An Examination of the Impact of Labor Contract Laws on Firm Operation and Performance in China

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Weihai, October 3, 2019

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Acknowledgements

I arrived in Canberra in the cold winter in 2012, a 27 years old man, with one unrealistic dream: to get a Ph.D. degree in economics. I heard there were three factors that would allow one to realize his dream: be hard working, be unrealistically optimistic and have some luck. As a mediocre student with average grades from my master's degree, when I could not get out of bed due to refusals of my Ph.D applications at different universities in 2013, I sincerely prayed for luck. Now, at the end of the journey, I have to confess that I have received far more than I have expected and I do appreciate how fortunate I am.

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Abstract

This thesis provides an overall evaluation of the impact of labor market interventions through the implementation of the Labor Contract Law (LCL) in 2008 in China. To begin, a transaction cost explanation of the choice of contract in a free market is established. It argues that the choice of contract is a comparison between related transaction costs and functions as a theoretical base for the thesis. In the scenario with labor market intervention, the theoretical framework predicts that alternative production function or contractual arrangements will be adopted by firms to avoid the direct impact of labor laws. Two areas of interest were studied empirically. One is employment conflicts. In the short-run, the number of labor disputes significantly correlates with mandated benefits coverage and low-skilled employment ratio. Such correlation weakens in the long-run, possibly due to changes in firms' strategies. The other is capital deepening, and related efficiency impact. It is found that the capital: labor ratio in private firms increased dramatically after the implementation of the LCL, with a decline in total factor productivity. This evaluation conclusively rejects the claims of supporters that labor market interventions reduce social conflict, and finds evidence that confirms the negative efficiency effect of these regulations on Chinese firms, especially small enterprises. It provides the necessary policy evaluation for the Chinese government to conduct the relevant reform.

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Chapter 1: Introduction

1.1   Overview

Traditionally, economists have tended to focus on tangible inputs such as labor and capital in production in studying the growth of an economy. However, it is well-known that institutional change plays a crucial role in economic development (North, 1971). In 1978, China's economy was on the edge of collapse resulting from the failure of the planned economy, which led to the Reform and Opening policy. Under the planned economy system, lifetime tenure better known as the "Iron Rice Bowl'', was the dominant employment system in urban China. Labor market reform included the introduction of labor contracts (1986) and labor law (1994), improvements in the freedom to change jobs in hiring. These reforms allowing labor mobility between rural and urban areas increased the productivity of the nation (Cai, Park, & Zhao, 2011; Meng, 2012). In this period, the Chinese economy grew at an average of almost 10% annually and became the world's second-largest economy (Moore, 2011). The standard of living, especially for the poor, improved in a short period. It is noted that 600 million Chinese were lifted out of poverty as the poverty rate fell from 85% in 1981 to 27% in 2004 (World bank, 2010). However, in 2008, the Labor Contract Law (LCL), also known by the public as the 'new labor law', started to be implemented nationwide. Since then, the Chinese economy has lost its growth momentum. However, there are still some unanswered questions that remain to be addressed. Therefore, to get a deep appreciation of the issue, this thesis will analyze the impact of labor market intervention on firms' operation and performance in modern China.

Despite significant economic achievements during the reform period, there emerged a popular view in the media in the late 2000s, which argued that the Chinese government must balance economic growth with social justice. The violation of workers' legal rights would threaten social and political stability (China Labor Bulletin, 2010). X. Li

and Freeman (2015, p. 711) criticize the working conditions of Chinese workers, stating that, With limited skills and little access to legal protection, many migrants faced "sweatshop conditions" that included wage arrears (in which firms delay wage payments or do not pay them in full), unhealthy working environments, violations of their legal rights at work, poor treatment by employers, and limited provision of the social insurances that Chinese law requires employers give to workers'. It was reported that an owner of a small mine illegally captured and imprisoned a number of workers to work for him. This slave-worker incident in 2007 became a national scandal (John Chan, 2007). Many urged the Chinese government to take action in the labor market.

Interestingly, ten years after the implementation of the LCL, slave-workers still exist in China nowadays. In 2018, 4 'slave-worker' factories were found in Heilongjiang Province (Zhu, 2019). However, the supporters of the LCL simply ignore this information, and the incident attracts much less public attention. I am not suggesting the slave-workers should disappear after the LCL has been implemented. It should be noted that slave-worker is unusual, abnormal, and illegal activity in any societies. Thus, it is hard to study the situation based on quantitative analysis. My criticism is that legislation should not be enacted based on illegal activity under existing law. For instance, it was reported some fathers raped their daughters in German and Austria. It is true the daughters are on the weak-side. Should the government then regulate every father-daughter relationship to prevent such a rare incident? To some extent, should the fathers be separated from their daughters mandatory by law, as they can be potentially rapist? Does the existing law allow rape to happen? The answer to these questions is negative.

At the end of 2007, to regulate the labor market, a national Labor Contract Law (LCL) was passed by the Chinese Parliament. It introduced compulsory written labor contracts, reinforced the minimum wage and mandated benefits, improved employment protection and promoted the influence of trade unions.

Business interests raised their concerns about the impact of labor market interventions on the costs of production. However, their concerns were ignored due to their lack of political influence. The supporters of the intervention possessed more political power. The major supporters included the Ministry of Labor and Social Security of the People's Republic of China (MOLSS) and the All-China Federation of Trade Unions (ACFTU), which as a part of the central government, were actively participating in drafting and implementing the legislation. Moreover, politicians, including Prime Minister Wen Jiabao, directly influenced the legislation of the LCL. Finally, foreign interests such as the International Labor Organization (ILO) and the American and German governments were found to be lobbying the Chinese government to intervene in the labor market (Karindi, 2008).

The argument regarding the effect of the Labor Contract Law (LCL) starts from the drafting stage. The leader of the law-making group for this legislation change argues that to create a "harmonious" working environment, the government must favor the labor side to comply with social interests. The underprivileged labor, with less bargaining power, would suffer in the market. However, Dong (2016) argued that the draft law would set labor standards too high, which would cause all-round tensions instead of "harmonizing" the relationship between the government, the entrepreneurs and the employees (H. Xu, 2007). Dong (2016) further points out that the previous Labor Law from 1994 was sufficient and appropriate to protect both employees' and employers' legal rights, and the problem in the labor market results from its lack of enforcement. He believes that there is no need for new legislation to overprotect workers' rights. The essence of such a debate is about what kind of service the government should supply in the labor market. In the terminology of the Common Law, the controversy lies between the principles of "freedom of contract" and the "purposive approach" to the employment contract. The former believes that the function of the court is to ensure the enforcement of the contract based literally on the agreement.

According to the Coase theorem, a clear delineation of private property rights is an

essential prelude to market transactions (Ronald Harry Coase, 1988). If we review the philosophy of Deng Xiaoping carefully, it is essentially putting the Coase theorem or 'freedom of contract' principle into practice: "［We］should adopt the most efficient form of production, and it depends on which form improves the standard of living quicker. If people prefer a certain form of production, then they should be allowed to use such a form. If it is illegal, make it legal." Also, he provides his famous 'cat' theory, it doesn't matter whether a cat is white or black, as long as it catches mice (Deng, 1962, p. 323).

An incident involving Communist employment regulations is the Idiot Sunflower Seeds' company in Wuhu City in 1984. The entrepreneur Nian Guangjiu hired more than eight employees in his factory, which was against the doctrine of Marxism. He was accused of being a capitalist and of exploitation of his employees (Anhui Business News, 2014). Deng criticized such left-wing idealists by saying that, 'if a party, a nation, a people, rigidly follow the doctrines of books without critical thinking, full of superstition for political correctness, then it cannot move forward and its growth will be stagnated. The party and nation will be destroyed' (Deng, 1978, p. 151).

Sadly, the underlying principle of the LCL adopts a purposive approach toward employment contracts, which presumes a predetermined standard of employment to be optimal. According to Trading Economics (2018b), the growth rate of the Chinese economy started to decelerate since 2008: from its peak at 15 percent to below 8 percent. There was a growing criticism arguing that the implementation of the LCL had caused this slowdown in growth. Economist S. N. Cheung (2007) predicted that the law would encourage workers to sue their employers and would destroy the economic development of China. Economist Zhang Weiying stressed that the outcome of LCL and its purpose are opposite to each other. He argued the job opportunities of the employees were damaged by the law ("Economist Zhang Weiying: the Labor Contract Law hurts the interests of workers, I suggest to demolish it immediately," 2009). Legal scholar He Bing criticized that the law-makers ignore the reality of China. He pointed

out that the LCL violated the doctrine of legal principle and was difficult to practice. He Bing also argued that the LCL cannot solve the 'slave-workers' incident as these 'business owners' were outlaw in the first place, and these people would not care about the labor market intervention. In fact, they did not even worry about criminal law. The LCL would only hurt the lawful enterprises (He, 2009). Former Finance Minister Lou Jiwei openly criticized that instead of protecting workers as the law claims, it discriminates against low-skilled workers and is incompatible with labor flexibility, which in turn damages economic growth (Observer, 2016). Entrepreneurs, such as Liu Yonghao claimed that the law increased the cost of labor and reduced profitability of firms ("Liu Yonghao: the Labor Contract Law should consider different stakeholders' interests," 2008). On the other hand, the supporters of the law kept urging the government to institute more severe enforcement (Harris, 2008).

Theoretically, labor economics produces several models for capturing different government interventions (Lazear, 1990; Summers, 1989), and there are various policy impacts, such as employment, capital deepening and productivity change (Caballero & Hammour, 1998), and informal workers (Lindbeck & Snower, 1984). However, there is no general theoretical framework to incorporate multiple legislation and to explain multiple phenomena in one setting. This lack of understanding about the mechanism of how the labor laws affect the operation of firms restricts policy evaluation. Thus, this thesis proposes to fill the gap by establishing a firm-level model, based on derived demand. As firms are the basic unit in society to combine labor and capital in production, this model would also be used to explain aggregated data.

According to the theoretical framework being developed, this research categorizes the impacts of the labor laws on firms into two kinds: direct and indirect impacts. Direct impacts involve mandated benefits such as social security, and employment conflicts such as strikes. Elfstrom and Kuruvilla (2014) and Remington and Cui (2015) have examined labor disputes and strikes in China since 2008. To avoid direct impact, several strategies have been taken by firms. These include a reduction in employment (Yan,

2015), an increase in informal workers (Liang, Appleton, & Song, 2016), and the substitution of labor with machines (Ren, 2015). These results are consistent with my theoretical prediction. However, they cannot explain how labor market intervention causes these phenomena properly, due to lack the of a theoretical framework. Hence, under the instruction of the theoretical analysis, a more comprehensive empirical study needs to be produced.

1.2   Research problem and objectives

To provide an objective evaluation of the issue, this thesis develops a framework to study how labor market interventions affect the operation of Chinese firms. This includes direct impacts such as labor disputes and strikes raised by employees and indirect impacts such as capital deepening. Additionally, the Total Factor Productivity (TFP) of firms was measured to evaluate the performance impact of the labor laws.

Chapter 2 reviews two broad approaches in the choice of contract: risk-sharing and transaction cost. It finds that neither approach can currently provide a satisfactory answer for the choice of contract. Particularly, whether variance of production affects the choice of share contract is still in question, which is the main focus of the chapter.

Chapter 3 develops a Marshallian-derived demand model to explain the policy consequences of labor market interventions. Also, by understanding the mechanism of the labor market intervention, it enables me to conduct further empirical testing in later chapters.

Chapter 4 discusses the issue of methodology. It includes the participants, research design, data collection, analysis and interpretation. To establish a causal relationship, a mixed method with both qualitative and quantitative analysis has been adopted. The qualitative information is particularly crucial in understanding the underlying logic of the quantitative results.

Chapter 5 examines labor disputes and strikes empirically. The LCL was aimed at reducing conflicts in the labor market to achieve a so-called 'harmonious' working environment. Therefore, it investigates the following question: What is the relationship between labor market intervention and the number of labor disputes and strikes?

Chapters 6 and 7 both study the capital deepening caused by labor market interventions with quantitative and qualitative data respectively. Chapter 6 uses firm-level survey data from 2008 and 2012 to examine the relationship between the capital: labor ratio and pension coverage[1]. Chapter 7 uses self-collected interview data to study the difficulties the firms faced in transforming their production from labor to capital.

1.3   Findings and contribution

The core contribution of this research is that it demonstrates how useful simple theories with realistic assumptions can be in explaining economic phenomena. Therefore, there is no complicated utility function in explanations in this thesis, on purpose, as utility is not observable for empirical testing[2].

Mainstream contract theory based on a principle/agent model with information asymmetry failed to provide satisfactory predictions for empirical testing. Allen and Lueck (1995) provide an interesting discussion about the shortcomings of such an approach. Allen and Lueck (1992) used data from the US and claimed that they rejected that variance in production affected the choice of sharecropping contract. However, the explanation of Allen and Lueck (1992) cannot be empirically tested either. Salanié (2003) criticized the lack of empirical studies in the field of contract theory. Chapter 2 adopts the new explanation provided by S. N. S. Cheung (2014) and it also finds

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[1] The sample collects information for the previous year. Hence, the 2008 sample is actually the sample without intervention.

[2] Some may argue that experiments can be used to measure preference and utility. However, this approach cannot guarantee that the behavior of participants in the laboratory can be repeated in the outside world.

supporting evidence that variance in production is a determining factor for sharecropping contracts. With such a finding, it enables researchers to conduct long-hold empirical studies for contract theory.

Chapter 3 establishes the analytical model of this thesis. Previous theories in labor economics have tended to examine the effect of labor market intervention on the whole market without considering firm-level impacts. This ignorance may hinder the researchers from locating realistic assumptions about the situation. It also explains the lack of explanatory power of these models. The simple model in Chapter 3 can be applied to a range of phenomena relating to labor laws. It includes the increase in informal workers, replacement of workers with machines, the rise in labor disputes and strikes, and support from certain interest groups. Another issue is that existing literature tends to focus on the impact of one particular piece of legislation, such as employment protection legislation, mandated benefits, and minimum wages. However, this approach overlooks the interaction between different legislation. The model in Chapter 3 incorporates separate laws in one setting. Finally, the hypotheses of the model are consistent with many empirical studies considering labor market interventions, such as Obamacare. This literature improves the reliability of the theoretical analysis.

Chapter 5 studies employment conflicts with a mixed methodological approach. Qualitatively, the case transcripts reveal how ambiguity in the wording of the labor laws creates a common good in economic rent, which encourages employment disputes. Quantitatively, descriptive data confirms that the number of conflicts increased after the intervention of the Labor Contract Law. The fixed effect (FE) regression analysis demonstrates that the number of labor disputes significantly correlates with pension coverage and the low-skilled worker ratio at the provincial level in the short run. In the long term, however, the relationship weakened as firms have taken actions to reduce the impact of the intervention, as predicted by the theoretical model. The findings in Chapter 5 refuted the common stereotype that workers raise disputes because they are not protected by welfare.

Chapters 6 and 7 study the capital deepening after the labor market intervention with quantitative and qualitative data respectively. The findings of these two chapters support and complement each other. The regression study in Chapter 6 shows that pension coverage in Chinese firms significantly correlates with the capital/labor ratio after the labor market intervention. Furthermore, I find that small firms have difficulty in transferring their production function from using more labor to more capital, which damages their economic performance accordingly. Chapter 7 confirms that big firms have an advantage in capital deepening with interview data I collected from fieldwork. It also finds that the average pension cost per worker has increased by 10 percent over the past decade due to the rise in the social average wage level announced annually by the local labor government department. This evidence demonstrates that the increase in the capital/labor ratio in China in recent years can be partly explained by the rising cost of labor due to labor market intervention.

1.4   Organization of the thesis

The remainder of this thesis is organized as follows: Chapter 2 provides an explanation for the choice of contract in a free market, with evidence. Chapter 3 establishes the theoretical model that explains the impact of labor market intervention on a firm. Chapter 4 discusses the methodology issues relating to empirical work in this thesis. Chapter 5, Chapter 6 and Chapter 7 present three empirical papers that cover three research questions addressed in the thesis. These chapters are written as stand-alone papers. Chapter 8 is the conclusion.

Chapter 2: A transaction costs explanation for the choice of the share contract

2.1 Introduction

Contracts can be viewed as the fiber that glues a society together, but the understanding of contractual arrangements is far from satisfying. Modern contract theory, which is rooted in agricultural reform in Taiwan by S. N. S. Cheung (1969), involves two major components: the efficiency of different contractual arrangements, and the choice of contracts. Although the two topics are interrelated in certain ways, this paper restricts its focus to the second, which is the economic explanation for the choice of contracts in the free market. Specifically, it will examine the choice between sharecropping and fixed-payment contracts[3].

Currently, there are two major explanations considering the choice of contract. The mainstream has established theoretical models based on principal/agent, with information asymmetry. Allen and Lueck (1992) also provide a transaction cost explanation for the use of sharecropping, based on the experience in the United States.

However, neither approach provides a suitable model for empirical testing. The direct evidence is that, although a huge amount of theoretical work has been developed over the past thirty years, empirical works remain scarce (Salanié, 2003), not to mention the lack of supporting evidence for these complicated models (Prendergast, 1999). This lack of applicability motivates us to return to the original topic with the latest insight from its founder, S. N. S. Cheung (2014).

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[3] For readers not familiar with this field, sharecropping contract is a system of agriculture where a landowner allows a tenant to use the land in return for a percentage of the crop produced on the land.

This study addresses the question of how a share contract is chosen over a fixed-rent contract with Cheung's new explanation. I especially explore how change of variance in production affects the decision. Existing empirical papers and other real-life phenomena will be adopted to test the validity of this explanation.

It contributes to the literature in the following aspects. To begin, this theoretical framework is not only applicable to share contracts, but to a broader range of contractual arrangements. In fact, the internal logic of Cheung's explanation is in line with Ronald Harry Coase (1937) and Allen and Lueck (1992) and argues that a specific kind of transaction cost is attached to each type of contract. Thus, the choice between two contracts in reality is the choice between two transaction costs. My criticism of the work of Allen and Lueck (1992) is that their specific 'land exploitation' explanation is, as they admitted, not directly observable. On the other hand, the variables of this theoretical explanation are observable and explicit in definition, which enables researchers to conduct long-held empirical studies using share contracts. Last, by clarifying the endogenous variables, it explains some seemingly contradictory empirical results, such as those presented by Rao (1971) and Allen and Lueck (1992) and demonstrate that some empirical works, such as those indicated by S. N. S. Cheung (1969), Y. Huang (1973), and the stylized facts of Newbery and Stiglitz (1977), do not violate the key assumptions of the model, thus supporting our prediction.

One of the issues in contract studies is its terminologies among different scholars. Allen and Lueck (1992) argue that the use of a sharecropping contract is a decision between two transaction costs, the mismanagement of land and the division cost between landlord and tenant. The terms of the division cost are equivalent to the monitoring cost of the total output by S. N. S. Cheung (2014), and hidden action in the risk-sharing approach. The variance of production is often used to measure the riskiness of a plant. Cheung re-interprets this variable as the transaction cost of negotiating for a fixed amount rent or information cost for the quantity of the output. Hence, the two

transaction costs in Cheung's explanation are the negotiation cost (measured by the variance of production) and the monitoring cost.

The findings are consistent with my predictions. First, I confirm the importance of variance of production in the choice of sharecropping contracts. One of the significant results is that the decline in the number of share contracts for agriculture after World War II around the world is associated with a decrease in variance in production due to new agricultural technology, such as highly productive wheat. Second, I summarize the results of existing studies and confirm that the monitoring cost is another factor in consideration of sharecropping.

The remainder of the paper is organized as follows. Section 2 provides a review of the mainstream contract theory based on risk-sharing. Section 3 introduces a theoretical explanation to explain how variance of production affects the choice of contracts. Section 4 tests the model. Section 5 explains some of the contradictory works, and Section 6 concludes the major findings of this research.

2.2   Critical review of the risk-sharing approach

The issue of the sharecropping contract was studied by the father of economics, Adam Smith (1776), in his seminal book, *An Inquiry into the Nature and Causes of the Wealth of Nations*. Smith compares the fixed-rent contract system in Britain with the sharecropping system in continental Europe, and concludes that the sharecropping contract lacks efficiency. Alfred Marshall and later economists further conduct graphical analysis and show that a sharecropping contract yields less than a fixed-payment contract (Marshall, 1920). This proposition of productivities differing under various contractual arrangements was challenged by S. N. S. Cheung (1969), who argues that the efficiency of sharecropping contracts is equal to fixed-rent contracts since the rental percentages can be adjusted. S. N. S. Cheung (1969) shows mathematically and graphically that the productivity of sharecropping contracts is equal

to other forms of contract, under a zero transaction cost assumption. In Chapter 3 of his thesis, he finds real world evidence (with transaction costs) showing that, the efficiency of fixed-rent and share contracts are also approximately the same.

The second question is related to why people choose different forms of contracts, such as fixed-wage, fixed-rent and share contracts. S. N. S. Cheung (1969) finds the variance in production for wheat is much higher than for rice. At the same time, the sharecropping contract is more often used where wheat is planted. Cheung then argues that tenants and landlords adopt sharecropping contracts in order to reduce risk from high variance. The risk-sharing approach, which originates from Cheung's sharecropping theory, postulates that an efficient contract is a balance of risk-sharing and moral hazard incentives. However, it concludes that the share contract is an inefficient contractual arrangement as the second-best option (Stiglitz, 1974).

Most of the current theoretical studies are based on the risk-sharing explanation, which has been applied to a range of contractual arrangements, including executive compensation (Garen, 1994), leasing (Leland, 1978), partnerships (Gaynor & Gertler, 1995), and insurance (Townsend, 1994). However, there are three major criticisms of the risk-sharing approach.

To begin, it is worthwhile to point out that these 'applications' are all theoretical. More precisely, they can only be classified as *ad hoc* theory, which cannot be applied to wide ranges of phenomena (Stigler & Becker, 1977). Milton Friedman (1962) argues that an illogical argument can be corrected for a specific case, but cannot be generalized. In fact, the first of the four stylized facts of Newbery and Stiglitz (1977) shows why sharecropping contracts still exist despite risk-sharing theories suggesting they are inefficient, which has already refuted their theory. Moreover, even when taking variance of production as a risk for sharecropping contracts, it remains unclear how to measure risk in other fields. Thus, theories based on risk-sharing may possess logical inconsistency.

The comparison of the mathematical analysis of Cheung's tenancy theory and the current risk-sharing approach based on principal/agent model reveals the source of contradiction in the mainstream contract economics. One key assumption of the mathematic model of S. N. S. Cheung (1969) is the real constraint faced by the tenant, that is, W*t = (1 – r) * q (h, t), where W is the market wage rate of the tenant's labor input, t; r stands for the share rent rate; and q (h, t) is tenant's production function. This is a direct application of the zero profit principle, which means the total labor return for the worker under the sharecropping contract on the farm is equal to the market wage return elsewhere.

On the other hand, the assumptions for mainstream contract theory are more complicated but less realistic in key constraints. The typical moral hazard model includes the following assumptions: preferences for both the principal and agent, information asymmetry, and other compulsory assumptions. It fails to capture the real constraints faced by the relevant parties. Take the individual rationality (IR) constraint as an example, the IR constraint says that the agent ***must prefer*** working for the principal to not working and receiving his or her outside option. It is argued that if the IR constraint were not imposed, the solution to the problem might be economically meaningless, insofar as it was a contract that met some criterion of optimality but which an agent would refuse to sign. In reality, an agent has different choices for contracts. Hence, the cost of choosing one form of contract should be another form of contract. The constraints in Cheung's mathematical models capture this fact with a zero transaction cost assumption. The IR assumptions in the principal/agent model yield an interesting question, namely, if the option yields the highest return, even including the consideration of risk or transaction cost, why would an agent refuse to sign a contract?

Furthermore, one key component of the principal/agent analysis is the so-called 'hidden action' or observable effort level of the agent, which in its essence is a problem of information asymmetry. Spence (1973) and Arrow (1972) argue that information

asymmetry leads to inefficient outcomes and Stiglitz (1983) argues that moral hazard is the unique risk that cannot be solved by the private market. On the other hand, Barzel (1977) shows that an alternative contract arrangement can easily get around the information asymmetry issue within a specific contract. Thus, information asymmetry does not necessarily lead to inefficiency. For instance, foreigners in Beijing often get tricked by local taxi drivers and circulate around the city for a while before landing at their destination. The method such travelers find is to negotiate a fixed traveling fee up front, which easily bypasses this information asymmetry problem. From this perspective, one of the key problems with moral hazard models is that they ignore alternative forms of contracts to reduce information costs. Demsetz (1969), in addition, points out that it is not economical to eliminate all the opportunity for moral hazard. It is the same as mining firms leaving some ore in the ground because it is too expensive to mine it. S. N. S. Cheung (1969) has pointed out that the landlord does not need to know the details of farming efforts him-or-herself. Zero profit indicates that different investments should yield the same return for investors and is equal to the interest rate. If the landlord finds out his or her return is lower than the interest rate or other investments, he or she will then terminate the contract with the tenant or change his or her contract arrangement to a fixed-rent contract. With the comparison of productivity growth in the same region and same period, it is not as hard as Stiglitz (1983) suggests, to find out whether the farmer has put enough input into the land. If the effect of 'hidden action' has been exaggerated, it also explains why mainstream contract theories cannot be used to explain the existence of share contracts.

Moreover, the risk-preference of a fixed-rent tenant may not be neutral as the payment is not really fixed in reality. S. N. S. Cheung (1969) mentions a special contractual arrangement, called the 'escape clause' in the fixed-rent contract in Chinese agriculture. The 'escape clause' does exist in real contracts in China. A survey conducted by Nanking University in China in 1935 found that the escape clauses were used in 83 percent of fixed crop rent contracts and 63 percent of fixed cash rent contracts, and in no share contracts. In two of the sample fixed-rent contracts Cheung provided, the

contracts explicitly clarify that, 'in a famine year, rental payment shall be adjusted (downward) according to local custom' and 'the (aforementioned) rental rate is subject to adjustment according to local customs in a famine year' (p.72-73). He then argues that with multiple 'escape clauses' for tenants, a fixed-rent contract is no longer 'fixed'. With the adjustment from the 'escape clause', fixed agricultural contracts are more popular in China than in other Southeastern Asian nations. Allen and Lueck (1992) find similar clauses in agriculture in the US. The only difference is that the adjustment is upward due to extremely good conditions. This may be due to the existence of agricultural insurance for natural disasters in the US. In the labor market, Key Performance Indicators (KPI) are commonly used to compensate fixed-wage earners. The KPI functions in a similar way to the 'escape clause'.

The second issue, as mentioned earlier, is the testability of mainstream contract theory. Without the restrictions of the scientific method, 'theoretical' papers nowadays can hardly rarely be tested empirically and thus yield few, if any, impacts. In essence, the variables in the principal/agent framework used by mainstream contract theory include the preferences of people, which cannot be observed and measured directly (Allen & Lueck, 1995). Thus, Allen and Lueck (1995) argue convincingly that the risk-preference approach cannot be tested empirically and instead they propose that a transaction cost approach should be used to explain choice between various contracts.

Third, one key methodological difference between Cheung's original approach and mainstream contract theory is the attitude toward real-life contracts. The aim of Cheung's paper is to explain the existing contract in reality. On the other hand, the principal/agent model is adopted to examine the defects of the market approach, in order to provide an alternative contract design. The question then arises as to why relevant parties, including landlords and tenants, ignore these designs after half a century of development in contract theory with a huge amount of theoretical literature. It is like the two groups are living on different planets with no interaction. Posner (2003), a professor of law, criticizes the development of contract economics noting that although

the accumulation of literature in economic theory on contract creates a sense of forward movement in the subject, in fact, it provides few testable implications to the practical side of law. This embarrassing situation reflects the need for introspection around the current approaches to contract theory.

2.3   Theoretical explanation

S. N. S. Cheung (1969) first adopts the approach of using risk-sharing to explain why share contracts are used in certain situations. Cheung found that fixed-rent contracts were more popular in rice producing regions, whereas sharecropping tenancy contracts were more dominant in wheat producing regions. Variance in wheat production is significantly larger than it is for rice. Cheung argues that even though ***the share contract involves higher transaction costs***[4], the arrangement is a method intending to avoid and reduce risk. He further assumes that both parties are risk averse. Therefore, tenant and landlord who share the total output with a fixed percentage, would lower the variance in their return.

Later, according to Cheung (2014), the words highlighted in the previous paragraph are not accurate and provided misleading instructions for mainstream contract theorists. If we return to the case of sharecropping theory, Cheung's theoretical proof, either the mathematical or graphical analysis, shows that different forms of contract yield the same efficiency. However, one point to note here is that such an analysis is under the assumption of zero transaction costs. Another way to view this assumption is that transaction costs do not play a crucial role in the efficiency of different contractual arrangements, as the output evidence indicates.

On the other hand, the misleading statement in Cheung's original paper that the sharecropping contract involves higher transaction costs is rejected by the co-existence

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[4] It is obvious that there is a monitoring cost in the use of sharecropping contracts as the total output must be measured for dividing.

of shared and fixed-rent contracts. Imagine there are two different contract forms as choices for the transacting parties; the returns for both contracts should be the same under the zero transaction cost situation. With the zero-profit principle, if one contract involves less transaction cost than the other, then logic dictates that there will be a monopoly of contract. The co-existence of different forms of contracts in a competitive market suggests that the marginal transaction cost for both contracts must be equal. S. N. S. Cheung (2014, p. 219) later expresses this view as a statement.

Differing from the explanation of Allen and Lueck (1992), S. N. S. Cheung (2014, p. 285) proposes that large variance in wheat production should be seen as an increase in information cost for tenants and landlords to reach an agreement on a specific amount of fixed-rent. He argues that this information cost, instead of monitoring cost, is the cause of the choice of sharecropping contracts in Chinese agriculture. This new insight actually provides a clearer picture of the current debate. The high variance in production, traditionally treated as risk, can be viewed as one type of transaction cost. On the other hand, the 'hidden action' can be viewed as another transaction cost, such as monitoring cost. If the tenant and landlord choose a fixed-rent contract, the landlord does not have to supervise the total outcome of the tenant, but the related parties have to bear the transaction cost of product fluctuation or the escape clause. If they choose a sharecropping contract, extra transaction costs to monitor the output must be paid. At the margin, by definition, the two types of transaction costs associated with their related contracts should be roughly equal.

Without other information or constraints, this statement is clearly a tautology. Therefore, constraints must be added to form refutable hypotheses, which can be used to test the validity of this theory. Two hypotheses were then produced

- Hypothesis 1: Holding the monitoring cost roughly constant, the larger the variance of output, the more likely for the share contract to be employed, and vice versa.

● Hypothesis 2: Holding the negotiation cost roughly constant, the lower the monitoring cost, the more likely for the share contract to be employed, and vice versa.

2.4   Consistency with empirical evidence

One might believe a regression analysis between the choice of contract and its potential cause, such as variance of production with a random collection of plants would be sufficient to test the hypothesis in the previous section. Unfortunately, it does not work that way. From the analysis above, the endogenous variables are the two transaction costs: monitoring and negotiation. Thus, in order to examine the influence of one of them, the other variable must be kept constant. In econometrics, omitting an essential variable in a regression model would certainly produce biased results, which I will demonstrate in the next section.

● Hypothesis 1
Rice vs wheat in China
Table 1 from S. N. S. Cheung (1969) summarizes the mean and variance of wheat and rice production in the period 1901-1950 in Taiwan (unit: kilogram). According to Table 2-1, the variance in wheat production in the time period 1941-1950 is significantly larger than for rice, whether in absolute amount or relative terms.

According to Allen and Lueck (1992, p. 402), 'underreporting may take the form of crop quality as well as quantity. For example, ***a farmer may keep the best hay or the wheat with the fewest weeds for himself***, while not underreporting quantity at all. An extreme example is land leased for pasture. This land is cash rented because the costs of detecting quality and weight-gain underreporting for live cattle is prohibitive'. In the modern terminology of econometrics, the technique Cheung (1969) used 50 years ago is called difference in differences (DID). The plants he chose were rice and wheat,

which are both staple plantation crops. Staple crops share the property of homogenous quality, large quantity, and low profit margin per acre. These similarities between rice and wheat enabled Cheung (1969) to control the monitoring cost roughly constant, and compare the variance of production alone.

Table 2-1: Variance between rice and wheat

Physical output/Year		1901-1910	1911-1920	1921-1930	1931-1940	1941-1950
Mean	Wheat	880	710	759	1058	625
	Rice	1318	1379	1588	1927	1648
Variance	Wheat	291	118	375	1180	1158
	Rice	31	32	46	62	180

Source: Computed from data in Sino-American Joint Commission for Rural Reconstruction. Taiwan Agricultural Statistics, 1901-1955 (Taipei: 1956), p. 20 and 24.

Rice in different regions in Malaysia

Y. Huang (1973) used data from Malayan paddy land and found the use of share contracts was only common in Kelantan, a state on the eastern coast, where productivity was low and risk was high. Due to poor weather conditions, lack of government facilities, and pest damage, productivity in Kelantan was 50 percent lower than the other four states on the western coast. The output fluctuation was also larger in Kelantan, as often much of the harvest was lost. The exact figures are shown in Tables 2-2 and 2-3 below. This evidence is consistent with Cheung's prediction. Again, the comparison using one crop alone eliminates the influence of monitoring cost difference.

Table 2-2: Paddy area classified by tenure, 1957 (Percentage)

State	Owner	Fixed-rent	Fixed-rent	Lease	Sharecropping

	Farm	in Paddy	in Cash	(Cash)	
Perlis	53.2	38.3	0.7	2.0	5.8
Kedah	44.0	41.6	7.7	6.2	0.4
Wellesley Province	38.0	57.3	0.6	3.8	0.3
Perak	56.7	34.9	5.4	1.5	1.0
Kelantan	50.9	1.8	0.1	…	47.0

Source: Wilson (1958)

Table 2-3: Average paddy yields by state, 1960-68

State	Average Yield*	Range[T]	Standard Deviation	Coefficient of Variation
Perlis	486	417-560	48.22	9.92%
Kedah	486	367-531	57.19	11.76%
Wellesley Province	461	402-550	53.33	11.56%
Perak	369	325-422	35.66	9.66%
Kelantan	261	116-375	92.70	35.51%

Source: Calculated from data supplied by the Malaysian Ministry of Agriculture and Cooperatives.

*: Yields (output per acre) are measured in gantangs per acre, with 400 gantangs 1= ton. The average yield is the average of eight annual yield figures for each state.

T: The range is the lowest and highest yields obtained during 1960-68 for each state

Same crop between black and white farmers in 1910, US

Although Reid (1973) uses data from 1910 in the US to deny the existence of a relationship between the use of sharecropping contracts and yield variance, I cannot

reach his conclusion based on the data he provides. Tables 2-4 and 2-5 below show his evidence. Two patterns can be observed. The first is that, the scale of the yield variance for both corn and cotton in the 1910s US is at a similar level to rice producing paddy land in Malaysia in the 1960s. This less significant variation in production in America indicates the enormous productivity difference between the two nations. It implies that the agricultural data in the US from the 1910s has already become unsuitable to detect the importance of variance. The second and more important pattern is that the percentage for blacks using sharecropping contracts is higher than whites in almost all states for corn and cotton. With strong racial discrimination at that period of time, it is not hard to predict that African Americans had significantly fewer opportunities to acquire better quality land than their white counterparts. Under the same weather conditions in each state, the black tenant and landlord had to face much higher output fluctuation. Therefore, as one of the four stylized facts suggest, share contracts are often associated with less productive land.

Table 2-4: The coefficient of variation and use of sharecropping contracting in different states in US in 1910 by race (percentage) for corn

	Corn		
State	Yield Variance[a]	% Black Sharecropping[b]	% White Sharecropping[b]
North Carolina	.095	49.5	23.2
South Carolina	.237	34.6	16.5
Georgia	.099	39.3	22.7
Florida	.100	12.5	6.3
Tennessee	.159	38.7	23.8
Alabama	.173	25.8	21.6
Mississippi	.204	38.2	16.9
Arkansas	.230	32.9	23.6

| Louisiana | .150 | 58.3 | 16.7 |

Table 2-5: The coefficient of variation and use of sharecropping contracting in different states in US in 1910 by race (percentage) for cotton

	Cotton		
State	Yield Variance[a]	% Black Sharecropping[b]	% White Sharecropping[b]
North Carolina	.096	55.1	28.6
South Carolina	.158	41.6	20.6
Georgia	.125	42.5	27.2
Florida	.120	16.7	9.9
Tennessee	.143	34.3	26.3
Alabama	.133	23.9	23.9
Mississippi	.125	41.5	19.6
Arkansas	.145	40.0	28.4
Louisiana	.248	61.2	18.6

Source:

a. Coefficient of variation computed from average yields, 1900-1909, in Robert Higgs, "Race, Tenure, and Resource Allocation in Southern Agriculture, 1910."
b. Percentage of specific crop acreage sharecropped, by race, from U. S. Bureau of the Census, Negro Population, 1790-1915, pp. 623-24.

The 2ⁿᵈ and 3ʳᵈ stylized facts by Newbery and Stiglitz (1977)

Newbery and Stiglitz (1977) summarized four phenomena that needed to be explained. The second is the decline in sharecropping in the modern era around the world. Singh and Byerlee (1990) examine the coefficients of variation of wheat production in 57 nations in the period 1951 to 1986, and find a consistent decline in field variability. In particular, they find the wheat yield variability in state, district and national level data of India all confirm the decline. Wheat, among other cereals, experienced the most significant technological improvement in the 1980s. In addition, Singh and Byerlee

(1990) find technological change reduces, instead of increases coefficients of variation for wheat production. Anderson and Hazell (1989) confirm the pattern of decline in the variability in grain yields, including rice and wheat. Such a decrease in variance can be viewed as a reduction in negotiation cost to reach agreement between tenants and landlords for a specific amount of rental payment. This overall decrease in variance of production explains the drop in the number of sharecropping contracts around the world, especially in underdeveloped nations.

Another puzzle raised by Newbery and Stiglitz (1977) is that sharecropping contracts are often associated with land of lower productivity. Taylor, Payton, and Raun (1999) review 362 wheat research projects of over 2000 wheat experiments and find that there is a significant negative correlation between mean yields and coefficients of variation. Hence, the negotiation cost of a fixed-rent contract for low-productive wheat land is higher.

Similar cases

In a market without interventions, masseuses, legal or otherwise, often adopt a share contract with the house[5]. Similarly, it is common knowledge that real estate agents and salespersons always use share contracts (i.e. commissions) (Jean, 2019). It can be understood as the incomes of these professions change dramatically from time to time, person to person, and it is virtually impossible to predict the amount of outputs for each worker beforehand. Hence, without an actual measure of the variance in the outputs, it can be argued that the high negotiation cost prevents the relevant parties from using a fixed-payment contact. Rusco and Walls (2005) find that the share contract is used in rural areas and fixed-rents are more prevalent in urban areas in the bus market in the Philippines. This observation may be explained by the variance of production for buses in rural areas being higher due to low population density.

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[5] Labor market is an area of heavy regulations. Thus, the wage contract for massage therapists used in western nations, such as the US, is often hourly payment, just like other jobs. However, almost all the masseuses I met in China are under share contracts with the house.

● Hypothesis 2

Modern agriculture in the US

There is less disagreement in the field of sharecropping that the monitoring cost on total output affects the choice of contract. Allen and Lueck (1992) found some supporting evidence in the 1980s US. The institution Allen and Lueck (1992, p. 408) mentioned is the local elevator, which provides measuring services for crops sold privately. In their case, the special crop is hay crops: alfalfa, brome, and native hay, which never go to the elevator in their sample. They found that hay crops difficult to measure at harvest were more likely to use fixed-rent contracts.

Pre-modern society

In fact, the advanced technology in modern developed nations makes the empirical testing of monitoring costs more complicated. In a traditional society, distance itself increases the cost of monitoring. A story in the famous classic Chinese novel, *A Dream in Red Mansions*[6] provides some insights. The landlord family used to live in the north of China, then moved to Beijing with the Manchurian emperor. With their family land thousands of miles to the north, the landlord relies on agents to collect their rent. Even though the outputs fluctuated dramatically in the north, being highly reliant on the weather, the landlord still employed a fixed-rent contract, as the supervision cost was too high for them to use a share contract. The agent asks for a reduction in the rent because of famine. There is no evidence to show whether the agent is lying. However, the landlord permits such a reduction without hesitation. On the other hand, local landlords have a lower cost to find out the actual output. Thus, they normally use share contracts. In fact, an empirical study does find that distance between a landlord's residence and the location of his or her property increased the choice of fixed contract in sixteenth century France (Hoffman, 1984).

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[6] Chapter 53 of the book describes this story.

Uber and taxis

In another area, Tsui (2016) explains that the use of share contracts in the Uber industry is due to high variance in production. It is noticed that the target customers of the taxi and Uber industries are often the same, that is, passengers with random destinations. This characteristic of the taxi industry makes the prediction of outputs for each driver impossible. At least in China, I found that all taxi drivers must pay a fixed-rent to the car owner. In this case, where there is no remarkable difference between the output fluctuation for each taxi and Uber drivers, 'hidden action' or the monitoring cost plays a more crucial role in deciding the form of payment contracts. The adoption of a share contract in the case of Uber is caused by the invention of the smartphone application, which allows passengers to submit a travel request and the software then organizes the Uber driver in the region to pick up the passengers. The Uber app automatically calculates the fare based on four criteria: base fare, cost per minute, cost per mile and booking fee. This smartphone application greatly reduces the cost of monitoring for the Uber company to adopt a share payment system.

One might question the lack of econometric technique in this paper, especially in the example of Uber. It should be emphasized that regression techniques are used to find small changes in variables, just like Allen and Lueck (1992) did in their research. However, these real-life examples demonstrate visually observable changes, which makes the use of complicated econometric techniques redundant. As discussed earlier, apart from the formality, the two examples reach the same conclusion, which demonstrates the importance of monitoring costs.

2.5   Explanation for contradictory results

A number of studies conclude that variability in production does not affect the choice of sharecropping. A study by Rao (1971) is often used as a rejection of Cheung's explanation of risk-sharing. The plants Rao chooses are rice and tobacco. The latter is not a staple crop. If we return to the examples above, Cheung (1969) and Anderson and

Hazell (1989) study rice and wheat, Huang (1973) examined rice production in different regions, and Singh and Byerlee (1990) and Taylor, Payton and Raun (1999) focus on wheat alone. These studies used crops of similar kinds, the same crop in time series, or the same crop in different regions to satisfy the assumption of *ceteris paribus,* and study one aspect of these plants alone. In these cases, they examine the coefficient of variance of production, while holding other variables roughly constant, especially these factors affecting the monitoring cost.

According to the webpage of the Tobacco Institute of India, there are a number of characteristics of tobacco plantations that may increase the transaction cost of monitoring. Firstly, the varieties of tobacco include cigarette tobacco, and non-cigarette tobacco. They can be further categorized into a number of sub-categories. In India, the production of tobacco is particularly diverse, due to its consumption patterns. Most crucially, compared with other staple crops, 'tobacco grows in poor, marginal soils that are largely unsuitable for cultivation of other crops. It is a highly labor intensive and remunerative crop providing much higher returns than other crops grown in the region' ("Tobacco Production,"). Thus, even in the case of comparing variance in yields for two plants, the other properties of the crops should be roughly the same. Rao (1971) and many works of Allen and Lueck violate this assumption, which makes their comparisons between variance and sharecropping meaningless.

Monitoring costs in the pre-industrial-revolution period are rather stable, and play a trivial role in the choice of contract. The occasional outliers, such as the influence of distance would be evened out by the law of large numbers. However, as Allen and Lueck (1992) have shown, this transaction cost has changed dramatically in developed economies such as the US in the modern era. Hence, their comparison violates the assumptions of difference-in-differences (DID), and creates an omitted variable bias in their results, in which they treat one endogenous variable as exogenous. In other words, both endogenous variables are changing in the sample.

Apart from the omitted variable bias, there are a further two issues that exist in the sample of Allen and Lueck (1992, 1999) that cannot be eliminated by any regression techniques. In agriculture, Taylor et al. (1999) defined large coefficients of variation as being over 30 percent. Allen and Lueck (1992, 1999) tested the relationship between product variance of different crops and the use of share contracts, which they define as the risk-sharing approach, using data from the 1980s and 1990s from the United States. In both cases, they find no correlation between the two variables, which they argue refutes the risk-sharing hypothesis[7]. However, comparing the size of their variance with the results of Cheung (1969) and Huang (1973), it is clear that the overall variance of the latter is significantly higher than that of the former. Almost all the crop yield coefficients of variance in Allen and Lueck's result are around 10 to 20 percent, quite low in agriculture, considering their sample unit is the state, as shown in Table 2-6. This is similar to rice production in China, where the cost of negotiating a fixed-rent plays a trivial role in the contract decision. To test the influence of a factor, the variable must move in a range. However, as one of the most advanced nations in agriculture, it is sensible to predict that variance in production for the US should not be so large a change, compared with developing nations, such as China and Malaysia.

Table 2-6: Coefficient of variation of Corn and wheat in different states

	Yield Coefficient of Variance (percentage of share contracts)	
Region (date of the sample)	Corn	Wheat
British Columbia (1992)	0.27 (20)	0.18 (79)
Louisiana (1992)	0.29 (62)	0.21 (76)
Nebraska (1987)	0.12 (69)	0.11 (86)
South Dakota (1987)	0.14 (64)	0.25 (61)

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[7] There is a need to point out that variance as a variable can be interpreted as either risk or transaction cost. The falsification of the risk-sharing hypothesis does not necessarily mean that variance as a variable cannot cause the choices of contract.

Source: Allen and Lueck (1992, 1995)

Last, agricultural industries in developed nations are more influenced by public policy and other private insurance for famine. These factors surely would affect the choice of contract, but as Allen and Lueck (1992) admitted, cannot be solved.

To sum up, as my research interest is in how variance in production affects the choice of sharecropping contract, agricultural contracts in the US might not be the appropriate sample. The agriculture industry in developing nations seems like a better laboratory for the choice of sharecropping contract.

2.6 Conclusion

To sum up, this paper has provided a critical review of the risk-sharing approach. The existence of the 'escape clause' shows that risk-preference in risk-sharing analysis is not appropriate. In addition, another contradiction between the risk-sharing approach and the transaction cost approach, in this study, relates to the zero-profit principle. The inability to explain the existence of the sharecropping contract with the moral hazard model indicated that mainstream contract theory was based on an absurd premise that the returns for various contractual arrangements differed. This unrealistic assumption was made due to the ignorance of alternative contractual arrangements and reinforced by the 'preferences' forced by economists. Such logical inconsistency renders a huge number of risk-sharing models into *ad hoc* theory, which cannot be tested empirically.

The paper then established a theoretical analysis that argued that both monitoring cost and information cost of the quantity of the output are determining constraints for choosing share contracts. The two hypotheses were examined with existing studies. By clarifying the relevant assumptions, not only have we demonstrated evidence supporting our explanation, but we also illustrated how contradictory findings are not valid. In fact, this link between theoretical analysis and empirical studies is an

unintended contribution of this paper. It demonstrates the importance of theoretical models to provide the necessary instructions for empirical testing. Otherwise, endogenous variables that need to be controlled in examination, but treated as exogenous, will certainly create biased results.

Finally, three points need to be clarified. Firstly, although the analysis in this paper seems to confirm the prediction of the risk-sharing approach, there is a fundamental difference between the two. Risk, other than the variance of production, cannot be measured and employed to other contractual arrangements, such as the boundary of firm explanation of Ronald Harry Coase (1937). This issue limits the application of risk-sharing analysis to broader circumstances. Secondly, the analysis of Cheung (2014) is in its essence, an expansion of Coase's theory of firm. When Ronald Harry Coase (1937) explains the size of the firm, he emphasizes the concept of 'substitution at margin' developed by Marshall (1920) in his introduction. As a result, the explanation of Ronald Harry Coase (1937, p. 394), in its essence, is a marginal answer, which argues that 'a point must be reached where costs of organizing an extra transaction within the firm are equal to the costs involved in carrying out the transaction in the open market'. If we view 'market' and 'firm' as two contractual arrangements, then the assertion of Cheung (2014) can simply be seen as a generalization. Thirdly, by unifying the analytical terminology, one theoretical assertion of this study is that the choice of contract in a free market is that with the lowest possible transaction cost. Hence, a logical consequence is that government intervention that restricts freedom of contracts will ultimately increase the overall transaction costs, as stated by S. N. S. Cheung (1974).

Chapter 3: Theoretical framework

3.1 Introduction

The Labor Contract Law (LCL), which was implemented in 2008 in China, provided a valuable opportunity to examine the overall impact of labor market interventions. Before the Chinese parliament passed the LCL in 2007, the 1994 Labor Law regulated the labor market. The LCL, which was highly influenced by developed nations (Karindi, 2008), improved mandated benefits, such as social security, and introduced employment protection such as severance pay. In the terminology of common law, the LCL chose a "purposive approach" that views labor as the "weak" side, which needs intentional intervention over the traditional "freedom of contract", which argues that external parties have no excuse for interventions based on fairness or bargaining power (Atiyah, 1985).

Labor market interventions, such as minimum wage law, employment protection legislation (EPL), and mandated benefit (MB) in essence are the same, in that they alter the price of labor. The consequences of price controls have been well established. In other fields of economics, S. N. S. Cheung (1969) found that when the Taiwanese government raised the rental percentage for share tenancy, the tenants increased their labor inputs in production to compensate for landlords' losses. Landlords impacted by price controls also reduced their inputs such as water infrastructure, and attempted to use other payment arrangements or cancellation of the leases. S. N. S. Cheung (1974, p. 58) later summarizes that a restriction on any private property rights would lead to

''a change in the form of using or producing the good … or through a change in contractual behavior'', and result in ''a decline in its value''. Empirical studies around the world have found evidence supporting S. N. S. Cheung (1974) after labor market intervention: capital deepening in production (Autor, Kerr, & Kugler, 2007; Cingano, Leonardi, Messina, & Pica, 2015), increases in informal workers (Dillender, Heinrich, & Houseman, 2015, 2016; Even & Macpherson, 2015; Lazear, 1990; Mulligan, 2014) and unemployment (Kirkegaard, 2014; Yan, 2015), and declines in overall productivity (Autor et al., 2007; Caballero & Hammour, 1998).

However, a theoretical explanation about the overall impact of labor market interventions is still lacking. The first issue is the inability to produce a refutable hypothesis. Regarding the employment impact of labor market interventions, neither Summers (1989), who studied mandated benefits, nor Lazear (1990), who studied employment protection legislation, could generate a definite prediction. Second, some theoretical analyses cannot produce general applications other than within in a specific situation. For instance, Caballero and Hammour (1998) explained the phenomenon of increases in capital investment and decreases of total factor productivity (TFP) after the improvement of job security through the concept of "appropriability of capital." Last, different theoretical models produce contradicting predictions. With the assumption of treating productivity as exogenous, Bentolila and Bertola (1990) and Bertola (1990) argued that employment levels would not be affected by firing costs. In contrast, Hopenhayn and Rogerson (1993) with alternative assumptions, predicted that the increase in employment protection would decrease employment. As Addison and Hirsch (1998, p. 126) pointed out, the argument on both sides is "often less than compelling."

Thus, this research examines the overall impact of labor market interventions on different parties, which includes labor, capital, and other beneficial interest groups. Existing empirical evidence will be presented to test the predictions.

The premise of this analysis is based on the Marshallian derived demand model, a partial equilibrium in its essence. Milton Friedman (1955, p. 904) commented on the difference between the approaches of Marshall and Walras: the tool of supply and demand for Marshall is an ''engine for the discovery of concrete truth.'' On the other hand, the Walrasian equilibrium provides sophisticated mathematical analysis, but cannot solve any particular (real) problem. As Hoover (2004, p. 12) put it, ''There is a sense that the Walrasian attitude is that to know anything, one must know everything.'' Thus, Milton Friedman (1991) criticizes the use of mathematics in modern economics as impressive rather than informative. Romer (2015) also made similar criticisms. This paper, therefore, intends to demonstrate how useful the Marshallian equilibrium can be in discovering the ''concrete truth'' with a realistic assumption.

This paper makes three contributions. First, as previous theoretical studies tend to concentrate on only one aspect of labor market interventions, such as an increase in informal workers or replacing labor with capital, the analytical framework adopted in this paper explains these phenomena related to such regulations in the same setting. This general applicability enables a comparison between different aspects related to labor market interventions. Second, more than one regulation often exists in the current labor market. Although theorists attempt to explain such interventions separately with independent models, there is a need for a framework to evaluate these regulations together to examine interrelated effects. Hence, this paper incorporates the social average wage level, social security (mandated benefits), and the Labor Contract Law (employment protection legislation) into one framework. Last but not least, the theoretical analysis in this paper is in line with other branches of economics, such as common resource, price control theory, theory of the firm, Coase theorem and insider/outsider theory. This reinforces the model's reliability.

The remainder of the paper is organized as follows. Section 3.2 critically reviews the work of Summers (1989) and demonstrates that the lack of explanatory power of the

current theoretical approach results from the lack of a realistic assumption. Section 3.3 provides the theoretical model. Section 3.4 tests each of the hypotheses with existing empirical evidence. Section 3.5 explains the underlying reason for the controversies in regard to labor regulations. Section 3.6 discusses the relationship between the theoretical explanation and other branches of economics. Section 3.7 reports the findings of this research and concludes.

3.2   Critical review

"Some simple economics of mandated benefits" by Summers (1989) is a classic paper in labor economics. As the title suggests, the simplicity in that paper provides an obvious example to examine, and it is also similar to the theoretical analysis in the current article. By comparing against the work of Summers (1989), I demonstrate the importance of realistic assumptions in economics.

In an interference-free environment, market supply-and-demand curves determine both the level of employment and wage prices. Summers argued that mandated benefits decreased labor demand from firms and increased the supply of labor. Summers' paper demonstrated that, given the same decline in demand, the difference in the value of such benefits would mean the exact position of the new market labor supply curve was undetermined. In this setting, mandated benefits could increase, decrease, or even remain at the same employment level. In the field of logic, such a model is a tautology, an assertion that is true in every possible interpretation. In other words, the level of employment, the only observable variable in Summers' model, cannot be tested empirically.

This lack of predictability raises an interesting question. Are the assumptions in Summers' theory correct? It should be noted that both the labor demand and supply curves move in Summers' model. In the basic model for minimum wage, the policy impact is a price floor above the equilibrium. In its essence, it is a shift in the supply of

labor, with no change in the demand curve. If we express the benefits payments in monetary terms, the two models should be roughly the same.

Such speculation prompts a further question: Was there any double counting in Summers' model? Labor demand as derived demand, should remain the same if the primary market were unaffected by government interventions, holding other variables constant. On the other hand, would the increase in mandated benefits shift the labor supply curve to the right? Would it be different if we changed the focus from labor to a good or other input? Suppose that robots have replaced human workers and certain interest groups want to improve the working welfare of robots, like giving them an extra set of clothes. The supply curve of robot workers, like all other goods would then shift to the left, as the cost per robot increases. Labor supply curves are derived from cost curves, which, according to general price theory, have nothing to do with willingness to pay employees.

Finally, the market labor supply curve is an aggregation of the firm-level labor supply curve of the economy. At the firm level, labor market interventions, such as mandated benefits and employment protection legislation, affect employment in three aspects. First, they reduce the profitability and survival rate of firms, especially small businesses. Second, they induce firms to replace human workers with machines. Third, even without any firm changes, such interventions function as a price control, like a minimum wage. Therefore, these regulations raise the cost of labor, which shifts the market supply curve upward instead of downward.

Thus, this paper intends to propose an alternative approach to settle this debate. Multiple hypotheses have been generated from the same theoretical analysis and tested separately and repeatedly. Although it is true that each hypothesis could and need only be perceived as correlation, together they enable causal inference. This multiple hypotheses approach was first used by Milton Friedman (1957) in his famous book about the consumption function, in which he tested a permanent income hypothesis in

different contexts, such as different ethnic households, industries, time series, and income levels[8].

3.3   Theoretical analysis

The inspiration of this paper comes from S. N. Cheung (2008), who argued that both employment protection legislation and mandated benefits act as mechanisms intended to transfer economic rent from employers to employees. He further pointed out that this part of economic rent was not defined explicitly in terms of property rights and, as such, attracted interest groups to seize wealth without ownership. Hence, the number of peculiar outcomes related to the LCL can be seen as a case of the tragedy of the commons. We provide graphics and mathematical solutions accordingly in this section.

3.3.1 Setting the stage

It is well-known that labor demand is a derived demand of the primary market, also called the value of marginal product of labor, and is equal to the price of the good times the marginal productivity of labor. It represents the dollar value increase in revenue generated by one extra labor unit, that is, it holds capital constant. In a competitive market for homogeneous labor in a typical firm, the labor supply curve would also remain constant at w_1 dollars/unit of labor, as shown in Figure 3-1.

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[8] Friedman argued that permanent consumption is in a fixed function relationship with permanent income. These different scenarios in his empirical testing chapters functioned as repeated experiments, which improved the reliability of his assertion.
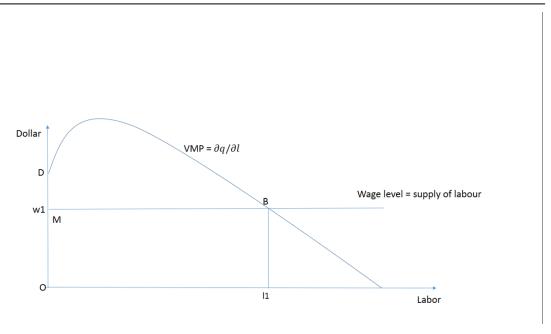
Figure 3-1: The free market firm-level equilibrium

Moving along the horizontal axis, the DB curve represents the marginal return of each unit of labor and MB represents the marginal cost of such labor input. The employer will cease hiring at the point where marginal revenue (MR) equals marginal cost (MC) at point B, with l_1 of labor at the cost of w_1 per labor unit. The integration of the value of the marginal product of labor (VMP) or the area below the VMP represents the total value of output, $ODBl_1$. We further divide $ODBl_1$ into two parts, MDB and $OMBl_1$, which stand for the returns on capital and labor.

According to the previous analysis, we assume the production function of a typical firm is, $f_1 (k, l)$, where k and l are capital and labor, respectively. Hence, the equilibrium point can be rewritten into the mathematical form of $\partial f_1 (k, l) / \partial l = w_1$, the market wage level. The capital return or economic rent would be the integration of the partial derivative of production to the point of l_1, minus the labor return—i.e., $\int_0^{l1} (\partial f1 (k, l) / \partial l) \, dl - l1 \times w1$—and the labor return would be $l_1 \times w_1$.

3.3.2 The impact of each regulation

At this point, we introduce institutional factors into the model. As detailed legislation is distinct in different nations, the following assumptions were made based on the legal

context in China. However, with minor adjustments, the analysis can be applied to other environments, such as the study of the Affordable Care Act (ACA; aka 'Obamacare') in the US.

The Labor Contract Law (LCL) is considered to be employment protection legislation (EPL). The LCL mandates written contracts with severe penalties (Articles 10, 14, and 82), social security (Article 17), and severance payment (Articles 46 and 47). Its primary function, as stated in Article 1, is "to build and develop ... stable employment relationships," and thus to increase the number of formal workers and coverage of mandated benefits. Many empirical studies of the LCL using different household survey data have shown that the coverage of employment contracts and social insurance have both increased (Cheng, Smyth, & Guo, 2015; Gallagher, Giles, Park, & Wang, 2013; Gao, Yang, & Li, 2012; Meng, 2017).

Second, the social security payment for each worker is the product of his or her salary and a fixed rate. Social security includes pensions, medical insurance, unemployment insurance, work-related injury insurance, maternity insurance, and housing accumulation funds. Among these mandated benefits, pensions account for most of the share. As the Chinese system was copied from the US system, both the employee and employer must contribute to the fund. This shared-payment design has not changed the fact that each unit of additional labor must be paid the social security payment.

Lastly, one labor department notice stated that the base salary for social security payments should be in the range of 60 percent to 300 percent of the social average wage level (SAWL) (China, 2008). Most private companies use the lower boundary of 60 percent of the SAWL as the base for social security payments. Thus, increasing this wage level could be a way to improve the social security payments rate per worker, $w_2 - w_1$. The SAWL as the base for social security payments significantly increased at a rate of roughly 10 percent per year in China, which is consistent with claims provided by foreign firms leaving China in this period (Yuki, 2014). Many criticized the SAWL

calculation as being misleading and manipulative (Tencent, 2015).

As shown in Figure 3-2, the LCL aims to transfer the MABC, or $(w_2 - w_1) \times l_1$, from the firm to workers, which raises the price of labor. The actual location of the AB line is unclear, as there are many ambiguous statements in the LCL—the major difference between this model and the minimum wage model. The purpose of social security is to increase the costs per worker, $w_2 - w_1$. On the other hand, the LCL was aimed at increasing the actual coverage of benefits to all employees, l_1. Also, the yellow line represents the minimum wage base level for social security, which is 60 percent of the SAWL. As previously mentioned, the government increases the level annually to collect more social security payments per worker.[9]

Figure 3-2: Impact of different legislation

Given the output from the production function $\int_0^{l1} (\partial f1\,(k, l) / \partial l)\,dl$, the intended coverage of welfare l_1, and the level of welfare w_2, the capital return after the intervention can be written as, $Rk = \int_0^{l1} (\partial f1\,(k, l) / \partial l)\,dl - l1 \times w2$.

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[9], Ma Kai, the Vice Premier Minister of China, also comments that the share of social security payments is too high, comprising about 40% to 50% of total labor costs according to the law in 2015. However, if the social average wage level is used as the base instead of the actual wage level, the social security payment is roughly 30% of the labor cost. By law, if the actual wage is below the minimum level social-average wage level, employees must pay 60% of the social average wage level as social security payment.

3.3.3 Hypothesis

With the constraints of self-interest, it is predicted that an owner would want to minimize the area of $(w_2 - w_1) \times l_1$, whereas workers would want to maximize this area of a common resource. It leads to two broad predictions:

- Hypothesis 1: The intervention will lead to more conflicts in the labor market.
- Hypothesis 2: An increase in the cost of labor due to government regulations would lead to an increase in the capital-labor ratio in production, with a decline in productivity.

For hypothesis 2, the capital deepening at firm-level can result from two strategies adopted by employers to minimize the cost of labor.

One process to delay the effects of rising labor costs is to change the production function from $f_1(k_1, l_1)$, to $f_2(k_2, l_2)$. It reduces the use of labor $(l_1 > l_2)$ with higher consumption of capital $(k_1 < k_2)$, which is shown in Figure 3-3. Logically, if the new production function were more profitable in the first place, the self-interested employer would choose it before the intervention. Thus, there must be a loss of efficiency as the inequality at the margin.

Figure 3-3: Changing production function by firm

The decision to use either machines or human workers after the intervention can be written as the following two equations with no specific form of the production function. Equation (2) represents the old production function with the law-intended increase in the cost of labor (w_2), and Equation (1) is for economic rent with the new production function. In other words, the substitution would occur only if Equation (1) minus Equation (2) produces a positive result, as shown:

$$\int_0^{l2} (\partial f2\ (k, l)\ /\ \partial\ l)\ dl - l2 \times w2 \qquad\qquad --- (1)$$

$$\int_0^{l1} (\partial f1\ (k, l)\ /\ \partial\ l)\ dl - l1 \times w2 \qquad\qquad --- (2)$$

$$\int_0^{l2} (\partial f2\ (k, l)\ /\ \partial\ l)\ dl - l2 \times w2 - \int_0^{l1} (\partial f1\ (k, l)\ /\ \partial\ l)\ dl + l1 \times w2 =$$

$$\left[\int_0^{l2} (\partial f2\ (k, l)\ /\ \partial\ l)\ dl - \int_0^{l1} (\partial f1\ (k, l)\ /\ \partial\ l)\ dl \right] + (l1 - l2) \times w2$$

---- (3)

We can obtain the following results, given the productivity of the old production function, $\partial E3\ /\ \partial\ w2 > 0$, $\partial E3\ /\ \partial\ l1 > 0$, and $\partial E3\ /\ \partial\ f2\ (k, l) > 0$. Translating the mathematical result into common language, it means other things being constant, the capital deepening process is determined by the cost per unit of labor (including

welfare), welfare coverage, and the efficiency of the new production.

Another way for an owner to avoid the rising cost of labor is to adopt alternative contractual arrangements. Given the same size in the increase in cost per unit of labor due to mandated benefits (social security) and employment protection legislation (e.g. severance payments, among other things), a simple way to reduce the direct cost of labor is to reduce the coverage of benefits. We explain this scenario in Figure 3-4, whereby the owner only needs to pay the extra benefits, w_2, for full-time workers up to the amount of l_2 labor. Total employment may remain at l_1, with many informal workers only receiving a market wage, w_1, instead of the extra benefits intended by the regulations. The informal workers in strict legal terms, might not be classified as employees of the firm. Common contractual arrangements used include dispatch firms and subcontractors. If the capital remains the same, the reduction in employment will raise the capital-labor ratio at the firm-level.
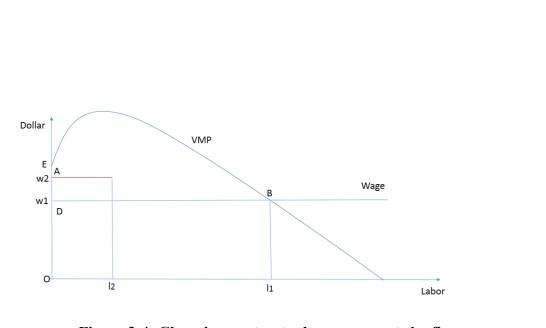

Figure 3-4: Changing contractual arrangements by firm

Similar to the previous analysis, the contractual change would occur if the gain in Equation 6 is larger than zero:

$$\int_0^{l1} (\partial\, f1\, (k, l) \,/\, \partial\, l)\; dl \;-\; (l1 - l2) \;\times\; w1 \;-\; l2 \;\times\; w2 \quad \text{--- (4)}$$

$$\int_0^{l1} (\partial\, f1\,(k, l)\, /\, \partial\, l)\, dl - l1 \times w2 \quad \text{--- (5)}$$

$$\int_0^{l1} (\partial\, f1\,(k, l)\, /\, \partial\, l)\, dl - (l1 - l2) \times w1 - l2 \times w2 -$$

$$\int_0^{l1} (\partial\, f1\,(k, l)\, /\, \partial\, l)\, dl - l1 \times w2 = (l_1 - l_2) \times (w_2 - w_1) \quad \text{--- (6)}$$

In Equation 6, suppose w_1 and w_3 are given, and $l_2 < l_1$, we thus obtain a similar result:

$$\partial\, E6\, /\, \partial\, l1 > 0, \text{ and } \partial\, E6\, /\, \partial\, w2 > 0.$$

3.4 Consistency with existing evidence

We test the hypotheses generated in the previous section in this section.

● Hypothesis 1:

Empirical studies on labor strikes and disputes are somewhat limited in both China and other nations. Moreover, the cause of these employment conflicts is also far from reaching any agreement. The common stereotype the supporters of the LCL used is that workers raised more disputes and strikes because they lacked welfare (Harris, 2008; X. Li & Freeman, 2015). Nevertheless, Addison and Hirsch (1998, p. 126) described the situation in which "more enthusiastic supporters of mandates attempt to justify them with rationale from what are incomplete models, ignore what is unintended although predictable secondary effects of employment regulation, exaggerate benefits and understate costs, and demonstrate little appreciation for market alternatives."

After 2008, both labor disputes and strikes increased significantly. Harris (2008, p. 1) acknowledged the fact that the number of Chinese labor disputes in 2008 doubled from 2007, but their new argument was that 'This increase in labor law cases proves both that Chinese workers are aware of their new rights under the LCL and that they perceive themselves as having new rights worth enforcing.' Remington and Cui (2015) find that the LCL significantly increased the volume of labor disputes.

Regarding the numbers of labor strikes, Elfstrom and Kuruvilla (2014) provided a

review of strikes in China and found two changes during 2008. First, the number increased significantly. According to the *China Labor Bulletin*, the average number of strikes was 55 per year from 2000 to 2010 (China Labor Bulletin, 2012). In 2016, the number of strikes rose to 1,454 for only the first half of the year, an 18.6 percent increase from 2015 (China Labor Bulletin, 2016). Second, the nature of the strikes changed. Before 2008, workers were fighting for existing rights and benefits, which they categorized as defensive. However, since 2008, workers have been striking for more money, more benefits, and better working conditions. Silver and Zhang (2009, p. 174) and E. Friedman (2012) both identified China as "an emerging epicenter of world labor unrest."

Hypothesis 2:

Manufacturing firms in China, such as Foxconn, have increased investment in machinery or robots to replace labor since the LCL enforcement (Wakefield, 2016). Z. Liu (2015a) confirmed that economic growth in China has been more dependent on capital investment since 2008 and contributions from labor have shrunk. Ren (2015) used data from 2001 to 2013 to determine that the implementation of the LCL in 2008 correlated with an increase in the capital-labor ratio in large stock-market-listed companies in China.

This transformation from using more labor to more capital is a worldwide phenomenon. Cingano et al. (2015) found that improvement in employment protection (EPL) in Italy for small firms had caused an increase in the capital-labor ratio, which indicates the inputs transforming from labor to machinery in production. Similarly, Autor et al. (2007) found that in the US the adoption of EPL had increased labor productivity significantly and decreased the TFP. Hasan, Mitra, and Sundaram (2013) showed that labor market regulations could increase the capital-labor ratio in the manufacturing industry in developing nations such as India. Some empirical evidence in the name of union-improved labor productivity, actually were supporting evidence of hypothesis 2, such

as that provided by Morikawa (2010).

Apart from changing the production function, alternative contractual arrangements are another option for owners to reduce the impact of labor market interventions. According to an official report of the All-China Federation of Trade Unions (ACFTU), in the years following the enactment of the LCL, the number of dispatch workers increased by 15 percent per-annum (J. Wang, Wang, & Wang, 2011). Liang et al. (2016) use the 2007 and 2013 waves of the Chinese Household Income Project Survey (CHIP) and find a significant increase in the number of informal workers, who receive less income and welfare than formal employees.

Moreover, the number of informal workers increased after the implementation of the ACA (mandated benefits). Most studies confirm this result (Dillender et al., 2015, 2016; Even & Macpherson, 2015; Mulligan, 2014). The exception is Mathur, Slavov, and Strain (2016), who find no evidence of such a change. However, their result was criticized by others (Dillender et al., 2016; Even & Macpherson, 2015) as using the wrong period and imprecise estimation (the dataset these authors used is the same one). Lazear (1990) finds that severance pay creates a transfer from full-time workers to part-time workers in European countries. Montenegro (1999) found that tenure-based severance payment reduces long-term jobs from data from 39 consecutive annual household surveys in Chile. Autor (2003) found that improvement in EPL increased the number of labor outsourcing agents in the U.S. from 1973 to 1995 by 11 percent annually. Moreover, states with smaller declines in trade union influence experience significantly higher agency growth.

However, there is substantial evidence showing that a change in the capital/labor ratio is not an improvement in technology. A significant investment withdrawal from the manufacturing sector has occurred in recent years due to low returns in China (Hu, 2017b), along with a decline in manufacturing investments. According to official data (Chinese National Data), investment growth rate in the manufacturing industry over the

years 2004 to 2015 was 33.3 percent, 35.7 percent, 28.3 percent, 30.6 percent, 27.4 percent, 24.5 percent, 25.5 percent, 15.9 percent, 21.3 percent, 18.6 percent, 13.1 percent and 8 percent, respectively. At the same time, Hu (2017b) found that the TFP in China from 2007 to 2012 was 1.3 percent, which was the lowest point since the reform period. In comparison, the TFP from 2001 to 2007 was 4.8 percent. Similarly, R. Li and Wang (2015) showed that the technology shock in China went from consistently positive in 2001–2007 to consistently negative in 2010–2014 and has been the primary driver behind the nation's slowing growth since 2010.

Although the Chinese economic growth rate did drop after the implementation of the LCL, we cannot eliminate many internal and external impacts in regard to economic growth in China. A straightforward way is to conduct an international comparison. Autor et al. (2007) found that the adoption of EPL in the US reduced the TFP. Bassanini, Nunziata, and Venn (2009) used industry-level data in OECD nations and found that EPL has a depressive impact on productivity growth in industries where EPL regulations are more likely to be binding. Bjuggren (2015) used firm-level data in Sweden and finds that an increase in labor market flexibility improves productivity, holding capital investment and education level constant. Rama and Forteza (2006, p. 75) compared annual growth rates across 119 countries and found that "countries with relatively rigid labor markets experienced deeper recessions before adjustment and slower recoveries afterward." Besley and Burgess (2004, p. 91) find in India that states that regulate the labor market in a pro-worker direction, ''experienced lowered output, employment, investment, and productivity in registered or formal manufacturing''… ''with increases in urban poverty''.

This list can go on and on. Dictator Augusto Pinochet liberalized the Chilean economy under the influence of the Chicago School of Economics. His economic policies included banning trade unions, the privatization of social security, redesigning labor laws, and minimizing social welfare. Labor law reforms, under the influence of the "Chicago boys," created a neoliberal labor relationship in Chile and kept unions out of

the decision-making process (Ruess, 1999). Consequently, the Chilean economy performs significantly better than other Latin American nations (Bilbao, 2014). Margaret Thatcher, the former Prime Minister of the UK, shifted the balance of power in industrial relations decisively toward employers (Elliott, 2013). The U.K. economy, once viewed as the sick person of Europe, has returned to a high growth rate (Ballantyne, 2013). Germany liberalized its labor market in the 2000s; for example, the country exempted temporary jobs from income tax and social security payments. This has led to significant economic success and a decline in unemployment (Kirkegaard, 2014). Moreover, China itself demolished the permanent employment system, the "Iron Rice Bowl" in the 1990s. The reform increased the productivity of labor and improved economic performance (L. Liu, 2014).

3.5   Other phenomena: supporters and opponents

There are two other related phenomena that can be explained by the theoretical model.

First, an obvious prediction is that business owners would be, in general against labor market intervention as it reduces returns to capital. The richest Chinese woman in 2008, Zhang Yin, criticized that the implementation of LCL was a return to the "Iron Rice Bowl" (T. Huang, 2016). Business associations, such as the European Union Chamber of Commerce in China (EUCCC), the American Union Chamber of Commerce People's Republic of China (AmCham-China), and the US-China Business Council (USCBC) all raised concerns about the detrimental effect of the LCL. Xu, Tingting, the representative of the Shanghai Association of Human Resources Management in Multinational Companies actually threatened to withdraw investment if the LCL was implemented (Karindi, 2008).

Second, Karindi (2008) further reveals that the All-China Federation of Trade Unions (ACFTU) played a major role in drafting and implementing the LCL. At the same time, the LCL also strengthens the influence of unions. In 2018, the Ministry of Labor and

Social Security of the People's Republic of China (MOLSS) announced that the unions should be more active in private firms (Ministry of Labor and Social Security of the People's Republic of China, 2018).

Other supporters of the LCL are often bureaucrats in the MOLSS, labor dispute lawyers, and judges. Harris (2008), an international litigation and business law firm, conducted a study on the impact of the Labor Contract Law and found no serious impact on the economy. The law firm argues that the costs of the legislation to employers have been exaggerated and that small bankrupted firms were not so profitable in the first place. Zhou (2016), a labor dispute judge in Shanghai, denies the adverse effects of the LCL. To some extent, he even argues that the LCL would reduce the cost of labor. In an interview in 2008, a bureaucrat from the Chinese Ministry of Labor and Social Security also said the law did not significantly increase the cost of labor. He tried to use the decline in the market supply of labor and stricter enforcement to explain the problems caused by the LCL (Ministry of Labor and Social Security of the People's Republic of China, 2009).

The supporters and opponents of the intervention can be easily understood by the theoretical model. In a free market system, the property rights of ending the contract or rewarding benefits equally belongs to the employees and the employers. The intervention removes such rights from the employers. These rights were transferred to a number of interest groups, and not an accident at all, to the supporters of these interventions.

3.6   Consistency with other branches of economics

The economic theory in this research is based on price theory, however, the phenomena relating to labor market interventions can be understood and studied using other theoretical explanations. According to Ronald Harry Coase (1960), the prerequisite for a market transaction is a clear delineation of private property rights. Thus, a labor law

that protects the freedom of contract, instead of purposively favoring the labor side, provides the necessary institution for a market economy, which in turn promotes growth. Interventions, such as the LCL create a disputed area of wealth between labor and capital, which leads to a tragedy of the commons and dissipation of rent.

Furthermore, although interventionist policies are often based on externalities and information asymmetry, it should be noted that apart from market failure, there is also the cost of using government. From the perspective of a firm's margin, Ronald Harry Coase (1937, p. 394) argues that 'a point must be reached where costs of organizing an extra transaction within the firm are equal to the costs involved in carrying out the transaction in the open market.' If we view the government as a firm that provides a public service, similar assertions can then be made that the optimal government boundary is determined by the services it offers. Regarding efficiency, it is not sufficient to support interventions based on so-called defects in the market but to show that the transaction cost of using government is smaller than the market cost. The LCL was enacted to reduce social conflicts in China, however labor disputes increased dramatically after 2008, hence Remington and Cui (2015) raised questions about the relative costliness of the intervention, not to mention other negative impacts.

These negative impacts have been well-described by the theorem of rent-seeking developed by Krueger (1974), which improves the share of existing wealth for certain groups without creating anything new. According to Wade and Dabla-Norris (2001), rent-seeking activities would decrease efficiency through poor resource allocation, reduction in wealth-generation, lost government revenue, increased income inequality, and (potentially) national decline[10].

The analysis indicating an increase in informal workers in this research is the

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[10] Note that the rent-seeking theory provides similar predictions to the price control theory mentioned later. The difference between these two approaches is their perspectives, one from interest groups, and the other from the property rights of goods. It is clear that any interest group gaining certain exclusive rights from an employer would be positive in terms of the intervention.

mathematical proof of the insider/outsider theorem (Lindbeck & Snower, 1988; Lindbeck & Snower, 1984; Lindbeck & Snower, 2001). This theorem described dominant insider workers who enjoy more favorable employment opportunities than outsider workers. Lindbeck and Snower also use institutions that affect turnover costs, such as employment protection legislation (Elmeskov, Martin, & Scarpetta, 1998) and trade unions, to explain this different employment status.

3.7 Conclusion

One of the weaknesses in the study of economics is the inability to produce repeated experiments involving the variables of interest while controlling other factors. To overcome such drawbacks in social science, this study provides an alternative approach. It includes three multiples: multiple hypotheses, multiple testing, and multiple theories.

The models developed in this paper, based on suggestions from Cheung (2008), provide multi-hypotheses relating to the LCL in China. This explains the increase in labor disputes and strikes, the rises in informal workers and the capital/labor ratio, the criticisms from businesspersons, and support from some interest groups, such as trade unionists, lawyers, and judges. Also, it provides an evaluation of these labor market interventions based on efficiency and equality.

This multi-hypotheses approach provides two advantages. First, Milton Friedman (1962) illustrates why an illogical argument can be corrected for a specific case. He shows that the alleged syllogism, 'Socrates is a man, Socrates is X, therefore all men are X,' happens to be correct, when X represents 'mortal,' but not when X represents 'Greek.' More importantly, the 'correct' prediction when X stands for 'mortal' does not make the syllogism valid. Thus, he points out, the logical analysis is more applicable to many cases in addition to the particular one it studies. This comprehensive application of the theoretical analysis indicates that the assumptions in this study are realistic, reliable, and logical.

Second, the evidence presented in this paper provides an opportunity to evaluate the validity of competing hypotheses. As mentioned repeatedly, certain interest groups deliberately want to mislead the public. One popular argument is presented in the Lewis Turning Point (LPT) theory, which interprets the rising cost of labor as a result of demographic changes. However, the co-existence of an increase in unemployment[11] and the high cost of labor not only refutes the demographic argument but also indicates that the cost of labor is raised by institutional factors.

Furthermore, to improve the reliability of a causal relationship, repeated experiments are essential. Therefore, empirical results from different datasets, nations, and time periods presented in this paper functioned as a natural experiment. It demonstrates that with other variables in various circumstances, we can always find correlation between labor market interventions and related phenomena. This approach is particularly crucial in our case, as labor departments around the world were avoiding testing the effectiveness of their policies.

Similarly, labor market interventions are an application of the broader range of theories. They involve price control theory, Coase theorem, the tragedy of the commons, rent-seeking and the insider/outsider model. These theoretical works, along with consistent empirical studies, reinforce the validity of the results of this paper.

Moreover, this paper also incorporated different legislation, such as the Social Average Wage Level, the Labor Contract Law, and social security into one model as Addison and Hirsch (1998) suggested, which demonstrates the interrelationships between different government interventions in the labor market. It also answers an unasked question of why both mandated benefits and employment protection legislation have a similar effect on the labor market, such as an increase in informal workers (Almeida &

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[11] The official Chinese unemployment figure is highly unreliable. However, it is reported that a large number of workers returned to their hometown and the government urged them to start their own businesses.

Carneiro, 2009; Lazear, 1990), and an increase in the capital: labor ratio (Cette, Lopez, & Mairesse, 2016; Mitchell, 1990).

Finally, this study has limited its focus to homogeneous assumptions. Thus, the modification cases should be examined in the future. Further explorations could include the impact of deregulation in the EPL (without changes in mandated benefits) and labor unions on informal workers,[12] and the decline in capital investment after costs of labor reach certain levels.[13] This analysis also sheds light on other branches of economics, such as the 'sticky wage' in macroeconomics and the sources of TFP in development economics.

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[12] An empirical paper (Morikawa, 2010) about Japanese union studies found union reduction in informal workers, and studies regarding the EPL increase in Europe have found contradictory results（Fialová, 2010; Hazans, 2016).
[13] As the hanging capital/labor ratio is a temporary solution to avoid rising labor costs, the only choice for these surviving firms facing the perpetually rising pressure of the EPL is to reduce investment as indicated by the law of diminishing returns. The scope of the paper restricts me from exploring this situation. However, this hypothesis not only follows common sense, but is also supported by evidence. Like the old adage goes, it is important to compare like with like. A comparison between Germany and France, two countries with similar industrial structures, can demonstrate some seeming contradictions in empirical findings. Brenke (2013) closely examines the manufacturing sectors in Germany and France from 2001 to 2011. Contradicting common belief, modernization runs from the agricultural industry through the manufacturing industry and only later to the service industry. He finds that Germany has maintained a strong position in the manufacturing industry, with good economic performance. Its service industry has not evolved into an engine of growth. On the other hand, there has been deindustrialization in almost all branches of industry in France, which has also experienced depressed economic growth. Brenke (2013) further argues that differences in wage policy affect wage growth, which in turn influences the competitiveness between the two nations. The wage growth rate has been much faster than productivity growth in France. Conversely, the German wage rate has lagged behind production increases.

Chapter 4: Methodology

4.1   Introduction

This study provides causal analysis between labor market intervention and its related impacts, specifically, employment conflicts and capital-deepening. In order to establish a causal relationship, four conditions must be satisfied. These conditions include the causal mechanism, time order, co-variation and non-spuriousness. Apart from the causal mechanism, which relates to the theoretical explanation as outlined in the previous chapter, the rest of the conditions are the focus of this chapter.

The majority of the previous literature on the LCL used household survey datasets. Due to limitations in the knowledge of employees on the subject, the topics are quite limited. Meng (2017) argues that the household survey dataset is inadequate to provide more insightful knowledge of the LCL. Stakeholders involved in the impact of the LCL include employers, employees, lawyers and human resource managers. In addition,

strategies adopted by different firms vary. As a consequence, alternative data collection methods, such as firm-level surveys, intensive interviews, strike and dispute statistics and court proceedings are adopted in this study to provide a full picture of the impact of the LCL.

Regression analysis has been used to examine the time order, co-variation and non-spuriousness of the variables in concern. Qualitative data has been adopted to illustrate the internal logic of the phenomena. Hence, a mixed methodological approach is used. Shorten and Smith (2017, p. 74) characterize a mixed method as 'a purposeful mixing of methods in data collection, data analysis and interpretation of the evidence'. This is particularly crucial for this study. Quantitative analysis can only provide evidence of an overall change, whereas, qualitative data enriches our understanding of the subject matter.

4.2   Research design

Due to the legal sensitivity of this topic, both quantitative and qualitative approaches have been adopted to determine the real impact of the LCL. Regression analysis has been used for large sample data and case studies have been used for small samples.

4.2.1   Large sample: capital deepening

The Chinese Private Enterprise Survey (CPES) includes firm-level information about the number of pensions purchased, total pension costs, total wage costs, total number of employees and total capital value. These data enable the testing of the hypothesis of capital-deepening in this research. The survey collects information from the previous year. The 2008 and 2012 waves were used in this analysis to demonstrate the effect of the LCL. The 2010 wave has not been used as a number of labor market interventions, including the LCL and social security, were exempted from enforcement in 2009, due to the Global Financial Crisis. By comparing the regression results in the two waves, the time order and co-variation conditions will be satisfied. To avoid spurious

correlation, the instrumental variable (IV) approach has been adopted.

4.2.2   Case study: capital deepening

In order to estimate the detailed impact of the LCL on labor costs, a small sample of firms has been chosen. It is well-known that comparison of cases can be viewed as real-life experiments, which enables generalization. Therefore, it is important to examine whether the LCL affects firms in the same manner across different contexts, such as regions, ownership, industry and so on. Mill's method of agreement (MDSD) has been adopted to locate the marginal factor of causality (Mill, 1843). If two firms with similar industry, location and ownership, but of different sizes, result in different outcomes of the LCL, it implies that the size of firms matters. Of course, unobservable variables may bias the results in such analysis. However, the reliability of small sample study is not relying on the analytical technique, but its rich details of the subject matter to o supplement the quantitative analysis or to explain a particular point that may not be well explained by quantitative analysis.

4.2.3   Large sample: labor disputes and strike analysis

Currently, the China Labor Statistical Yearbooks includes information about regional labor disputes in China. Waves 2004 to 2016 were obtained for this study (previous year data was collected). The sample was divided into three sample periods: before the intervention (Years 2003-2007), the short-run effect (Years 2007-2010), and the long-run effect of the LCL (Years 2011-2015). The year 2007 was included in the short-run period to capture the immediate effect of the LCL. As mentioned earlier, the LCL was not fully enforced from the second half of 2008 to the end of 2009. Thus, 2010 was the date on which the legislation was re-started to be enforced. The sample in each period is used to test against the theoretical predictions empirically. The China Labor Bulletin Strike Map contains strike information in China from 2011 to 2015. It should be noted that data on strikes in China is lacking due to its sensitivity. Thus, we can only test the long-term effects of labor market intervention on strikes. To overcome endogeneity, a fixed-effect (FE) model has been adopted.

4.2.4 Case study: cause of labor disputes

We explore the source of employment disputes with real cases. This approach enriches and supports the quantitative analysis. The theoretical explanation of increasing labor conflicts is due to the common resource between labor and capital created by labor market intervention. Thus, cases with similar contents yielding different outcomes would demonstrate that ambiguity in labor laws would encourage conflicts in the workplace.

4.3 Data: collection methods

4.3.1 Datasets

The collection of the quantitative data is relatively straightforward. The datasets for labor disputes and strikes are both open access. The Chinese Private Enterprise Survey (CPES) can be applied publicly as well.

4.3.2 Legal documents

Court proceedings, which have been largely ignored by previous studies, are rich sources of information to analyze disputes between employees and employer in detail. Studying these real cases can improve our understanding of how the law in practice affects the cost of labor in China and will also reveal what factors have caused the labor relationship to worsen in recent years. Most cases used in this study come from official case transcripts. Others come from the internet, official court releases, and labor law textbooks.

4.3.3 Interviews

Most of the key information in this study, especially the indirect costs of LCL, is proposed to be collected by the author from constructed interviews with different stakeholders. Variables from the hypothesis were operationally defined to formulate open-ended questions for the interviewees to answer. An example is that high capital-

return can be interpreted as the existence of patents, licenses or technology know-how, which are observable.

I interviewed a number of firms in China, and obtained information on contractual arrangements/production function alternations due to the legislation and the impact of welfare on firms. These interviews not only enable me to establish the relationship between empirical observation and theoretical concepts, but also to better explain the quantitative results. Interviews from other stakeholders, such as lawyers, policy makers, trade unionists, and workers, have been summarized in the case study. Interviewees could choose the location and duration best suited to their schedules, including online or telephone communication. Participants had been informed about the time required (about one hour) for each interview. Participants were also advised in advance of my commitment to keep all interviews anonymous.

Participation in this project was voluntary. Participants could refuse to take part or withdraw from the study without providing an explanation at any time until the work had been prepared for publication. Participants were informed that they could refuse to answer a question. In addition, if participants were to withdraw, the data from withdrawn participants would be removed and not be used.

With consent from participants, audio recording was conducted and then transcribed for analysis. The transcripts of the individual recording were provided to each participant for perusal after the interview process. To avoid e-mail surveillance, I showed the related documents to the participants in person. Participants have been informed that only relevant researchers, such as my supervisors and me can access the recordings. The participants have been notified about the potential risks involved in the interview process such as legal risk, for them to decide whether to consent to or refuse participation. The legal risk for the interviewees is that if certain information includes illegal activities, such as not paying the full amount of social security for employees, and was leaked to the media or to lawyers, the employer could be charged for breaching

the Labor Contract Law. Therefore, confidentiality is key. I explained to the interviewees that I would take a number of actions to conceal their identities. However, such risk does exist. I let the interviewees decide whether to participate in this research.

4.4   Data: reliability and validity

To grasp the full picture of the labor market intervention, data must be reliable and valid. Reliability refers to consistency. In this research, it includes consistency both across items and across different researchers. The effect of the LCL includes both direct and indirect impacts. It demonstrates that the result from the three datasets in this thesis match each other perfectly over different time periods. In addition, the results of the qualitative study support the findings of the quantitative studies. This consistency in the overall data shows the reliability of the sample in this research.

There are two major sources of reliability in the interview data: intended and unintended. To avoid unintended errors, such as clerical mistakes and ambiguous questions, it is important to be careful in designing and recording the data. However, both the interviewer and interviewee can be dishonest and create a biased result. Ethics training and other tests or recordings can be adopted to restrain the interviewer from intentional manipulation of the data. On the other hand, as LCL is a sensitive subject with possible illegal activities, interviewees may worry that the answer they provide could damage their safety. According to Salkind (2009), one of the basic assumptions in a reliable survey is that the questionnaire does not put unreasonable demands on the respondent. Alkin, Daillak, and White (2006) suggest that trust in the researcher is of equal importance to the adequacy of the procedures themselves. Therefore, I tried to build personal relationships with the interviewees to improve trust, in order to increase the reliability of the data. Otherwise, refusal of the interview would increase. Other solutions involved clarifying the purpose and safety procedures of the research with the interviewees. A snow-ball sampling technique was attempted in the fieldwork. It was aimed to not only expand the sample size, but also to improve the trust level between

the interviewer and interviewees. However, in practice, the amount of information provided by an interviewee is highly reliant on the personal relationship. In general, the younger generation are more vocal than their parents on this sensitive matter and retirees are more willing to provide information than those still in the workplace. Discourse analysis has been used to determine the true meaning of their responses.

Validity is a measure of whether research actually studies what it purports to study. As reviewed in the literature review section, the current literature only measures part of the direct costs of LCL, which indicates that it suffers from validity problems. Hence, to study the full-impact of LCL, both direct and indirect costs of LCL must be included.

The economic agent that decides the use of resources, including labor, is the owner of the firm. Workers may be experts in a specific production process, but they don't always have information on the firm's organizational decisions. Thus, to understand the economic impact of LCL on firms, such as investment decisions and contractual arrangements, the key stakeholder is the business owner. Intensive interviews have been used to collect data about the indirect impacts of LCL. In this case, the population is heterogeneous and contains different groups with inequality of information. Certain groups, such as lawyers, local officers and owners possess more knowledge of LCL than others. Thus, stratified sampling has been adopted to collect valid information. As firms with various backgrounds and characteristics behave differently with the impacts of LCL, the sample has been collected accordingly to provide valid results.

The ethical concerns and precautionary actions are summarized in appendix 1 below.

Appendix 1:

The benefits of this research may not accrue to each individual. Most participants in this research, such as businessmen and workers, could financially benefit from the de-regulation of the law. Thus, these stakeholders have strong incentives to participate in the research to make their voices heard. However, the data collected from the interviews can be sensitive, which may lead to personal loss by the interviewee, if the information was exposed to the public. These risks include financial risk, legal risk and social risk. To minimize these risks, confidentiality is key.

Only the nominated researchers have access to the material provided by the interviewees and confidentiality has been protected as far as the law allows. In order to protect the interviewees, the data collected has been modified, coded and saved confidentially, without personal information that can be traced back to the interviewees. For instance, instead of recording the specific industry, such as footwear manufacturing, I have recorded manufacturing as the industry. If a firm is located in Qingdao city, I record the location as a large city in North China. The large population of China also reduces the possibility of others identifying the interviewees. Moreover, businesses in

different locations in China have similar methods to get around the law; the homogeneous nature of the information increases the difficulties in locating interviewees personally. In publications, any personal information, such as full names, that could be potentially traceable to interviewees has been deleted to avoid personal damage to the interviewees. Finally, the information collected from each individual interviewee has been broken down and re-organized into different topics in my papers, which will make it difficult to re-identify the interviewee. For instance, the 20 to 30 firms in my sample have been used to study the increased use of informal workers or machinery after the law, without any identifiable information for each firm.

Following the rules of the ANU Code of Research Conduct, the data has been stored at the ANU. Storage on any computer is password-protected. All information has been securely backed up on University computers. Normally data must be stored for a period of at least five years from the date of any publication arising from the research. I have followed the standard practice. At the end of the storage period the data will be used for future research. As this use does not expose participants to new or additional risk, after the data is no longer needed for the current research, it may be archived or retained in a de-identified format by me, if the participants agree with this usage.

The interview data has been mainly used in Chapter 7, which studies capital deepening with a case study. The information related to changes in the production function is not very sensitive as the Chinese government openly supports the use of more machines in production. On the other hand, the interview data related to changes in contractual arrangements to avoid the impact of the LCL has not been directly quoted in this thesis, as the information includes illegal activities.

Chapter 5: Does the Labor Contract Law reduce or intensify employment conflicts in China?

5.1 Introduction

Labor market interventions, such as employment protection legislation (EPL), have been examined by economists and law scholars separately with different sets of terminologies. It is widely accepted that labor market interventions are necessary due to the unbalanced power between the rich and poor (Brubaker, 2012). However, legal scholars then raise the practical question, 'how far' should leaning toward labor be considered fair? (McClelland, 2012, p. 428). To my knowledge, the economists have not incorporated such analysis into their studies. Hence, I intend to fill this gap. The experience in China after the implementation of the Labor Contract Law (LCL) in 2008 and the extended restriction on the use of dispatch workers in 2012 provides a valuable opportunity to explore the effects of labor market interventions on the employment

relationship. Implications from the current study could be beneficial for academics from both schools of economics and law.

Table 5-1 below summarizes the EPL indicators and days lost due to disputes in several OECD nations. France is considered to have one of the most rigid labor law systems in Europe, which has led to attempts at reform by several political leaders. Not surprisingly, it also has one of the highest rates of lost working days due to labor disputes in the list of such nations. The UK, which deregulated its labor law under the ruling of Prime Minister Margaret Thatcher (Addison & Siebert, 2000), on the other hand, has one of the lowest numbers of working days lost due to disputes. The pattern is fairly consistent: the higher the indicators, the more days lost due to strikes. Scandinavian nations such as Sweden and Norway are often used to defend the implementation of welfare. Notably, the EPL indicators of Denmark, Norway, and Finland are somewhere between France and the UK, as are their rankings for related working days lost. The EPL indicators of China rank near the top of the list which, many have suggested, is a result of LCL. We do not have information on working days lost for China, which motivates this study.

Table 5-1: EPL indicators and days lost due to strikes[14]

Index	France	UK	Denmark	Norway	Finland	China
Permanent workers[15]	2.82	1.59	2.32	2.31	2.17	3.22
Temporary employment[16]	3.75	0.54	1.79	3.42	1.88	1.88

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[14] The time period for the EPL indicators is from 2012 to 2015, whereas the days lost figure is between 2009 and 2013.

[15] Regulation on individual dismissal of workers with regular contracts and additional costs for collective dismissals. Most countries impose additional delays, costs or notification procedures when an employer dismisses a large number of workers at one time. The overall strictness of regulation of collective dismissals is the sum of costs for individual dismissals and any additional cost of collective dismissals. 0 = very loose, 5 = very strict.

[16] Regulation of fixed-term and temporary work agency contracts with respect to the types of work for which these contracts are allowed and their duration; regulation governing the establishment and operation of temporary work agencies; requirements for agency workers to receive the same pay and/or conditions as equivalent workers in the user firm, which can increase the cost of using temporary agency workers relative to hiring workers on permanent

Individual dismissal[17]	2.6	1.18	2.1	2.23	2.38	3.31
Days lost (2009-2013)	171	24	82	76	55	-

Source: (*OECD Indicators of Employment Protection*; "Strikes - Map of Europe,")

This paper studies employment conflicts, including strikes and disputes, in different regions in China. We empirically test two explanations concerning the purpose of the Chinese Labor Contract Law. Detailed court proceedings will also be used to explore the nature of labor disputes.

This paper links two schools of thought on labor laws together and contributes to the literature in three areas. First, the law school has had a long debate about labor legislation. It provides a new perspective for economic studies. The transcripts of real labor cases enable economists to understand practical issues in labor disputes, which they might otherwise overlook. Second, the theoretical and empirical results may also be enlightening for law scholars, which helps to settle the debate between 'purposive approach' and 'freedom of contract'. Third, there have been only limited studies, such as those carried out by Elfstrom and Kuruvilla (2014) and Remington and Cui (2015), on the friction in the Chinese labor market after 2008. Both studies found a surge in work-related conflicts after 2008. However, there are gaps that need to be filled. To begin with, the data for these two studies are not up-to-date. In particular, the data used by Remington and Cui (2015) only goes up to 2010. Thus, the current study uses the latest data up to 2015 to consider the long-run evolution of Chinese labor conflicts.

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contracts. Regulation on temporary forms of employment. 0 = very loose, 5 = very strict.

[17] Regulation on individual dismissal of workers with regular contracts, incorporating three aspects of dismissal protection:

(i) procedural inconveniences that employers face when starting the dismissal process, such as notification and consultation requirements;

(ii) notice periods and severance pay, which typically vary by tenure of the employee; and

(iii) difficulty of dismissal, as determined by the circumstances in which it is possible to dismiss workers, as well as the repercussions for the employer if a dismissal is found to be unfair (such as compensation and reinstatement). 0 = very loose, 5 = very strict.

Moreover, the regression techniques in these two studies have not solved the issue of endogeneity. Hence, we adopt a fixed-effect (FE) model, which can reliably eliminate the time-invariant factors that cause the endogeneity problem. This is particularly important in examining provincial-level heterogeneities in China. Lastly, the mechanism of how labor laws affect employment conflicts has not been properly explained.

Notably, when the LCL was enacted, there were no explicitly set goals. However, in the literature, the prevailing theory is that LCL was implemented to reduce social unrest caused by issues in the labor market. My speculation of the internal logic is that, by transferring wealth from rich to poor, the more equalized society would then be presumed to be more harmonious. Consequently, I examine whether labor market interventions such as LCL, can fulfil this purpose.

At a micro-level, this paper uses a number of similar cases with different judgements to illustrate the nature of employment conflicts under intervention. It reveals that ambiguity in the text of legislation creates more controversies, an unavoidable result if the court abandons the 'freedom of contract' approach of protecting private property rights.

Quantitatively, the average number of provincial strikes and disputes has been calculated based on the China Labor Bulletin Strike Map between 2011 and 2015 and the *China Labor Statistical Yearbooks* from 2003 to 2015. The key explanatory variable is pension coverage, which is a proxy for employment status. Moreover, we also control for real GDP per capita, the proportion of workers with low educational backgrounds, industry, and ownership. We have averaged all variables at the provincial level and adjusted by inflation rate. Finally, the Ministry of Human Resources and Social Security further restricted the use of dispatch workers in 2012 to improve welfare coverage. Hence, we test, with descriptive data, whether such regulation would reduce conflicts.

The overall quantitative results are consistent with our predictions. First, the total number of strikes and disputes increases significantly each time an intervention is implemented. This clearly rejects the argument used by the supporters of the LCL. Second, as we predicted, the number of labor disputes was strongly associated with provincial pension contributor coverage and low-education backgrounds in the period 2007 to 2010, while the correlation became insignificant in the later period. In addition, throughout the period, the numbers of both strikes and disputes are negatively correlated with regional GDP per capita.

The remainder of the paper is organized as follows. Section 2 provides the background and literature review. Section 3 provides a theoretical explanation and Section 4 describes the data. Section 5 analyzes six real labor cases. Section 6 tests the hypotheses with descriptive data and regression analyses, and Section 7 concludes.

5.2 Background and literature review

At the end of 2007, to regulate the labor market, a national labor act was passed by the Chinese Parliament. It introduced mandated benefits to employees, reinforced minimum wages, improved employment protection and promoted the influence of trade unions.

The debate about the effect of the Labor Contract Law (LCL) started from the very beginning. The leader of the law-making group for this legislation, Chang, argues that to create a 'harmonious' working environment, the government must lean to the labor side to comply with social interest. Underprivileged labor, with less bargaining power, would suffer in the market. However, Dong (2016) argues that the draft law would set labor standards too high, which would cause all-around tensions instead of 'harmonizing' the relationship between the government, the entrepreneurs and the employees (H. Xu, 2007). Dong further points out that the Labor Law from 1994 is sufficient and appropriate to protect both employees' and employers' legal rights. The

problem in the labor market results from its lack of enforcement. There is no need for new legislation to overprotect workers' rights (Dong, 2016).

Similar arguments have occurred in the Common Law nations in the debate between the principles of 'freedom of contract' versus a 'purposive approach' to the employment contract. According to Atiyah (1985), the traditional common law principle on contract is that relevant parties are free to make contracts. If a contract is concluded, then it is assumed that each party is content. External parties have no excuse for interventions based on fairness or bargaining power. However, the underlying principle of LCL adopts a purposive approach toward the labor employment contract, which presumes a predetermined standard of employment to be optimal. Legal practitioners soon realized the definition of fairness was ambiguous, which will undoubtedly increase the difficulties in legal judgement.

In theory, labor conflicts, especially strikes, have been explained by information asymmetry with a union bargaining model (Hayes, 1984; Tracy, 1987). This paper, on the other hand, explores the issue from an institutional perspective.

Empirical evidence from around the world consistently shows that labor market intervention increases employment conflicts. Cramton and Tracy (1994) use a bargaining model to explain the strikes in the Unites States between 1970 and 1989, and find unions are more likely to strike when there is 'low unemployment or a real wage drop'. However, the effect is weaker after 1981. This coincides with the change of government: under the administration of Ronald Reagan (1981-1989), labor market intervention was kept to a minimum. Elfstrom and Kuruvilla (2014, p. 453) finds that strikes in China after 2008 not only increase in number, but also change nature from defensive to offensive 'for more money, better working conditions, and more respect from employers.' Remington and Cui (2015) also found a dramatic increase in the number of disputes in China after the LCL was enacted.

In China, the LCL in 2008 has increased dismissal costs and mandated benefits for permanent employees. Hence, in a short period of time, temporary employment has expanded dramatically. Estimates have been conducted by different entities. The All-China Federation of Trade Unions constructs a result of 60 million dispatch workers in 2011, around 20 percent of the workforce. The Ministry of Human Resources & Social Security estimates the figure to be 27 million, and 13 percent of the working population (Jiang, 2011). Liang et al. (2016) use the 2007 and 2013 CHIP surveys and find a significant increase in the number of informal workers (dispatch workers), who receive less income and welfare than formal employees.

In 2013, the Ministry of Human Resources and Social Security further restricted the use of dispatch workers. It regulated the use of dispatch workers to equal to or less than10 percent of the total labor in an enterprise. The job of dispatch workers must be temporary, auxiliary or for substitutable positions only ("Interim Provisions on Labor Dispatch," 2014). Since then, firms have switched to sub-contracting contracts to deal with these low-skilled workers. Whether such regulation reduces or increases employment conflicts is an unanswered question. However, Germany deregulated its labor regulations in the Hartz reforms in 2002 (Jacobi & Kluve, 2006). As a result, Germany has a low number of working days lost due to labor conflicts ("Strikes - Map of Europe,"). The most significant change in the Hartz reform is that it legalized the use of mini-jobs, which effectively removed legal rights for informal workers to fight for.

5.3   Theoretical explanation and hypothesis

Although Harris (2008, p. 1), an international law firm, claimed that labor market interventions, such as the LCL could reduce social unrest, they changed their argument when labor disputes surged after 2008 to 'Chinese workers are not hesitating to seek to enforce their rights in the courts'. The inconsistency in logic of these arguments is not the focus of this study. However, the later statement reveals the truth: without labor market intervention or government support, employees have no ground to fight for.

These interventions provide a 'promised right' to workers, and were leading to more strikes and disputes (Elfstrom & Kuruvilla, 2014; Remington & Cui, 2015).

The distinction between 'freedom of contract' and 'purposive' approach will be demonstrated below.

As shown in Figure 5-1, a typical firm can be seen as a combination of labor and capital. Labor demand, also called the value of marginal product of labor, is a derived demand. If labor productivity is homogeneous, the labor supply curve would be horizontal and equal to the wage level. The equilibrium point will be at point B. Hence, the return for capital and labor is divided into the areas MDB and OMBD respectively. The 'freedom of contract' approach can be viewed as providing institutional assurance in setting the wage line. If the employer and employee agreed upon a price for labor, the court should ensure both parties go ahead with the contract. In this sense, a mandated written labor contract under the LCL has a reasonable ground. It will reduce information costs for judges to establish an employment relationship, especially for low-skilled workers without contracts. However, the actual practice of the LCL includes more than this, which will be discussed later. The finding of Elfstrom and Kuruvilla (2014), that workers before 2008 were striking for their existing benefits fit this situation neatly.
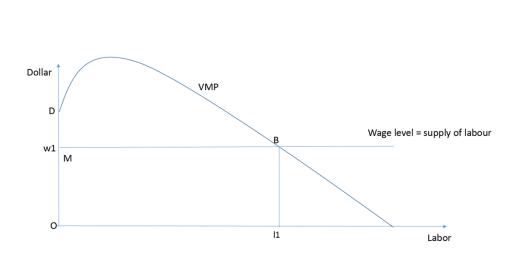

Figure 5-1: The free market firm-level equilibrium

With an intervention that favors labor, the return for labor up to the point of l_2 in Figure 5-2 below, would increase. From each employee's perspective, these benefits are promised by the government as their legal right. As mentioned, Elfstrom and Kuruvilla (2014) found that after 2008 workers were striking for extra benefits. The disputed area depended on both w_2 and l_2. However, the exact position of w_2 is unclear as mentioned earlier in the purposive approach. Thus, in the short run, the number of labor conflicts relies upon l_2. However, after the initial shock, firms will take actions to reduce the impact of the labor law, such as increasing the use of dispatch workers or switching from labor to capital in production. These shifts will reduce the impact of welfare coverage on employment conflicts.
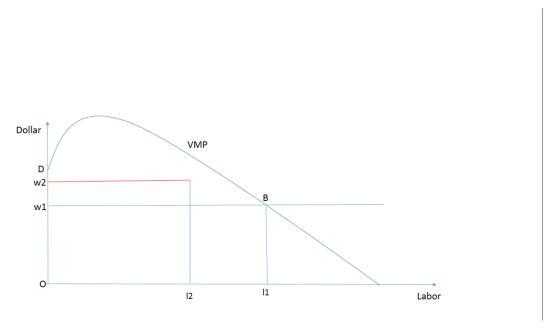

Figure 5-2: The short-run intervention scenario

In addition, as labor market intervention functions as a wealth-transferring-mechanism, less productive firms will be less able to afford such a policy.

Thus, we generate the two hypotheses:

- Hypothesis 1: The number of labor disputes is strongly associated with permanent employment status, l_2 in the short-run, not the long-run.

● Hypothesis 2: As the labor market intervention is in essence a form of wealth transfer[18], disputes and strikes are more likely to occur in rich regions.

These hypotheses will be empirically tested in this paper.

5.4 Case analysis

Detailed labor cases about the controversy in legal interpretation will be presented in this section. Two problems will be discussed separately: the employment status and actual benefits. The latter depends on the former. The cases are selected from official legal transcripts published by the Chinese Court. The detailed cases in this section provide a micro-level example to illustrate the source of increasing number of disputes.

In nations where common law is practiced, the principle of binding precedent ensures minimum uncertainty in future cases, as it presumes a judge in a higher court has more legal knowledge. Cases with similar facts must produce the same outcome. China's legal system, on the other hand, is based primarily on the model of civil law. The judgement of a supreme court in China can only provide guidance for lower-level courts. Thus, the decisions of different courts on similar cases, even the same case, can be vastly different. This problem with legal precedents in the Chinese legal system actually enables us to understand the detrimental effect of the 'purposive approach' more vividly.

5.41   The definition of employment relationship: l_2

In most nations, the eligibility of the employment relationship is a debatable topic. It is a logical consequence of labor market intervention, as only employees recognized by law can be rewarded by the intervention. In other words, disputes about the employment relationship would become an issue after labor market intervention.

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[18] From the figure 5-2 above, the labor market intervention intends to reduce the return to capital and then transfer such wealth to labor.

Case 1: Luo vs. Beijing Wuhuan Hotel (Sub-contracting)

Luo was hired to work for the hotel as a cook on September the 2nd in 2011, and he finished on 31st of May, 2012. In this period, no labor contract was signed and no social insurance was paid. Luo sued for his rights, such as the penalty for no written contract. The hotel then revealed that it had sub-contracted the restaurant service to Yangguang Corp. A sub-contract between Wuhuan Hotel and Yangguang was signed to avoid any legal responsibility of Wuhuan. Luo was legally hired by Yali Su, an employee of Yangguang Corp. The question is: Which enterprise is the employer of the person? The court refuses to recognize the sub-contract agreement. Its decision is that the Hotel should be responsible for the relevant compensation.

Case 2: Beijing Yunguanghuandao Furniture Town Corp. vs. Wang (Sub-contracting)

Yang rented a furniture-house from Yunguanghuandao Corp. to sell furniture in 2007. In November of 2008, Yang hired Wang to work for him. On November the 30th, Lan and Diao sub-leased the furniture-house until 2013. Lan and Diao continued to hire Wang and paid him a salary. In November 2012, Wang claimed that Lan fired him orally. He then raised a legal dispute against Yunguanghuandao Corp. and argued that Lan was not a lawful sub-contractor. The key dispute is whether Yunguanghuandao Corp. is the employer.

At arbitration, the local judge decided that there existed an employment relationship between Yunguanghuandao Corp. and Wang. Yunguanghuandao Corp. then upgraded to court. In the first and second trials, both judges refused to recognize that such a relationship existed.

The first two cases are similar. The employees in both cases were trying to establish an employment relationship with the larger firm. This implies that small firms cannot afford the extra compensation required by law. In fact, if found guilty, these small firms could go bankrupt to avoid compensation. Also as discussed, the outcomes are different.

This demonstrates that ambiguity in the legal definition leads both parties to believe they can win the case.

Case 3: Zhang vs. local sub-district office (Special industries)

Zhang started work for the Asian Olympic sub-district office, and the contract ended July, 2010. After this date, no contract was signed between the parties. On 31st December, 2011, the sub-district office fired her on grounds of serious mistakes. Zhang then raise a dispute. The first request was to establish an employment relationship. Other compensation included that for illegal dismissal, double-pay for the penalty of no contract, and so on. The judges in the first and second trials both refused to recognize the relationship. Thus, no compensation was needed.

Similar to this case, a bar worker in Shanghai sued the bar for compensation. The Court rejected such a request ("Civil Judgment for the Second Trial of X Hotel Corporation and Chen," 2014). As discussed, the legal rights promised by labor market intervention are based on the existence of an employment relationship.

5.42   How far is fair: w_2

At the beginning of its implementation, some argued that the LCL encouraged workers to be trouble-makers, while other denied this (Shi, 2009). I will demonstrate that labor cases with similar content can be judged adversely. The more disputes an employee raises, the higher the economic return received. This result does provide incentives for employees to raise more labor disputes.

Case 4: Restaurant vs. Xiao (Dismissal)

Xiao was caught washing her underwear with menstrual blood ina sink supposed to wash vegetables for the restaurant. The news got out, and no one dared to dine in the restaurant. The employer wanted to fire Xiao. However, the arbitrator in Beijing did not believe such behavior 'seriously' violated the rules of the firm. He

ordered the firm to pay Xiao 70,000 RMB for unfair/illegal dismissal. After mediation, the final settlement was 40,000 RMB.

Case 5: Feng vs. Zhongtougongshi Corp. (Dismissal)

Feng started to work for Zhongtougongshi Corp in November 2009 as an office manager. The fixed contract expired in 2013. However, Feng delayed passing an important legal document to the authority on time. When the management changed in 2010, he then delivered the document without the permission of the current manager. Then he got transferred to work in the construction unit. In November 2011, Feng engaged in an intense quarrel with other colleagues in a work meeting. In November 2011, the firm issued a notice to end the employment relationship without compensation based on two conditions. First, Feng failed to fulfill the tasks of his role, and he had an attitude problem. Second, he seriously violated the management rules of the firm.

In the first instance, the judge decided Feng did not follow the rules of the firm. First, he did not send the document on time. Second, with the change in management in 2011, he should have obtained permission from the new managers before he sent the document as the rules of the firm require. Therefore, the firm could fire Feng without any compensation. The second judge, on the other hand, believed the quarrel between Feng and management did not mean that Feng was incapable. Also, the rules of the firm did not specifically mention the necessity to re-obtain perimission for the document after the management change. Hence, there was no serious violation of the rules. He ordered compensation for wage loss and Feng to go back to work for Zhongtougongshi Corp.

Article 39 of the LCL provides that an employer can fire an employee if the employee seriously violates the rules of the firm, or causes severe damage to the firm. Otherwise, a severance payment must be paid. Therefore, the whole judgement of dismissal is based on a normative or subjective opinion of the word, 'seriousness'. In the two cases

above, the judges themselves could not even provide a consistent opinion on what should be classified as a 'serious violation'.

> Case 6: Dong vs. Food Production firm (Injury between workplace and home)
> An employee, Dong left his job early. He had a car accident mainly caused by his own mistake and died. His spouse then raised a dispute of work-related injury. According to article 14 of the Injury Insurance Regulations of 2004, the injury due to transportation occurred on the way between work and home so should be considered a work-related injury. The arbitrator and the judges in the first and second instances, and the provincial supreme court, all found Dong offended against the firm's rules and regulations as he left his job early. Thus, it was not a work-related injury.

One might wonder why Dong's spouse appealed the case so many times. It is because there is another possible judgement based on an alternative interpretation. A lawyer argued that the Injury Insurance Regulation of 2004 regulates that as long as the employee injured himself on the way home by vehicle, it should be considered a work-related injury, no matter whether he left his job early. The latter behavior can be punished separately, but does not alter the fact that this is a work-related injury.

Notably, certain interpretation decisions of the language in the statue must be arbitrarily made for such wealth transfers to proceed, which inevitably increases the uncertainty of the outcomes. Dong and Dong (2007) reviewed 50 controversial cases in China. Almost all cases could have been decided in another direction, as were similar situations. The cases reviewed in this section demonstrate that labor market intervention provides grounds for employees to request extra benefits. Without these laws, can workers who are injured on the way home be considered to have work-related-injuries? The answer is no.

5.5   Data

We use three data-sets to conduct the statistical analysis in this paper. First, we use the China Labor Statistical Yearbooks for the years 2003 to 2015, and include regional information, such as the number of individual and collective disputes, causes, settlements, pension contributions, regional working populations, and total population.

Second, we use the China Labor Bulletin Strike Map from 2011 to 2015, which includes variables such as region, number of strikes, causes, settlements, firm ownership, and number of people involved. Different from the population data I used for studying labor disputes, the strike data is a sample of the population. Elfstrom and Kuruvilla (2014) claim that their collected information about missing strikes does not match the data in the Strike Map, this then raise question about the potential selection bias of our sample. Although the sample involves small conflicts with few people involved, it is sensible to believe the cost to collect small conflicts is higher. Thus, the sample should be consistently biased with strikes involve large number of employees. However, as such bias is consistent along both rich and poor regions, the impact of such selection bias should be negligible on the wealth effect. Moreover, it should be noted that such sensitive data is hard to gather reliably. Therefore, we have to made some comprise between consistent evidence and availability for this study.

Also, there is a data limitation on testing short-run effects of the intervention for strikes. I deleted all missing data points and strikes not relating to the employment relationship.

Third, I used the China Statistical Yearbook to collect regional GDP figures, the ratio of industry and ownership, and employees' educational backgrounds.

5.6   Regression Analysis

5.61 Model

I establish a model that examines the correlation between the number of employment

conflicts with provincial welfare coverage with controlled variables, such as GDP per capita, low-education worker ratio, industry and ownership:

$$Y_i = \beta_0 + \beta_1 PENSION_{i,t} + \beta_2 CONT_{i,t} + u + \varepsilon_{i,t}.$$ (1)

Model 1 studies the impact of pension coverage on employment conflicts. The variable Y_i represents the number of employment conflicts: both legal disputes and labor strikes. These variables are annual figures at the province level. To compare between provinces, I divide the explained variables by the related residential population. I choose the residential population, as a large number of low-skilled workers may not be in the working population and may be legally classified as independent sub-contractors.

The key explanatory variable is pension contributor coverage, which is calculated as the proportion of active pension contributors over the working population. It should be noted that pension coverage is a proxy for labor contract coverage, and they are highly correlated with each other (Cheng et al., 2015; Gallagher et al., 2013; Gao et al., 2012; Meng, 2017). The pension has the highest coverage compared with other types of social security. Also, the Chinese pension funding system represents intergenerational equity, which faces a tremendous liquidity problem ("China's 'Biggest Fiscal Risk Is Pension Risk' from Aging Population," 2018). This financial problem pressures the government to increase coverage to its limits. Other public insurance, such as health care, is a collective fund. The government has also used approaches other than increasing coverage, such as complicated restrictions on the use of funds, to resolve the solvency issue. Thus, pension coverage is a more reliable measure of welfare coverage or employment status. I predict that, in the short run, higher welfare coverage would be associated with higher labor disputes.

There are also some controlled variables. First, it is real GDP per capita, $W_{i,t}$, that measures the local wealth level. GDP per capita reflects the average level of economic rent firms created at the regional level. As I demonstrate in the case analysis, an employee prefers to establish employment relationships with larger firms. Remington

and Cui (2015) found the higher the GDP per capita in a province, the more disputes arose after 2008. Therefore, we also predict such a pattern throughout the sample period. The second controlled variable is the proportion of low-skilled workers. We adopt the ratio of the sample participants that do not have a Tertiary Education Certificate (senior high school education, or lower) as a proxy of the level of unskilled workers. In China, like many other countries, tertiary education is commonly used to determine white-collar and blue-collar job. May (2017) finds that, in the US without any legal requirement, paid maternity leave is only for elite workers. From this perspective, the functions of labor market interventions are to attempt to expand benefit coverage from the elite class to the whole workforce, which would naturally increase the number of disputes from low-skilled workers. Finally, we controlled for the proportion of workers in the manufacturing and construction industry and in state-owned enterprises (SOEs).

The coefficients β1 will be estimated; i indicates provinces and t indicates years. ui is a province-specific factor that is time-invariant and assumed to be homoscedastic across provinces. $\varepsilon i,t$ is the error term, which is an independent and identically distributed random variable over years and provinces.

5.62 Descriptive data analysis

In this section, I provide an overall test for the two competing explanations for the two periods of concern: 2008-2012 and 2013-2015. We find both labor strikes and disputes increase dramatically in these two periods, which is consistent with our explanation.

Strikes

According to the China Labor Bulletin, the average number of strikes in China was 55 per year for the period 2000 to 2010 (China Labor Bulletin, 2012). Many scholars who have supported the LCL use this number to justify the intervention, as they claim the law would achieve a harmonious result in the labor market, such as reducing labor strikes (Freeman & Li, 2013). However, as Elfstrom and Kuruvilla (2014) indicate, the number of strikes did not decline after 2008.

The Bulletin also provides a Strike Map on the most updated period, which enables us to examine the impact of the restriction on dispatch workers in 2013. Annual strike data are shown in Table 5-2 below. The evidence rejected the proposed argument of harmonious employment relations, as the number of strikes has increased dramatically since 2011, reaching a peak in 2015. Table 5-2 also shows that the vast majority of social unrest in China involves employment-related issues.

Table 5-2: Trends in the Number of Strikes: 2011-15

Year	2011	2012	2013	2014	2015
National	184	382	645	1355	2774
Employment related	136	344	515	1180	2564
Non-employment[19]	48	38	130	175	210

Source: The China Labor Bulletin (2018)

In addition, the decomposition of the sample reinforces the reliability of our results. Supporters use wage arrears as an example of social unrest before the labor market intervention, which the LCL was supposed to resolve X. Li and Freeman (2015). However, as Table 5-3 indicates, the number of strikes due to wage arrears has not declined at all, and the figure for wage arrears strikes has increased dramatically since 2014, which represents a sign of the economic slowdown in China. Like the problems that were raised by Joanna Law (2008) and quoted by Allard and Garot (2010, p. 531), 'employers who cannot afford the sudden increase in expenses face bankruptcy, leaving employees out of work. The intention of the law and the social effect were therefore at

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[19] The majority of non-employment-related strikes are in the transportation industry, particularly in regard to illegal taxi/Uber drivers. The transportation industry is profoundly affected by other government regulations and thus should be taken out of the sample. We have made some arbitrary judgments. Incidences involving taxi drivers that seek to reduce management fees from the company are classified as non-employment; however, pay raise claims by these drivers are labeled as employment-related. We categorize strikes for no apparent reason, anti-corruption raids in the manufacturing industry, or teachers demanding a rural area subsidy, as employment disputes. Strikes caused by other factors, such as hospital violence, or pneumoconiosis victims, are identified as non-employment disputes. However, the number of these disputable cases is limited.

opposite ends of the spectrum'.

Table 5-3:[20] Causes of labor strikes

Causes/Year	2011	2012	2013	2014	2015
Wage arrears	41	117	162	719	2107
Compensation	17	70	89	138	190
Social security	24	20	37	92	133
Overtime	7	31	37	44	32

Source: The China Labor Bulletin (2018)

Labor disputes

It is well-known that the number of labor disputes in China doubled in 2008. As shown in Table 5-4 below, the total number of labor cases declined slightly from 2009 and started to surge again in 2012, the year new restrictions started to be enforced.

Table 5-4: Trend in the number of labor disputes

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Cases	350182	693465	684379	600865	589244	641202	665760	715163	813859
Number of Laborers Involved	653472	1214328	1016922	815121	779490	882487	888430	997807	1159687
Disputes Reasons									
Labor Remuneration	108953	225061	247330	209968	200550	225981	223351	258716	321179
Social Insurance	97731	-	-	-	149944	159649	165665	160961	158002
Relieve	80261	139702	43876	31915	118684	129108	147977	155870	182396

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[20] As each strike often involves more than one issue, there is a certain amount of double-counting by design. The number is counted using keywords such as wage arrears.

or End the Labor Contract									

<div align="center">Source: China Labor Statistical Yearbook (2016)</div>

The decomposition by dispute reason reveals some interesting information. The number of disputes caused by social security in the 2011-2015 period is very stable, even though the 2012 regulation intended to improve the number of permanent employees and increase social security coverage. This implies that firms have taken action to avoid the direct impact of this intervention. The number of cases caused by relieving or ending labor contracts increased in 2008 and then had a temporary decline in 2009 and 2010. It then went upward again. The pattern is consistent with the temporary suspension of the LCL and social security from the second half of 2008, which ended in 2009 (Ministry of Labor and Social Security of the People's Republic of China, 2008a).

To sum up, the descriptive data for strikes, as well as disputes, all show an increasing trend in 2012, which is not consistent with what supporters claim, which is that labor market intervention improves harmoniousness in employment relations.

5.63 Justifications

I use balanced panel data, which allows me to control for unobserved heterogeneities, such as cultural factors or differences in government attitudes toward labor disputes and strikes across provinces. It also controls for properties that change over time but not across regions, such as national policies such as the LCL. There exists a fixed-effect (FE) term u_i in Eq. (1) that captures all unobservable time-invariant effects across provinces. It is sensible to perceive that these factors have been distributed unequally within China. To control for such an impact from the correlation between the entity's error term and independent variables, we use an FE model. The FE model enables us to evaluate the net effect of the predictors, such as wealth level and welfare coverage on the outcome variable, and eliminate the impact of the time-invariant characteristics. It

should be noted that FE model can only eliminate time-invariant endogeneity. Thus, other regression technics such as instrumental variable (IV), difference-in-difference (DID) estimators should be able to provide a better answer. However, due to data limitation, we can only perform FE model at current stage.

For the choice of model, we choose the ordinary least-squares (OLS) estimator, fixed-effect (FE) estimator, and random-effect (RE) estimator. The likelihood ratio test and Breusch and Pagan Lagrangian multiplier (LM) tests show that the FE and RE estimators are better than the OLS estimator. We settled on FE using the Hausman test. The test shows that the RE model is not consistent.

Also, we test the issues of heteroscedasticity, autocorrelation, and cross-sectional dependence for both strikes and disputes. The first problem is heteroscedasticity, which means the residuals are correlated within or between provinces. We adopt a modified Wald statistic for potential areas of heteroscedasticity in the residuals of the fixed-effect, national-level model. The results of all models show the existence of heteroscedasticity.

Another possible problem is autocorrelation, which can arise if a particular province has a persistent but unobservable factor. For example, a high political sensitivity that might reduce the number of strikes in Tibet. In this case, the estimates are inefficient though still unbiased. We adopted the Wooldridge test for autocorrelation. The results from all models indicate the existence of first-order autocorrelation. The FE model results are inefficient, though unbiased.

Hoechle (2007) suggested that this cross-sectional correlation may result from the explanatory variables and disturbance terms containing three components: an individual specific long-run mean, an autocorrelated common factor, and an idiosyncratic forcing term. Pesaran (2004) tests were carried out and showed that the null hypothesis of no cross-sectional dependence was strongly rejected.

To solve the issues of heteroscedasticity and autocorrelation, the cluster results (Rogers standard errors) for Equation (1) were calculated (Cameron & Miller, 2015). Also, we estimate the Driscoll–Kraay FE estimators (Hoechle, 2007) in Equation (1). With this estimator, the assumptions that residuals must be correlated both within and between groups could be relaxed by taking account of spatial correlation in the model. The Driscoll–Kraay FE estimators also guarantee consistency and independence of cross-sectional dimension N.

5.64   Empirical results

We split the results into two sub-groups: disputes and strikes. We examine the disputes data from a different period, as previously mentioned. The logarithm was taken solely for labor disputes, as many poor provinces such as Gansu and Xinjiang had no strikes for a whole year. We report the tests for autocorrelation, heteroscedasticity, cross-sectional independence, and unit roots in Appendix 2.

Strikes

I demonstrate the results of the fixed-effect for labor strikes in Table 5-5. To start with, pension coverage does not affect the level of strikes across different provinces in the period of the regulation on the use of dispatch workers. It may be caused by a change in the production function or contractual arrangements by firms. Ren (2015) used data from 2001 to 2013 to determine that the LCL in 2008 correlated with an increase in the capital-labor ratio in large stock-market-listed companies in China. By switching the use of labor to machines, it may decrease the number of strikes associated with the pension rate.

The fixed-effect model indicates that the number of strikes is in a significantly positive relationship with real GDP per capita and is negatively correlated with the low-education ratio. Given that the issue of wage arrears was the cause of the majority of strikes in recent years, as shown in Table 5-3, it provides another explanation. The increase in the number of labor strikes may reflect the deterioration of the Chinese

economy as a large number of firms became bankrupt. The negative sign of the low-education-worker ratio indicates that employment conflicts have recently also expanded to skilled workers. The positive correlation with real GDP per capita indicates a large number of firms had financial insolvency issues. It is reported that investors were fleeing the country (Brown, 2016). Labor market intervention, such as social security payments, could increase the financial burden of firms, which in turn increases the risk of strikes. However, other policies under the latest administration, such as the anti-corruption campaign, could also have a negative impact on economic development (L. Wang, 2016).

Table 5-5. The OLS and FE of strikes

	(1) Strikes (OLS)	(2) Strikes (FE)	(3) Strikes (Rogers)	(4) Strikes (Driscoll–Kraay FE estimator)
Real GDP per capita	-0.000000130**	0.000000529***	0.000000529***	0.000000529***
	(1.98)	(3.49)	(3.17)	(4.42)
Pension rate	0.00149	-0.00670	-0.00670	-0.00670
	(0.47)	(0.94)	(0.67)	(0.84)
Low education	-0.0456***	-0.138***	-0.138***	-0.138***
	(3.50)	(9.25)	(6.75)	(7.60)
Manu+Constr	-0.00543	0.00264	0.00264	0.00264
	(0.89)	(0.19)	(0.16)	(0.20)
SOEs	-0.000403***	-0.0000726	-0.0000726	-0.0000726
	(4.12)	(0.53)	(0.49)	(0.42)
Constant	0.0611***	0.121***	0.114***	0.114***
	(4.92)	(7.31)	(4.93)	(6.99)
N	155	155	155	155
r2/within	0.290	0.770	0.770	0.770
F/Wald chi2	12.17	525.97	75.49	10616.7

Notes: *** 1%,** 5%,* 10%; Standard errors in parentheses.

Source: Author's own estimations.

The Rogers and Driscoll–Kraay FE estimator results are consistent with the fixed-effect model.

Disputes

The crucial difference between strikes and disputes in our sample is that the former is more likely to be the only choice for employees in bankrupting firms, while the latter occurs in surviving firms. Thus, the results of labor disputes fit our model better.

I divide the regression results of Model 1 into different periods, as shown in Table 5-6. The first sub-period from 2003 to 2007 has no intervention. The second period is between 2007 and 2010. The year 2007 is included to capture the short-run impact of the LCL. Thus, the LCL restarts in 2010. Our theoretical explanation mainly focuses on this short period. Lastly, the 2011–2015 period occurs with the takeover of the new government, and I use this period to test the effect of the 2012 regulation and the long-run impact of the LCL on firms.

As Table 5-6 shows, the overall results fit neatly with our predictions. Before the intervention, labor disputes were more likely to occur in wealthy areas. The other variables are all statistically insignificant.

The impact of the LCL in 2008 follows our predictions for the period 2007 to 2010. Pension coverage and low-skilled workers are more likely to be associated with labor disputes. Firms with a political background, such as SOEs, are less likely to be sued.

We find the pension coverage in the latest period does not correlate with the number of labor disputes. Chinese firms have gradually taken action to reduce the use of human labor. In other words, the short-run elasticity of labor demand is steeper, and the long-run elasticity is flatter. These actions include changing the production function to replace workers with more machines (Ren, 2015), using more informal workers (Liang et al., 2016), and changing or upgrading the industrial structure from low skilled to high tech (Kenney, Breznitz, & Murphree, 2013). After taking these actions, the importance of low-skilled workers in production decreases, which leads to lower impact from

disputes.

Moreover, as with the result for strikes, the number of disputes is strongly associated with local GDP per capita, which is consistent with Hypothesis 2.

Table 5-6. Fixed Effect of disputes in different sub-periods

	(1) 2003–2015 FE	(2) 2003–2007 FE	(3) 2007–2010 FE	(4) 2011–2015 FE
Real GDP per capita	0.732***	0.881***	0.920**	1.380***
	(7.82)	(5.10)	(2.15)	(5.59)
Pension rate	1.040***	0.0560	1.976***	-0.0237
	(6.60)	(0.22)	(3.71)	(0.10)
Low-education	-0.303	-0.0101	6.483***	-0.666
	(0.51)	(0.01)	(2.89)	(1.61)
Manufacturing	0.253	0.138	-1.136	-0.593***
	(1.43)	(0.44)	(1.55)	(3.63)
State-owned share	-0.437***	-0.318	-1.931***	0.179
	(2.81)	(1.07)	(3.04)	(0.83)
Constant	4.092***	1.475	6.491	-5.385*
	(2.98)	(0.58)	(1.11)	(1.72)
N	403	155	124	155
r2	0.680	0.578	0.469	0.587
F	155.8	32.58	15.52	33.88

Notes: *** 1%,** 5%,* 10%;   Standard errors in parentheses.

Source: Author's own estimations.

The Driscoll–Kraay FE and Rogers estimators in Table 5-7 below are, in general, consistent with the findings of the fixed-effect models. The major difference is the correlation between the low-skilled worker ratio and the number of disputes in the 2007 to 2010 period. The Driscoll–Kraay FE estimator becomes insignificant. Even though the size of its t-value is 1.92, it is still relatively large.

Table 5-7. Different Sub-periods with Robust Errors

	(1) 2003–2015 Driscoll–Kraay	(2) 2003–2007 Driscoll–Kraay	(3) 2007–2010 Driscoll–Kraay	(4) 2011–2015 Rogers
Real GDP per capita	0.732***	0.881***	0.920**	1.380***

	(7.85)	(6.96)	(2.60)	(3.95)
Pension rate	1.040***	0.0560	1.976**	-0.0237
	(5.14)	(0.42)	(2.92)	(0.07)
Low-education	-0.303	-0.0101	6.483	-0.666
	(0.29)	(0.02)	(1.92)	(1.44)
Manufacturing	0.253	0.138	-1.136*	-0.593*
	(0.83)	(1.25)	(3.01)	(1.97)
State-owned share	-0.437**	-0.318*	-1.931**	0.179
	(3.69)	(2.37)	(4.81)	(0.71)
Constant	4.012***	1.566	6.825	-6.071
	(3.40)	(1.03)	(2.98)	(1.37)
N	403	155	124	155
r2	0.680	0.578	0.469	0.587
F	127.1	31.90	8.128	15.80

Notes: *** 1%,** 5%,* 10%;   Standard errors in parentheses.

Source: Author's own estimations.

5.65 Discussion

The findings in this section are in line with existing studies, such as those conducted by Cramton and Tracy (1994), Elfstrom and Kuruvilla (2014) and Remington and Cui (2015), which illustrate the positive relationship between labor market intervention and employment conflicts. In addition, the empirical results contribute to our understanding about how labor laws, such as pension coverage affect the incentives of low-skilled employees to improve their benefits in the short run. At the same time, the regression analysis demonstrates the reaction of the firms in the long run, which is consistent with the empirical results of Ren (2015) and Liang et al. (2016). Moreover, the negative relationship between government background enterprises and labor disputes after the intervention is particularly interesting. It is reported thatSOEs and the government are the biggest employers of dispatch workers (Sina.com, 2013). This can be explained by the intervention providing a special advantage to SOEs and government departments. In fact, Case 3 in Section 5.4.1 provides a vivid example. A temporary government job is arbitrarily judged not to be an employment relationship, even though it fits the definition nicely. It seems that the labor judges and bureaucrats in the labor department know exactly who can be offended and who has to be pleased. Finally, the results for

GDP per capita across all periods are strongly associated with employment conflicts, without exception. A similar phenomenon that occurred in the 2016 U.S. presidential election was that voters from poor regions, supposedly the biggest beneficiaries of the Affordable Care Act ([ACA]; aka Obamacare), chose to support President Trump, who promised to demolish the program if elected. Both cases demonstrate the wealth-transferring nature of these policies.

5.7 Conclusion

This paper has examined the policy impact of the LCL in China on employment conflict, which involves labor strikes and disputes. The supporters of labor market intervention promised these regulations would increase the equality of the society. Hence, they predicted these laws would reduce conflicts in the labor market. Even previous studies clearly rejected this claim. However, the detailed mechanism of employment conflicts is still missing. This paper, therefore, has provided an explanation of how labor market intervention affects the employment relationship.

We tested these two explanations both with case analysis and regression analysis. The results are consistent with our prediction.

The transcripts of real labor disputes presented in this paper demonstrated that ambiguity in the text of labor market interventions has provided incentives for employees to sue their employers for 'promised benefits'. It is clear that without these legal supports, the employees would have no grounds to raise the issue.

The empirical analysis of strikes and disputes also rejects the argument that the intervention would create a 'harmonious' working environment. The numbers of both strikes and disputes increased after labor market interventions in 2008 and 2012 respectively. More importantly, as our theory predicts, short-run pension contributor coverage has significantly correlated with the number of labor disputes. The long-run

effect of the pension rate on both disputes and strikes become insiginificant. This change indicates that firms have taken action, such as sub-contracting, to reduce the impact of mandated benefits.

The analytical approaches adopted in this study may exclude some other variables which might potentially impact on labor market outcomes. However, future studies in other nations are needed as a function of a controlled experiment to explore whether the relationship between labor market intervention and employment conflict is causal.

Appendix 2

Table A1. Test for autocorrelation, heteroscedasticity and cross-sectional independence of labor strikes

Table A1

Test	2011-2015
Wooldridge test for autocorrelation	0.0011
Modified Wald for groupwise heteroskedasticity	0.0000
Pesaran test for cross-sectional independence	0.0000
Standard error	Driscoll–Kraay FE estimator

Table A2. Test for autocorrelation, heteroscedasticity and cross-sectional independence of labor disputes of Eq. (1).

Table A2

Test	2003-2015	2003-2007	2007-2010	2011-2015
Wooldridge test for autocorrelation	0.0000	0.0000	0.0004	0.0003
Modified Wald for groupwise	0.0000	0.0000	0.0000	0.0000

heteroskedasticity				
Pesaran test for cross-sectional independence	0.0000	0.0000	0.0000	0.3908
Standard error	Driscoll–Kraay FE estimator	Driscoll–Kraay FE estimator	Driscoll–Kraay FE estimator	Rogers

Chapter 6: Labor market intervention, capital deepening and efficiency outcomes in Chinese private firms

6.1 Introduction

Capital deepening is a worldwide phenomenon. However, its actual cause is still being debated: is it a natural process of technology improvement, or a result of policy? Even without any rigid examination of the subject, the former merely conforms with our perception of technology development. In the Manhattan Project, the vast amount of calculation was done manually (Atomic Heritage Foundation, 2017). There is no doubt that with the invention of the modern computer, the amount of labor used today for a similar task would be greatly reduced. On the other hand, capital deepening is also found after labor market intervention. The Labor Contract Law (LCL) in China in 2008 provides a valuable opportunity to evaluate this debate empirically, especially when the

Chinese government has tried to use technology changes, or 'Industrial Upgrading', to explain the increasing use of machines in recent years.

Another strange phenomenon is that large firms seem to benefit from the intervention. In 2009, Xiang Wenbo, the CEO of Sany Heavy Industry Co., Ltd, China's most significant engineering machinery manufacturer, openly supported the implementation of the Labor Contract Law and urged the government to enforce the law during the period of the global financial crisis (Xiang, 2009). Also, the number of large manufacturing firms in China has increased three-fold since 2011. The financial reports of stock-market-listed companies, such as Haier, Sany, Meidi, and Geli, show that the sales figures of these firms increased two to three times in 2010, the year the LCL was re-enforced[21].

Thus, this paper examines whether the labor market intervention has become a significant cause of the capital/labor ratio increasing in China. Notably, we test the impact of pension coverage and average pension cost using an instrumental variable (IV) approach. Also, we explore what specific kind of firms are more likely to conduct such transformation from labor to capital, which leads to higher productivity.

Previous studies have already found supporting evidence that capital deepening occurred after the implementation of labor market interventions, such as employment protection legislation (EPL) and mandated benefit (MB) in China, as well as in other nations. Xi and Sun (2017) and Cingano et al. (2015) all use regression discontinuity design (RDD) to confirm the capital deepening after the implementation of EPL. Cette et al. (2016) use the EPL indicators for 14 OECD countries covering the years 1988 to 2007 and Hasan et al. (2013) use cross-country panel data on manufacturing industries to evaluate capital deepening. Both studies find the more restrictive the labor law is in one country, the higher the capital/labor ratio. Autor et al. (2007) use a fixed-effect

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[21] The LCL was temporarily suspended due to the Global Financial Crisis and the suspension ended in 2009.

model and find an increase in the capital/labor ratio after EPL was enacted. However, the detailed mechanism of such a transformation is still absent from the literature.

This paper intends to add three contributions to the literature. First, based on a simple theoretical explanation, we provide insights into how different labor market intervention affects the cost of labor. EPL and MB were traditionally studied by separate models in theory (Lazear, 1990; Summers, 1989). Nevertheless, this paper argues and finds evidence supporting the idea that the average labor cost is raised by MB and welfare coverage increased by EPL, together influencing the cost of labor, which in turn affects the capital deepening of firms. Firm-level data from the Chinese Private Enterprise Survey (CPES) allows us to explore the capital deepening transition in a comprehensive manner. Second, we employ the IV approach to overcome the issue of endogeneity. This regression technique is particularly crucial, as mentioned earlier, as capital-deepening is also a natural process of technology changes in economic development. The two-stage least squares (2SLS) regression technique would allow us to identify the capital deepening caused by labor market intervention. Individual labor contract coverage is adopted as the IV of firm-level pension coverage. The LCL requires mandated written labor contracts with heavy penalties. It is found that the written agreement provides proof for low-skilled employees to enjoy mandated benefits. We find a strong first-stage for the 2012 sample, except for industries exempt from the LCL. Moreover, the cost of labor contracts in itself is negligible. Its effect on the cost of labor is entirely through the legally promised welfare. Third, despite the increase in the capital/labor ratio, overall investment in China has dropped dramatically since 2008 (Trading Economics, 2018a). In addition, empirical studies from around the world, including China, have found that small, marginal firms were affected the most by labor market intervention (Bottasso, Conti, & Sulis, 2017; Haltiwanger, Scarpetta, & Schweiger, 2014; Harris, 2008). Combining these two pieces of information, this implies the existence of a survivor bias: only a certain kind of firm, possibly large enterprises, is capable of changing its production function in response to rising labor costs, whereas the only choice for the majority of small firms was to go out of business.

Moreover, some studies find a negative correlation between EPL and capital/labor ratio and investment (Calcagnini, Giombini, & Saltari, 2009; Cingano, Leonardi, Messina, & Pica, 2010). Janiak and Wasmer (2012) describe a U-shape relationship between EPL and the capital/labor ratio: positive at low levels of EPL and negative at high levels of EPL. Our study provides evidence to enlighten the impact of labor market intervention on the evolution of the market structure and firms' strategies in allocating resources in production.

This paper uses cross-sectional data from the Chinese Private Enterprise Survey (CPES). The data set includes firm-level data, such as profitability, total labor cost, total capital investment at the end of previous year, number of employees, industry, location, ownership structure, whether there was a reduction in employment due to pension coverage, and labor contract coverage. Other information on the business owners includes education profiles.

The Chinese Private Enterprise Survey collects firm information for the previous year. We use two waves of survey data, the years 2008 and 2012, to represent the samples before and after the labor market intervention[22]. Regressions will be run separately for these two periods to evaluate the marginal effect of the LCL. Also, we divide the 2012 data into sub-groups according to the level of profitability to demonstrate which firms fit the regulatory environment better.

The findings are consistent with theoretical predictions. First, we find the increase in the capital/labor ratio significantly correlates with pension coverage in the 2012 wave. Moreover, the education level of the owner also affects the transition from labor to capital. Second, firms with higher profits fit the regression model better. Firms with lower profitability do not seem to possess the necessary resources for either carrying out the transformation, or spending more resources in the purchase of pensions. Firms

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[22] There was a temporary suspension in 2009 due to the Global Financial Crisis. Thus, we do not include the 2010 wave.

with a profit of over 5 million yuan, which is the minimum requirement to enter the Chinese stock market, almost uniformly purchased pensions and had high capital/labor ratios. Hence, the lack of heterogeneity reduces the explanatory power of our model for the top profit group. Third, the related Total Factor Productivity (TFP) for different sub-groups is consistent with the theoretical explanation that capital deepening provides an advantage for profitable firms. Firms with low profitability suffer the most in an environment of labor market intervention.

The remainder of the paper is organized as follows. Section 6.2 provides a literature review of the explanations for the capital deepening and rising labor costs. Section 6.3 describes the data. Based on a simple theoretical framework, Section 6.4 establishes empirical strategies, presents the estimation results from the IV regression, and performs robustness checks. Section 6.5 concludes.

6.2 Literature review

In this section, I will review explanations concerning the increase in the capital/labor ratio and the rising cost of labor, separately, and explain the connection between the two variables.

To begin, the Chinese government has encouraged companies to invest in the research and development in technology in recent years. The government often claims the replacement of workers with machines is a result of its 'industrial upgrading' policy (Jun Zhang, Fu, & Yan, 2016). One popular explanation of the rising capital/labor ratio is that technological improvement often tends to be capital-augmenting (Arpaia, Pérez, & Pichelmann, 2009; Bentolila & Saint-Paul, 2003; Raurich, Sala, & Sorolla, 2012). Some scholars believe that technical change is particularly damaging for the job opportunities of low-skilled workers (Acemoglu, 2010; Arthur, 2011; Zeira, 1998).

This view, however, cannot explain the slowdown in overall productivity, measured in

Total Factor Productivity (TFP), that has occurred in China since 2008 (R. Li & Wang, 2015). The question then arises: how can an improvement in technology reduce productivity? An improvement in technology, such as the use of computers, would certainly have improved the productivity of calculation and reduced the length of the Manhattan Project. Cai (2014), in fact, criticizes the 'increase' in labor productivity in China as not a real improvement, but a result of the changing production function. In addition, a reduction in TFP after the implementation of EPL can be found in other nations as well (Autor et al., 2007; Caballero & Hammour, 1998).

On the other hand, H. Li, Li, Wu, and Xiong (2012) summarize three possible reasons for the increase of labor costs to the period of 2010. First, they argue that labor market reform could link monetary rewards with productivity, which causes higher educational returns (Junsen Zhang, Zhao, Park, & Song, 2005). Second, a popular explanation is that demographic change due to the one-child-policy has caused a shortage of labor, leading to increased labor costs. The last possibility is institutional barriers in China. They argue that the Hukou system restricts labor mobility and then labor supply.

The first and second reasons, in their essence, were arguing that rising wages were a result of the market. However, Golley and Meng (2011b) found that up until 2009 there was still abundant unskilled labor in China. In addition, it is reported that huge numbers of migrant workers have returned to their villages in China in recent years. At the same time, labor expenses grew at 10 percent per annum (Lin, 2018). The co-existence of high labor costs and spare labor indicates that there must be friction in the labor market.

Theoretical explanations of the relationship between EPL and the capital/labor ratio based on price theory are, in general, consistent with the empirical findings. Autor et al. (2007) argue that labor market intervention will increase the relative price of labor and lead to the substitution of labor with capital with efficiency loss. Alesina and Zeira (2006) and Koeniger and Leonardi (2007) both compare the labor market between Europe and the US. They suggest that labor market regulation is the major difference,

which leads to the adoption of more capital-intensive technologies.

According to the general theory of price control, S. N. S. Cheung (1974, p. 58) defines private property rights into three types: the exclusive right to use, the right to receive income, and the right to transfer. A restriction on any of these rights will lead to 'a change in the form of using or producing the good … Or through a change in contractual behavior', and result in 'a decline in its value'. Labor market intervention, in essence, is a price control in the labor market. The policy outcomes mentioned in this paper, such as capital deepening, lead to an increase in unemployment (Yan, 2015), and more use of informal workers (Liang et al., 2016), and reduction of productivity is consistent with the prediction of S. N. S. Cheung (1974) on restriction of private property rights. However, a detailed mechanism of the transformation is lacking.

6.3   Data

The main data set used in this paper is the Chinese Private Enterprise Survey (CPES) which is a joint scientific endeavor by the United Front Work Department of the CPC, the National Association of Industry and Commerce, China's National Bureau of Administration for Commerce and Industries, and the Chinese Private Business Economic Research Association.

Multistage sampling is used to ensure the CPES reliably represents Chinese firms. The sample is around 0.05 percent of the national population. The survey first allocated sample sizes to each province, municipality and autonomous region. In addition, in each province, municipality and autonomous region, six cities were chosen based on administration level and economic development. Moreover, the ratios of rural/urban and different industries were based on local urbanization and industrial distribution. Last, systematic sampling was adopted. Although the questionnaires vary slightly in each wave of the survey, fundamental information, such as total capital and labor, has been recorded to maintain comparability. Apart from firm-level information, one

advantage of the CPES is that the survey includes questions about personal qualities of business owners. This provides an opportunity to examine what kinds of characteristics the owner needs to possess to be the winner with labor regulations.

Currently, there have been 11 waves of the CPES: 1993, 1995, 1997, 2000, 2002, 2004, 2006, 2008, 2010, 2012 and 2014. Due to data availability, I only possess the data between 2002 and 2012. Because the survey collects information relating to the previous year, the 2008 survey is classified as before the intervention, and we use it as the benchmark. It should be noted that there was a temporary suspension in the enforcement of the LCL, especially severance fee payments, which ended at the end of 2009. The aggregated figure for national pension contributors in Table 6-1 below shows a sharp increase since 2010, which is consistent with the enforcement period of the LCL. Hence, we use the 2012 wave, instead of the 2010 wave, as the sample to test the effects of the LCL.

Table 6-1: Number of pension contributors

Year	2006	2007	2008	2009	2010	2011	2012
Total (10 000 persons)	18766.3	20136.9	21891.1	23549.9	35984.1	61573.3	78796.3

Source: China national data online (National Bureau of Statistics of China).

Another dataset used in this research is taken from the China City Statistical Yearbook, which provides information about the Social Average Wage Level. The dataset provides four average figures: city averaged wage level with and without local counties and provincial averaged wage level with and without local counties.

The data cleaning process involves deleting unanswered sample points for all variables, firms with zero employees/labor cost/sales, firms with pension cost and zero pension

coverage unmatched, firms with profits exceeding their sales figures, and firms with negative and zero capital value.

6.4 Regression analysis

6.4.1 Analytical framework

The functions of employment protection legislation and mandated benefits overlap, to some degree, and both increase the cost of labor as Autor et al. (2007) suggested. However, how the cost of labor is increased by labor market intervention is still in question. The theoretical analysis in this paper provides a simple framework to study the impact of labor market intervention on capital deepening.

In a partial equilibrium setting, a firm can be viewed as the combination of capital and labor, respectively. This is shown in Figure 6-1 below. If the labor is homogenous, the labor return would be represented as the area of $OMBl_1$. w_1 is the market wage and l_1 is the amount of labor used in production. The return to capital would be represented as the area of MDB.
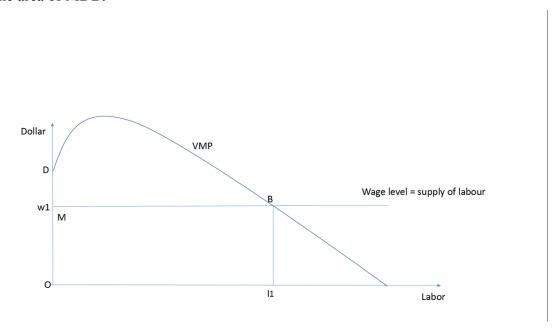

Figure 6-1: The free market firm-level equilibrium

Labor market interventions increase labor costs through two factors: the actual welfare coverage, l_2 and average labor cost, w_2. They are affected by employment protection

legislation and mandated benefits respectively. As shown in Figure 6-2, the LCL aims to transfer the MACB from firms to workers, which raises the price of labor. The purpose of social security is to raise the cost per worker, $w_2 - w_1$. On the other hand, the LCL was aimed at increasing the coverage of benefits to all employees, l2. A labor department notice stated that the base salary for social security payments should be in the range of 60 to 300% of the social average wage level (SAWL) (Ministry of Labor and Social Security of the People's Republic of China, 1997). The yellow line represents the minimum base wage level for social security, which is 60% of the SAWL. Many have criticized that the government was using the SAWL to increase social security payments (Tencent, 2015).
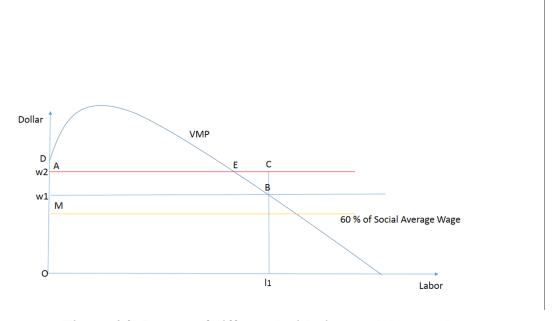

Figure 6-2: Impact of different legislations on labor markets

To reduce the impact of labor regulations, the employer can adopt two methods: to use a new production function with more machines or to hire more informal workers. This is demonstrated in Figures 6-3 and 6-4 below. It should be noticed that at firm level, the number of employees in legal terms and practice may differ. The informal worker may not be classified as an employee. This issue may be particularly severe with low-skilled workers (Liang et al., 2016), which leads to a higher pension coverage rate with the remaining high-skilled workers. Either way, the capital/labor ratio would be projected to increase.
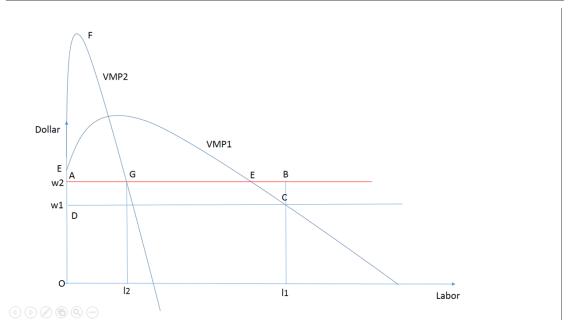
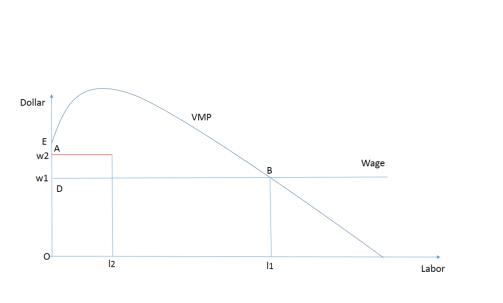**Figure 6-3: Changing production function by firm**

Figure 6-4: Changing contractual arrangement by firm

Hence, we predict the following:

1. The increase in the welfare coverage rate would be significantly correlated with the increase in the capital/labor ratio of the surviving firms.

2. Similarly, an increase in the average labor cost also provides incentives for firms to change their production function or contractual arrangements.

6.4.2   Regression strategies

A full version of the model is constructed as:

$$\frac{K}{Li} = \beta 0 + \beta 1 PENSION + \beta 2 AWC + \beta 3 APC + \beta 4 CONTi + \varepsilon i$$

The dependent variable is the capital/labor ratio, which I built as the total capital value divided by the number of employees. The dependent variable captures the adjustment of firms in order to reduce the impact of labor market interventions. Due to data limitations, I cannot construct the capital stock using the perpetual inventory method, with deflators and depreciation rates. Instead, the CPES dataset includes the self-reported total value of capital investment at the end of the previous year, and I adopt this variable and adjust by an inflation factor.

The key independent variable is firm-level pension coverage, which is the number of pensions purchased over the total number of employees. The theoretical analysis predicts that a change in relative cost between labor and capital leads to a shift in the new marginal point in production. Thus, pension coverage should be significantly associated with higher capital/labor ratios after the labor market intervention in 2008. As mentioned earlier, labor contract coverage is used as an instrumental variable for pension coverage. It was constructed as the quantity of individual employment contracts over the number of employees.

Furthermore, the average cost of labor was tested separately as average wage cost (AWC) and average pension cost (APC). The local Social Average Wage Level has been adopted as the IV for the APC. The average wage cost is the total salary cost divided by the number of employees in the firms. The APC has been constructed as the total pension cost over the number of pensions purchased.

In addition, I control for the profitability of the firm. As in theory with other things being equal, firms with higher profitability should perform better in the transition from labor to capital. I also add the region dummy variable of the firm (1 is on the eastern coastline, 0 is in the inland). This will demonstrate whether the change in the

capital/labor ratio differs by region. Furthermore, we add a dummy variable of the capital city (capital city is 1, others are 0), which could affect capital deepening. Finally, we control for the firm structure (1 for company, 0 for sole proprietorship or partnership) to evaluate whether different legal entities choose differently. The liability of sole proprietorships and partnerships is unlimited. The owner is personally liable for all debts of his or her business. On the other hand, company owners have only limited liability for their invested capital. Finally, I control for the education level of the owner (1 stands for university degree or higher, 0 is others).

I adopt two waves of the CPES datasets: 2008 and 2012, to examine the effect of the LCL on firms. I further test firms according to different levels of profit in the 2012 wave.

6.4.3   Descriptive data analysis

First, the average capital/labor ratios in the five years we are concerned with are summarized in the first row in Table 6-2, below. This confirms that the capital/labor ratio increased after 2008. The 2012 mean capital/labor ratio is almost four times the 2008 figure. The second row displays the sum of capital over the sum of labor and the third row is the median of the average value. The pattern of these three measurements is similar, increasing after 2008. Hence, the capital deepening in Chinese private firms after the LCL implementation has been confirmed. The last column with the star key, is the 2012 wave without the construction and mining industries, which have been exempted from the LCL.

Moreover, after the intervention, the distribution of the capital/labor ratio starts to diverge. The increasing standard deviation indicates that the optimal production function is no longer stable.

Table 6-2: Overall capital/labor ratio

Item/Year	2004	2006	2008	2010	2012	2012*
$\Sigma(K/L)/n$	14.91 (80.07)	12.65 (45.71)	9.87 (30.75)	22.13 (73.92)	37.29 (136.10)	35.39 (132.65）
$\Sigma K/\Sigma L$	9.95	7.24	3.30	14.73	17.88	17.87
Median of K/L	4.26	5	2.63	7.85	10	10

Source: The Chinese Private Enterprise Survey

Second, I summarize the critical independent variable, pension coverage, and its instrumental variable, contract coverage, in Table 6-3 below. This shows that the coverage of pensions and labor contracts in our sample, on average, was somewhat stable. The standard deviation of pension and contract coverage, on the other hand, increases significantly, especially in 2012.

Table 6-3: Overall pension and contract coverage

Item/Year	2004	2006	2008	2010	2012	2012*
Pension rate	0.274 (0.738)	0.408 (0.891)	0.505 (0.879)	0.505 (1.165)	0.574 (2.137)	0.566 (2.022)
Contract rate	0.752 (1.176)	0.786 (0.840)	0.890 (1.064)	0.739 (0.486)	0.781 (2.365)	0.785 (2.470)

Source: The Chinese Private Enterprise Survey.

I separate the sample into three sub-groups according to levels of profitability: above and equal to 5 million, between 1 and 5 million, and below 1 million. The minimum requirement for Chinese firms to conduct initial public offerings (IPO) is 5 million RMB profit in the previous year. The choice of the threshold will be discussed in the results section.

Table 6-4 summarizes the capital/labor ratio of sub-groups. Similar to the overall sample, two patterns exist. First, the capital/labor ratio increases significantly after 2008.

Second, the standard deviation increases over time as well. In addition, the capital/labor ratio is positively associated with profit levels. Without any regression analysis, this result shows that firms with higher profits would be affected less by labor market interventions, such as the LCL.

Table 6-4: Capital/labor ratio according to profit-level

Item/Year	2004	2006	2008	2010	2012	2012*
Σ (K/L)/n (Profit<1)	10.76 (49.92)	9.80 (17.78)	9.40 (28.02)	18.26 (64.58)	41.26 (132.36)	29.90 (121.02)
Σ (K/L)/n (1 $\leqslant$ Profit<5)	23.39 (90.66)	19.06 (92.41)	9.78 (27.77)	24.74 (70.55)	28.26 (113.67)	32.65 (122.47)
Σ (K/L)/n (5 $\leqslant$ Profit)	47.17 (224.76)	21.64 (36.57)	13.25 (47.12)	38.72 (112.74)	31.81 (116)	56.56 (172.81)

Source: The Chinese Private Enterprise Survey.

Table 6-5 provides a summary of pension and contract coverage in firms with different profit levels. The most crucial finding is in the last column. First, the mean and standard deviations of the pension coverage for firms with less than 1 million profit are roughly stable in this period. This shows that even with labor market intervention, workers in small firms still cannot enjoy improved welfare. Second, firms with profits between 1 and 5 million and over 5 million have similar average pension coverage, but the latter has a much smaller standard deviation. In fact, a requirement for a stock market launch is the mandatory purchase of social security. This regulation provides extra incentives for high-profit firms to purchase pensions for their employees.

Table 6-5: Pension and contract coverage rate by profit-level (percentage)

Item/Year	2004	2006	2008	2010	2012	2012*
Pension rate (Profit<1)	0.224 (0.396)	0.396 (1.007)	0.418 (0.825)	0.472 (1.379)	0.325 (0.406)	0.423 (1.275)
Pension rate (1≤Profit<5)	0.434 (1.456)	0.397 (0.466)	0.662 (1.043)	0.546 (0.400)	0.438 (1.324)	0.775 (3.711)
Pension rate (5≤Profit))	0.533 (1.257)	0.544 (0.547)	0.738 (0.786)	0.620 (0.478)	0.754 (3.478)	0.787 (0.728)
Contract rate (Profit<1)	0.686 (0.507)	0.770 (0.951)	0.838 (1.128)	0.696 (0.519)	0.604 (0.484)	0.691 (1.300)
Contract rate (1≤Profit<5)	1.031 (2.717)	0.806 (0.434)	1.007 (0.977)	0.813 (0.402)	0.711 (1.370)	0.966 (4.798)
Contract rate (5≤Profit))	0.924 (1.111)	0.878 (0.511)	0.988 (0.754)	0.857 (0.374)	0.938 (4.497)	0.881 (0.665)

Source: The Chinese Private Enterprise Survey.

Finally, I find some firms in the 2012 sample with a pension rate over 1, which indicates the use of dispatch workers. Business owners are required to purchase pensions for dispatch workers, who are legally not employees. However, as some employers do not follow the rule strictly, the evidence can only be interpreted as the existence of the use of such contractual arrangements. No further statistical inference has been made.

6.4.4   Justifications of the instrumental variable

I apply the IV method to establish causality between two effects of the labor market institution on the capital deepening of the Chinese firms after 2008. It is crucial to discuss how I chose the IVs for pension coverage and average pension cost. The IV should fulfill two conditions. First, it must be significantly correlated with pension coverage (relevance). Second, the IV is not associated with the error term, ε_i (exclusion

restriction).

This paper argues that the switch from labor to capital in firms' production is a result of rising labor costs, the LCL (employment protection legislation) in 2008—which effectively increases contract coverage with substantial penalties. This, in turn, increases pension coverage (mandated benefits), because low-skilled workers without a written labor contract can hardly prove they had an employment relationship before the intervention. Many empirical papers have confirmed such a pattern (Cheng et al., 2015; Gallagher et al., 2013; Gao et al., 2012; Meng, 2017). Thus, contract coverage is correlated with pension coverage, which satisfies the first condition.

Regarding the average pension cost, the SAWL is the lower boundary for pension payment for firms. Most small firms in China choose this lower standard to pay social security, including pensions. Hence, the SAWL at the local level would directly cause the level of pension payments for each employee to increase.

I thus explain the exclusion restriction of the contract coverage: the instrumental variable is exogenous and does not cause the dependent variable other than through the channel of the mandated benefits coverage. The case of our IV is rather apparent. The LCL does improve contract coverage with penalties, which directly affect the cost of labor. The cost of the written labor contract in itself is very small, but it reduces the information cost for judges to establish an employment relationship, which is crucial for coverage of mandated benefits.

In the case of pension expense, the SAWL has been estimated by the local labor department as the mean labor cost. Many have criticized the SAWL calculation as being misleading and manipulative. The SAWL announcements each season by the Chinese labor department often use the misleading title 'Great news: your wage just increased,' and the phrase 'being averaged' has also been used to describe the situation (Tencent, 2015). More interestingly, the first-stage statistics were sufficiently large only for the

average pension expense, but not for firms' average wage expense. This examination gives us little reason to believe that the SAWL can affect the cost of labor other than pension cost, which in turn causes capital deepening.

Last, Bound, Jaeger, and Baker (1995) discussed problems with weak instruments. The first stage of our estimation shows that contract coverage has a significant positive effect on pension coverage at firm level. The F-statistics for contract coverage are well above 10, which means our IV is a reliable instrument. Exceptions in particular industries can be explained by the enforcement of the LCL. For the SAWL, the most relevant value is the city averaged wage with local counties. In fact, it is the only value with a first stage over 10.

6.4.5   Results
Overall results

Table 6-6 below lists the overall results with the instrumental variable of contract coverage. Columns 1 and 2 presents the Ordinary Least Square (OLS) estimates for 2008 and 2012. I present our OLS estimates as a benchmark to detect the existence of endogeneity. Columns 3 and 4 show the IV of contract coverage results, which I name IV1. Column 5 shows the 2012 sample without the construction and mining industries. The first-stage statistics for these two industries are less than 10. This confirms that article 53 of the LCL made these industries an exception, as the mobility of labor in these professions is too high. Owners in these industries only need to sign a collective labor contract. Thus, the IV of contract coverage is not applicable in these industries. As Table 6-6 below shows, the first-stage statistics in column 5 are larger than those for the overall sample.

Table 6-6. Overall estimation results

	(1)	(2)	(3)	(4)	(5)
	2008	2012	2008	2012	2012*
	(OLS)	(OLS)	(IV1)	(IV1)	(IV1)

Pension coverage	-0.409	0.627	11.35	11.96***	18.44***
	(-0.18)	(0.31)	(0.96)	(3.19)	(3.24)
AWC	1.869***	7.913***	0.537	4.812***	2.497
	(4.09)	(11.48)	(0.39)	(4.34)	(1.39)
APC	-1.213	-2.343	-2.392	-2.363	-1.911
	(-0.22)	(-0.96)	(-0.42)	(-0.97)	(-0.80)
Profit	0.00310**	0.00207**	0.00275**	0.00190*	0.00141
	(2.51)	(1.98)	(2.14)	(1.80)	(1.19)
Education	10.97***	16.55***	9.805***	16.41***	22.06***
	(3.46)	(2.79)	(2.90)	(2.75)	(3.67)
Region	-3.056	-5.379	-4.722	-5.794	-5.996
	(-1.01)	(-0.97)	(-1.37)	(-1.04)	(-1.06)
Capital city	2.182	1.724	2.511	2.518	4.008
	(0.69)	(0.29)	(0.78)	(0.43)	(0.67)
Ownership type	5.811*	-0.0255	4.019	-1.251	-0.305
	(1.61)	(-0.00)	(1.00)	(-0.17)	(-0.04)
Constant	14.52*	10.09	9.655**	13.95*	12.54*
	(1.87)	(1.28)	(2.51)	(1.75)	(1.54)
N	1787	2259	1787	2259	2072
r2_a	0.0261	0.149	0.0114	0.137	0.146
F/Wald chi2	6.987	50.39	56.24	409.19	405.47
First-stage	-	-	69.35	921.84	1371.23

Notes: *** 1%,** 5%,* 10%;   Standard errors in parentheses.

Source: Author's own estimation.

First, compared with the OLS estimates, the results of the 2-stage-least-sqaure (2SLS) model in 2008 and 2012 are dramatically different, especially the pension coverage. This difference indicates that there is an issue of endogeneity. This is consistent with the results of tests of endogeneity. Both the Durbin and Wu-Hausman statistics rejected the idea that the null hypothesis of the variables is exogenous.

Second, the comparison between the 2SLS estimates in 2008 and 2012 shows that the increase in pension coverage significantly raised the capital/labor ratio of Chinese private firms after the intervention. This was especially obvious for the sample excluding the construction and mining industries in column 5. The capital deepening associated with the pension coverage improvement almost doubled in the 'clean'

sample compared with the full sample for 2012. Moreover, the adjusted R-square reveals the explanatory power of the model in these two periods. The R-square of the 2008 wave is less than 1 percent. On the other hand, the applicability of our model in the 2012 wave reaches 14 percent. This clearly demonstrates the impact of LCL on the production function of Chinese firms.

Third, the low R-square in the 2008 waves restrict us from providing further interpretation. However, the result in the 2012 wave confirmed hypothesis 1 of our theory. It shows that pension coverage is significantly correlated with the increase in the capital/labor ratio. Also, the IV approach enables us to infer a causal relationship between pension coverage and the dependent variable.

Last, I find some interesting results from the control variables. Unsurprisingly, the education level of the owners is strongly associated with the capital/labor ratio in both waves, especially the 2012 wave. The result implies that labor market intervention such as the LCL, provides an advantage to owners with better education as they are more capable of adapting to the new regulatory environment. As the labor market intervention is a national regulation, regional dummies are insignificantly correlated with capital deepening. Profitability of the firm is not strongly correlated with capital deepening, which may be open to different interpretations. One possible explanation is that between firms with similar products, the firms with higher profitability or a larger quantity of sales are more advantaged in employing capital over labor. The aggregated sample obviously violates this assumption. Hence, profitability plays a minor role in the overall data. Another possibility is that the vast majority of firms in the sample are small, and do not have the resources to conduct the transformation from labor to capital. Hence, the number of firms can be explained by the model in the sample is too small to show the importance of profitability.

I run the 2SLS model without control variables as a robustness check. The findings are approximately the same. This demonstrates the validity of our explanation.

Table 6-7. Robustness tests on the estimation results without control variables

	(1) 2008 (OLS)	(2) 2012 (OLS)	(3) 2008 (IV1)	(4) 2012 (IV1)	(5) 2012* (IV1)
Pension	0.761	0.751	12.18	11.45***	17.83***
	(0.34)	(0.37)	(1.07)	(3.02)	(3.10)
AWC	1.879***	7.963***	0.560	5.031***	2.768*
	(4.11)	(11.53)	(0.41)	(4.50)	(1.53)
APC	0.400	-1.824	-1.595	-1.871	-1.358
	(0.07)	(-0.75)	(-0.27)	(-0.77)	(-0.57)
Constant	16.81***	13.09***	14.55***	15.64***	16.46***
	(8.09)	(4.22)	(4.79)	(4.87)	(4.59)
N	1787	2259	1787	2259	2072
r2_a	0.0139	0.146	-0.000428	0.135	0.141
F/Wald chi2	9.368	129.2	28.80	392.52	381.66
F(First-stage)	-	-	73.54	902.69	1344.81

Notes: *** 1%,** 5%,* 10%;   Standard errors in parentheses.

Source: Author's own estimations.

Similarly, I examine the effect of average pension cost on the capital deepening of Chinese private firms with the instrumental variable of the local SAWL, which I name IV2.

Table 6-8. Overall estimation results of SAWL

	(1) 2008 (OLS)	(2) 2012 (OLS)	(3) 2008 (IV2)	(4) 2012 (IV2)	(5) 2012* (IV2)
APC	-1.213	-2.343	284.7	-33.83	-21.14
	(-0.22)	(-0.96)	(0.81)	(-1.11)	(-0.66)
Pension coverage	-0.409	0.627	-5.169	0.665	-1.613
	(-0.18)	(0.31)	(-0.76)	(0.32)	(-0.44)
AWC	1.869***	7.913***	0.579	7.910***	8.632***
	(4.09)	(11.48)	(0.33)	(11.09)	(7.24)
Profit	0.00310**	0.00207**	0.00244	0.00221**	0.00169
	(2.51)	(1.98)	(1.16)	(2.03)	(1.40)
Education	10.97***	16.55***	2.979	21.74***	26.19***
	(3.46)	(2.79)	(0.27)	(2.75)	(3.36)
Region	-3.056	-5.379	-31.29	-4.147	-6.224

	(-1.01)	(-0.97)	(-0.90)	(-0.71)	(-1.09)
Capital city	2.182	1.724	-15.77	0.435	1.149
	(0.69)	(0.29)	(-0.70)	(0.07)	(0.18)
Ownership type	5.811*	-0.0255	-8.190	1.914	1.858
	(1.61)	(-0.00)	(-0.45)	(0.25)	(0.24)
Constant	9.511**	10.09	-16.46	17.36*	10.55
	(2.48)	(1.28)	(-0.51)	(1.62)	(0.94)
N	1787	2259	1787	2259	2072
r2_a	0.0261	0.149	-	0.0853	0.132
F/Wald chi2	6.987	50.39	23.25	376.96	388.78
First-stage	-	-	1.11	15.51	11.69

Notes: *** 1%,** 5%,* 15%;   Standard errors in parentheses.

Source: Author's own estimations.

The first-stage of the overall result for the 2012 wave, whether including or excluding the construction and mining industries, reaches 10, the threshold suggested by Staiger and Stock (1997). As Table 6-8 indicates above, the difference in the average pension cost between firms does not play any dominating role in the capital deepening decision at this early stage of enforcement. Similar to the previous section, the R-square for the 'clean' sample is higher.

Decomposition by profitability

It is noticed that the R-squares of the two IVs are quite low for the 2012 sample, with or without the construction and mining industries. This implies that only a proportion of the sample can be explained by our model. Thus, I explore the question of what specific types of firms adjusted their production function due to the labor market intervention.

First, I divide the 2012 sample without the construction and mining industries, into five equal-numbered sub-groups according to the size of profit. The central story of our paper is that labor market intervention raised the cost of labor, which provided incentives to firms to switch from labor to capital in production. However, such a story

is not for everyone. Table 6-9 below represents the five sub-groups in order from high profitability to low profitability. From columns 3 to 5, the R-squares of these firms are quite low. This means that capital deepening to reduce labor cost is irrelevant to them. An interesting result in column 3, supporting our explanation, is that the determining factor for these firms to increase their capital/labor ratio is profitability. In addition, the education background results for these low-profit firms reveal a cold truth: without enough resources, an advanced degree for the owner does not make much difference in capital deepening.

The firms best representing our story are in column 2. The adjusted R-square reaches an unbelievably high level: over 0.85. In some sense, these firms are the marginal firms to observe our prediction. It is like the minority ethical groups, or youth workers in labor economics, to determine the unemployment effect of the minimum wage.

The tricky issue is how to explain that the group with the highest profit does not fit our model well. I interpret this unexpected phenomenon in the next table with an alternative categorization.

Table 6-9. 5 equal-numbered sub-groups

	(1)	(2)	(3)	(4)	(5)
	5-1	5-2	5-3	5-4	5-5
	(IV1)	(IV1)	(IV1)	(IV1)	(IV1)
Pension Coverage	32.45*	21.24***	51.91*	-5.831	8.085
	(1.55)	(4.22)	(1.55)	(-0.31)	(0.53)
AWC	-3.103	2.991*	0.840	7.652***	-1.861
	(-0.66)	(1.95)	(0.24)	(4.59)	(-0.29)
APC	-1.442	-5.307	-4.420	12.23*	-23.43
	(-0.40)	(-1.28)	(-0.55)	(1.68)	(-0.67)
Profit	-0.000152	0.0173	0.751***	0.149	0.00881
	(-0.08)	(0.75)	(3.38)	(0.46)	(0.42)
Education	27.41*	12.38***	7.007	1.395	47.97**
	(1.59)	(2.58)	(0.62)	(0.28)	(2.38)
Region	-5.774	-0.782	-9.845	-5.547	3.013
	(-0.29)	(-0.16)	(-0.97)	(-1.30)	(0.17)

Capital city	20.76	-9.326*	8.459	-2.114	6.600
	(0.96)	(-1.78)	(0.65)	(-0.47)	(0.38)
Ownership type	-62.95**	0.173	10.64	0.694	24.59
	(-2.13)	(0.03)	(0.90)	(0.14)	(0.94)
Constant	88.35**	1.294	-41.20**	-0.629	3.928
	(2.51)	(0.15)	(-2.15)	(-0.10)	(0.13)
N	414	414	415	414	415
r2_a	-0.0152	0.877	0.00719	0.0983	-0.002
F/Wald chi2	13.14	3076.40	22.64	54.58	8.37
F(First-stage)	295.86	141.75	41.56	27.98	645.96

Notes: *** 1%,** 5%,* 15%;   Standard errors in parentheses.

Source: Author's own estimations.

An alternative grouping is presented in Table 6-10 below. The first column lists firms with profit over 5 million RMB. It should be noticed that the results of the first two columns in Table 6-10 are almost identical to those in Table 6-9, above. As mentioned, the threshold of 5 million RMB profit was the minimum requirement to list on the Chinese stock market. Furthermore, another prerequisite of a stock market launch is the full purchase of social security. It is well known that the equity market is much easier than loan or debt channels for Chinese private enterprises to gain access to capital. Hence, it is understandable that these highly profitable firms are very homogeneous: they have high pension coverage with a high capital/labor ratio, which was demonstrated in the descriptive data section. On the other hand, firms with profits between 1 to 5 million RMB do not have extra incentive to purchase pensions for their employees, to access the stock market. Therefore, such heterogeneity in pension coverage and capital deepening results in a perfect match for our model.

Table 6-10. Alternative sub-groups

	(1)	(2)	(3)
	(5≥Profit)	(1≤Profit<5)	(Profit<1)
	(IV)	(IV)	(IV)
Pension Coverage	32.53*	20.34***	-1.371
	(1.52)	(4.01)	(-0.20)
AWC	-3.199	3.265**	2.667
	(-0.67)	(2.11)	(1.02)

APC	-1.505	-4.749	-0.993
	(-0.40)	(-1.08)	(-0.13)
Profit	-0.000227	0.0154	0.00625
	(-0.12)	(0.73)	(0.45)
Education	28.99*	9.922**	21.00***
	(1.61)	(1.99)	(2.63)
Region	-6.137	-2.367	-4.021
	(-0.30)	(-0.47)	(-0.58)
Capital city	22.17	-10.95**	6.858
	(0.98)	(-2.01)	(0.95)
Ownership type	-66.50**	2.026	11.87
	(-2.14)	(0.31)	(1.38)
Constant	91.92**	3.235	6.523
	(2.50)	(0.39)	(0.66)
N	394	453	1225
r2_a	-0.0148	0.849	0.0076
F/Wald chi2	13.24	2639.11	17.12
F(First-stage)	284.48	173.95	1166.78

Notes: *** 1%,** 5%,* 15%;   Standard errors in parentheses.

Source: Author's own estimations.

TFP evaluation

I adopt a fundamental method to calculate the Total Factor Productivity (TFP) for the overall results and the different profitability groups in the two waves in Table 6-11 below[23].

Table 6-11: TFPs in the two periods

	2008 (OLS)	2012* (OLS)
Overall	0.0988	0.0837
5-1	0.620	0.598
5-2	0.370	0.522
5-3	0.272	0.340
5-4	0.307	0.255
5-5	0.0228	-0.0190

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[23] The TPF is the residual of the following OLS regression formula. The dependent variable is the logarithm of sales value. The independent variable is the logarithm of number of employees, capital value, and intermediate expense, which we measured as sales minus net profit.

Source: Author's own calculation.

The overall result is consistent with existing studies on the subject, which find that overall TFP in China has dropped since 2008. More importantly, the TFP of firms with different profitability follows the theoretical prediction. In both periods, the TFPs of firms with higher profitability are higher. However, there is a structural difference in the two samples. In the 2008 sample, the TFPs for firms in the middle groups are somewhat similar. The TFP of the least profitable firms are at least positive. This means that, in good times, the economic performance that cannot be explained by inputs or luck is evenly distributed among firms.

In the 2012 sample, there is a clear gap occurring between groups 2 and 3, which as presented in the previous section, also differs significantly in the capital/labor ratio. In fact, the difference in TFP between each group is more significant after the labor market intervention. The TFP of the least profitable firms turned negative in 2011[24]. This means that low-return firms in 2011 faced a much harsher business environment than in 2007. It should be noticed that the estimation of TFP may be biased because of the use of capital variables. Hence, there is a potential gap to be filled for future studies to use better data to re-examine the issue.

Discussion

To begin, the result of this analysis is consistent with existing studies about capital deepening after labor market intervention in different periods around the world. Studies including Cingano et al. (2015), use regression discontinuity design (RDD) to confirm the capital deepening after the implementation of EPL in Italy. Autor et al. (2007) use a fixed-effect model and find an increase in the capital/labor ratio after EPL was enacted in the USA. Cette, Lopez, and Mairesse (2016) use the EPL indicators for 14 OECD

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[24] Unlike the OP and LP approaches, using the OLS approach for calculating the TFP could generate negative results.

countries covering the years 1988 to 2007 and Hasan, Mitra, and Sundaram (2013) use cross-country panel data on manufacturing industries to evaluate capital deepening. Both studies find the more restrictive the labor law in one country, the higher the capital/labor ratio. One of the weaknesses of social science is the inability to perform experiments that control other variables. However, as labor market interventions can be found in most nations, these empirical results could function as repeated experiments, enabling us to infer a causal relationship between labor market intervention and capital deepening.

Additionally, by understanding the mechanism of how labor laws affect labor costs and how firms react to such an increase in cost, the findings of this paper provide inspiration for explaining some unasked questions. First, the empirical studies find supporting evidences that welfare coverage increases the capital/labor ratio in the Chinese firms. Supporters of the Affordable Care Act (ACA; aka Obamacare) have often used increases in health care coverage to illustrate the importance of government intervention (Sommers & Kronick, 2012). Thus, future analysis can further examine this relationship in other contexts. Second, capital deepening was thought to be a procedure of replacing labor with physical capital, such as machines or robots. This study shows that by reducing the number of legal employees in a firm, the capital/labor ratio also increases. It explains how industries other than manufacturing could perform capital deepening, as the replacement of labor with capital is highly dependent upon the homogeneousness of the task. Third, as the change of contractural arrangements does not depend on the technology in a specific industry, it enables the comparability of TFP between firms in different industries in this study.

6.5   Conclusion

The overall results of this paper are consistent with our prediction and provide answers to our research questions. First, I find the critical explanatory variable, pension coverage, is significantly correlated with changes in firms' capital/labor ratio. This

study provides evidence of the detailed mechanism of how labor market intervention affects the cost of labor, which in turn increases capital deepening. However, empirical estimation is complicated by the issue of endogeneity. The finding from the IV approach indicates that pension coverage significantly affected capital deepening in the years of concern.

Second, by decomposition of the sample, I discover that firms that fit our theoretical model are concentrated in the range of 1 to 5 million RMB profit. Firms with profit less than 1 million have lower pension coverage and lower capital/labor ratio. This indicates that these low-profit firms do not have the resources to reduce the impact of the labor market intervention and would possibly be affected the most by LCL. The descriptive data analysis shows that firms with high profitability have high pension coverage with minimal variance. It is known that a requirement for stock market listing in China is 5 million annual profit with the full purchase of social security. Thus, our model explains these high-profit firms poorly.

Third, our study provides a picture of the dynamic change in the Chinese market after labor market intervention. The findings of this study demonstrate that large-sized firms in China have an advantage in the regulatory environment. At the same time, both the growth of GDP (Trading Economics, 2018b) and investment (Trading Economics, 2018a) decline in China as the majority of small firms cannot adjust their production toward capital and subsequently withdraw from the market.

There are two major limitations to this study. First, due to the data limitation, the capital value used in this study is the self-reported overall figure, instead of the accumulation of investments as capital stock. However, the purpose of this research is not only to measure physical investment by firms to replace human employees. In reality, the increased use of informal employees or the simple reduction of employment can both increase the capital/labor ratio at firm level. Thus, the capital/labor ratio sufficiently captures the overall change in the production function. Second, the efficiency analysis

based on TFP is still relatively simple, which may require further studies on the topic. One might question the comparability of TFP between firms in different industries. Nevertheless, the major strategy for firms to get around the law is the use of informal workers. This is somewhat similar in different industries. As this research argues, the fundamental constraint is the adequacy of financial resources to conduct such a transformation.

Finally, labor market intervention is a worldwide social issue. In the United States, the Affordable Care Act (ACA; aka Obamacare) is so controversial that the entire nation is almost divided over this issue. The LCL in China attracted just as much attention and is the most contentious legislation in modern China. The findings of this study, therefore, produce the necessary inspiration to contribute to this policy debate.

Chapter 7: Why do big firms love labor market interventions?

7.1 Introduction

Since 2010, a significant increase in the use of robots has occurred in the Chinese manufacturing industry. According to a report by the World Industrial Robot Organization, the global sales of robots prior to 2008 was relatively stable. However, a sharp surge in demand from China, which increased by about 36 percent per year on average, resulted in an average annual increase in the world consumption of robots by 16 percent between 2010 and 2015. In 2015, China became the biggest consumer of robots, accounting for 27 percent of world demand. As the rest of the world market remained roughly unchanged, China was the main contributor to the global increase in the use of industrial robots (World Robotics, 2016). These investments increased the capital/labor ratio, leading to higher average labor productivity (Cai, 2014).

However, what has triggered such continuous transformation in China since 2010 remains unclear. The official statement is that the transition from human workers to machines is a result of the industrial upgrading policy implemented by the Chinese government. The Chinese government claims these effects are a sign of technological and economic progress (Jenny Chan, 2017). The media has extensively reported the massive replacement of human workers (Elkins, 2015). Nevertheless, if the transition from labor to capital is a result of market competition, which indicates an improvement in Chinese manufacturing technology as advertised by the Chinese government, then private investments from both domestic and international markets would be predicted to flow into the Chinese manufacturing sector. However, the exact opposite has happened. A significant investment withdrawal from the manufacturing sector occurred due to low returns on capital investment (Hu, 2017a). Overall investment in China has declined since 2008, including in the manufacturing

industry[25].

Research analyses based on large datasets have demonstrated the substitution is correlated with the implementation of Labor Contract Law in 2008 (Ren, 2015). Lin (2018) demonstrates the labor costs increased over 10 percent annually in recent years. However, no specific analysis explains why and how the replacement of human workers with robots has occurred in China. In this paper, we used in-depth interview data collected from six provinces in China in 2017 to provide a detailed explanation for this phenomenon. The key argument is that the replacement of human workers by machines is a result of the rising cost of labor enacted by labor market regulations. In addition, due to the properties of industrial robots, certain firms would benefit more by this substitution. Two major findings were revealed by this study. Firstly, the labor market interventions in China, especially the Social Average Wage Level set by local labor departments, effectively increased the cost per worker in China by roughly 10 percent per year. Secondly, large firms with a high volume of homogeneous outputs have fewer difficulties than their smaller competitors when implementing the substitution. This special advantage has resulted in a change in the industrial structure in China since 2011.

The remainder of this paper is structured as follows. Section 7.2 provides a literature review. Section 7.3 establishes an analytical framework to generate testable hypotheses. Section 7.4 describes the data collection method and Section 7.5 examines the hypotheses with empirical evidence from China using case studies. Section 7.6 provides the conclusions.

7.2   Literature review

The Labor Contract Law in China is classified as employment protection legislation

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[25] According to official data, Investments in manufacturing industry increased from 2004 to 2015 by 33.3%, 35.7%, 28.3%, 30.6%, 27.4%, 24.5%, 25.5%, 15.9%, 21.3%, 18.6%, 13.1%, 8% annually.

(EPL). The law was copied from western societies. It reinforces mandated benefits, such as social security and minimum wages, and improves employment protection, such as severance payments. Although a large amount of theoretical work has been constructed in this field, contradictions and inadequacies still exist. Summers (1989) and Lazear (1990) established two theoretical models to individually determine the market impact of mandated benefits and employment protection legislation. Both were unable to provide a refutable hypothesis. In addition, Hopenhayn and Rogerson (1993) and Bentolila and Bertola (1990) predicted the opposite effects of EPL on employment. Janiak and Wasmer (2012) found capital investment was positively correlated with low levels of EPL, and negatively correlated with high-level EPL nations. They then established a theoretical model to explain the relationship between EPL and the capital/labor ratio. However, their theory did not produce any testable hypotheses.

Empirically, experiences from other nations have shown a similar pattern of EPL reducing overall productivity and increasing the capital/labor ratio. Cingano et al. (2015) found that after an improvement in EPL for small firms with fewer than 15 employees in Italy, these firms increased their capital/labor ratio, with a decline in Total Factor Productivity (TFP). Autor et al. (2007) used data from the United States of America and had similar results. Hasan et al. (2013) showed that labor market regulations, and especially employment protection, would increase the capital/labor ratio in the manufacturing industry in developing nations such as India.

In addition, Haltiwanger et al. (2014) used cross-country data and found that EPL reduces job reallocation[26], especially in industries that require more frequent labor adjustment. Crucially, they found that this effect is particularly strong in exiting or marginal firms than in continuous firms. Bottasso et al. (2017) used data from 13

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[26] This includes job creation plus job destruction.

nations and confirmed this pattern. They also found a stronger negative effect for smaller firms. Cuñat and Melitz (2007) found evidence suggesting that firms in volatile sectors are more sensitive to EPL.

In the Chinese context, studies have also been conducted with big datasets. Z. Liu (2015b) confirmed that growth in China has been more dependent on capital investment since 2008. Contributions from labor and productivity gains have shrunk. Ren (2015) used data from 2001 to 2013 and determined the Labor Contract Law (LCL) in 2008 was correlated with an increase in the capital/labor ratio in large stock market-listed companies in China. Xi and Sun (2017) used the LCL as an instrument variable and found that rising labor costs were positively correlated with the increase in the number of robots used.

Hu (2017a) found the TFP in China from 2007 to 2012 was 1.3 percent, which was the lowest point after the reform period. In comparison, the TFP from 2001 to 2007 was 4.8 percent. Similarly, R. Li and Wang (2015) showed that the technology shock in China, from being consistently positive in 2001-2007 to consistently negative in 2010-2014, was the primary driver of the slowing of the nation's growth since 2010.

Most interestingly, X. Zhang (2009) used a sample of 2,158 firms and confirmed that small firms are more affected by the Labor Contract Law (LCL) than large firms, possibly due to lack of enforcement for small firms prior to the intervention. X. Liu, Guo, and Zhu (2009) used interview data collected in Zhejiang Province, and found the impact of LCL on small, high-fluctuation, labor-intensive firms was more severe.

However, several questions in relation to the Chinese Labor Contract Law remain that cannot be answered with these large survey datasets. To start, the ceteris paribus

assumption can hardly be satisfied. Supporters of the LCL often use the Global Financial Crisis to explain the decline in economic growth in China since 2008. Moreover, the increasing use of machines can be interpreted as a result of financial aid provided by the Chinese government. Although a large number of empirical studies using different survey datasets have found that the LCL increases the coverage of labor contracts and social security (Gao et al., 2012), they cannot explain the increase in cost per unit of labor during this period. Thus, some use the Lewis Turning Point to explain the rising cost of labor in China. Indeed, these reasons are difficult to determine and explanations are often speculative. Therefore, a deeper analysis into the decision making of businesses is required, which is the focus of this research.

7.3   Analytical framework

According to our theoretical framework, two hypotheses can be deduced[27].

Hypothesis 1. Maintaining constant the productivity of the old and new production functions of a typical firm, the higher the cost per labor (w2), the more likely firms are to use more machines.

Hypothesis 2. Maintaining constant the cost per unit of labor (w2), the higher the return from the new production function in a particular firm, such as its size or industry, the more likely the transition would be.

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[27] As changing the capital/labor ratio is a temporary solution to avoid the rising cost of labor, the only choice left for these surviving firms facing the rising pressure of EPL is to reduce investment. The scope of this paper restricts me from exploring this situation. However, this hypothesis not only follows common sense, but is also supported by evidence. Like the old saying, it is important to compare like with like. A comparison between Germany and France, with similar industrial structure, can demonstrate some apparent contradictions in empirical findings. Brenke (2013) closely examines the manufacturing sectors in Germany and France in the period of 2001 to 2011. Contradicting common belief, modernization runs from the agricultural industry through to the manufacturing industry and only later to the service industry. He finds that Germany has maintained a strong position in the manufacturing industry, with good economic performance. Germany's service industry has not evolved into an engine of growth. On the other hand, there has been deindustrialization in almost all branches of industry in France, which has also experienced a depressing economic growth. Brenke (2013) further argues that differences in their wage policies affect wage growth, which in turn influences the competitiveness of the two nations. The wage growth rate has been far quicker than productivity growth in France. Conversely, German wage rates have lagged behind increases in production.

7.4   Methodology

To examine the relationship discussed in the analytical framework, data about the actual cost of labor and machine for firms operating in China was required. The data included sensitive information, such as illegal activities in the grey economy. The richest woman in China at that time, Zhang Yin, expressed concern and criticized the law as a return to the 'Iron Rice Bowl' in 2008 (T. Huang, 2016). Certain interest groups chose to use her as an example of a sweatshop owner who exploits workers. Labor lawsuits almost bankrupted her company and she later refused to comment on the law (Wei, 2009). Rhetorically, as one interviewee pointed out, 'No one can follow that law perfectly. Therefore, no one dares to criticize it in public.' Due to the sensitivity of this issue, large survey datasets cannot appropriately collect this information. Similar problems have occurred for other researchers[28]. Therefore, small-sample, in-depth interviews were conducted to overcome this problem. In addition, official data and other empirical studies were chosen and interpreted to reinforce the validity and reliability of the collected data.

In total, three lawyers, five employees, three local officials, four labor department bureaucrats, 26 companies' human resource managers/owners and one manager from a robot-producing company were interviewed. The employees included managers, engineers, and low-skilled workers. Among the 26 companies, 21 were in the manufacturing industry, and the rest were in transportation, banking, retail, commerce, and construction. The size of these firms varied from small, with fewer than 100 workers, to medium, with 100 to 1,000 workers, to large, with over 1, 000 workers. The firms were from nine provinces, including Anhui, Canton, Guangxi, Hebei, Hubei, Shandong, Shanghai, Sichuan, and Zhejiang. Three enterprises were

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[28] In a discussion with a scholar in the same area, he admits the size of the sample cannot expand to people he does not have a personal relationship with. The results from these interviews can hardly be used to generate regression analysis as so much information is missing. A similar situation occurred in my fieldwork, that is, the more distant the relationship between me and the interviewee, the less likely that I can obtain data from him.

state-owned-enterprises and three were foreign-owned (including Hong Kong firms);
the rest were private firms. The 21 manufacturing firms comprised the sample for this
analysis. Table A1 in Appendix 3 summarizes the information about these firms.

Notably, the sample size of this study is relatively small for drawing implications for a
large nation such as China. However, these semi-designed, in-depth interviews provide
detailed information about actual costs for business owners when deciding to robotize.
We also found that the capital/labor ratio change information was quite homogeneous
across firms with different sizes, locations, and ownership. As these interviewees were
chosen independently, the reliability of the data is adequate.

7.5   Case studies

Before examining the causal relationship between the rising cost of labor and the
change of capital/labor ratio, the true cause of the rising labor cost must be
determined. In neoclassical economics, the price of labor and capital are determined
by their relative supplied quantity. A shortage of migration workers in China has often
been reported ("Labor shortage hits China," 2011). Hence, some argue that the rising
cost of labor is a result of demographic changes, such as the Lewis Turning Point
(LTP). The LTP states that as the Chinese working population ages, the rising labor
cost is due to the decline in labor supply. Nevertheless, Golley and Meng (2011a)
show that unskilled labor is still abundant, which suggests that demographic changes
have not yet played a crucial role in determining the price of unskilled labor. In
addition, a large number of low-skilled workers have lost their jobs and returned to
their village homes. The government has not admitted the economic failure and
labeled these workers as 'returning home workers for starting businesses' as
propaganda (Lv, 2017). This evidence counteracts the demographic argument.
Therefore, the rapidly rising labor costs can only be explained by institutional factors.

Indeed, the institutional explanation provides a full picture of what is occurring in

China. If the price of labor is increased through policies, enterprises are encouraged to alter their production function to reduce labor costs. This results in the co-existence of high unemployment, and the huge amount of robots purchased in China. Golley and Meng (2011a) suggested that the Hukou system was the institutional barrier causing the costs of labor to rise. Nevertheless, during the period studied, no significant tightening of the Hukou system occurred.

In summary, two key variables from the hypotheses mentioned in Section 7.3 were examined: the actual increase in costs caused by the Labor Contract Law and other related legislation, and the difficulties due to robotization.

7.5.1 Hypothesis 1

Enforcement: time/ownership

The timing of a number of changes around 2010-2011 has been questioned, as they did not coincide with the implementation of the LCL in 2008. However, an issue unnoticed by most researchers is that the Chinese Labor Department temporarily relaxed enforcement during the financial crisis period. In November 2008, the department issued a notice of temporary suspension of increasing minimum wages (Ministry of Labor and Social Security of the People's Republic of China, 2008b). In December 2008, likely given pressure from other departments, such as the Department of Commerce, the severance fee payment was deferred during layoffs under 'extreme economic hardship.' If the local government granted a firm permission, the firm could also temporarily suspend their social insurance payments (Ministry of Labor and Social Security of the People's Republic of China, 2008a). The deadline for these suspensions was 2009. Thus, 2010 was the real starting date for the enforcement of the law, and the major changes (Tables 7-1 and 7-2) occurred in 2011. Table 7-1 summarizes changes in the investment behaviors of firms based on different ownership structures.

Table 7-1: Domestic investment from different sources

Items/Year	2007	2008	2009	2010	2011	2012	2013	2014	2015
Private (percent)	29.6	27.0	27.5	27.6	18.7	21.3	22.7	15.3	10.3
HK,Macao,Taiwan (percent)	26.4	16.0	2.0	17.0	13.7	9.0	7.3	8.2	-0.04
Foreign (percent)	20.3	14.9	-0.6	6.2	4.2	13.6	5.5	-0.7	-2.8

Source: China national data online (National Bureau of Statistics of China)

Another interesting implication from Table 7-1 is the difference between domestic and foreign investors. A dramatic decline in investments from foreign firms occurred. In this study, enforcement for foreign-owned firms was stricter than for their domestic competitors. When questioned about different investment behaviors between local and foreign firms, one human resource manager stated that, 'The foreigners do not dare to violate local laws. It would damage their global reputation. The local firms do not care about the law in the first place and can get around the law easily. In fact, they are playing on their home ground.' This result is not only confirmed by many interviewees in this fieldwork, but also supported by other empirical studies. X. Zhang (2009) and Gallagher et al. (2013) found the enforcement and impact of the LCL was less serious for local private firms.

Functions of different legislations

Notably, the LCL functions as a part of overall labor market restrictions. Although speculating about motivation for the LCL is difficult, social security coverage increased, which in turn increased the cost of labor. This is evidenced by the LCL mandating written contracts with severe penalties (Article 10, 14, 82), social security (Article 17), and implementing severance payments (Article 46, 47) ("Labor Contract Law of the People's Republic of China," 2008).

Prior to this intervention, low-skilled employees rarely signed labor contracts, which is consistent with economic predictions. Goodhue, Heien, Lee, and Sumner (2003) found growers of high-quality grapes were more likely to use formal written contracts than those who produced low-quality grapes. This pattern can be explained by the Alchian-Allen effect, also known as the 'shipping the good apples out' theorem, which argues that higher-grade products can justify expensive transportation costs. In this case, only higher-grade labor can afford the transaction costs of written contractual arrangements and other welfare, such as social security. Written contracts, as proof of an employment relationship, re-enforce the social security coverage for low-skilled workers, which has been confirmed by many empirical studies (Cheng et al., 2015).

In this fieldwork, labor department bureaucrats always attempted to deny that the introduced legislation has increased the cost of labor in China. One common argument was that the social security payment percentage and LCL were fixed during this period. Therefore, the rising cost per laborer was a result of the market due to the Lewis Turning Point, not a consequence of government intervention. The government stance is refuted by the labor department notice stating that the base salary for social security payments should be in the range of 60 to 300 percent of the social average wage level (Ministry of Labor and Social Security of the People's Republic of China, 1997). The lower boundary of 60 percent of the SAWL is used by most private companies as the base for social security payments. Thus, increasing this wage level by local government can be a method of increasing social security payments, which explains the yearly increase in labor costs for low-skilled workers. During the same time the SAWL, as the base for social security payments, increased dramatically at a rate of 10 percent per year in China, which is consistent with the explanations provided by foreign firms leaving China. Many criticized the SAWL calculation as being highly misleading and manipulative. The phrase 'being averaged' has also been used to describe the situation (Tencent, 2015). In this study, most of the small and medium manufacturing firms in the sample admitted they were using a lower

boundary wage to pay social security. However, this issue falls into a grey area of the law. One interviewee nodded, instead of using words to describe this situation. Table 7-2 lists the yearly national SAWL.

Table 7-2： National SAWL from 2008 to 2016

Items/Years	2008	2009	2010	2011	2012	2013	2014
Monthly salary (Yuan)	28898	32244	36539	41799	46769	51483	56360
Growth rate (percent)	16.9	11.6	13.3	14.4	11.9	10.1	9.5

Items/Years	2015	2016
Monthly salary (Yuan)	62029	67569
Growth rate (percent)	10.1	8.9

Source: China national data online (National Bureau of Statistics of China)

Local SAWLs are also consistent with the pace of growth of national data. Table 7-3 summarizes the SAWL in four capital cities in different areas of China. It is shown that in the majority of these years, the growth rate was around 10 percent, as described by foreign investors.

Table 7-3: Local SAWL

Year/Items	Guangzhou	Growth rate	Shijiazhuang	Growth rate
2010	54495	10.7	31460	2.6
2011	57468	5.5	35132	11.7
2012	63756	10.9	38658	10.0
2013	69696	9.3	41501	7.4
2014	74244	6.5	46239	11.4
2015	81168	9.3	52409	13.3
2016	89096	9.7	59337	13.2

Year/Items	Chengdu	Growth rate	Hangzhou	Growth rate
2010	30515	11.9	34330	12.6
2011	34008	11.5	38837	13.1
2012	38221	12.4	42493	9.4
2013	47644	24.7	46831	10.2
2014	51681	8.5	51449	9.9
2015	57480	11.2	55908	8.7
2016	61330	6.7	61174	9.4

Source[29]: Collected from online notice

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[29] The information was collected separately online from each department notice.

One hypothesis is that the higher the cost of labor in an area, the higher the number of machines used. This hypothesis is consistent with the global evidence. According to the World Industrial Robot Organization report (World Robotics, 2016), 75 percent of robot products in 2015 were consumed by five nations: China, the Republic of Korea, Japan, the United States, and Germany. Apart from China, the other four nations are developed nations with high labor costs. The cost of labor in China, as discussed throughout this study, has increased during this period.

Nevertheless, a number of barriers prevent the author from testing this hypothesis directly. Firstly, the robot density figure often used to measure the use of robots in a nation provides no reliable provincial data that can be used for regression analysis. Secondly, the robot density figure only includes industrial robots. As an interviewee pointed out, "Machines, production lines, and lathes should all be counted, but they are hard to measure." Lastly, holding other factors constant is challenging for regional comparison. As shown in Table 7-4, the SAWL in Guangdong and Zhejiang are higher than in other areas. The use of robots in these two regions was reported to be the highest in China (Wakefield, 2016). Notably, these two regions are also the industrial base of China, with larger manufacturing companies in these locations than in any other Chinese region.

This evidence, combined with the time-series analysis provided by Ren, is consistent with Hypothesis 1. These findings provide observable variables that explain the continuous increase in labor cost in China. The results show that the Labor Contract Law has increased the coverage of mandated benefits l_1. However, the wage level $w2$ in China was "dragged upward" by the labor department using social average wage levels for social security payments, which is creating solvency issues (J. Xu & María, 2015). The combination of these three pieces of legislation provides a full picture of the labor market intervention in China.

When Prime Minister Li Keqiang urged the labor department to reduce social security

payments in 2016, the Ministry of Labor faced enormous public pressure and quickly agreed to study the possibility of reducing the payment percentage (Zhao, 2016). Notably, this reaction appears to be a stalling tactic by the department, even though the agreed cut was around 1 percent. One interviewee criticized the ignorance of the Prime Minister: "The reduction in the social security rate is totally useless, the labor department can simply raise the social average wage level to get the money they want."

7.52 Hypothesis 2

Almost all interviewees, including lawyers, human resource managers, owners, local officials, and investment bankers, stated the key characteristic for a successful transition from labor to capital was having a large volume of homogeneous and stable product. Two factors are related to this characteristic: (1) Firm size: Large or expanding firms would be more likely to have stable product sales, (2) Industry type: Certain industries with more homogeneous outputs are more likely to change their production function.

This applies not only to industrial sectors, but also to agricultural products. Reaping machines are often used in harvesting. However, not all crops are suitable for these machines. Worldwide, apple picking is an activity that seldom uses machines because each apple is located at a different place on the tree, which makes the use of machines costly. Conversely, wheat, rice, and carrots can all be mechanically harvested. Apple picking machines were unpopular even in 2016, due to their cost (Geranios, 2017).

Size

Firms in different industries, locations, and with different ownership structures all follow a pattern in the substitution from labor to capital, as shown in Table 7-4. Firm 6 is an exception to the size explanation, as its product is homogeneous, which is discussed in the next sub-section. Among the 21 manufacturing companies, four were

highly profitable and large companies (10, 15, 19, and 20). They had no significant difficulties during the transformation from labor to the use of robots. Firms 16 and 18 are expanding firms that hesitated to make this decision, and were examined carefully. Most small firms chose to close or reduce outputs, with the exception of Firms 5 and 9.

Table 7-4: Firms summary

Firm type	Firm number	Success in substitution
Group 1: large firms	10, 15, 19, 20	10, 15, 19, 20
Group 2: expanding firms	16, 18	16, 18
Group 2: small firms	2, 3, 4, 5, 6*, 9, 11, 14, 17, 21	6*

Large firms

In traditional manufacturing industries, the size of a firm is a determining factor in the decision to change the production function, as it is related to a large quantity of stable outputs. All four large stock-market-listed companies in this study faced no difficulties in replacing human workers with full automatic production lines (not necessarily industrial robots). All firms also followed a similar pattern, automating only one or two of their production lines. An engineer from one of the large companies declared the decision-making process as:

> A number of staff from different departments will come to sit together for this decision. The accountant will show the cost per labor, price of the machine, and interest expense. The engineers must provide the productivity of the machines in relation to the productivity of labor. The sales department must provide information about what product is more stable, and the boss will make a final decision based on this information.

The engineer further explained that, 'We use these machines at full capacity, whereas the workloads of human workers are more adjustable. This is a special advantage for

large firms.' When productivity was questioned, he replied, 'We will not lose money, but it is not any technology improvement either.'

External public sources also re-enforce the reliability of the fieldwork data. Yihua, a connector manufacturer announced in its prospectus ("Prospectus of Yihua," 2016) to its potential investors that, "Although the profitability of the firm was affected by rising costs and lower prices, our company has taken steps to use more machines to replace labor to minimize rising costs." Moreover, the prospectus describes the actual labor transition:

> As the overall automation level increases, the quantity of the main products increases accordingly. Especially, the core products, RJ45 and SFP increased significantly. The related rates of capacity utilization improve accordingly, almost at full capacity. On the other hand, the personalized product, USB and HDMI declines a little when using machines, but is maintained at a reasonable level. The company maintains a flexible production (human labor) for these products.

Lastly, the company hinted that the transition does not improve its profitability, 'Although we have used machines to replace workers to reduce cost; however, a time-lag occurs for this transition to take effect.'

Expanding firms

In this study, marginal firms are small, expanding firms with fluctuating outputs. Their difficulties related to the transition are significantly greater than those faced by large firms. The manager of a small firm had just finished purchasing a robot, and explained why they had been reluctant toward this transition,

> As a small business with seasonal fluctuations, labor workers provide. I can hire more for the peak season and fire them off-season. It is very convenient. But if I rent machines for the job, I have to pay interests in offseason, but there are not so many jobs in that period. It is a waste of money for me.

A similar result was found by X. Liu et al. (2009).

Compared with large firms, small firms face higher uncertainty in terms of competition. In this fieldwork, a business-person in the stationery industry stated that,

> I am the fifth producer in the world. Number one is in Canton. My sales are pretty good every year, but I cannot predict next year's return. I am hoping to be the supplier to the largest stationery company in world. If I succeed, my income will be more stable and predictable.

This uncertainty also prevents small firms from using more machines. A famous comedian, Luo, has invested in the mobile phone industry. His production relies on the Oriental-Equipment-Manufacture factory instead of machines. An interviewee stated, 'He [Luo] does not even know his company can last next year, so why buy expensive machines?'

This example illustrates a critical point. The economic rent of a company is not only dependent on the productivity of the new machines. The key determining factor for rent is market power, which is created through patent monopoly power, entrepreneurship, and technological knowledge. As such, changing the production process toward robotization cannot in itself improve the market power of a small firm. Large companies with stable sales can use robots with less efficiency loss. Thus, supportive government policies may mitigate the temporary financial difficulties faced by small firms. However, the long-term issue of mismatched capacity is unaddressed by these policies.

After three months, the medium-sized firm that had just purchased machines to replace workers was revisited. The full automated production cost 40,000 to 50,000 RMB, which is a much smaller investment compared with large firms. However, the owner had a much clearer calculation of the investment. He said,

> Before, we needed six people to do the packing, now we only need two

people. The labor cost is around 3,500 RMB for each worker per month. Similarly, we used to need eight for bottling, now we only need one. It will take over a year to recover the investment; the quicker the better.

When asked about the uncertainty issue, he answered, "It is a gamble for us, yes. We must select the top three products from the six total. In order to have more stable production, the adjustment of the production line is too expensive". Regarding product quality, he said, 'The quality definitely improved, more stable and quicker. Before, the packaging was all dependent on experience of the employee'. Then a question about its monopoly on price was asked, but they denied that the machines result in any extra market power: 'These stationery companies do not care how we produce the product, only the price. Our output price did not change'.

Small enterprises

Compared with these expanding firms, almost all small and medium enterprises had reduced their investments since 2008 in this sample. Some firms even decided to close. One small business owner explained that the profit margin was around 10 percent, so a tiny increase in government-mandated intervention would result in bankruptcy. Relocation is essentially the only choice for low-profit margin enterprises.

The two businesses (Firms 5 and 9) that had maintained their production function are in the weaponry and computer game industries. The profit margin for these two firms was high enough to cover the extra mandated benefits. The owner of the high-tech firm stated that, 'We use the lowest social average wage level to pay social security, but no one in my firm cares about it anyway. We pay them well, way over the average level, so they can use their savings as pension'. In fact, workers at the management level would not normally use the law to sue the firm, even though some disputes had occurred. One interviewee summarized the situation as,

The higher your ranking, the smaller circle. When you are nobody, you can

sue your employer. When you become somebody, everyone knows who you are. Background checks are popular for management level employees. On the other hand, who cares about low-skilled workers? They do not have resumes. The amount of wealth in dispute is rather small for high-income group, but quite large for migration workers.

In addition, a law firm conducted a study on labor dispute cases in Hebei, Zhejiang and Guangdong provinces. The top industry involved in disputes was always manufacturing (iCourt, 2016), which involves a large number of low-skilled workers. Almost all interviewees in the sample said that low-skilled workers were more likely to sue their employer.

Firm 5 is an SOE that manufactures weaponry. The interviewee was asked, 'Why are machines not used to replace workers like those firms in Zhejiang?' He answered, 'There is not a high enough volume of outputs for us to use machines. A characteristic of our job is that each piece is very expensive with a high profit margin. Thus, we rely on human labor'. Another interviewee who used to work in the weaponry said that,

> There is not enough market to justify the use of large production lines. There is roughly a total of 6,000 tanks in China. They only need to use human technicians to finish that order, especially the latest version, which is around 2,000 tanks. Only during war time is there a need for massive production.

This example confirms that the quantity of outputs plays a crucial role in the decision to transition in firms with different ownership structures. Moreover, the high profitability allows these two companies to maintain their old production function.

Other sources
These findings are in line with publicly available information. In 2009, Xiang Wenbo, the owner of Sany Heavy Industry Co., Ltd, China's largest engineering machinery manufacturer, openly supported the implementation of the Labor Contract Law and

urged the government to enforce the law during the period of the financial crisis. He also supported the increase in the minimum wage and payment of social security. He argued, "If a firm cannot follow the labor laws, minimum wage, and environmental regulations, then it does not create social value. There is no point for having it" (Xiang, 2009).

Logically, if an interest group supports particular legislation, this group must benefit from the law. In reality, the large firms expanded their market share. Since 2010, the number of large manufacturing firms in China has increased three-fold, whereas the number of small firms shrank significantly, as shown in Table 7-5. This evidence indicates that the increase in the capital/labor ratio in China may only be due to survivor bias, which means that many small firms exist in the market, whereas big companies changed their production functions. This result is consistent with the results found by Haltiwanger et al. (2014): that marginal firms are the main victims of EPL.

Table 7-5: Change of structure in the distribution of Chinese firms

Size of firm/Year	2008	2009	2010	2011	2012	2013	2014	2015	2016
Large size (number)	3188	3254	3742	9111	9448	9806	9893	9633	9631
Medium size (number)	37204	38036	42906	52236	53866	55708	55408	54070	52681
Small size (number)	385721	393074	406224	264262	280455	304299	312587	319445	316287

Source: China national data online (National Bureau of Statistics of China)

The evidence from the large companies is also consistent with the hypothesis. The summarized financial reports of Haier, Sany, Midea, and Gree are listed below in

Table 7-6. It is shown that the sales figures of these firms roughly doubled in 2010, the year LCL was re-enforced. This phenomenon can be found in many large firms in labor-intensive industries, which the law affected the most.

Table 7-6: Sales of the stock-market-listed company

Company sales /Year	2007	2008	2009	2010	2011	2012
Haier	29,468	30,408	32,979	60,588	73,662	79,856
SANY	9,144	13,745	16,495	33,954	50,776	46,830
Midea	47,920	63,992	68,533	103,847	134,045	102,598
Gree	38,009	42,032	42,457	60,431	83,155	99,316

Source[30]: Online financial reports

Unit: 1,000,000 Yuan

Many scholars have criticized the validity of the official GDP numbers. For instance, Takahashi (2006) challenges the credibility of the Chinese GDP figure for its old counting method. Fiscal revenue and tax are highly dependent on the profitability of companies and, therefore, more reliable than the official GDP growth figures to reflect China's economic condition. Nevertheless, all three economic indexes declined consistently between 2008 and 2015, as shown in Table 7-7. Combining the information, it shows the overall profitability of firms in China, especially small enterprises dropped during this period.

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[30] All the financial information was collected online, as these companies are public listed.

Table 7-7: Economic indexes of China

Items/year	2008	2009	2010	2011	2012	2013	2014	2015
GDP (percent)	9.7	9.4	10.6	9.5	7.9	7.8	7.3	6.9
Fiscal (percent)	19.5	11.7	21.3	25.0	12.9	10.2	8.6	5.8
Tax (percent)	18.9	9.8	23.0	22.6	12.1	9.9	7.8	4.8

Source: China national data online (National Bureau of Statistics of China)

Particular industries

One human resource manager in a large foreign-owned firm in Shanghai stressed the importance of homogeneous products:

> It depends on the industry. For example, the sole of a shoe, this product can be standardized. Thus, it can be produced by machines. However, products with considerable variations, such as clothes not in massive production, are not suitable for substitution with machines.

Similarly, a local official in a small town said, 'There is not much room for such an upgrade. It is very troublesome to use machines if your product is rather heterogeneous. You cannot just sell one type of product in the market, right'?

Among the firms upgrading their production, the characteristics of a particular product also played a role in the decision-making process. In this fieldwork, the two private textile companies each had a separate subsidiary in the coloring industry, which is a common practice in this industry. When asked why the firm had not exchanged human workers for robots, one owner answered, 'Not all jobs are fit for

such change. We have used more machines to replace workers in the fine weave division, but not the coloring part: it is too complicated for machines'. This case shows that if the firm size, property rights, and location are constant, the stability of a job is a determining factor in changing production type from humans to automation.

One large manufacturing firm has two major products: valves, an important part of home air conditioners, and central air-conditioning. The firm has upgraded the production line for valves, but not that for central air-conditioning. A former engineer explained,

> Central air-conditioning is unique for each project according to the building. In addition, not many jobs are available each year in this industry. Thus, human workers are required, which are more flexible. On the other hand, we are the largest producer of valves in the world. It is very easy for us to replace workers with machines for this product.

Similarly, firms manufacturing cigarettes, cars, and lubricant oil face fewer difficulties in implementing the use of more machines. This is due to the homogeneous nature of their products. A tiny lubricant oil manufacturer (firm 6) changed their production function to reduce the cost of labor. The owner described their machine, 'It can replace eight workers'. A glue manufacturing firm used the same machine and the owner explained that different qualities of glue are due to differences in the mixture of ingredients. These differences in products causes more automation difficulties, even though the firm is larger in size than firm 6.

The housing industrialization industry (Firms 2, 3, 11) is a marginal industry that benefited from the industrial upgrading policies implemented by the government. Given the political pressure to upgrade, the State Council proposed that around 30 percent of newly built construction should be produced on an assembly line (State Council, 2016). Housing industrialization is also called assembly housing, and is an industry that manufactures houses in a factory, as with automobile assembly, and the

components are assembled at the construction site. Human workers are being replaced with machines in the construction industry. It is commonly argued that such replacement improves the quality of the buildings.

In this study, the size of the interviewed firms revealed certain industry secrets. All three are subsidiaries of large real estate firms. However, all refused to address the profitability issue. It is common knowledge in the industry that the cost of producing for assembly housing is higher than traditional construction. A variety of estimates has been made of the actual costs. Zha and Zhai (2017) concluded that the economic cost of assembly housing was higher than the traditional method by 200 to 500 RMB per square meter. One interviewee joked, 'The moment I mention the cost, these clients disappear'. Among many newly created companies in this industry, few companies actually currently make a profit. Large companies were using this investment as an advertisement and a government relationship program, in order to enjoy beneficial policies.

One interviewee said, 'Anyone who is stupid enough to put real money down is crying now. The biggest investment was made by Weide in Shenyang, and they are bankrupting. But it is a SOE, who cares about money. They just need to be politically correct'. A business owner complained about the difficulties in the industry in a public interview: 'The most serious problem is scale. I have invested in a factory for three years. However, there is not enough jobs for it. It is very costly to maintain'.

This example of assembly housing clearly indicates that industrial policies promoted by governments cannot overcome the cost problems faced by enterprises. These results are consistent with the existing empirical findings that find EPL most affects firms with fluctuating outputs (Cuñat & Melitz, 2007). Notably, the industry upgrading explanation cannot justify the phenomenon in this section, including the change in market size and negative effects on industries with unstable outputs.

7.6   Conclusion

In summary, two major factors affect the willingness of firms to replace human workers with machines: the relative productivity advantage of the machines and the Social Average Wage Level policy. The more stable and homogeneous the product, the easier the transition would be. Hence, big firms with stable sales or firms with homogeneous products are more able to adopt the use of machines, and many small enterprises had to choose to declare bankruptcy or relocate. The Social Average Wage Level is the legal mechanism that increased the cost of labor per person in China. This evidence supports the claims of foreign investors. The overall results, including the effects of timing, ownership structure, and industry type, are consistent with the hypothesis in this study. The results support the reliability of the data collected during the fieldwork.

Empirical studies using big data were used to test the validity of a theory about the general population. This study, with its small sample size, had no such intention or function. The aim of this study was to provide a detailed explanation for the phenomena related to LCL. The difference between the two approaches is the process of induction and deduction. Future studies, including big data analyses, can then be conducted based on the results of this paper. One possible future study could examine the financial reports of publicly listed firms for the period since 2010 to determine the reason for the change in the market size.

From the perspective of the firms, replacing humans with machines delays the effects of the rising cost of labor. If the cost of labor continuously increases due to regulations, the remaining firms eventually face the threat of bankruptcy. Conversely, although the Labor Contract Law and related legislation were intended to protect labor and create equality, ordinary workers have been hurt in two ways: the layoffs from large firms resulting from robotization, and the loss of job opportunities from

bankrupt firms. As both parties lose, this labor market intervention should be viewed as a negative shock that has negatively affected the growth of the Chinese economy in the recent decade.

An old saying in China accurately describes the current industrial upgrade policy: 'Try to help the seedlings grow faster by pulling them upward', meaning that something is spoiled by excessive enthusiasm. The saying describes a person, impatient for success, who destroys the very conditions upon which success depends. The supporters of the 'industrial upgrading' have often stated that the economic slowdown is temporary, a price to be paid. However, this study has conclusively shown that this argument is simply a rationalization for a bad policy. With the tightening of the enforcement of the LCL since 2010, China has lost its advantage due to low labor cost for almost a decade. The nation that used to be called the world's factory now requires serious labor market deregulation to regain its growth momentum.

Appendix 3

Table A1[31]

No.	Industry (L or K intensive)	Size	Location	Ownership	Upgrading? (Y/N)
1.	Cement/Concrete (K)	M/L	Anhui	SOE	No need
2.	Housing Industrialization (K)	M/L	Anhui	Private	Y
3.	Housing Industrialization (K)	M/L	Guangdong	Private	Y
4.	Toy (L)	M	Guangdong	Non-domestic	N
5.	Weaponry (L)	M	Hebei	SOE	N
6.	Lubricant Oil (L)	S	Hebei	Private	Y
7.	Household products (L)	M	Hubei	Private	N
8.	Unknown	S	Hubei	Private	Unknown
9.	Computer Games （K）	S	Hubei	Private	No need
10.	Household	L	Shandong	Private	Y

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[31] Most of the interviewees of these firms are their owners or human resource managers. However, for the firm number marked with * the interviews was conducted with its employees.

	electrical (L)				
11.	Housing Industrialization (K)	M/L	Shandong	Private	Y
12.	Textile (L)	L	Jiangsu/Zhejiang	Private	Y
13.	Household electrical (L)	L	Shanghai	Non-domestic	Y
14.	Textile/Coloring (L)	S	Sichuan	Private	N
15.	Air-conditioning (L)	L	Zhejiang	Private	Y
16.	Hydraulic (K)	S	Zhejiang	Private	Y
17.	Textile/Coloring (L)	M	Zhejiang	Private	Y
18.	Glue (L)	M	Zhejiang	Private	N/Y
19.	Building Materials (L)	L	Jiangsu/Zhejiang	Private	Y
20.	Wheel Gear	L	Zhejiang	Private	Y
21.	Wet Paper Towel	S	Zhejiang	Private	N

Chapter 8: Conclusion

This study has provided a framework to analyze the impacts of labor market interventions on firms' operation and performance in China. Theoretically, it provides a general theoretical model that can be applied to a wide range of phenomena related to labor regulations. Empirically, this thesis has examined employment conflicts, firms' reactions and efficiency consequences using both qualitative and quantitative data. The chapters in this thesis were written as individual research papers. I will briefly summarize the methodology, the findings of each chapter, the policy implications and future research.

8.1   Methodology

A causal relationship between labor market intervention and related phenomena requires four conditions. To begin, a causal mechanism has to be established. To ensure the soundness of the theoretical explanation in this thesis, two strategies were taken. First, the predictions of the theoretical framework are consistent with empirical evidence not only from China but from other nations in different periods. These empirical studies listed in Chapters 2 and 3 function as a repeated experiment, which improves the reliability of the theory. Second, according to Milton Friedman (1962), theoretical explanations with more realistic assumptions can be applied more broadly. In the terminology of Nagel (1963), the 'fundamental statements' must be realistic. The general application of the theoretical analysis also indicates the theory captures realistic 'fundamental statements.'

Regarding the empirical studies, the conditions of time order, co-variation and non-spuriousness must be satisfied. In Chapter 5, I examine the impact of the LCL with dispute data in 2003-2007 (before the intervention), 2007-2010 (short run) and 2011-2015 (long run). The correlation analysis confirms the theoretical prediction. To ensure the result was not a spurious correlation, the fixed effect model was used to overcome the issue of endogeneity. Moreover, alternative data sources such as case transcripts also reinforce the reliability of the predictions.

Both Chapters 6 and 7 studied the topic of capital deepening caused by labor market intervention. As one of the policy consequences of the LCL is increased welfare coverage, I examined the correlation between pension coverage and the capital/labor ratio in Chapter 6 with the Chinese Private Enterprise Survey (CPES). Two sample waves, 2008 and 2012, were used to compare the impact of the intervention. The instrumental variable approach was adopted to solve the endogeneity issue. Chapter 7 used qualitative data collected during my fieldwork to provide the internal logic for the transition from using more labor to more capital. As both studies reach the same conclusion, the mixed method approach ensures the result in Chapter 6 is non-spurious.

One thing that needs to be emphasized is that the results in Chapters 5 and 6 are also in time order. This correlation between different data sources also demonstrates the reliability of the theoretical prediction.

8.2 Major findings

Chapter 2 discussed the choice of contract without regulations. It provided a transaction cost explanation for the choice of share contract in agriculture. This chapter laid the theoretical foundation for the price-controlled scenario discussed in later chapters. It showed that the current mainstream approach with the principal-agent model failed to capture the fundamental assumption, which leads to its limited application. By clarifying the endogenous variables for the choice of sharecropping contracts, it

demonstrated that variance of production in crops does affect the choice of share contract.

A theoretical model based on derived demand for labor was constructed in Chapter 3. It predicted that labor market regulations function as a wealth-transfer-mechanism, which creates a common resource between labor and capital. Both parties were eager to seize such undefined property. Employees intend to maximize it and this led to more strikes and disputes in China after 2008 (Elfstrom & Kuruvilla, 2014; Remington & Cui, 2015). Employers, on the other hand, want to minimize the disputed income by switching labor to capital in production or by adopting alternative contractual arrangements, such as the use of staffing firms (Liang et al., 2016). These changes of behaviors have been identified by individual model in the previous literature, such as the insider-outsider model. However, the model in this chapter fills the gap by providing a general explanation. Moreover, the theoretical explanation provides testable implications for empirical studies.

Of the many consequences of labor market interventions, I have mainly concentrated on two perspectives empirically. I studied employment conflicts in Chapter 5. As with the existing literature, I find an increase in employment conflicts after the implementation of the LCL, which rejects the claims of supporters of the intervention. Furthermore, the regression analysis in different periods illustrated the pension contributor coverage, and the ratio of low-skilled employees are significantly correlated with the number of labor disputes in the short run, but not in the long-run. This difference can be explained by the strategies of firms described by my theoretical model. Finally, the detailed case transcripts illustrate how ambiguity in legal text creates problems in the workplace.

Another issue I studied is the strategies taken by firms to avoid the direct impact of the intervention, which results in capital-deepening in firms. I studied the capital deepening quantitatively in Chapter 6 and qualitatively in Chapter 7. In Chapter 6, I find that

pension coverage is significantly correlated with the capital-labor ratio after the intervention. Second, firms with higher profit levels would be more likely to have a higher capital: labor ratio, which leads to the key finding of these two chapters: that firms with a higher capital: labor ratio have a significantly larger chance of survival in the regulated environment. This finding is crucial for scholars and policymakers to understand the dynamic changes in a decelerating economy. Chapter 7 fills two gaps that quantitative data cannot answer. Based on data collected from my fieldwork, I examined the difficulties for small firms to transform their production functions toward capital. This provides insight into capital deepening from the firms' perspectives. Also, due to the lack of data, I could only examine the early stage of the intervention in Chapter 6, in which the Social Average Wage Level plays an insignificant role in capital deepening. I used a small sample of cities to illustrate that Social Average Wage Levels in different regions have all increased at 10 percent per annum over the past ten years. This result explains the continuous growth in the cost of labor in China.

8.3   Contribution and policy implications

The most repeated phrase that Deng Xiaoping likes to use is to ''seek truth from facts'': no matter how good the purpose of any theory sounds, does it work in reality? This attitude is a scientific one as theoretical explanations must be empirically tested. The success of the Communist Party in the reform period is based on this motto. Thus, the major contribution of this thesis is that it provides a general framework to objectively test the impact of labor market intervention.

Previously, the prevailing view of society was that workers were striking for more justice and legal rights. However, this study shows the opposite happens. Government intervention into the labor market does not reduce conflicts but worsens the employment relationship. Therefore, to create a harmonious employment environment in China, de-regulation of the LCL is a logical and necessary action.

Also, the findings from Chapters 6 and 7 indicate the major victims of the LCL are small enterprises and low-skilled employees. This causal relationship is not a secret and has already been acknowledged by the Chinese government. Former Finance Minister Lou Jiwei criticizes the LCL as it was 50 years ahead of its time and hurt the people it was supposed to help. The Premier, Li Keqiang, consistently urges the local government and the Ministry of Labor and Social Security of the People's Republic of China (MOLSS) to reduce social security payments from firms, especially small firms. Therefore, the results of this thesis provide supporting evidence for their policy evaluation.

Ronald Harry   Coase (1937, p. 394) provided a definition for the boundary of a firm. He argued that 'a point must be reached where costs of organizing an extra transaction within the firm are equal to the costs involved in carrying out the transaction in the open market.' If we view a government as a firm that provides public services, then each policy it enacts reshapes its boundary with the market. As the findings in this thesis indicate, labor market interventions in China, such as the Labor Contract Law and social security, not only fail to achieve what they aim to solve, but also increase the overall transaction costs of the society. This departure from the optimal point has reduced the attractiveness of China as an investment destination in recent years.

8.4   Future research

The theoretical studies in this thesis enable me to expand my research topic to other areas. To begin, the contract explanation based on the transaction cost approach dramatically reduces the difficulty in empirical testing. Thus, with the appropriate dataset, I plan to research the choice of share contract empirically in the future.

Moreover, the derived-demand model provides intuition for several possible studies. One of them is the mathematical proof of the 'insider-outsider' model. The same analysis can also be used in explaining the Hukou system in China and permanent

residency system in Australia and similar problems in other developed nations.

One research area could be to replicate some of the findings found in China to other nations. A straightforward example would be to adopt the Employment Protection Legislation Index (EPL index) to examine the predictions of my model, such as strikes or informal workers, in panel data.

Some of the recent emprical papers have used these regression techniques and found supporting evidence of this thesis. Akee, Zhao, and Zhao (2019) use IV estimation to find strong impact of the new Labor Contract Law on unemployment. They use regression discontinuity design (RDD) and find unemployment damage the wellbeings of the workers. You and Wang (2018) use regression discontinuity design (RDD) and find that, although job quality for shorter-term unemployed workers improves, the employees in longer-term unemployment are much less likely to be able to re-enter into the labor market. In addition, re-employment rate and job-match quality are worse for marginal employees. Therefore, I could re-examine the impact of the LCL with an alternative regression technique such as the RDD.

Some extension of the empirical studies could also be made if I could access the latest data, such as the 2014 wave of the Chinese Private Enterprise Survey (CPES). Another possible area of future study is about the behavior of rent seekers. It has been noticed that the supporters of the labor market intervention were concentrated in a few professions, such as lawyers, and officials from the labor department. It would be interesting to examine the pattern of behavior more closely.

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