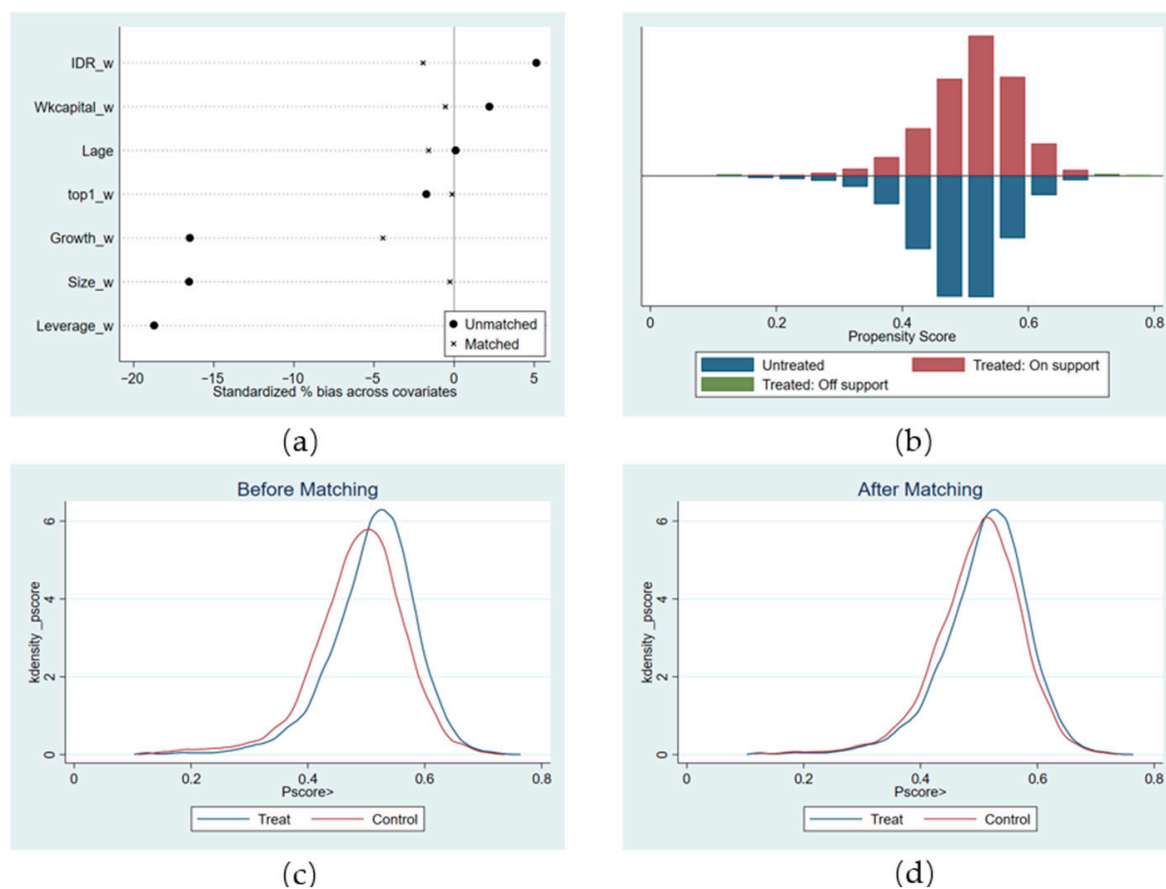
**Table 5.** Robustness test results.

Variable	Model (1) <i>Tur_asset</i> <i>X = LaborInt</i>	Model (2) <i>Tur_inv</i>	Model (3) <i>Tur_asset</i> <i>X = LaborInt_log</i>	Model (4) <i>Tur_asset</i> <i>X = LaborInt_nolog</i>	Model (5) <i>Tur_asset</i> <i>X = LaborInt_emp</i>
<i>Laborp</i> × <i>X</i>	0.070 *** (0.019)	4.455 *** (1.26)	0.600 *** (0.204)	0.787 *** (0.087)	0.050 *** (0.014)
<i>Laborp</i>	−0.093 (0.093)	−0.897 (6.532)	−0.410 ** (0.191)	0.017 (0.069)	−0.052 (0.072)
<i>X</i>	−0.261 *** (0.018)	−6.658 *** (1.195)	−5.676 *** (0.194)	−2.333 *** (0.084)	−0.010 (0.013)
<i>Size</i>	0.015 *** (0.003)	−1.138 *** (0.182)	0.012 *** (0.002)	−0.010 *** (0.002)	0.015 *** (0.002)
<i>Growth</i>	0.007 *** (0.001)	0.344 *** (0.047)	0.006 *** (0.000)	0.008 *** (0.000)	0.010 *** (0.001)
<i>Leverage</i>	0.381 *** (0.021)	−16.704 *** (1.461)	0.287 *** (0.015)	0.364 *** (0.015)	0.465 *** (0.016)
<i>Wkcapital</i>	0.232 *** (0.018)	−13.544 *** (1.192)	0.154 *** (0.012)	0.195 *** (0.013)	0.294 *** (0.013)
<i>Top1</i>	0.339 *** (0.020)	11.114 *** (1.377)	0.333 *** (0.014)	0.327 *** (0.015)	0.321 *** (0.015)
<i>IDR</i>	−0.120 ** (0.054)	11.865 *** (3.653)	−0.221 *** (0.038)	−0.178 ** (0.038)	−0.211 *** (0.041)
<i>Age</i>	0.001 *** (0.001)	0.065 * (0.035)	0.002 *** (0.000)	0.002 *** (0.000)	0.001 ** (0.000)
<i>Year</i>	Yes	Yes	Yes	Yes	Yes
<i>Industry</i>	Yes	Yes	Yes	Yes	Yes
<i>Province</i>	Yes	Yes	Yes	Yes	Yes
<i>Obs</i>	18,522	34,722	34,722	34,722	34,722
<i>Adjusted R</i> <sup>2</sup>	0.289	0.170	0.352	0.330	0.257

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

##### 4.3.1. Propensity Score Matching (PSM)

We conducted the control group analysis ( $LaborInt = 0$ ) through propensity score matching (PSM) to reduce the systematic differences between firms. The matching effect is shown in Figure 1. It is clear that the firms in the treated group and control group differed systematically before matching, while after propensity score matching, there were more common support areas in the two groups, and the overall difference between control variables decreased and approached 0. In addition, the kernel density curve of propensity score after matching was closer, indicating that the matching effect was good. Model (1) reports the regression results after propensity score matching, indicating that the coefficient  $\beta_1$  of the interaction term of labor protection and labor intensity ( $Laborp \times LaborInt$ ) was significantly positive at the 1% confidence level (Model 1:  $\beta_1 = -0.070$ ,  $p < 0.01$ ), which was consistent with the previous findings.



**Figure 1.** PSM results. Notes: (a) Covariate standardization bias test; (b) common support area; (c) nuclear density map of pre-treated group and control group; (d) matched nuclear density map of post-treated group and control group.

#### 4.3.2. Dependent Variable Replacement

We replaced the dependent variable, total asset turnover (*Tur\_asset*), with inventory turnover (*Tur\_inv*), which was calculated as “operational cost/annual average inventory”. Model (2) reports the regression results after replacing the dependent variable, indicating that coefficient  $\beta_1$  of the interaction term labor protection and labor intensity (*Laborp*  $\times$  *LaborInt*) remained significantly positive at the 1% confidence level (Model 2:  $\beta_1 = 4.455$ ,  $p < 0.01$ ), which was consistent with previous findings.

#### 4.3.3. Labor Intensity Measurement Replacement

Referring to previous studies [23], we replaced the measurement of labor intensity (*LaborInt*) with *LaborInt\_log*, *LaborInt\_nolog* and *LaborInt\_emp*. Specifically, *LaborInt\_log* was a continuous variable, calculated as “the logarithm of cash paid to and for employees/the logarithm of operational income”; *LaborInt\_nolog* was a continuous variable, calculated as “cash paid to and for employees/operational income”; *LaborInt\_emp* was a dummy variable, calculated as “if the firm’s labor intensity (the logarithm of employee amount/the logarithm of operational income) is higher than the median within the industry for the year, the value is 1; otherwise, the value is 0”. Model (3), Model (4) and Model (5) report the regression results after replacing the measurement of labor intensity, indicating that coefficient  $\beta_1$  of the interaction term labor protection and labor intensity (*Laborp*  $\times$  *LaborInt*) remained significantly positive at the 1% confidence level (Model 3:  $\beta_1 = 0.600$ ,  $p < 0.01$ ; Model 4:  $\beta_1 = 0.787$ ,  $p < 0.01$ ; Model 5:  $\beta_1 = 0.050$ ,  $p < 0.01$ ), which was consistent with previous findings.

#### 4.4. Further Analysis

To further improve the credibility of this study, we designed a policy test and a mechanism test. The policy test and mechanism test results are shown in Table 6.

**Table 6.** Policy and mechanism test results.

Variable	Model (1) <i>Averagepay1</i>	Model (2) <i>Averagepay2</i>	Model (3) <i>Payablegrowth</i>	Model (4) <i>MER</i>
<i>Laborp</i> × <i>LaborInt</i>	4458.2 * (2374.5)	4323.5 * (2449)	−0.157 *** (0.044)	−0.012 *** (0.003)
<i>Laborp</i>	100,062.9 *** (12,299.5)	38,761.9 *** (11,125.4)	−0.071 (0.227)	−0.010 (0.014)
<i>LaborInt</i>	6777.4 *** (2250.7)	5987.5 *** (2320.3)	0.060 (0.042)	0.069 *** (0.003)
<i>Size</i>	7807.5 *** (343.4)	8584.8 *** (354.8)	−0.003 (0.006)	−0.026 *** (0.000)
<i>Growth</i>	227.8 *** (88.9)	360.7 *** (91.3)	0.021 *** (0.002)	−0.001 *** (0.000)
<i>Leverage</i>	25,913.2 *** (2750.2)	26,107.3 *** (2838.4)	0.049 (0.051)	−0.009 *** (0.003)
<i>Wkcapital</i>	40,114.4 *** (2244.6)	41,878.2 *** (2320.3)	0.044 (0.420)	−0.047 *** (0.003)
<i>Top1</i>	12,577.4 *** (2592.7)	13,403.8 *** (2695.4)	0.001 (0.048)	−0.050 *** (0.003)
<i>IDR</i>	13,880.3 ** (6877.9)	12,100.5 * (7105.5)	−0.210 (0.128)	0.059 *** (0.008)
<i>Age</i>	973.5 *** (65.4)	864.7 *** (67.9)	−0.010 *** (0.001)	0.001 *** (0.000)
<i>Year</i>	Yes	Yes	Yes	Yes
<i>Industry</i>	Yes	Yes	Yes	Yes
<i>Province</i>	Yes	Yes	Yes	Yes
<i>Obs</i>	34,722	34,147	33975	34,722
<i>Adjusted R<sup>2</sup></i>	0.301	0.300	0.019	0.333

Notes: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

##### 4.4.1. Policy Test

A number of previous theoretical studies claim that the implementation of the Labor Contract Law has strengthened the protection of employees' rights and interests [29,33]. We conducted a further policy test by testing whether the Labor Contract Law has truly improved employees' treatment. We chose three ways to measure employees' treatment: (1) *averagepay1* was calculated as "cash paid to and for employees/employee amount"; (2) *averagepay2* was calculated as "(cash paid to and for employees + employee compensation payable)/employee amount"; (3) *Payablegrowth* was calculated as "(current year's employee compensation payable−last year's employee compensation payable)/last year's employee compensation payable", which represented the situation of defaulting on employee wages. We conducted the DID model taking employees' treatment as the dependent variable. Model (1), Model (2) and Model (3) report the regression results, indicating that coefficient  $\beta_1$  of the interaction term labor protection and labor intensity (*Laborp* × *LaborInt*) were significant (Model 1:  $\beta_1 = 4458.2$ ,  $p < 0.1$ ; Model 2:  $\beta_1 = 4323.5$ ,  $p < 0.1$ ; Model 3:  $\beta_1 = -0.157$ ,  $p < 0.01$ ). The results show that employees' treatment was improved effectively after the implementation of Labor Contract Law, which is consistent with previous theoretical and empirical studies [29,32,33].

##### 4.4.2. Mechanism Test

We further tested the possible mechanism for enhanced labor protection to improve firms' operational efficiency. According to the previous theoretical analysis, labor protection enhancement is likely to improve employees' ability and motivation to participate



in corporate governance, aiming to monitor and correct managers' behaviors that would damage the company's interests, which, in turn, leads to a decrease in the agency costs of the company. Therefore, the decrease in agency cost can be one of the mechanisms by which labor protection improves firms' operational efficiency. We selected the management expense ratio (MER), which was calculated by "management expense/operational income" to represent agency costs. Then, we constructed a DID model with management expense ratio as the dependent variable, and Model (4) reports the regression results. The results show that the management expense ratio was significantly negatively related to labor protection (Model 4:  $\beta_1 = -0.012$ ,  $p < 0.01$ ), indicating that enhanced labor protection reduces the agency costs and improves the governance level of enterprises, which helps with operational efficiency improvement. The results are consistent with previous studies, which found labor protection is positively related with the executive compensation performance sensitivity, indicating that enhanced labor protection could mitigate a company's agency problems [26].

## 5. Conclusions

Based on the data of Chinese listed companies from 2004 to 2021, we constructed a DID model with the implementation of the Labor Contract Law in 2008, as a quasi-natural experiment to investigate the relationship between labor protection and firms' operational efficiency. The results show the following: (1) the strengthened labor protection can effectively improve firms' operational efficiency; (2) the positive effect of labor protection on firms' operational efficiency is more significant in higher legal governance regions and state-owned enterprises, which represent a better macro and micro law enforcement environment, respectively; (3) after the implementation of the Labor Contract Law, the treatment of employees in enterprises was significantly improved and the phenomenon of defaulting on employee wages has been significantly reduced. Moreover, with the improvement of labor protection, companies' management expense rate has significantly decreased, which indicates that the firms' agency costs have been effectively suppressed, and the level of corporate governance has been effectively improved.

Our findings may offer some implications for governments and corporations. First, although enhanced labor protection can cause a short-term "shock" to corporations, appropriate labor protection may be rewarded with positive feedback from employees, and bring a positive impact on firms' operational efficiency in the long run. Second, China's experience in labor protection can provide an example for emerging economies. Unlike developed countries, China is a developing country whose economy is still in a period of structural adjustment. In that context, the strengthening of labor protection will lead to the restructuring of production factors and accelerate the transformation process of enterprises to improve operational performance to cope with labor cost shocks. Such transformations will benefit the sustainable development of emerging economies. Third, from the perspective of enterprises, strengthening labor protection can be both a challenge and an opportunity, especially in the era of knowledge-based economy, where the role of human capital is coming to the fore. Managers should actively respond to the reform of labor protection by trying to leverage the power of employees to mitigate agency issues and achieve management and operational efficiency improvements.

The limitations of this study also deserve some attention. First, we used second archival data to test our model, and the operation of some variables was limited by the database. For example, although we selected suitable proxy variables for operational efficiency based on previous studies, some of the items characterizing operational efficiency, which were usually obtained through questionnaires, were not available in the CSMAR database. We believe that future research can address this issue by integrating data from multiple sources. Second, we paid close attention to investigating the relationship between labor protection and operational efficiency, while the mechanisms through which labor protection affects firms' operational efficiency have not been sufficiently explored. We believe future study can use multiple research methods, such as grounded theory and case

studies, to illuminate the mechanisms and processes by which labor protection affects the operational performance of enterprises.

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