## Learning from a Puzzle: When Can Stronger Labor Protection Improve Productivity?

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The paper aims to provide some novel insight on the effect of stronger regulation on firm profit and aggregate productivity. While a majority of existing empirical studies suggests that stronger labor protection raises labor costs and reduces firm profit, we start with a puzzle: the adoption of the 2007 Chinese Labor Contract Law appears to have raised the stock prices of more labor intensive firms relative to those of less labor intensive firms. We consider four possible explanations: (a) Commitment: stronger enforcement provides firms with a commitment device to treat workers well, which can induce the latter to make more firm-specific investments that are beneficial to firms. (b) Compliance: stronger enforcement corrects previous non-compliance by smaller and less inefficient firms. (c) Connections: The law is not binding for politically connected firms. (d) Competitiveness: the law raises the market power of large firms. Our series of evidence support the second (compliance) story. One larger message of the research is that, conditional on having the legal/regulatory requirement, a strong and more uniform enforcement can raise overall productivity.

JEL codes:

Key words: commitment, compliance, connections, competitiveness, uneven enforcement, misallocation, productivity

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### I. Introduction

Does a stronger enforcement of labor regulation raise returns to capital and improve aggregate productivity? If a majority of the existing empirical studies on the topic is a good guide, the answer should be "no". In this paper, we first present a surprising result from an event study on the stock price response to the passage of the 2007 Chinese Labor Contract Law, which is widely reported as having strengthened labor rights relative to capital owners and firm managers. The data show a rise in the stock prices of more labor-intensive firms relative to those of less labor-intensive firms. How can this be?

We consider four possible stories, which we label as commitment, compliance, connections, and competitiveness hypotheses, respectively. Under the first (commitment) story, firms cannot commit to treating workers well in a weak enforcement environment, and workers do not make sufficient amount of firm-specific investment in the absence of commitment by employers. In this case, a law that strengthens the enforcement provides firms a commitment device, which induces workers to make more firm-specific investment, which benefits firms as well as workers. This story is consistent with the theories of Acemoglu (2001) and of MacLeod and Nakavachara (2007), and summarized nicely in Macleod (2011).

Under the second (compliance) story, in a weak enforcement environment, firms, especially smaller and less efficient ones, systematically evade legal obligations. Stronger enforcement, by raising the compliance costs by small firms, disproportionately benefits large firms. The reallocation of resources from previously smaller firms to larger ones can also improve the aggregate productivity. We have not found this channel to be discussed in the existing theoretical or empirical literatures on labor regulation.

Under the third (connections) story, politically connected firms can get away with non-compliance. A tougher law simply raises the cost of doing business for non-connected firms, which benefits the connected ones. Under the fourth (competitiveness) story, stronger labor regulation raises barriers to entry, which increases the market power of large firms. While we have found no existing studies on this point in the labor regulation context, Bartel and Thomas (1987) point to this possibility in the context of environmental and occupational safety regulations. We investigate a number of data patterns and interpret our evidence as consistent with the second (compliance) story. We also provide evidence that aggregate productivity has increased from 2006 (the last year before the new law) to 2008 (the first year after the law) due to a better alliance between firm level productivity and firm level market shares. This is not to say that any labor regulation always improves efficiency. Rather, conditional on having a regulation in place and given the higher likelihood of evasion by smaller firms, a strengthening of the regulation or a more uniform enforcement could improve the returns to capital in large firms and improve aggregate productivity by reducing resource misallocation due to systematic non-compliance by less efficient firms. Our paper appears to be the first one that provides systematic evidence for this mechanism.

The paper is organized in the following way. In Section II, we provide two types of background information. First, we review the relevant literature and highlight the contributions of our paper to the literature. Second, we supply a succinct description of the 2007 Labor Contract Law of China. In Section III, we provide empirical findings. In the final section, we provide concluding remarks. A set of appendices report a series of extensions and robustness checks, as well as descriptions of the key variables and their sources.

### **II. Literature Review and Background Information**

We discuss two topics in this section. The first is a review of the relevant literature. The second is a summary of the background information regarding the 2007 Chinese labor contract law.

## 2.1 Existing Literature

This paper is related to a literature on the economic consequences of labor market regulation, which is too large to be comprehensively surveyed here. Generally speaking, in theory, the effects of stronger protection on aggregate employment and productivity are expected to be negative. The primary exception is a commitment story to be explained below. In terms of empirical results, the research overwhelmingly reports a negative effect of labor regulation on these outcome variables, although there are some important exceptions. Macleod (2011) reviews many of the papers, both theoretical and empirical, on this and other related topics.

We start with a review of the theoretical results. Hopenhayn and Rogerson (1993) state that the increased firing costs reduce employment and productivity. In comparison, the model of Bentolila and Bertola (1990) predicts a nuanced result from a higher firing cost: it reduces hiring in good times (as marginal cost of hiring goes up), but may reduce firing in bad times (as shedding workers is more costly). While these papers do not directly study the effects of labor laws on returns to capital or firm profit, the effects are presumably negative in both good and bad times.

Acemoglu (2001) develops a search-based model in which higher minimum wages or unemployment benefits can induce firms to create more high-wage jobs (instead of low-wage jobs), therefore increasing average labor productivity (due to a shift in the composition of jobs). In this setting, a well-enforced labor regulation serves as a commitment device for firms, inducing them to shift from an equilibrium in which not enough high-wage jobs are created to one in which more high-wage jobs are created. As firms and workers share the rent associated with any increase in productivity, both can benefit from such a law. This theory has the potential to explain the puzzle we report below. As all employers are ex ante identical, the theory does not have predictions on which subset of firms will benefit more in relative terms.

MacLeod and Nakavachara (2007) motivate their theory by a review of several court cases on labor disputes in the United States involving employment terminations. They interpret the court cases as suggesting labor regulations can address egregious mistreatment of workers. They build a model in which relationship specific investment is important (as well as firms' screening of workers). In the model, imposing restrictions on an employer's ability to dismiss workers can induce workers to make more firm-specific investment. The model does have to assume that firms cannot directly compensate workers for making firm-specific investments. They report some evidence that, across US states, enactments of implied contract exceptions or good will exceptions to the norm of employment-at-will are associated with an increase in the employment of those workers in occupations that may require high investment. While the paper does not directly study the effect on returns to capital, one may presume that returns to capital in firms that hire many workers that need to make firm-specific investments also rise. As the authors acknowledge, the nature of their panel data does not allow them to go from correlation to causality.

As we will see, we will argue that the most likely explanation of our puzzle is that stronger enforcement corrects previous non-random evasion of regulation by less

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efficient small firms. As a result, stronger enforcement leads to reallocation from less to more efficient firms, leading to an increase in aggregate productivity. This explanation is different from any of these theoretical models.

We now review empirical results. Cross country evidence provided by Botero et al. (2004) suggests that stronger labor regulations in terms of employment protection, collective bargaining, and social security are associated with lower labor force participation and higher unemployment rates.

Similar evidence is reported across states in the United States. Holmes (1998) finds that those US states that have a more pro-labor legal framework tend to see substantially less manufacturing activities than other states with a more pro-employer legal framework (with the so-called right-to-work law). Autor et al. (2007) study spatial variations in the imposition of restrictions on employers' ability to dismiss workers (i.e., the wrongful-discharge law) by US states, and conclude that they reduce employment flows and reduce firm entry rates. (Their more rigorous methodology overturns the previous insignificance result of Miles (2000)). Bird and Knopf (2009) confirm the finding of Autor et al. with a different sample - eighteen thousand commercial banks - and conclude that the adoption of the wrongful discharge laws has a significantly negative impact on overall profitability<sup>1</sup>. These studies imply firm profits are generally hurt by these laws. However, as mentioned earlier, MacLeod and Nakavachara (2007) suggest that the evidence on employment can be more nuanced, while at the same time, they acknowledge that the nature of the data does not allow them to prove causality.

Lazear (1990) exploits variations in labor laws across 22 European countries over 29 years, and finds that stricter severance pay requirements reduce employment. Using variations in regulations on temporary contracts in nine European countries from 1996 to 2001, Kahn (2010) concludes that restrictions tend to reduce temporary jobs although the effect on overall employment is not clear. Comparing the United States and Portugal, Blanchard and Portugal (2001) find that stronger labor protection produces more durable unemployment. By logical extension, these papers would imply that labor regulations tend to hurt firm profits.

Empirical papers on developing countries also tend to find negative effects. Across regions in India, Besley and Burgess (2004) show that pro-labor laws tend to reduce

<sup>1</sup> Autor (2003) finds that stronger labor protection encourages firms to outsource some of their activities, mitigating though not overturning the negative effects on firm profits.

output, employment, investment and productivity in the formal sector. Also across Indian states, Dutta Roy (2004) and Ahsan and Pages (2009) confirm these basic findings by considering adjustment lags and additional types of labor regulations, respectively. Across cities in Brazil, Almeida and Carneiro (2009a) find that stricter labor regulation constrains firm size and increases unemployment. Across South and Central America, stricter labor regulations are found to raise labor costs (Heckman and Pages 2004), and to lead firms to hire less workers. These papers also imply that labor regulations reduce firm profits.

The highly influential work by Katz and Krueger (1992) and Card and Krueger (1994 and 1997) shows that an increase in minimum wage in several episodes in the United States has led to an increase in actual wage without any decrease in employment. Such an empirical pattern can and has been used to support a monopsony story: if employers have monopsony power in the labor market, an increase in the minimum wage (or a tightening of labor regulation in general) could help workers and even raise aggregate welfare. Note, however, firm profits should fall in this theory, at least weakly, as long as firms cannot completely pass the extra cost onto consumers. The monopsony story will not generate a positive stock price response of labor intensive firms to the passage of a stronger labor law and therefore will not be the right explanation for our puzzle.

We have found two academic papers that study the Chinese Labor Contract Law. The first one, by Park, Giles, and Du (2012), utilizes a survey of 1644 firms conducted in the fall of 2009 that asked the respondents to recall strictness of enforcement of the prevailing labor regulations at four time points in the past from December 2007 to June 2009. Through cross-sectional regressions, they reach two main conclusions. First, regions that had a more lax initial enforcement before the 2007 law experienced a greater increase in enforcement. This suggests that the new law is more strictly and uniformly enforced than the previous labor regime. Second, regions with a greater increase in enforcement exhibit a slower growth in employment during 2007-2009. Our paper differs from theirs in terms of both objectives and methodology. Their objective is to check in the Chinese context for the validity of a well-accepted conclusion in the literature: stricter labor regulation increases firms' costs and hurts employment. In comparison, we aim to make a point that is more distinct from the existing literature: conditional on having a regulation in place, stronger enforcement can induce beneficial resource reallocation from less to more

efficient firms, potentially resulting in a higher aggregate productivity. Our methodologies are also different. While they principally rely on cross-sectional regressions on firm employment, which do not allow them to pin down causality, we employ an event study approach based on stock price reactions within a relatively narrow time window around the passage of the labor contract law on June 29, 2007. As long as there are no other major events in the same narrow window that differentially affect labor intensive and non-labor intensive firms, the event study result can be interpreted as reflecting a causal effect. (We will also look into the actual employment and firm profit data before and after the new law.)

The second paper, by Freeman and Li (2013), focuses on the enforcement of the law from the perspective of rural migrant workers in Chinese cities. By analyzing a survey of such workers in nine cities, the authors find that both the fraction of workers receiving a formal contract and the employer compliance with payments into various social insurance funds have increased substantially since the law took effect in 2008. The results suggest that the Labor Contract Law generates a noticeable improvement in compliance by employers relative to the previous labor regulatory regime.

When distinguishing sectors by labor intensity, the existing literature generally and unsurprisingly finds a greater negative impact in more labor intensive sectors (Ahsan and Pagés 2009) or sectors with a more volatile labor supply or demand (Micco and Pages 2007). When distinguishing firms by formal versus informal sectors, the literature unsurprisingly finds that the effect is present or greater in the formal sector that is covered by the law (see Kugler and Pica, 2008, on Italy; Fallon and Lucas, 2003, Besley and Burgess, 2004, and Amin, 2009, on India; Almeida and Carneiro, 2009b, on Brazil; and Djankov and Ramalho, 2009, and Caballero, et al., 2013, on general cross-country evidence).

There are two active literatures on resource misallocation and on political connections, respectively. Because each is too large to survey comprehensively, we can only selectively review some representative work. Hsieh and Klenow (2009) document that micro-level misallocation of resources can lead a large loss of aggregate productivity in China and India. They do not investigate the sources of misallocation. Fisman (2001), Faccio (2006), Fan, Wong, and Zhang (2007) study how political connections affect firm values; they do not explore implications for aggregate productivity. Khandelwal, Schott, and Wei (2013) investigate the implications of resource misallocation due to differential firm-level connections for

aggregate productivity using a combination of Chinese firm-level export data in the textile and garment industries and trade theories. None of these papers studies non-uniform enforcement of regulations as a source of resource misallocation.

To sum up, existing theories of labor regulations predict a negative effect from a stronger labor regulation except for a commitment story. In comparison, while some empirical papers report a positive effect on employment, an overwhelming majority report a negative effect on firm profitability and overall employment.

## 2.2 The Chinese Labor Contract Law of 2007

The key event we study is the adoption of the Labor Contract Law by the Standing Committee of the Chinese National People's Congress on June 29, 2007. The law came into effect on January 1, 2008. The legal framework governing the prevailing labor protection regime up to then was the Labor Law that was enacted in 1994 and took effect in 1995. The two laws formally have different legal standings in the Chinese civil law system. The 1994 law is a general law, while the 2007 law is a special law that does not replace but is explicitly meant to strengthen the enforcement of the 1994 law.

Interestingly, the larger social backgrounds surrounding the passage of the two laws are somewhat different. When the 1994 law was being formulated, China was still in the early stage of dismantling a centrally planned socialist economic model, and the majority of the urban labor force was working in state-owned enterprises (SOEs). While formal employment contracts were uncommon then, SOEs were notorious for being saturated with redundant workers that they could not fire. The 1994 law was meant to end such a *de facto* life-time employment guarantee and to facilitate reallocation of labor from non-performing firms to more profitable ones. Firing workers now had a new-found legal basis in the 1994 law (Gallagher 2004), whereas protecting labor rights was not the most important objective of the law. By the mid-2000s, however, sufficient numbers of *de jure* or *de facto* privatizations had taken place and 70% of the urban labor force was already working at privately owned firms (including foreign invested firms).

Two features of the Chinese labor regime before the 2007 law are worth emphasizing. First, because the 1994 law often copied provisions commonly found in the labor laws of Western countries, the letters of the law appear to accord plenty of labor rights. For example, when Botero et al. (2004) coded the letters of the employment laws in 1997 for 85 countries, they reported that the Chinese labor law was somewhat more stringent than those of the United States, Japan, and the United Kingdom and was similar to the median of the sample (which included many Western European countries). Second, compliance and enforcement were spotty in practice. For example, although the 1994 Labor Law stipulates that an employment contract is needed when a firm hires a worker, it didn't specify the penalty for non-compliance. Employment without a labor contract was pervasive, especially among small firms, in the decade after the adoption of the 1994 Labor Law. Given the over-arching objective of the government to increase labor market flexibility throughout the 1990s and early 2000s, non-compliance was not aggressively pursued.

It is important to note for our later analysis that non-compliance was systematically more prevalent among small and medium sized firms. It is reported that only 20% of small and medium firms outside the public sector and 12% of firms in coastal areas had labor contracts (Liu 2007). Even when there were contracts, many were informal or temporary. Some report that temporary contracts account for 60% of all contracts signed, which were widely used by small and medium firms and typically ended within a year (Xiu 2007).

By the mid-2000s, with widespread complaints of both rising income inequality and abusive labor practices in some firms, the political pressure to tighten the enforcement of labor regulation was building strong, especially when the government felt not particularly capable of turning around the trend of rising inequality any time soon. The 2007 Labor Contract Law was born in such a context.

Although the 2007 law has a small number of new obligations on firms, much of the focus was on tightening the enforcement of existing regulations. First, this is achieved by adding specifics to the legal requirements and specifying explicit penalties for non-compliance. For example, while having an employment contract was a legal requirement in the old regime, the 2007 law now specifies an explicit financial penalty (i.e., doubling the pay) on non-complying firms. As another example, while employer contributions to a social insurance fund (covering pensions, medical insurance, workplace injury insurance, etc) were legally required even in the pre-2007 regime, the new law now requires all employment contracts to spell out explicitly the exact types and amounts of social insurance contributions to be made by an employer for an employee. This presumably would increase employee awareness of their rights

with regard to the social insurance contributions they are entitled to. Second, the 2007 law has increased the incentive for workers to monitor firms' compliance and report non-compliance. This is achieved primarily by awarding the penalty on non-complying firms to workers whose relevant legal rights were violated (as opposed to being col lected by a local government as an administrative fine). (Reported court cases<sup>2</sup> also suggest that the Chinese courts follow through as the law intended.) Third, the new law explicitly expands the coverage to all employers in the economy whereas the previous regulation was only applied to registered firms. In other words, even for unregistered firms, illegally or otherwise, non-compliance of labor regulations is a ground for workers to sue the firm and obtain both the penalty on the firm and the pay owed to them. These measures have greatly improved compliance with labor regulations.

Another noteworthy feature of the 2007 law is that it has converted many implicit common-sense norms to be explicit legal obligations. For example, keeping a complete list of all employees and not withholding a worker's identification documents were always considered the right things to do but were not explicitly mentioned in the 1994 law. Large Chinese firms and multinational firms typically had a complete roster of workers anyway and did not withhold an employee's ID card. But it is reported that many smaller firms sometimes intentionally kept some workers out of its employee roster in order to avoid making full contributions to the social insurance fund, and withheld workers' identification documents in order to prevent them from quiting their jobs. The new law states explicitly that it is illegal to do such things and non-observance will incur a fine (to be awarded to the affected workers).

We have conducted interviews with heads of human resources departments and Chief Financial Officers in five companies in different parts of the country, and concluded that the 2007 law is generally regarded as providing a stronger and more uniform enforcement of existing labor regulations as opposed to adding new legal obligations. A (separate) survey of 1644 manufacturing firms by the Chinese central bank in 2009 reports that 95.9% of the responding firms say that the 2007 Labor Contract Law is strictly or very strictly enforced (Park, Giles, and Du 2012).

<sup>&</sup>lt;sup>2</sup> A Judge in a court in Jiangsu Province stated in an interview that in the first three months after the law took effect, the court received 27 labor dispute cases, an increase of 68% compared to the same period in the previous year. (<u>http://www.legaldaily.com.cn/legal case/content/2010-04/19/content 2118138.htm?node=22953</u>). The Chongqing court reported that among all labor disputes before the court since 2008, workers won 95% of the cases (Data source: <u>http://news.xinhuanet.com/politics/2011-05/01/c 121368554.htm</u>.

Interestingly, some news reports recorded heterogeneity in firm response to the new law. The president of the US-China Business Council stated that, while the new law imposed new restrictions on those domestic firms which had failed to comply with the existing labor law and regulations, U.S. companies have always been in compliance with local laws (Frisbie 2007). China Daily (2008) also predicted that the new law will bring new growth opportunities to firms that have always been in compliance while adding labor costs to previous non-complying firms. The report contrasted a top manager of Anta, a large domestic shoe producer, who welcomed the 2007 law as good news for his firm, to the owner of a small textile factory who complained loudly about the higher costs of doing business resulting from the new law.

## **III. One Puzzle and Four Possible Solutions**

## 3.1 An Apparent Puzzle

From the review of the literature, we may expect to see a relative decline of stock prices of more labor intensive firms in China compared to less labor intensive firms after the adoption of the 2007 labor contract law. Yet, we find an opposite result from a straightforward event study.

To implement the event study, we need to have an event, a treatment group, and a control group. Our event is the adoption of the labor contract law. Interestingly, the event date has some ambiguity. While the law was formally adopted on June 29, 2007, the last day of a five-day meeting of the Standing Committee of the People's Congress, a draft that substantially resembles the final version was circulated to all members for debates on the first day of the meeting. In addition, as other studies that apply an event study methodology have found, the stock market reaction is often not instantaneous and sometimes comes with a considerable delay possibly due to uncertainty about a law's implementation or investors' rational inattention. For example, when Lee and Mas (2012) applies an event study methodology to investigate the stock price response to unionization at US companies during 1961-1999, they use a relatively long event window from 20 months before an event to 20 months after an event. They argue that the stock price response is slow partly because unionization events are sufficiently rare such that any attempt to engage in arbitrage trading could entail substantial fundamental risks. For similar reasons, we do not assume that the news about the Labor Contract Law is instantaneously incorporated into the stock

prices in China. Nonetheless, in our application, it is sufficient to choose an event window that is substantially narrower than that of Lee and Mas (2012). More precisely, with June 29, 2007 as date zero, we use as our benchmark event window 5 days before the event and 10 days after the event. We will do robustness checks by varying event windows later.

To check if the labor contract law was indeed the most relevant news that could differentially affect the stock prices of labor intensive and non-labor intensive firms, we use Google Trends to identify top search phrases in Chinese by users in China for the month of July 2007. (The smallest time interval Google allows is a month, and July 2007 is the closest month for our event window. Baidu, the largest local search engine in China, does not provide similar information.) In the category of "government and laws," Google identifies the top ten "rising interest" search words for that month. Interesting, phrases related to the new labor law accounts for half of the top ten phrases. They are "New Labor Law" (ranked the 3<sup>rd</sup> on the list in terms of popularity), "Labor Contract Law" (ranked the 4<sup>th</sup>), "Contract Law" (ranked 6<sup>th</sup>), "Labor Law" (ranked 8<sup>th</sup>), and "Labor Contract" (ranked 9<sup>th</sup>), respectively. All the other search phrases on the top-10 list do not have an obvious connection with the profits or stock prices of labor intensive firms. For example, the top two search phrases for that month were "Duan Yihe" and "Jinan Explosion." The two phrases refer to a single story: Mr. Duan Yihe, an official in the city of Jinan in Shandong Province arranged a car bomb to kill his lover, Ms. Liu Haiping. The 5<sup>th</sup> and 7<sup>th</sup> most popular phrases were "07 military uniform" and "new military uniform," respectively. Apparently, the newly designed uniform was an item of intense interest, though not as much as the labor contract law. The 10<sup>th</sup> most popular item was "the government procurement net." For the month of June, 2007, Google only released a list of seven "rising interest" search phrases. Even though the passage of the law occurred toward the end of the month, the "new labor contract law" and "labor contract" are still two of the most searched phrases. Others did not appear to have direct effects on stock performances: CPI, Jiujiang Bridge, new era of wedding, resignation, and Furong (a star).

Our treatment group consists of all relatively more labor-intensive firms that are listed on the Shanghai and Shenzhen Stock Exchanges.<sup>3</sup> Our control group consists of

<sup>&</sup>lt;sup>3</sup> When the Chinese government re-introduce stock exchanges in the early 1990s (after a four-decade gap), they decided to set up two for regional balance. Both exchanges subsequently competed to have companies listed in

all relatively less labor-intensive firms on the same two exchanges. To measure labor intensity, we first use China's Input Output Table in 2005<sup>4</sup> and classify each of the 42 sectors into two baskets, based on whether a sector's labor intensity (total labor compensation as a share of total inputs) is above or below the median. We then classify all 1319 listed firms in our sample into two groups: more or less intensive types based on the labor intensity of the sector that characterizes a firm's main line of business. (Because financial statements of listed firms lack information on the value of intermediate goods, they are not suitable for directly calculating the labor share in total inputs.)

The event study is essentially a difference-in-differences exercise. The periods before and after the event window correspond to two regimes with weaker and stronger enforcement of labor protection, respectively. The use of a control group is to absorb other developments in the economy across the two regimes, such as changes in macroeconomic policies, transport infrastructure, global commodity prices, or political leadership that may have an impact on firm performance in ways that are unrelated to firm level intensity in labor usage and labor protection. The double differencing is designed to pick up the impact of a change in the enforcement of labor protection on expected streams of firm future cash flows after accounting for other factors that may also affect firm performance but are unrelated to labor usage.

As the Chinese stock market has a higher volatility level than the United States or most other well-developed capital markets, one may wonder if the Chinese stock prices are too noisy or too much driven by non-fundamental mood swings of investors to tell us anything useful. Our difference-in-differences methodology is designed to control for factors (including changes in government policies or investor mood swings) that may affect all stocks equally. Moreover, a high volatility (or a low ratio of signal to noise) should work against us, making it harder for us to find differential stock price responses between firms of different groups. In any case, in both applied corporate finance and asset pricing literatures, there are several papers that have applied a stock-price-based event study methodology to investigate a variety of questions in China (e.g., Fan, Wong, Zhang, 2007; Deng, Liu, and Wei, 2013). These papers all find that Chinese stock prices have a sufficiently high ratio of signal to

their places, though the overall number of IPOs in any year is tightly controlled by the Chinese Securities Regulatory Commission, a ministry in the central government.

<sup>&</sup>lt;sup>4</sup> Input-output tables are not published on a yearly basis. The date of the 2005 table is closest to our event date and is also pre-determined with respect to our event.

noise for an event study approach to be informative.

Another pre-requisite for a stock-price-based event study to be useful is that the event contains some surprise. One may wonder if the passage of the Labor Contract Law on June 29, 2007 had any news or surprise. We argue that the event was news for at least two reasons. First, before the law was finally passed, there were previous sessions of the Standing Committee of the People's Congress that discussed some version of the Labor Contract Law but did not enact it as a law. Indeed, because a draft of the legislation released in April of 2007 generated heated controversy, presumably including resistance from numerous small business owners, there were rumors as late as May of 2007 that the government may give up the effort to pass the law. So there was uncertainty over whether such a law would be enacted. Second, we can look at the intensity of internet search for the Labor Contract Law in Chinese by people in China around the event period from both Google and Baidu (Figures 1a and 1b). The search interests were mild in months before the opening of the Congress session on June 24, 2007, but ramped up dramatically during the days of the Congress and peaked on June 30, the day after the passage of the law. Similarly, we can look at the number of articles in Chinese news media (including those in Hong Kong) that discuss the new labor law during that period (Figure 2). Again, while the count of such articles was low in May and early June of 2007, it shot up after the Congress opened and put the legislation on its agenda, peaked on the day after the passage of the law, and stayed high for many weeks following the passage. We read these as suggestive evidence that the passage of the law did contain news to investors. In any case, had the passage of the law had little or no news content, it would have worked against us, making it harder for us to find a difference between the treatment and control groups.

Table 1 presents the summary statistics on sector level labor intensity and Appendix Table 1 tabulates all sectors in terms of labor intensity, which is quite consistent with common sense. All firms in a sector are assigned the labor intensity of the sector its main line of business belongs to. We classify all firms into two approximately equal-sized bins: one with labor intensity above the median, and the other with labor intensity below the median.

In Figure 3, we present the value weighted mean of cumulative abnormal returns of all firms in the treatment and control groups from 40 trading days before June 29, 2007 to 40 trading days after. Data from the 250 trading days prior to the start of the

event window are used to estimate the beta. The solid line represents the more labor intensive firms (the treatment group), and the broken line the less labor intensive firms (the control group). As we can see, the two lines are reasonably close before the adoption of the labor contract law, but become visibly divergent five days after the adoption of the law and stay so 40 days later.

Formally, we can compute the return to a buy-and-hold strategy for a portfolio of firms in the labor intensive sectors relative to that for a portfolio of firms in the less labor intensive sectors from June 22 to July 20, 2007, corresponding to an event window of (-5 days, +15 days). The excess return on the first portfolio is 2.4% un-annualized (about 30% on an annualized basis) with a standard error of 0.14. With a t-statistic of 2.96 and a p-value of 0.003, we can easily reject the null that the excess return is zero. Thus, the firms in labor intensive sectors appear to benefit from the new labor contract law relative to their counterparts in less labor intensive sectors.

This result represents an apparent puzzle relative to the extant empirical literature. The law is supposed to have raised the cost of using labor and therefore, if the existing empirical studies are taken as a guide, should be expected to reduce the returns to investors in more labor intensive firms relative to those in less labor intensive firms. Why do we get an opposite result? Can a resolution to the puzzle speak to a larger issue of the effect of regulations on aggregate productivity and allocative efficiency in ways that may have been missed by the existing studies on labor regulations?

### **3.2** Possible Resolutions to the Puzzle

We have reviewed all news stories, op-eds, and other commentaries, on Baidu News and Google News during June 29-July 31, 2013<sup>5</sup>, and found no article suggesting that the law turned out to be weaker than people had previously expected. So we rule out the possibility that the rise in the stock prices of labor intensive firms is due to investors' relief that the law was not as strict as they had feared. (Some subsequent data patterns we will report also suggest that this is an unlikely scenario.)

We also check if the differential in the returns between the portfolio of the labor

<sup>&</sup>lt;sup>5</sup> We searched for articles that contain the phrases (in Chinese) "labor contract law", "labor law," and "labor contract", and found about 900 articles or commentaries on these two websites. The most common types of articles are explanations of the new law's provisions, commentaries on the penalties specified by the new law, examples of employment practices that are or are not consistent with the new law, the role of labor unions under the new law, and interestingly, comments suggesting that the new law implies little new costs to firms that have already been in compliance with the previous labor law. We found no article that suggests that the law is considered weaker than people had previously anticipated.

intensive firms and that of the non-labor intensive firms reflects a continuation of a pre-event trend or a mean reversion. In particular, we compute the returns to a buy-and-hold strategy of the two portfolios, respectively, in the six months prior to the event (from December 21, 2006 to June 20, 2007). We find no statistical difference between the two returns. More precisely, the realized return on the portfolio of labor intensive firms is 143.22%, whereas that on the portfolio of non-labor intensive firms is slightly higher at  $145.13\%^6$ . The difference is -1.91% with a standard error of 93.44%. This implies a t-statistic of -0.26 and a p-value of 0.72. Therefore, we conclude that the return differential during the event window does not reflect a continuation of a pre-event trend nor a reversion to the mean.

We consider four additional theories that may explain the puzzle, which we label as commitment, compliance, connections, and competitiveness stories, respectively. Under the first (commitment) story, firms cannot commit to treating workers well in a weak enforcement environment, and workers do not make sufficient firm-specific investment in the absence of commitment by employers. In this case, a law that strengthens the enforcement provides firms a commitment device, which induces workers to make more firm-specific investment, which benefits firms as well as workers. This story is consistent with the theories of Acemoglu (2001) and of MacLeod and Nakavachara (2007).

Under the second (compliance) story, in a weak enforcement environment, firms, especially less efficient smaller ones, systematically evade legal obligations. Stronger enforcement, by raising the compliance costs by small firms, disproportionately benefits large firms. (Since listed firms are larger than non-listed firms, listed firms as a group many benefit from the new law.) The reallocation of resources from previously smaller firms to larger ones can also improve the aggregate productivity. We have not found this channel to be discussed in the existing theoretical or empirical literatures.

Under the third (connections) story, politically connected firms can get away with non-compliance. A tougher law simply raises the cost of doing business for non-connected firms, which benefits the connected ones. If the set of listed firms contains more politically connected firms than the set of non-listed firms, we would see that the stock prices of the listed firms (in the labor intensive sectors) would rise.

<sup>&</sup>lt;sup>6</sup> First half of year 2007 was mainly a bull period for the whole market.

Under the fourth (competitiveness) story, stronger labor regulation raises barriers to entry, which increases the market power of large firms. Since listed firms are larger than non-listed firms, the former group see their stock prices to rise.

While each story is capable of producing the stock price reactions reported in Figure 3, ascertaining which force is the main story is important. Broadly speaking, the first two stories (commitment or compliance) imply that stronger enforcement could improve aggregate productivity and/or improve efficiency, whereas the last two stories (political connections or market power effect) imply the opposite. Within the first two stories, the implied pattern of resource reallocation is different as will be made clear later. If the commitment story is right, any regulation that enhances commitment by employers increases both workers' welfare and firm profitability. In comparison, if the compliance story is right, labor regulation may be beneficial or harmful, but conditional on having the regulation, stronger and more uniform enforcement can improve aggregate productivity by inducing reallocation of resources from smaller and less efficient firms to larger and more efficient firms.

In this section, we report various triple-differencing results in an event study setting. The event is still the adoption of the 2007 Labor Contract Law. Two of the three differencing are similar to what were done in Section 3.1, namely before and after the adoption of the law, and between the treatment (more labor intensive firms) and control (less labor intensive firms) groups. The third differencing is meant to explore the testable predictions of the possible resolutions to the puzzle laid out in the previous section. It will be done in a number of different ways, which we will discuss in turn.

## 3.2.1 Do large and labor intensive firms exhibit a relative stock price increase?

We will first explore the role of firm size in stock price reactions and think about its implications for different hypotheses. We separate firms into large versus small categories (where size is measured by asset, revenue, net income, or employee count). Let us first restrict ourselves to just the commitment versus compliance story (we will bring the other two stories on board later). Consider the commitment story. If there is heterogeneity in firms' ability to commit to treating workers well, we presume that smaller firms have a weaker ability to commit since they have less of a reputation to protect. (Recall that non-observance has been reported to be more prevalent by small firms.) In this case, the commitment story would imply that the 2007 law benefits smaller firms disproportionately. In the triple-differencing setting, we would expect larger labor-intensive firms to exhibit a relative stock price decline.

Let us next consider the compliance story. If there is heterogeneity in the compliance of the norms and laws on labor regulation before 2007, we presume, as the news media reports indicated, that smaller firms are more likely to be in non-compliance, perhaps because the cost of compliance per unit of output is higher for them than for their larger counterparts. In this case, the 2007 law, by raising the strictness in enforcement, disproportionately raises the compliance costs for smaller firms, benefiting the larger firms as their competitors. In the triple-differencing setting, we would expect larger labor-intensive firms to experience a relative stock increase, which is the opposite prediction from the commitment story.

Because we go to the data, we note that firm size is a meaningful dimension of heterogeneity even among firms listed on a stock exchange. For example, in both applied asset pricing and applied corporate finance literatures, there is a long tradition of separating large and small listed firms and exploring the implications of firm size. In any case, the compliance record is uneven among Chinese listed firms. There is no shortage of stories about non-compliance with labor regulations by some listed firms before 2008. For example, Chongqing Department Store Company, which is listed on the Shanghai Stock Exchange, was reported to have violated the 1994 law for about ten years (up to 2007) by not offering all of its employees legally required written contracts. Luzhou Laojiao Company Limited, a famous strong liquor producer listed on the Shenzhen Stock Exchange, did not pay (legally required) social security contributions for many of its employees.<sup>7</sup> While such practices were often tolerated by the government before 2007 in the name of increasing labor market flexibility, it has become much harder for firms to get away after the Labor Contract Law took effect.<sup>8</sup>

Table 1 presents the summary statistics of firm size variables. In the main body of our empirical work, we use a size dummy indicating whether a firm's relevant size variable is above or below the median value. As robust checks, we also use a continuous measure of size in a regression framework. We note that the mean values

<sup>&</sup>lt;sup>7</sup> <u>http://news.xinhuanet.com/legal/2007-12/23/content\_7298564.htm\_\_\_\_\_\_\_\_and\_\_\_\_http://news.xinhuanet.com/legal/2007-12/15/content\_7253431.htm</u>, respectively.

<sup>&</sup>lt;sup>8</sup> Some small firms are subcontractors for large firms and often have better compliance record because their large firm clients may have an incentive to monitor their conduct. In this case, even if the big firms buy inputs from some small firms, they as a group may still benefit from the new law than small firms as a group.

(in Column 2) tend to be far from the median values (in Column 3). This suggests that the size distribution is skewed with a small number of very large firms. As sorting firms into large and small baskets is more robust to outliers than measuring firm size by a continuous variable, we use the size dummy in our benchmark case.

To reduce the influence of potential outliers, we also winsorize<sup>9</sup> the top and bottom 1% of the observations. We can also be more aggressive and winsorize the top and bottom 5% of the observations. In our subsequent analyses, we will report robustness checks that winsorize those variables that likely have a skewed distribution.

#### Benchmark: [-5, 10] and Dummy for Assets (Above Median)

We implement the triple differencing in the following regression framework.

 $CAR(j,k) = b0 + b1 D_labor + b2 D_big_firms + b3 D_labor \times D_big_firms + fixed effects + error term$ 

The dependent variables of all these three regressions in Table 2 are cumulative abnormal return from 5 trading days before to 10 trading days after the adoption (CAR [-5, 10]). The regression framework allows us to control a long list of fixed effects. In particular, we control for which stock exchange (Shenzhen or Shanghai) a company is listed, which industry it is in, and which province it is located in. D\_labor is a dummy for firms whose labor intensity is above the median, and D\_big\_firms is a dummy for firms whose size (measured by assets) is greater than the median. We are mainly interested in parameter b3, which captures the relative stock price increase of those firms that are simultaneously big and labor intensive after the passage of the law when benchmarked to other firms.

In the first column of Table 2, the insignificant coefficients on the first two regressors indicate that being labor intensive or being large *per se* does not generate abnormal returns. The third coefficient on the interaction between being large and being labor intensive is positive and statistically significant. This suggests after the enactment of the 2007 Labor Contract Law, those firms that are simultaneously large and labor-intensive exhibit a relative increase in stock prices. This pattern is

<sup>&</sup>lt;sup>9</sup> Winsorizing at x% level means that replacing the highest and lowest x% values with the next value counting inwards from the extremes.

consistent with the compliance story, but inconsistent with the commitment story.

In the next two columns, we split the sample into firms whose labor intensity is above the median and those whose labor intensity is below the median. On each subsample, we can implement a double differencing test. This specification is in principle less restrictive than the one in the first column, as it does not require the coefficients on the constant and all the fixed effects to be the same for the two subsamples. In any case, for more labor intensive firms, we find larger firms exhibit a relative stock price increase (Column 2). In comparison, for less labor intensive firms, firm size doesn't matter. Again, this pattern supports the compliance story.

## Alternative measures of firm size and labor intensity

We perform a number of robustness checks. We start with different ways to measure firm size and labor intensity. In Column 1 of Table 3, we measure size by the continuous value of log assets (rather than using a dummy for large firms). The key coefficient on the interaction between firm size and labor intensity is still positive and statistically significant, indicating again that firms that are simultaneously large and labor intensive experience a stock price increase relative to other firms.

Because the continuous measure of firm size is more vulnerable to potential outliers, we also adopt a measure of firm size for which the log asset is winsorized at the top and bottom 5% of the distribution. The result is presented in Column 2 of Table 3 and is qualitatively unchanged. If anything, the coefficient on the interaction between firm size and labor intensity becomes bigger.

In Column 3 of Table 3, we replace the dichotomous measure of labor intensity by a continuous measure (i.e., share of labor compensation in total inputs in log form) while retaining a dichotomous measure of firm size. Because the regression includes sector fixed effects, we exclude sectors with a small number of firms to avoid colinearity. We also exclude the agriculture sector as its labor share value appears to be an outlier relative to all other sectors. The coefficient on the interaction between firm size and labor intensity is positive and statistically significant<sup>10</sup>. In Column 4 of Table 3, we measure both firm size and labor intensity by a continuous variable. In this case, the coefficient on the interaction term is positive and statistically significant.

<sup>&</sup>lt;sup>10</sup> If we do not exclude the agriculture sector or sectors with a small number of firms, the coefficient on the interaction term is positive but marginally not significant. However, if we do not include sector fixed effects, the coefficient on the interaction term is again positive and significant.

Asset value is not the only way to measure firm size. In Table 4, we experiment six other ways to measure firm size. They are the continuous and dichotomous measures by log revenue, log net income, and log employee, respectively. In all cases, the coefficients on the interaction between firm size and labor intensity are positive; in five out of six cases, the coefficients are statistically significant. (The lone case in which the coefficient is not significant is likely due to the presence of outliers in the distribution of employee count across firms. In any case, a dummy measure based on whether the employee count is above or below the median still works as all other measures.)

### Alternative benchmarks for computing abnormal returns

In Tables 2 and 3, we use Hushen 300 – the most commonly used stock price index for China based on almost 300 largest stocks on the Shanghai and Shenzhen Stock Exchanges to compute the market return and use a market model (i.e., a one factor model) to compute abnormal returns. We now consider several ways to depart from this baseline case.

First, we use the prices of all firms in our sample, not just those in Hushen 300 index, to compute the market returns. In Column 1 of Table 5, we report results where a value-weighted average return of all stocks in our sample is used as the market return. In Column 2, an equal-weighted average return of all stocks is used as the market return. In both cases, the coefficients on the interaction between firm size and labor intensity are positive and statistically significant at the 1% level. In fact, the point estimates are close to the corresponding coefficient in Column 1 of Table 2.

Second, we change the market model to a three factor model (i.e., adding the size factor and book-to-market factor as two new factors in addition to the market factor) and a four factor model (i.e., also adding a momentum factor). The results are reported in Columns 3 and 4 of Table 5, respectively. Again, the coefficients on the interaction between firm size and labor intensity are positive, statistically significant, and numerically close to the corresponding coefficient in Column 1 of Table 2. These results are supportive of the compliance story we have articulated earlier.

## 3.2.2 An alternative proxy for prior compliance

It is useful to look for a proxy for the likelihood of compliance with previous labor regulation before 2007 other than firm size. In this context, those firms that use top-ranked auditing firms are more likely to be in compliance with all laws and government regulations including labor regulations. As it turns out, out of over 5000 accounting/auditing firms in China (Hong 2006), the top four in the country in terms of revenue, staff size and others are also the same four in the world. They are PricewaterhouseCoopers (PwC for short), Deloitte, Ernst & Young, and KPMG. Since these are global accounting firms that have a global reputation to protect, one presumes that their client firms are also more likely to obey laws and regulations. While, on average, users of the top-ranked accounting firms are large firms, there are exceptions in both directions. Some users of top accounting firms are not the largest firms in the country; some very large firms choose to use a local accounting firm.

(Accounting firms are asked to audit only the veracity of financial numbers in a firm's financial statement, and not whether a firm treats its workers properly. As a result, users and non-users of top-ranked accounting firms are not expected to exhibit differential stock price performance under the first (commitment) story hypothesis.)

Suppose the use of a top-ranked international accounting firm is a proxy for prior compliance, we can check if these client firms in the labor intensive sectors exhibit a relative stock price increase after the passage of the law. We report the results in Table 6. In Column 1 of Table 6, we employ a specification very similar to Column 1 of Table 2, except that the use of a top global accounting firm rather than firm size is used as a proxy for prior compliance. Interestingly, we find the coefficient on being labor intensive and that on using a top global accounting firms are both not different from zero statistically speaking. In other words, using a top accounting firm or being labor intensive *per se* does not generate a significantly different stock price trajectory from the market. However, the coefficient on the interaction term between users of a top auditor firm and being labor intensive is positive and significant. This is again supportive of the compliance story.

In Columns 2 and 3 of Table 6, we split the sample into those firms whose labor intensity is above the median and those whose labor intensity is below the median. When we run separate regressions, we again find that using a top global accounting firm produces a relative stock price increase only if the firms are in the labor intensive sectors.

## 3.2.3 State ownership, firm size, and use of a top accounting firm: A horse race

It is sometimes suggested that the majority state-owned firms may follow laws

and government regulations faithfully, since top officers of those firms are quasi-bureaucrats who do not consider profit maximization as their sole objective. By this view, state-ownership could also be a proxy for likely compliance with labor regulations prior to the passage of the 2007 labor contract law. On the other hand, a political connection view yields the opposite prediction. If state-owned firms are on average better connected politically to judges and government officials (as they are the former and likely future colleagues of the officers of the firms) than private firms, they are also more likely to get away with violating labor regulations. By this view, some state-owned firms could be more egregious violators of the labor regulations than non-state-owned firms. These two possibilities suggest that whether state-ownership could be a reliable proxy for prior compliance is ambiguous.

Do majority state-owned firms in labor intensive sectors exhibit a stock price increase relative to other firms after the passage of the labor law? We formally examine this in Column 1 of Table 7. To add some richness to the investigation, we separate those SOEs that are owned by the central government from those owned by provincial, city, or other local governments<sup>11</sup>. None of the coefficients in Column 1 are statistically different from zero. This suggests that the 2007 labor law does not differentially affect majority state owned firms and non-state-owned firms on average, whether they are in the labor intensive sectors or not.

We can also run a horse race among ownership, firm size, and use of top-ranked auditor firms. A pooled regression with four different interaction terms is reported in Column 3 of Table 7. In this case, only the interaction between firm size and labor intensity is positive and significant. In Columns 3 and 4, we split the sample into half of the firms whose labor intensity exceeds the median and another half of the firms whose labor intensity is below the median. While splitting the sample loses some efficiency, it could avoid some biases in the estimation resulting from forcing the coefficients on all the fixed effects to be the same between the two sub-samples. In any case, we now find both large firms and users of a top auditor exhibit a relative stock price increase after the new labor law, if they are in the more labor intensive sectors, but not if they are in the less labor intensive sectors. On the other hand, government ownership does not exhibit abnormal stock returns regardless of

<sup>&</sup>lt;sup>11</sup> State ownership is identified by the controlling shareholder, which is more informative than the firm ownership information recorded when a firm is first registered. The latter tends not be updated in a timely manner even when the controlling shareholder changes. A cross tabulation among government ownership, firm size, and use of a top auditor is reported in Appendix Table 5.

sector-level labor intensity.

### **3.2.4** Political connections

One alternative story is that politically connected firms benefit from the new law if they are able to get away with non-compliance whereas not-connected firms are not. Since politically connected firms are more likely to be large, what we have reported as the large firm effect could instead be the political connection effect.

To check this possibility, we identify a subset of firms that are likely to have a strong political connection. Following Fan, Wong and Zhang (2007), we hand-collect the career background information of CEO or Board Chairman from listed companies' annual reports or other public disclosures and define a firm to be politically connected if its CEO or the Board Chairman has previously worked in the central government, the local government or the military. This variable – to be labeled as Political Connection 1 - is one of the three measures of connections we use. This measure of political connection has been shown by Fan, Wong and Zhang (2007) to matter for firm values.

We also consider an expanded definition of politically connected firms (Political Connection 2) to include firms whose CEO or Board Chairman is or has been a member of the Chinese parliament (People's Congress) or the China People's Political Consultative Committee (CPPCC). We consider another variation (labeled as Political Connection 3) which is the set of firms in Political Connection 1, subtracting those whose CEO or Chairman previously had only a junior level government or military job but adding those whose CEO or Chairman is a member of the People's Congress or CPPCC.

We check not only if the stock prices of politically connected firms behave differently from others, but also after conditional on the potential political connection effect, if the large and labor intensive firms still exhibit an abnormal returns.

The regression results are reported in Table 8. We find some modest evidence that large and politically connected firms – measured by Political Connection 2 or 3 – have exhibited a positive stock price response (Columns 2 and 3, row 6). Other than that, political connection or its interactions with other variables do not seem to matter in the context of the labor contract law. More importantly, after controlling for political connections, we continue to find that those firms that are simultaneously labor intensive and large (or use a top-4 accounting firm) continue to have a positive

and statistically significant relative stock price increase. Therefore, our results are not likely driven by a political connection effect.

#### 3.2.5 Market power

Another alternative story that may be observationally equivalent to the compliance story in terms of the evidence we have shown so far is market power. In particular, the new law by increasing enforcement also raises entry barriers for new firms. Large incumbent firms may take advantage of higher entry barriers to explore their increased market power by raising prices of their output and realizing more profits. This could explain the patterns of the stock price response presented earlier.

To check how important this channel is, our idea is that large firms can exercise market power only in a less competitive environment. Therefore, we can examine if we obtain similar results as before if we restrict the sample to sectors that are intrinsically competitive. Firms in such a subsample are unlikely to enjoy a monopoly power. We consider four sets of intrinsically competitive sectors: (a) sectors that have a relatively low concentration index (by excluding sectors whose HHI value is in the top 30 percentile), (b) those with a consistently low profit margin (below the median) over 2003-2006, (c) those with a relatively high exposure to international trade (with trade/output ratio above the median), and (d) the union of the above.

In Table 9, we report the key coefficients from 24 different regressions. In the four rows, different measures of competitive sectors are used. In Columns 1-3, firm size is used as a proxy for prior compliance; and in Columns 4-6, the use of a top 4 global accounting firm is used as a proxy for prior compliance. All regressions include a full set of industry, location, and stock exchange fixed effects.

In Columns 1 and 4 of Table 9, we use the full sample, and the key coefficient of interest is the interaction between the large firm dummy and labor intensity dummy. We find that the coefficients are always positive and statistically significant in 5 out of 8 cases.

In Columns 2-3 and 5-6 of Table 9, we relax the restrictions on some nuisance parameters on the fixed effects, and run separate regressions for the more and less labor intensive subsamples. Our key interest is to compare the coefficient on large firms for the subsample of more labor intensive firms to the corresponding coefficient for the subsample of less labor intensive firms. For the more labor intensive subsample, the coefficients on large firms are always positive and are statistically significantly so in 7 out of 8 cases. In contrast, for the less labor intensive subsample, the coefficients on large firms are uniformly insignificantly different from zero.

Overall, the results strongly suggest that firms that are both labor intensive and large (or use a top global accounting firm) exhibit a positive stock price response even in competitive sectors where their market powers are greatly constrained. In other words, competitiveness story does not seem to be important.

### **3.3 From Stock Market Expectation to Real Outcomes**

While the stock price reactions reflect investors' expectation on the effect of a stronger labor law, we now check if these expectations are translated in an actual change in real variables from 2006 (the last year before the law passed) to 2008 (the first year after the law implemented). In particular, do firms that are simultaneously larger and labor intensive in 2006 subsequently also expand more in terms of sales, staff size, and profits?

We consider the following specification:

 $Growth(06,08) = b0 + b1 D_size + b2 D_labor + b3 D_size \times D_labor + b4$ Growth(03, 06) + industry fixed effects + location fixed effects + exchange fixedeffects + error term

We consider three different outcome variables. They are the growth rate from 2006 to 2008 of the following items respectively: employee count, revenue, and net income. The data for all these variables are collected from firm-level financial reports in the relevant years. In addition to separate industry, location, and stock exchange fixed effects, we also control for the average growth rate of the outcome variable from 2003 to 2006 in order to account for any possible pre-event trend.

We report the regression results in Table 10. The parameters of our main interest are those on the interaction between firm size and labor intensity, reported in the second row in the table. As we see, these coefficients are uniformly positive and statistically significant. This means that firms that are simultaneously labor intensive and big in 2006 also hire more people, expand more sales, and experience a faster growth in profit<sup>12</sup> when compared to other firms.

<sup>&</sup>lt;sup>12</sup> As noted in Table 10, since net income variable has relatively more non-positive values which are improper for

It is especially noteworthy that large labor intensive firms actually increased hiring by close to 10% than their non-labor intensive counterparts after the passage of a law that raised the strictness of labor regulation. (In terms of raw growth numbers, large labor intensive firms see a growth in employment by 26.9% over the two-year period, compared to 16.3% for large non-labor intensive firms during the same period. In comparison, the two-year growth rates for the small firms in the labor intensive and non-labor intensive sectors are 10.0% and 11.4%, respectively. While we do not observe non-listed firms in our dataset, it is possible that non-listed firms as a whole see a decline in employment. However, given the large labor migration from rural areas to urban manufacturing jobs, the change in employment for the non-listed firms may be moderate.)

As demonstrated by Column 3 of Table 10, the stock investors' expectation during the days immediately following the passage of the Labor Contract Law on June 29, 2007, is materialized when one examines changes in net income. Because the coefficient on the interaction term on being large and labor intensive is large (0.853), we check for possible outliers and indeed find that the net income data have many large values resulting in some very large positive and negative growth rates. The negative income growth is especially prevalent among firms in the less labor intensive sectors<sup>13</sup>. (We don't see similar problems for employee growth or revenue growth). In Column 4, we re-do the regression after excluding the top and bottom 10% observations in terms of net income growth rates. The coefficient on the interaction term (0.374) now looks more reasonable.

## 3.4 Does Stronger Labor Regulation Raise Productivity?

## **3.4.1** Firm productivity and proxies for prior compliance

Are previously non-compliant firms systematically less productive? If so, the re-allocation of resources from previously non-compliant to more compliant firms induced by stronger enforcement can lead to an increase in overall productivity.

We note that the leading economic theory predicts a strong positive association between firm size and firm-level productivity. In the heterogeneous-firm model of

using log, the growth rate of profit is calculated differently from growth rates in Column 1,2. Its parameter on interaction might seem higher than those in Column 1,2. In fact, if it is calculated similarly as those in Column 1,2, the interaction parameter is about 0.1, which is quite close to those in the first two columns.

<sup>&</sup>lt;sup>13</sup> Within the set of the labor intensive sectors, large listed firms see a growth in net income by 44% over the two-year period, whereas small listed firms see a decline in growth by 4% over the same period.

Melitz (2003), where firms differ in their productivity draws and choose their size endogenously, there is a perfect correlation between the two. In models that generalize Melitz (2003) to include multiple dimensions of heterogeneity, one still would expect a strong positive correlation.

To check empirically whether proxies for prior compliance also predict productivity, we need to measure the latter. We consider two measures of productivity. The first is labor productivity, or the ratio of firm value added to firm employee count. The advantage of this measure is its simplicity, using two variables in a firm's financial statement. The disadvantage is that labor productivity is not total factor productivity; its valuation can also reflect variations in firm capital stock.

Our second measure is total factor productivity (TFP). The advantage of the TFP measure is that it purges the effect of capital. A potential disadvantage is that its calculation is more involved and the recorded capital stock information is endogenously chosen by firm conditional on its productivity level. In our context, some of the information needed (such as the amount of intermediate inputs) is not directly available from financial statements of listed firms (but can be available from other sources). Our computation procedure (explained below) forces us to only focus on manufacturing firms when we look at TFP.

We measure TFP by applying the Levinsohn-Petrin (2003) method which makes use of the insight that an observable amount of intermediate inputs is a function of both unobserved firm-specific TFP shocks and observable capital stock.

To be specific, consider a Cobb-Douglas production function in logs:

$$y_t = \beta_l l_t + \beta_k k_t + \omega_t + \eta_t.$$

 $y_t$  is the log of value-added,  $l_t$  is the log of labor compensation and benefits,  $k_t$  is the log of capital input<sup>14</sup>. Both  $\omega_t$  and  $\eta_t$  are unobservable to the econometrician<sup>15</sup>, but  $\omega_t$  are the predictable or observable shocks by firms and could impact the firms' decision. This leads to a simultaneity problem in production function estimation. An OLS regression that ignores the correlation between inputs and the unobservable would give inconsistent results. The LP method uses intermediate input level  $m_t$  to address this problem. Suppose the demand function of intermediate input is given by  $m_t = m_t(\omega_t, k_t)$ . Under a monotonicity assumption, the unobservable can be inverted out as  $\omega_t = \omega_t(m_t, k_t)$ . In this way, the unobservable factor is shown as a

<sup>&</sup>lt;sup>14</sup> We construct the deflators and other variables by following Brandt, Van Biesebroeck and Zhang (2012).

 $<sup>^{15}</sup>$  The constant term in production function is subsumed to the productivity term  $\,\omega_t\,$  .

function of two observable variables. Therefore,  $y_t$  can be written as  $y_t = \beta_l l_t + \beta_k k_t + \omega_t(m_t, k_t) + \eta_t$  instead. Following the LP procedure,  $\hat{\beta}_l$  and  $\hat{\beta}_k$  can be consistently estimated step by step, and the productivity (in logs) can be predicted as  $\hat{\omega}_t = y_t - \hat{\beta}_l l_t - \hat{\beta}_k k_t$ . (We have also considered the index number approach to estimating TFP. But that approach assumes constant returns to scale, an assumption we test and reject. The test is reported in Appendix Table 11.)

Since the survey data of Chinese manufacturing firms (hereinafter survey data)<sup>16</sup> stop at 2006 and no data on intermediate materials are reported in the financial statements of the listed company data, we compute LP productivity using the available data via a two-step procedure.

In the first step, we use the comparable firms from survey data over 2003-2006 (which includes an intermediate material variable), and compute a set of parameters,  $\hat{\beta}_l$  and  $\hat{\beta}_k$ , for each industry. In the second step, we turn to the listed company data, and assume the parameters on capital and labor are the same as estimated in the first step for all listed firms in the same industry and applicable to 2004-2006. Together with the realized values of  $y_t$ ,  $l_t$  and  $k_t$ , at the firm-year level from the financial reports of the relevant firm and year, we can back out each firm's TFP level  $\hat{\omega}_t$  in these years.

In estimating  $\hat{\beta}_l$  and  $\hat{\beta}_k$ , we attempt to choose a subset of firms in the firm survey that are comparable to listed firms. Appendix Table 8 compares the basic statistics between the firms in the survey and the listed firms in 2006. This comparison suggests that the listed firms are more like the top 10% of the firms in the survey in terms of asset. For this reason, we pick the top 10% of the firms by asset in each industry in the survey.

In Table 11, we regress both labor productivity and TFP at the firm level during 2004-2006 (i.e., before the passage of the labor contract law) on proxies for prior compliance: firm size, use of top global auditing firms, and state ownership. There is clear evidence that both size and use of top auditors matter. Larger firms and users of top auditors are more productive than other firms.

Government ownership exhibits mixed results. Ownership by the central

<sup>&</sup>lt;sup>16</sup> The survey of Chinese manufacturing firms is conducted annually by the National Bureau of Statistics in China, but the public access data are available only up to 2006. The survey covers over 90% of industrial value added and includes all firms in manufacturing industries which have sale above 5 million RMB plus all majority state-owned firms regardless of size.

government is also associated with higher productivity, though the effect is weaker economically than either size or use of top auditors. Ownership by local governments does not matter. It is worth mentioning that the results shown in this table do not necessarily indicate that SOEs are more productive in general. When we look at a broader set of manufacturing firms (beyond publicly listed firms) covered in the survey data conducted by the National Bureau of Statistics, we find that SOEs as a group are less productive than non-SOEs, although those SOEs owned by the central government are somewhat more productive than those owned by local governments. The results are reported in Appendix Tables 6 and  $7^{17}$ .

Note that the results in these tables are not meant to prove causality. Instead, they simply suggest a correlation: proxies for compliance are correlated with productivity. As noted, this is consistent with the leading theory of heterogeneous firms in international trade which predicts a strong correlation between firm size and productivity. Therefore, less productive firms are more likely to be in non-compliance.

### 3.4.2 Productivity decomposition: resource reallocation effect

If less productive firms are more likely to be in non-compliance in a weak enforcement environment, then stronger enforcement can improve overall efficiency by inducing a reallocation of resources from less to more productive firms. We will regard as supportive evidence if we find an increase in the association between firm productivity and market share after the law was enacted. We will do this via a difference-in-differences approach, i.e., comparing the productivity-market share association for more and less labor intensive firms before and after the 2007 law was enacted.

## Evidence on reallocation of market shares from less to more productive firms

We now quantify the pattern of resource reallocation from 2006 (the last year before the adoption of the 2007 Labor Contract Law) to 2008 (the first whole year after the implementation of the law) by using an Olley-Pakes productivity decomposition that has been modified by Melitz and Polanec (2012) to take into account of firm entries and exits. In a nutshell, the overall increase in productivity during these two years is decomposed into four parts: improvement due to an increase

<sup>&</sup>lt;sup>17</sup> The data on surveys of manufacturing firms unfortunately have not been made available after 2006, so we cannot perform some other exercises on post-2006 data that we do with publicly listed firms.

in a given firm's average productivity (a within-firm term), improvement due to reallocation across firms (a between-firm term), change due to firm entries, and change due to firm exits. We are especially interested in the second term – changes in overall productivity due to reallocation across firms. We now summarize the detailed calculation process in the following equations.

Aggregate productivity level  $\Phi_t$  in each period t can be decomposed as:

 $\Phi_t = \sum_i s_{it} \varphi_{it} = \overline{\varphi}_t + \sum_i (s_{it} - \overline{s}_t) (\varphi_{it} - \overline{\varphi}_t) = \overline{\varphi}_t + \text{cov}(s_{it}, \varphi_{it}), \text{ where } \overline{\varphi}_t \text{ and } \overline{s}_t \text{ are non-weighted means of firm productivity and employee share. Besides, cov here is just a symbol (actually equals to <math>n_t \times \text{corresponding covariance}).$ 

Firms in each year are classified into survivors (S), entrants (E) and exiters (X):

$$\Phi_1 = s_{S1}\Phi_{S1} + s_{X1}\Phi_{X1} = \Phi_{S1} + s_{X1}(\Phi_{X1} - \Phi_{S1}),$$
  
$$\Phi_2 = s_{S2}\Phi_{S2} + s_{E2}\Phi_{E2} = \Phi_{S2} + s_{E2}(\Phi_{E2} - \Phi_{S2}).$$

In these two equations,  $\Phi_{St} = \sum_{i \in S} (s_{it}/s_{St}) \varphi_{it}$  and  $s_{St} = \sum_{i \in S} s_{it}$ .

Therefore, aggregate productivity change can be decomposed into four parts:

$$\Delta \Phi = (\Phi_{S2} - \Phi_{S1}) + s_{E2}(\Phi_{E2} - \Phi_{S2}) + s_{X1}(\Phi_{S1} - \Phi_{X1})$$
$$= \Delta \overline{\varphi}_{S} + \Delta \cos s + s_{E2}(\Phi_{E2} - \Phi_{S2}) + s_{X1}(\Phi_{S1} - \Phi_{X1}).$$

We work with listed firms<sup>18</sup>, and start with labor productivity but will also report results with total factor productivity. For labor productivity, we use employee share as the measure of market share, while for total factor productivity, we adopt value added instead (Melitz and Polanec 2012).

We use a difference-in-differences framework. That is, we do a similar decomposition for both labor intensive firms (the treatment group) and less labor intensive firms (the control group) for productivity increase from 2006 to 2008. We use the pattern in the control group to capture the effects of other factors in the economy (such as changes in monetary and fiscal policies or changes in other laws that are not related to labor protection). We are therefore primarily interested in the difference between the treatment and control groups.

The results are presented in Table 12. From 2006 to 2008, the overall increase in labor productivity for all labor intensive firms (the treatment group) is 30.3%, which is higher than the 22.5% increase recorded for the control group.

We note that, without benchmarking to the control group (the first panel), the

<sup>&</sup>lt;sup>18</sup> The survey data that we have access to stops at 2006. Therefore, for this exercise, we work with data on listed firms which are available for 2008 as well as 2006.

reallocation term (or the between-firm effect) yields 9.0% increase in productivity for the labor intensive sectors, accounting for 29.5% (=9.0/30.3) of the overall increase in productivity.

The within-firm term is the biggest contributor to the overall productivity increase. The terms related to firm entries and exits are relatively minor, especially if one looks at their net effect by summing them up.

To account for effects from factors unrelated to the labor law, it is useful to pay attention to the decomposition patterns for the control group (the middle panel). There, we see that the within-firm contribution is also very important, similar to the treatment group. In addition, the contribution from the firm entry effect to the overall productivity is more important for the control group than for the treatment group. That is, on average, the new entrants in the control group tend to be more productive than the incumbents. We note that the contributions from the firm exit term to overall group productivity change are comparable between the two groups of firms. Interestingly, the contribution from the reallocation term is negative for the control group.

The differences between the treatment and the control groups are reported in the bottom panel. As noted, the overall productivity increase in the treatment group exceeds that of the control group by 7.8 percentage points (30.3% relative to 22.5%). Of this differential increase in total group productivity, the difference in the reallocation term (the between-firm effect) is the single biggest contributor, accounting for 236.71% of the total differential. That is, when benchmarking to the control group, it is striking that the reallocation effect in the treatment really stands out. This supports the notion that market shares – reflecting underlying resource allocation - within labor intensive sectors are reallocated from less productive to more productive firms from 2006 to 2008. The relative importance of resource reallocation is especially pronounced when benchmarked to a control group of less labor intensive sectors.

We now decompose the growth of TFP from 2006 to 2008, and report similar decompositions for the treatment group (the top panel of Table 13), the control group (the middle panel), and the difference between the two groups (the bottom panel of Table 13)<sup>19</sup>. For firms in labor intensive sectors (the treatment group), the overall

<sup>&</sup>lt;sup>19</sup> The TFPs here are computed via the same two-step procedure described in Section 3.4.1, except that the capital and labor elasticity parameters estimated from the survey data during 2004-2006 are assumed to be

increase in TFP during the period is  $71\%^{20}$ . Interestingly, reallocation from less to more productive firms accounts for 70.3% of that increase, making it the largest contributor.

In comparison, for the control group, the contribution from the reallocation effect to overall group TFP is negative. This means that, on average, firms with a lower TFP in the control group actually gain market share.<sup>21</sup>

Unsurprisingly, when we look at the pattern for the treatment group relative to the control group, the role of reallocation from less to more productive firms stands out even more, contributing 93.8% to the difference in the overall TFP increase between the two groups.

### Placebo tests

One might wonder if the treatment and control groups are always different even in time periods with no major changes in labor protection. For this reason, we now check for possible presence of a "pre-trend" and a "post-trend." More precisely, we will perform two similar decomposition exercises for productivity increases during 2004-2006 and during 2008-2010. They can be thought of as placebo tests.

The results for the 2004-2006 period are reported in the upper half of Table 14. To save space, we focus our discussion on the bottom panel. When benchmarked to the control group, the reallocation effect (the between-firm term) provides a small contribution (3.58%) to the overall difference in the productivity increase of the treatment group over the control group. This shows that the role of reallocation during the 2006-2008 period is very different from the 2004-2006 period.

We now turn to the 2008-2010 period, reported in the lower half of Table 14. For this period, when benchmarked to the control group, the reallocation's contribution to the difference in the overall productivity increase between the two groups (in the bottom panel) is not just small, but negative. Again, this shows that the role of reallocation from less to more productive firms in the labor intensive sectors during

applicable to listed firms during 2006-2008.

<sup>&</sup>lt;sup>20</sup> The two-year TFP growth rates in this table appear high, but are broadly in line with the TFP growth rates reported by Brandt et al. (2012). Note that it is possible that the TFP growth rates for non-listed firms are lower, resulting in a lower economy-wide TFP growth.

<sup>&</sup>lt;sup>21</sup> This could be caused by other policies that may benefit small and medium sized firms at the same time. For example, in 2007, the Chinese government indeed set up special purpose funds of about 17 billion yuans to support the development of small and medium firms. Our double-differencing methodology is designed to control for such factors that produce different effects on firms of different sizes. Source: http://finance.sina.com.cn/review/20080821/07145221190.shtml and http://news.xinhuanet.com/fortune/2007-12/11/content\_7231590.html

the 2006-2008 period is quite unique when compared to the 2008-2010 period.

We conduct similar placebo tests for the TFP decomposition. It is useful to reiterate that the TFP here is computed in the same way as that in Section 3.4.1, using available data via a two-step procedure; the only difference is that in the second step the parameters on capital and labor are applied to 2004-2006 and 2008-2010. The results are reported in Table 15. In the "pre-trend" results (the upper half of Table 15), we note that the difference in the reallocation terms between the treatment and control groups (0.193) during 2004-2006 is substantially smaller than the corresponding term for the 2006-2008 period (0.563). In the post-trend results (the lower half of Table 15), the reallocation effect for the labor intensive group is smaller than that for the control group (10.5% versus 24.3%). In fact, the difference in the reallocation effects between the two groups is the single biggest reason for why the overall TFP increase in the labor intensive group lags behind that in the control group.

To summarize, for both labor productivity and TFP, we see relatively massive reallocation of market shares from less to more productive firms in labor intensive sectors from 2006-2008, especially when benchmarked to a control group of less labor intensive sectors during the same period. Our confidence in this interpretation is bolstered by the fact that no similar pattern is found during two placebo periods of 2004-2006 and 2008-2010.<sup>22</sup>

## A pictorial representation of resource reallocation

If previously more productive firms systematically gain market share (relative to previously less productive firms), the change can correspond to an increase in aggregate productivity. We can also graphically track whether the association between firm level productivity and market share becomes stronger from the pre-law period to the post-law period.

For each year during 2004-2010, we compute separate correlations between firm size (revenue) and productivity (either TFP or labor productivity) for the firms in the labor intensive group and for those in the less labor intensive group.<sup>23</sup> Define relative correlation in a year as the difference between the size-productivity correlation for the labor intensive firms and that for less labor intensive firms.

<sup>&</sup>lt;sup>22</sup> Note that according to unemployment data reported by the National Bureau of Statistics in China, there were no increase in unemployment during 2006-2008.

<sup>&</sup>lt;sup>23</sup> Firm size and firm productivity after controlling sector fixed effect are used to calculate correlations.

Note that we use non-labor intensive firms as a control group because many factors other than the labor law could affect the size-productivity correlation. For example, if the banking sector relaxes access to finance by small and medium-sized firms, it could affect the size-productivity correlation since smaller firms may expand more than larger firms. Nonetheless, we expect the effects of such factors on the size-productivity correlation to be the same for the two groups of firms.

In the left graph of Figure 4, we plot the relative correlation by year from 2004 to 2010, where productivity is measured by labor productivity. There is a visible structural break from 2007 to 2008. The firm-size correlation for labor intensive firms (relative to the control group) becomes noticeably stronger after 2008 and stays high in 2009 and 2010. This pattern of evolving size-productivity correlation is striking, and is consistent with the interpretation that, after the new labor law took effect on January 1, 2008, more productive firms become bigger, and less productive firms become smaller (in relative terms).

In the right graph of Figure 4, we measure firm productivity by TFP and then plot the corresponding relative correlations over the same period. Because labor productivity and TFP are not the same thing, the exact numbers of the relative correlations in any given year between the left and the right graphs do not always match. Nevertheless, we can clearly see a structural break in the relative correlation trajectory. In particular, the correlation between firm size and TFP is much stronger in each of the post-law years (2008-2010) than each of the pre-law years (2004-2007).

## 3.5 Further Evidence: Exploring Regional Variations in Compliance Costs

One of the requirements on firms that have been greatly tightened by the 2007 law is on the mandatory payment by firms into the government organized social security insurance scheme. It was widely reported that small firms often under-pay social security under the old regime, in part by intentionally under-counting the number of employees. Interestingly, while the law requires firms to contribute to the social security fund, the exact contribution rates are set in part by local governments as a significant portion of the fund is locally managed. (Note the 2007 law didn't change the contribution rates, only that the payment will be better enforced.)

This suggests another way to verify the compliance story. In particular, it suggests a positive effect from a combination of three factors (a) being located in a region with a high contribution rate, (b) being large, and (c) being labor intensive.

We hand-collect the social security contribution rates by reading government documents on the website of individual local governments (typically the capital city of a province). This allows us to compile contribution rates by province.

This regression is reported in Column 1 of Table 16. The coefficient on the triple interaction is indeed positive (0.071) and significant at the 10% level. This provides further corroboration for the compliance story.

To relax some of the implicit parameter restrictions, we can also do separate regressions on two sub-samples: those firms in regions with an above-the-median social insurance contribution rate, and those firms in regions with a lower contribution rate. For the regression in each sub-sample, our key parameter of interest is the coefficient on the double interaction between firm size and labor intensity. We would expect the coefficient to be positive and bigger for the subsample of firms in regions with a high contribution rate.

The regression results for these two sub-samples are reported in Columns 2 and 5 of Table 16, respectively. We find that the coefficients on the interaction term are positive in both sub-samples and statistically significant for the first sub-sample. Consistent with the compliance story, the coefficient is substantially bigger for the high contribution rate sub-sample.

We can further relax implicit parameter restrictions by splitting the sample into four sub-samples and then run separate regressions. The four sub-samples consist of firms in (a) high rate provinces and more labor intensive sectors, (b) high rate provinces and less labor intensive sectors, (c) low rate provinces and more labor intensive sectors, and (d) low rate provinces and less labor intensive sectors, respectively.

The separate regressions in these four sub-samples are reported in Columns 3, 4, 6, and 7, respectively. We find that the combination of being big and being labor intensive is associated with a positive relative stock price response. This is true for both the high contribution rate provinces and the low rate provinces, but the effect is much stronger for the high rate provinces. These patterns are again consistent with the compliance story.

## **IV.** Conclusions

This paper aims to shed some new light on the effect of stronger enforcement of laws or regulations on aggregate productivity.

A straightforward event study on the stock price response to China's Labor

Contract Law appears to present a puzzling pattern relative to the extant empirical literature: investors appear to think that the law is a good news for labor intensive firms. We have learned something very interesting in the process of solving this puzzle. We consider four possible solutions to the puzzle: (a) a commitment story – if the law improves the firms' ability to commit to treating workers well, workers may make more firm-specific investment, which is good for both the firms and the workers; (b) a compliance story – if previous non-compliance is systematically more likely by smaller and less efficient firms; (c) a connection story – political connected companies can get away with non-compliance and a tougher law simply raises the cost of doing business for non-connected firms; and (d) a competitiveness story – stronger labor regulation raises barriers to entry, which increases the market power of large firms.

We present a series of evidence and interpret it as supporting the compliance story. There are important implications from our findings. In particular, conditional on having labor regulations in place, stronger and more uniform enforcement could improve resource allocation and raise the aggregate productivity. This point is in principle applicable for other types of regulations or laws.

## **Appendix: Firm Size and Productivity beyond Listed Firms**

In this section, we use data from surveys of Chinese manufacturing firms, which go beyond firms listed on the stock exchanges, to further test the relationship between firm size and productivity. As the database does not include information on auditors (and many non-listed firms may not have an auditor), we only focus on firm size.

Appendix Table 6 reports both TFP and labor productivity. In Column 1, the coefficient of firm size (log asset) is 0.154 and significant at the 1% level. This confirms that larger firms are more productive after controlling for export status and separate year, province, and industry fixed effect.

The coefficient on SOEs in Column 2 is negative, suggesting that SOEs as a group are less productive than private sector firms as a group. On the other hand, the coefficient on foreign-owned firms is positive, suggesting that these firms are more productive as a group than domestic private firms. In Column 3, we decompose the SOEs into those owned by the central government, those owned by provincial/city governments and others. We find that central-government SOEs are more productive among all SOEs.

We examine labor productivity in Column 4-6 and obtain broadly similar results. Most importantly, firm size and firm-level productivity are positively correlated.

## **Data Source**

*Stock data:* Daily close prices of both individual stocks and Hushen 300 Index are from Thomson Reuters Database. Data for assets, revenue, and net income of each stock in 2006 are derived from Thomson Reuters Database.

*Sector level labor intensity:* the ratio between employee compensation and total inputs, derived from the 2005 Chinese Input Output Table, 42 sectors (National Statistics Bureau in China).

*Firm ownership type:* based on the identifying of actual controlling shareholder from the CSMAR Database.

*Social insurance fee rates:* Sum of the mandatory contribution rates for retirement insurance, unemployment insurance, medical insurance, work injury insurance, and birth insurance. Collected by the authors from the websites of the government of the provincial capital in June 2013. (The 2007 law did not change the contribution rates.)

*Political connected firms:* CVs of CEO and Board Chairman for all listed firms in 2006 are collected from CSMAR database. Political\_Connection\_1 =1 for all firms whose CEO or chairman of the board has previously worked in the military or the (central or local) government. Political\_Connection\_2 = Political\_Connection\_1 + firms whose CEO or board chairman is or was a member of the People's Congress (PC) or the Chinese People's Political Consultative Committee (CPPCC). Political\_Connection\_3 = Political\_Connection\_1 - firms whose CEO and Board Chairman held only an entry-level position in the military or the government + firms whose CEO or board chairman is or has been a member of the PC or the CPPCC. Here PC and CPPCC include both national level and local level ones.

Low concentration industries. Of all non-manufacturing industries, we define finance, mining, and electricity, gas and water production and supply industries, which are dominated by majority state-owned firms, as non-competitive. For manufacturing industries, we compute industry-level HHI concentration index based on revenue from the survey data, and define the top 25% of the manufacturing sectors in terms of HHI as non-competitive. Low concentration industries are lower HHI (non top 25%) manufacturing industries and competitive non-manufacturing industries.

*Industry level profit margin:* the median value of net incomes/revenue across all firms in each industry during 2003-2006. An industry is defined as having a low profit margin if its industry level profit margin is below the median.

Trade Openness: (exports+imports)/GDP by sector, from 2005 Input Output Table.

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## Figures and Tables for

## Learning from a Puzzle: When Can Stronger Labor Protection Improve Productivity?

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**Figure 1. Search Interests.** The up graph is from Google Trend while the down graph from Baidu Index. Both graphs are restricted to the period June 2007 to August 2007. (In fact, the down graph has been adjusted a little bit. We observe that big festivals in each month of 2007 have the spikes of search interests exactly one month later. For example, the June 1st Children's Day (in Chinese) has the spike in July 1st according to Baidu Index and it is the case for other big festivals, such as New Year, Valentine's Day, Fool's Day and so on. Therefore, we are convinced that Baidu Index has an obvious bug that delays one month and get the adjusted down graph accordingly.) Numbers in Google Trend represent search interest relative to the highest point on the chart. And Numbers in Baidu Index list the weighted sum of search frequency. Besides, the key words selected in both graphs are Labor Contract Law (in Chinese) or new labor law (in Chinese).



Figure 2: Counts of Newspaper Articles Mentioning Labor Contract Law in Chinese



**Figure 3. Market Reaction and Labor Intensity.** The horizontal axis labels how many trade days away from 29 Jun 2007, the day the new law was adopted. The vertical axis shows the cumulative abnormal return where we use the value weighted return of all companies in our sample as the market return in calculation. Each line in the graph captures the value weighted mean of CARs in a group.



**Figure 4: Relative Correlation between Firm Size and Firm Productivity.** Each point in the graph represents a relative correlation, i.e., the correlation between firm size and productivity for firms in labor intensive sectors relative to that for firms in non-labor intensive sectors. In the left graph, labor productivity is computed whereas in the right graph, TFP is computed. In both graphs, firm size is measured by log revenue. Correlations are computed year by year. Firm size and firm productivity after controlling sector fixed effect are used to calculate correlations. Only listed firms in manufacturing sectors are used.

	Table	e 1 Summary St	atistics or	h Listed Fir	ms in the	Sample			
Sectors	Variable	Ν	Mean	Median	SD	1st	5th	95th	99th
						Percentile	Percentile	Percentile	Percentile
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All	Assets (in billion RMBs)	1319	6.40	1.66	43.80	0.12	0.32	11.40	58.40
	Revenue (in billion RMBs)	1309	3.53	0.94	29.70	0.01	0.08	10.80	33.20
	Net Income (in billion RMBs)	1319	0.17	0.03	1.53	-0.67	-0.13	0.60	2.76
	Employee	1307	3639	1692	10958	25	106	12549	37282
	Labor Intensity	1269	0.103	0.082	0.078	0.037	0.050	0.193	0.553
	Users Top4Auditors /Non-Users	67/1251	-	-	-	-	-	-	-
	Central SOE/Local SOE/Private	232/581/402	-	-	-	-	-	-	-
More									
Labor	Assets	631	8.03	1.49	57.90	0.11	0.27	11.10	76.20
Intensive	Revenue	622	2.12	0.81	5.81	0.01	0.05	6.83	21.00
Sectors	Net Income	631	0.11	0.03	0.50	-0.60	-0.14	0.57	2.37
	Employee	623	2869	1264	5396	19	74	11786	25317
	Labor Intensity	631	0.141	0.104	0.097	0.085	0.086	0.243	0.553
	Top4/Non-Top4 Auditors Users	37/591	-	-	-	-	-	-	-
	Central SOE/Local SOE/Private	104/280/199	-	-	-	-	-	-	-
Less									
Labor	Assets	638	5.06	1.87	25.50	0.19	0.38	14.90	54.00
Intensive	Revenue	637	5.09	1.11	42.20	0.02	0.15	15.80	41.30
Sectors	Net Income	638	0.24	0.04	2.13	-0.53	-0.12	0.74	3.62
	Employee	635	4535	2089	14722	45	284	13834	38720
	Labor Intensity	638	0.065	0.065	0.009	0.037	0.05	0.081	0.082
	Top4/Non-Top4 Auditors Users	30/608	-	-	-	-	-	-	-
	Central SOE/Local SOE/Private	123/281/185	-	-	-	-	-	-	-

Bononna	Whole	More Labor	Less Labor
	Sample	Intensive	Intensive
Dep=CAR		Firms	Firms
	(1)	(2)	(3)
Dummy for More Labor	-0.0207		
Intensive Firms	(0.0491)		
Dummy for Large Firms	-0.0009	0.0487***	-0.0019
(Assets above median)	(0.0143)	(0.0123)	(0.0168)
Dummy for Large Firms $$ ×	0.0481**		
Dummy for High Labor Intensity	(0.0204)		
Stock Exchange Fixed Effect	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes
Province Fixed Effect	Yes	Yes	Yes
# Observation	1269	631	638
R-squared	0.088	0.152	0.084
Notos: Standard arrora are in parenth	anna Constant is	included in the rec	reaction but not

#### Table 2: Relative CARs of Large and Labor Intensive Firms Benchmark Measure, CAR[-5,10]

Notes: Standard errors are in parentheses. Constant is included in the regression but not displayed in the table. \*, \*\*, and \*\*\* denote significant at the 10, 5 and 1 percent levels, respectively.

	Continuous	Continuous Assets - Winsorized	Continuous	Continuous Assets and Continuous
Dep=CAR	Assets	at 5%	Labor Intensity	Labor Intensity
	(1)	(2)	(3)	(4)
Labor Intensity	-0.331*	-0.597**	-0.245	-0.795**
	(0.195)	(0.237)	(0.220)	(0.360)
Firm Size by log (Assets)	0.00408	0.00258	0.158**	0.0841**
	(0.00673)	(0.00782)	(0.0771)	(0.0337)
Firm Size×Labor Intensity	0.0160*	0.0285***	0.0537*	0.0274**
	(0.00878)	(0.0108)	(0.0310)	(0.0137)
Stock Exchange Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Observation	1269	1269	1199	1199
R-sq	0.090	0.093	0.082	0.088

### Table 3: Continuous Assets or Continuous Labor Intensity

Notes: Standard errors are in parentheses. Constant is included in the regression but not displayed in the table. \*, \*\*, and \*\*\* denote significant at the 10, 5 and 1 percent levels, respectively. When continuous labor intensity is used, the agriculture sector is excluded as its labor share value is an obvious outlier; sectors with very few firms in the sample are also excluded to minimize the problem of colinearity. In all columns, continuous labor intensity are in log form. In Column 3 and Column 4, continuous labor intensity is winsorized at 10%. In Column 4, assets are winsorized at 1% level.

Dep=CAR	(1)	(2)	(3)	(4)	(5)	(6)
Dummy for More	-0.0325	-0.388**	-0.00844	-0.366***	-0.0193	-0.0759
Labor Intensive Firms	(0.0488)	(0.156)	(0.0483)	(0.135)	(0.0488)	(0.0750)
Large Firms	-0.0133	0.00315	0.0189	0.00659	0.00500	0.00638
	(0.0143)	(0.00526)	(0.0140)	(0.00498)	(0.0147)	(0.00607)
Large firms x	0.0597***	0.0192***	0.0567***	0.0217***	0.0369*	0.0101
D_labor intensive	(0.0206)	(0.00722)	(0.0201)	(0.00704)	(0.0212)	(0.00803)
Stock Exchange Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
	Dummy Revenue	Revenue	Dummy Net Income (Above	Net Income	Dummy Employee	Employee
Firm size measured by	(Above Median)	(log)	Median)	(log)	(Above Median)	(log)
Observation	1259	1259	1269	1104	1258	1268
R-sq	0.086	0.093	0.102	0.113	0.086	0.088

## Table 4: Alternative Measures of Firm Size

Notes: Standard errors are in parentheses. Constant is included in the regression but not displayed in the table. \*, \*\*, and \*\*\* denote significant at the 10, 5 and 1 percent levels, respectively. The continuous measures of firm size (in Columns 2, 4 and 6) are winsorized at 1% level to filter out extreme values.

Table 5: Alternative Models to Compute CARs								
	Moc	lels Used in Calc	ulating CAR					
	Market=	Market=						
	Value	Equal						
	Weighted	Weighted	Three-	Four-				
	Average of	Average of	Factor	Factor				
Dep=CAR	All Firms	All Firms	Model	Model				
	(1)	(2)	(3)	(4)				
Dummy_High Labor Intensity	-0.0302	-0.0389	-0.0204	-0.00920				
	(0.0492)	(0.0494)	(0.0474)	(0.0483)				
Dummy_Large Firms	-0.000651	-0.00632	-0.0244*	-0.0243*				
	(0.0143)	(0.0144)	(0.0138)	(0.0141)				
D_High Labor Intensity	0.0500**	0.0488**	0.0449**	0.0481**				
X D_Large firms	(0.0204)	(0.0205)	(0.0197)	(0.0201)				
Stock Exchange Fixed Effects	Yes	Yes	Yes	Yes				
Industry Fixed Effects	Yes	Yes	Yes	Yes				
Province Fixed Effects	Yes	Yes	Yes	Yes				
Observation	1269	1269	1269	1269				
R-sa	0.083	0.073	0.063	0.067				

Notes: Standard errors are in parentheses. Constant is included in the regression but not displayed in the table. \*, \*\*, and \*\*\* denote significant at the 10, 5 and 1 percent levels, respectively. In Column 1 and 2, a market model is used to computer CARs, where the market is the average of all companies in our sample.

Dep=CAR	Whole Sample	More Labor Intensive Firms	Less Labor Intensive Firms
	(1)	(2)	(3)
Dummy_High Labor Intensity	-0.0024		
	(0.0477)		
Dummy_ Use of Top Auditors	0.0109	0.0978***	0.0183
	(0.0331)	(0.0250)	(0.0386)
D_use of top auditors $\times$			
D_ High labor Intensity	0.0826*		
	(0.0445)		
Stock Exchange Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes
Observation	1268	630	638
R-sq	0.087	0.151	0.084

## Table 6: Use of a Top Global Auditor as a Proxy for Prior Compliance

Notes: Standard errors are in parentheses. Constant is included in the regression but not displayed in the table. \*, \*\*, and \*\*\* denote significant at the 10, 5 and 1 percent levels, respectively.

Table 7: A Horse Race am	ong Ownership	, Size, and U	se of a Top Auditor	
Den CAR	Whole	Whole	More Labor	Less Labor
Dep=CAR	Sample	Sample		
	(1)	(2)	(3)	(4)
Dummy for High Labor Intensity	-0.00553	-0.0162		
	(0.0499)	(0.0505)		
Dummy for Large Firms (by asset)		-0.00233	0.0419***	-0.00383
		(0.0148)	(0.0127)	(0.0174)
D_ large firms $\times$ D_high labor intensity		0.0423**		
		(0.0211)		
Dummy for Use of Top 4 Auditors		0.0135	0.0819***	0.0203
		(0.0336)	(0.0252)	(0.0393)
D_top auditors $\times$ D_ high labor Intensity		0.0631		
		(0.0453)		
Dummy for central government SOEs	-0.00288	-0.00329	0.0120	-0.00291
	(0.0207)	(0.0209)	(0.0180)	(0.0248)
D_ Central SOEs $\times$ D_high labor Intensity	0.00551	0.0192		
	(0.0159)	(0.0299)		
Dummy for local government SOEs	0.0307	0.00581	-0.00453	0.00478
	(0.0296)	(0.0162)	(0.0136)	(0.0191)
D_local SOEs $ imes$ D_ high labor Intensity	0.00200	-0.00853		
	(0.0225)	(0.0229)		
Stock Exchange Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes
Observation	1269	1268	630	638
R-sa	0.082	0.094	0.168	0.084

Notes: Standard errors are in parentheses. Constant is included in the regression but not displayed in the table.\*, \*\*, and \*\*\* denote significant at the 10, 5 and 1 percent levels, respectively.

Dep=CAR	(1)	(2)	(3)	(4)	(5)	(6)
Dummy More Labor Intensive Sectors	-0.0217	-0.0242	-0.0291	-0.0215	-0.0270	-0.0206
	(0.0499)	(0.050)	(0.0498)	(0.0499)	(0.0498)	(0.0499)
Dummy for Larger Firms (or Users of Top Auditors)	-0.00944	-0.0145	-0.0108	-0.0101	-0.00594	-0.00719
	(0.0154)	(0.0157)	(0.0155)	(0.0150)	(0.0149)	(0.0148)
Dummy for Politically Connected Firms	-0.0395	-0.0498*	-0.0499*	-0.0371*	-0.0330	-0.0315
	(0.0283)	(0.026)	(0.0279)	(0.0219)	(0.0234)	(0.0237)
Dummy for More Labor Intensive Sectors	0.0494**	0.0541**	0.0566**	0.0445**	0.0460**	0.0444**
imes Dummy for Large Firms (or Users of Top Auditors)	(0.0227)	(0.023)	(0.0226)	(0.0205)	(0.0205)	(0.0205)
Dummy for More Labor Intensive Sectors	0.0196	0.0336	0.0532	0.0120	0.0239	0.00606
× Dummy for Politically Connected Firms	(0.0368)	(0.0341)	(0.037)	(0.0243)	(0.0259)	(0.0259)
Dummy for Large Firms (or Use of Top	0.0584	0.0741**	0.0640*	0.0506**	0.0333	0.0435*
Auditors) × Dummy for Political Connections	(0.0384)	(0.0354)	(0.0377)	(0.0242)	(0.0256)	(0.0255)
Triple Interaction Term	-0.0266	-0.0439	-0.057			
	(0.0514)	(0.0484)	(0.0514)			
Stock Exchange Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
	Dummy	Dummy	Dummy	Dummy	Dummy	Dummy
Firm Compliance Measured by	Assets	Assets	Assets	Assets	Assets	Assets
Policial Connection Measured by	Connection 1	Connection 2	Connection 3	Connection 1	Connection 2	Connectio
# Observation	1269	1269	1269	1269	1269	1269
R-squared	0.091	0.092	0.091	0.092	0.090	0.090

Table 8 a: Accounting for Political Connections (Firm Compliance Measured by Firm Size- Ass	Table 8 a: Accounting	a for Political Conne	ections (Firm Compliand	e Measured by Firm	n Size- Assets
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Dep=CAR	(1)	(2)	(3)	(4)	(5)	(6)
Dummy More Labor Intensive Sectors	-0.00373	-0.00497	-0.00948	-0.00487	-0.00963	-0.00363
	(0.0485)	(0.0486)	(0.0485)	(0.0486)	(0.0484)	(0.0485)
Dummy for Larger Firms (or Users of Top Auditors)	-0.00251	-0.00333	0.000323	0.00157	0.00514	0.00208
	(0.0364)	(0.0365)	(0.0357)	(0.0346)	(0.0342)	(0.0346)
Dummy for Politically Connected Firms	-0.0111	-0.0127	-0.0172	-0.0116	-0.0160	-0.00995
	(0.0196)	(0.0180)	(0.0191)	(0.0179)	(0.0189)	(0.0194)
Dummy for More Labor Intensive Sectors	0.0904*	0.0916*	0.0926*	0.0827*	0.0839*	0.0821*
imes Dummy for Large Firms (or Users of Top Auditors)	(0.0492)	(0.0492)	(0.0482)	(0.0446)	(0.0446)	(0.0446)
Dummy for More Labor Intensive Sectors	0.00764	0.0110	0.0280	0.00912	0.0259	0.00567
× Dummy for Politically Connected Firms	(0.0264)	(0.0247)	(0.0263)	(0.0243)	(0.0259)	(0.0259)
Dummy for Large Firms (or Use of Top	0.0771	0.0787	0.0723	0.0505	0.0374	0.0505
Auditors) × Dummy for Political Connections	(0.0878)	(0.0876)	(0.0958)	(0.0574)	(0.0616)	(0.0575)
Triple Interaction Term	-0.0467	-0.0495	-0.0595			
	(0.116)	(0.116)	(0.125)			
Stock Exchange Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
	Dummy for	Dummy for	Dummy for	Dummy for	Dummy for	Dummy for
	Users of Top	Users of Top	Users of Top	Users of Top 4	Users of Top	Users of Top
Firm Compliance Measured by	4 Auditors	4 Auditors	4 Auditors	Auditors	4 Auditors	4 Auditors
Delicial Connection Measured by	Political	Political	Political	Political	Political	Political
# Observation	1268	1268	1268	1268	1268	1268
R-squared	0.088	0.088	0.089	0.088	0.088	0.088

# Table 8 b: Accounting for Political Connections (Firm Compliance Measured by Users of Top 4 Auditors)

Table 9: Restricting the Sample to Competitive Sectors										
Dep=CAR		Complian	ce Proxy: D. Large F	Firms (by Assets)	Compliance Proxy: D. Users of Top 4 Auditors					
		All	More Labor Intensive Sectors	Less Labor Intensive Sectors	All	More Labor Intensive Sectors	Less Labor Intensive Sectors			
Competitiveness										
Measures	Selected Regressors	(1)	(2)	(3)	(4)	(5)	(6)			
Low Concentration	Dummy for More Compliant Firms	-0.0147	0.0476***	-0.0216	0.0395	0.0871***	0.0548			
		(0.0224)	(0.0128)	(0.0313)	(0.0480)	(0.0266)	(0.0678)			
	Dummy for High Labor Intensity	0.0607**			0.0449					
	X Dummy for Compliant Firms	(0.0273)			(0.0585)					
Low Profit Margins	Dummy for More Compliant Firms	0.0187	0.0553***	0.0231	-0.0522	0.0830*	-0.0329			
		(0.0195)	(0.0181)	(0.0221)	(0.0483)	(0.0452)	(0.0534)			
	Dummy for High Labor Intensity	0.0452*			0.147**					
	X Dummy for Compliant Firms	(0.0269)			(0.0669)					
High Trade Openness	Dummy for More Compliant Firms	0.0112	0.0545**	0.00355	-0.0245	0.0326	-0.0249			
		(0.0162)	(0.0223)	(0.0166)	(0.0472)	(0.0556)	(0.0476)			
	Dummy for High Labor Intensity	0.0376			0.0648					
	X Dummy for Compliant Firms	(0.0267)			(0.0721)					
Union of the above	Dummy for More Compliant Firms	-0.0000524	0.0465***	-0.00262	0.00883	0.0908***	0.0180			
Three		(0.0151)	(0.0126)	(0.0181)	(0.0366)	(0.0253)	(0.0434)			
	Dummy for High Labor Intensity	0.0470**			0.0793*					
	X Dummy for Compliant Firms	(0.0213)			(0.0478)					

Note: The regression specifications are identical to those in Table 2, except that the regression samples are restricted to competitive sectors only. All regressions include separate industry, location, and stock exchange fixed effects. Definitions of competitiveness proxies are in the Data Source Appendix. Standard errors are in parentheses. Constant is included in the regression but not reported.\*, \*\*, and \*\*\* denote significant at the 10, 5 and 1 percent levels, respectively.

Dep=Growth rate 2006-2008	Employee	Revenue	Net Income	Net Income
	(1)	(2)	(3)	(4)
Dummy for large firms (by asset)	0.0723**	-0.0117	-0.327	0.0472
	(0.0339)	(0.0386)	(0.296)	(0.111)
D_large firms X D_ high labor				
Intensity	0.101**	0.103*	0.853**	0.374**
	(0.0480)	(0.0551)	(0.421)	(0.157)
Dummy for High Labor Intensity	0.00782	-0.201	-1.153	0.309
	(0.113)	(0.135)	(1.014)	(0.402)
Dependent Variable Past Growth Rate	0.0617	0.00439	0.0276**	0.0135***
Over 2003-2006	(0.0471)	(0.0495)	(0.0117)	(0.00423)
N	1208	1253	1269	1018
R-sq	0.092	0.090	0.067	0.108

Table 10. Rates of	Growth in Tern	ns of Hiring	Sales and	Profits from	2006 to 1	2008
	Olowin in Terr	na or rinning,	Sales and	1 101113 110111	2000 10	2000

Notes: 1. In Column 1,2 and 3, dependent variables are winsorized at the 5% at the top and the bottom; In Column 4, the top and bottom 10% of dependent variable are excluded to further filter the outliers. 2. Standard errors are in parentheses. \*, \*\*, and \*\*\* denote significant at the 10, 5 and 1 percent levels, respectively. 3. Separate stock exchange, industry and province fixed effects and the constant are included but not reported. 4. In Column 1, the dependent variable is In(Employee 2008)-In(Employee 2006), and the average employee growth rate in past 3 years is (In(Employee 2006)-In(Employee2003))/3. Growth rates of revenue in Column 2 are calculated similarly; In Column 3, the dependent variable is Net Income 2008/Net Income 2006-1, and average net income growth rate in past 3 years is (Net Income 2005/Net Income 2004+Net Income 2006/Net Income 2005)/3-1. The net income growth rates in Column 4 are calculated similarly. 5. All dependent variables are growth rate 2006-2008.

Dep=Productivity		Labor Pro	oductivity			LP Proc	ductivity	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
D_Large Firms	0.416***			0.398***	0.588***			0.554***
(by asset)	(0.036)			(0.038)	(0.034)			(0.035)
D_Users of Top 4 Auditors		0.508***		0.365***		0.699***		0.495**
		(0.077)		(0.077)		(0.078)		(0.075)
D_SOEs (Central			0.184***	0.100*			0.210***	0.109**
government)			(0.055)	(0.054)			(0.055)	(0.051)
D_SOEs (local			0.015	-0.064			0.107**	0.002
Governments)			(0.042)	(0.042)			(0.041)	(0.039)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exchange Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	3662	3662	3662	3662	2143	2143	2143	2143
R-sq	0.289	0.273	0.267	0.296	0.888	0.876	0.873	0.891

#### Table 11: Association between Productivity and Proxies for Prior Compliance

Note: 2004-2006 listed company sample. Dependent variable for each column is productivity in log form. Column 1-4 uses listed firms in all industries, while Column 5-8 uses only manufacturing industries, since the LP productivity for listed firms are obtained by imposing procedure. Standard errors in parentheses. Constant is included in the regression but not displayed in the table. \* Significant at the 10 percent level. \*\* Significant at the 5

Surviving Firms		Entering	Exiting	All		
Within	Between	Firms	Firms	Firms		
	Мо	re Labor Intensive Se	ectors			
0.220	0.090	0.036	-0.043	0.303		
72.60%	29.54%	11.91%	-14.05%	100.00%		
	Les	ss Labor Intensive Se	ectors			
0.154	-0.095	0.205	-0.038	0.225		
68.29%	-42.13%	90.89%	-17.05%	100.00%		
Difference b/w More and Less Labor Intensive Sectors						
0.066	0.184	-0.169	-0.004	0.078		
85.05%	236.71%	-216.39%	-5.38%	100.00%		

## Table 12: Decomposing Relative Growth in Labor Productivity over 2006-2008

Note: Using dynamic Olley-Pakes Decomposition with entries and exits (Melitz and Polanec, 2012); Labor productivity are in logs and weighted by employee shares.

Firms	Entering	Exiting	All			
Between	Firms	Firms	Firms			
More	Labor Intensive Se	ectors				
0.500	-0.084	0.032	0.710			
70.33%	-11.86%	4.54%	100.00%			
Less	Labor Intensive Se	ctors				
-0.063	0.078	-0.049	0.111			
-56.82%	70.87%	-44.35%	100.00%			
Difference b/w More and Less Labor Intensive Sectors						
0.563	-0.163	0.081	0.600			
93.79%	-27.13%	13.56%	100.00%			
	Firms Between <i>More</i> 0.500 70.33% <i>Less</i> -0.063 -56.82% Difference b/w Mo 0.563 93.79%	Firms         Entering           Between         Firms           More Labor Intensive Set         0.500           0.500         -0.084           70.33%         -11.86%           Less Labor Intensive Set         -0.063           -0.063         0.078           -56.82%         70.87%           Difference b/w More and Less Labor           0.563         -0.163           93.79%         -27.13%	Firms         Entering         Exiting           Between         Firms         Firms           More Labor Intensive Sectors         0.032           0.500         -0.084         0.032           70.33%         -11.86%         4.54%           Less Labor Intensive Sectors         -0.063         0.078           -0.063         0.078         -0.049           -56.82%         70.87%         -44.35%           Difference b/w More and Less Labor Intensive Sectors         0.081           93.79%         -27.13%         13.56%			

## Table 13: Decomposing Relative Growth in TFP from 2006-2008

Note: Using dynamic Olley-Pakes Decomposition with Entry and Exit (Melitz and Polanec, 2012); TFPs are computed by the LP method for manufacturing firms. TFPs are in logs and weighted by value added shares.

Table 14:	Placebos Tests	- Labor Productivi	ty Growth Decom	position
Surviving	Firms	Entering	Exiting	All
Within	Between	Firms	Firms	Firms
	Pre-Tren	d: Growth from 20	04-2006	
	More	Labor Intensive Se	ctors	
0.158	0.055	0.400	-0.056	0.557
28.39%	9.80%	71.87%	-10.07%	100.00%
	Less	Labor Intensive Sec	ctors	
0.095	0.037	-0.038	-0.031	0.062
153.30%	59.59%	-62.04%	-50.86%	100.00%
	Difference b/w Mo	ore and Less Labor	Intensive Sectors	
0.063	0.018	0.439	-0.025	0.495
12.79%	3.58%	88.61%	-4.97%	100.00%
-				
-	Post-Trei	nd: Growth from 20	008-2010	
	More	Labor Intensive Se	ctors	
0.292	0.030	-0.024	-0.004	0.294
99.17%	10.28%	-8.10%	-1.35%	100.00%
	Less	Labor Intensive Sec	ctors	
0.261	0.039	-0.076	-0.011	0.213
122.27%	18.39%	-35.56%	-5.10%	100.00%
	Difference b/w Mo	ore and Less Labor	Intensive Sectors	
0.031	-0.009	0.052	0.007	0.081
37.99%	-11.20%	64.65%	8.56%	100.00%

Note: Using dynamic Olley-Pakes Decomposition with entries and exits (Melitz and Polanec, 2012); Labor productivity are in logs and weighted by employee shares.

	Table 15: Placeb	o Tests - TFP Grov	wth Decompositio	n
Surv	iving Firms	Entering	Exiting	All
Within	Between	Firms	Firms	Firms
	Pre-Trend	: Growth from 200	4 to 2006	
	More	e Labor Intensive S	ectors	
0.170	0.189	-0.086	0.058	0.330
51.59%	57.20%	-26.24%	17.46%	100.00%
	Less	s Labor Intensive Se	ectors	
0.081	-0.004	0.020	0.014	0.111
72.91%	-3.69%	18.45%	12.32%	100.00%
	Difference b/w M	lore and Less Labor	r Intensive Sectors	
0.089	0.193	-0.107	0.044	0.219
40.78%	88.07%	-48.90%	20.06%	100.00%
				_
	Post-Tren	nd: Growth from 20	008 to 2010	_
	More	e Labor Intensive S	ectors	
0.232	0.105	0.090	0.016	0.443
52.38%	23.65%	20.25%	3.72%	100.00%
	Less	s Labor Intensive Se	ectors	
0.272	0.243	-0.048	-0.007	0.461
59.03%	52.84%	-10.32%	-1.55%	100.00%
	Difference b/w M	lore and Less Laboi	r Intensive Sectors	
-0.040	-0.139	0.137	0.024	-0.018
225.68%	783.88%	-776.05%	-133.52%	100.00%

Note: Using dynamic Olley-Pakes Decomposition with Entry and Exit (Melitz and Polanec, 2012); TFPs are computed by the LP method for manufacturing firms. TFPs are in logs and weighted by value added shares.

		F	Provinces with ligh Social Insurance	e Rates	Provinces with Low Social Insurance Rates			
Dep=CAR	Full Sample	Whole Sample	More Labor Intensive Sectors	Less Labor Intensive Sectors	Whole Sample	More Labor Intensive Sectors	Less Labor Intensive Sectors	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Dummy for More Labor Intensive Firms	0.0106	-0.0867			0.0305			
	(0.0507)	(0.0875)			(0.0538)			
Dummy for Large Firms (by assets)	0.0182	-0.0258	0.0612***	-0.0239	0.0247	0.0364*	0.0267	
	(0.0203)	(0.0235)	(0.0171)	(0.0289)	(0.0174)	(0.0186)	(0.0187)	
Dummy for Provinces with High Fee Rates	0.1020**							
	(0.0482)							
D_labor intensive firms x D_large firms	0.0143	0.0890***			0.0100			
	(0.0294)	(0.0330)			(0.0255)			
D_Labor Intensive X D_High Fee Rates	-0.0707**							
	(0.0287)							
D_large firms×D_High Fee Rates	-0.0415							
	(0.0284)							
Triple Interactions	0.0708*							
	(0.0403)							
Stock Exchange Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
# Observation	1252	630	323	307	622	304	318	
R-squared	0.094	0.091	0.148	0.094	0.153	0.230	0.097	

Notes: Standard errors are in parentheses. Constant is included in the regression but not reported. \*, \*\*, and \*\*\* denote significant at the 10, 5 and 1 percent levels, respectively.

Input Output		Sector Level Labor	Number of
Code	Industry Name	Intensity	Firms
1	Agriculture	0.553	27
32	Finance and Insurance	0.243	18
35	Science Research	0.233	1
37	Public Facility Management	0.217	10
40	Public Health, Social Insurance and Social Services	0.203	1
41	Culture, Sports and Entertainment	0.193	17
25	Water Production and Supply	0.171	7
30	Wholesale and Retail Trade	0.170	100
2	Coal Mining and Washing	0.167	18
26	Building	0.130	21
38	Resident Service and Other Service	0.128	15
8	Clothing and Leather and Feather products	0.119	18
21	Other Manufacturing	0.111	9
27	Transportation and Warehousing	0.108	53
31	Hotel and Restaurants	0.104	8
34	Leasing and Business Services	0.103	4
33	The Real Estate Industry	0.097	120
24	Gas Production and Supply	0.090	1
13	Non-metallic Mineral Products	0.088	38
29	Information Transmission, Computer Services and Software	0.087	31
16	General and Special Equipment Manufacturing	0.086	84
20	Instrumentation and Cultural Office Machinery Manufacturing	0.085	6
10	Paper Printing and Stationery Manufacturing Industry	0.085	20
9	Wood Processing and Furniture Manufacturing	0.083	4
4	Metal Mining and Washing	0.082	11
7	Textile	0.081	29
15	Metal Products	0.078	14
17	Transportation Equipment Manufacturing Industry	0.075	62
18	Electrical, Machinery and Equipment Manufacturing	0.074	41
23	Electricity, Heat production and Supply Industry	0.066	58
12	The Chemical Industry	0.065	210
3	Oil and Gas Extraction	0.063	2
19	Electronic Communication Equipment and Computer Manufacturing	0.061	86
6	Food Manufacturing and Tobacco Products	0.058	60
14	Metal Smelting and Rolling Processing	0.050	52
11	Petroleum Processing, Coking and Nuclear	0.037	13
	Median across all firms	0.082	
	Mean across all firms	0.103	

## Appendix Table 1: Sector Level Labor Intensity List

Note: Authors' calculations based on China's Input Output Table of 2005. Sector level labor intensity is labor compensation divided by total inputs. The last column shows the number of companies in a sector. The sectors are listed in the descending ranking of labor intensity.

Appendix Table 2. Alternative Event windows							
			Event Window	/			
Dep=CAR	[-1,5]	[-1,10]	[-1,20]	[-5,5]	[-5,20]		
	(1)	(2)	(3)	(4)	(5)		
Dummy Assets (Above Median)	-0.00972	-0.0161	-0.0481***	0.00519	-0.0325**		
	(0.0111)	(0.0124)	(0.0132)	(0.0134)	(0.0140)		
Dummy Assets $  imes $ Dummy More							
Labor Intensive Sectors	0.0276*	0.0323*	0.0445**	0.0431**	0.0609***		
	(0.0158)	(0.0176)	(0.0188)	(0.0190)	(0.0200)		
Dummy More Labor Intensive							
Sectors	-0.0129	-0.0219	-0.0357	-0.0119	-0.0351		
	(0.0381)	(0.0425)	(0.0452)	(0.0458)	(0.0481)		
Stock Exchange Fixed Effects	Yes	Yes	Yes	Yes	Yes		
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes		
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes		
Observation	1269	1269	1269	1269	1269		
R-sq	0.054	0.057	0.066	0.088	0.087		

Appendix Table 2: Alternative Event Windows

Note: Standard errors are in parentheses. Constant is included in the regression but not displayed in the table. \* Significant at the 10 percent level. \*\* Significant at the 5 percent level. \*\*\* Significant at the 1 percent level.

Appendix Table 3: Tabulations on Firm Ownership Types						
	Number	Percent	Control			
Firm Ownership Type		of Total	Code			
Central Government Owned Enterprise	232	17.59	2			
Provincial Government Owned Enterprise	281	21.30	1			
Municipal Government Owned Enterprise	300	22.74	1			
Institution	25	1.90				
Development zone	26	1.97				
Collectively Owned Enterprise	33	2.50				
China Mainland Private Firms	402	30.48	0			
Hong Kong Private Firms	5	0.38				
Taiwan-invested Private Firms	2	0.15				
Foreign-invested Firms	13	0.99				

Note: Data is derived from CSMAR database. Firm ownership type is based on the actual controller of the firm.

	Dummy for					
	Sector Level Labor Intensity	Assets (log)	Use of a Top 4 Auditor	Firm Ownership Type		
Sector Level Labor Intensity	1	-0.05	-0.03	-0.04		
Assets (log)		1	0.38 <sup>*</sup>	0.27 <sup>*</sup>		
Dummy Top 4 Auditor			1	0.13 <sup>*</sup>		
Firm Ownership Type				1		

Notes: Sector Level Labor Intensity = Labor Compensation/Total Input (continuous measure). Firm ownership type = 2 if central government SOE; 1 if local government SOEs; and 0 all others. \* denotes significant at the 1% level.

Ar	pendix Tabl	e 5: Observ	ations by K	ey Regre	ssors			
				Use of	a top 4			
	_	Firm Size (	by asset)	auditor		Ownership		
		Below Median	Above Median	No	Yes	Private Firms	Local Govt SOEs	Central Govt SOEs
Sector Level Labor Intensity	Low	296	342	608	30	185	281	123
	High	339	292	593	37	199	280	104
Firm Size (by asset)	Small			653	5	274	230	99
	Large			598	62	128	351	133
Use of a Top 4 Auditor	No					394	551	209
	Yes					7	30	23

Note: Dummy Sector Level Labor Intensity=1 when a firm is in a more labor intensive sector (above median); Dummy assets=1 when a firm has above median assets; Dummy Top 4 Auditor=1 when hiring a Top 4 Auditor; Central SOE/Local SOE/Private Firm=2 when central SOE; Central SOE/Local SOE/Private Firm=1 when provincial/municipal SOE; Central SOE/Local SOE/Private Firm=0 when ordinary private firm.

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# Appendix Table 4: Correlations between Key Regressors

Appendix T	able 6: Produc	tivity and Firr	n Characteristi	ics- From Surve	y Data	
Dep=Productivity	L	P Productivity	1	La	abor Productiv	<b>'ity</b>
	(1)	(2)	(3)	(4)	(5)	(6)
Firm Size (log Assets)	0.154***			0.169***		
	(0.000801)			(0.000817)		
Dummy SOE		-0.645***			-0.701***	
		(0.00504)			(0.00513)	
Dummy Foreign Firms		0.0763***			0.275***	
		(0.00364)			(0.00371)	
Dummy HK Macao Taiwan Firms		-0.0483***			0.0154***	
		(0.00371)			(0.00378)	
Dummy Central SOE			0.511***			0.349***
			(0.0215)			(0.0201)
Dummy Provincial/City SOE			0.0984***			-0.0201
			(0.0152)			(0.0143)
Dummy Export	0.0748***	0.170***	0.673***	-0.178***	-0.118***	0.372***
	(0.00251)	(0.00263)	(0.0190)	(0.00256)	(0.00268)	(0.0178)
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observation	915498	915500	44319	916256	916258	44789
R-sq	0.297	0.282	0.266	0.146	0.130	0.143

Note: 2003-2006 unbalanced sample. Dependent variable for Column 1-3 is LP productivity in log form and for Column 4-5 is labor productivity in log form. In Column 1 and 4, firm size variable is winsorized at 1% level. In Column 3 and 6, the sample used includes only SOEs. Standard errors in parentheses. \* Significant at the 10 percent level. Constant is included in the regression but not displayed in the table. \*\* Significant at the 5 percent level. \*\*\* Significant at the 1 percent level.

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Dep=Productivity	Productivity (log)			
	Labor	LP		
	(1)	(2)		
Assets (log)	0.135***	0.135***		
	(0.000983)	(0.000968)		
Dummy SOE	-1.462***	-1.726***		
	(0.0280)	(0.0277)		
Dummy Foreign Firms	-1.639***	-1.161***		
	(0.0248)	(0.0244)		
Dummy HK Macao Taiwan Firms	-1.179***	-0.964***		
	(0.0268)	(0.0264)		
Assets × Dummy SOE	0.0687***	0.100***		
	(0.00274)	(0.00272)		
Assets × Dummy Foreign Firms	0.176***	0.110***		
	(0.00240)	(0.00237)		
Assets × Dummy HK Macao Taiwan Firms	0.110***	0.0822***		
	(0.00264)	(0.00259)		
Dummy Export	-0.202***	0.0877***		
	(0.00265)	(0.00260)		
Year Fixed Effect	Yes	Yes		
Industry Fixed Effect	Yes	Yes		
Province Fixed Effect	Yes	Yes		
Observation	916256	915498		
R-sq	0.177	0.317		

Appendix Table 7: Firm Size, Firm Ownership and Productivity- From Survey Data

Note: 2003-2006 unbalanced sample. Firm size variable is winsorized at 1% level. Standard errors in parentheses. Constant is included in the regression but not displayed in the table. \* Significant at the 10 percent level. \*\* Significant at the 5 percent level. \*\*\* Significant at the 1 percent level.

	Appendix Table 6. Comparison between Finnis in Listed bata and Survey bata								
		Percentile	Percentile	Percentile	Percentile	Percentile	Percentile	Percentile	
Variables	Obs.	1%	5%	25%	50%	75%	95%	99%	Mean
Assets (Listed data)	692	243,926,073	413,562,263	881,967,618	1,621,530,598	3,212,313,616	10,025,803,000	38,002,616,982	3,542,343,066
Assets (Survey data)	266,567	1,290,000	2,514,000	6,510,000	14,321,000	37,575,000	220,091,000	968,333,000	78,387,471
Employee (Listed data)	692	65	378	1,105	2,150	4,251	13,405	31,104	3,882
Employee (Survey data)	266,567	12	21	50	97	200	740	2,285	232
Revenue (Listed data)	692	68,655,538	191,888,841	530,390,762	1,109,033,382	2,534,253,615	12,730,978,381	34,104,906,066	3,141,097,913
Revenue (Survey data)	266,567	2,795,000	5,250,000	10,362,000	22,149,000	54,516,000	266,419,000	1,083,393,000	98,450,228
Value added (Listed data)	692	9,239,095	26,556,286	87,586,338	190,462,184	410,747,436	1,829,032,579	4,862,756,312	500,671,274
Value added (Survey data)	266,567	358,000	1,099,000	2,738,000	6,132,000	15,676,000	77,566,000	297,052,000	26,700,254

Appendix Table 8: Comparison Between Firms in Listed Data and Survey Data

Note: All in manufacturing industries. Delete the firms which have value added<=0 or employee<8.

Appendix Table 9: Summary Statistics on Capital to Labor Ratios										
							Percentile	Percentile	Percentile	Percentile
Stat	Industry	Year	Obs.	Mean	Median	SD	5%	25%	75%	95%
Capital to Labor Ratio	Manufacturing	2006	815	544,797	219,715	3,208,599	47,689	121,308	399,438	1,015,842
Capital to Labor Ratio	Manufacturing	2008	927	540,981	235,192	2,544,008	62,899	135,573	444,262	1,318,646
Capital to Labor Ratio	All	2006	1405	1,136,655	241,199	10,215,501	43,847	124,172	492,457	2,418,676
Capital to Labor Ratio	All	2008	1600	1,460,796	259,142	21,944,331	52,222	137,194	532,510	2,619,417

Appendix Table 10: t-test on Capital to Labor Ratio							
Mean 2006	Mean 2008	Diff	t-value	p-value			
(1)	(2)	(3)	(4)	(4)			
	For All Li	sted Firms					
1,136,655	1,460,796	-324,140	-0.530	0.598			
	For Manufactu	ring Listed Firms					
544,797	540,981	3,816	0.030	0.978			

Note: We also check the compliant (non-compliant) subgroup, more (less) labor intensive subgroup and so on. All of these t-tests are insignificant.

## Appendix Table 11: Testing for Constant Returns to Scale

Coefficient on	Coefficient on Capital	Wald test (Chi-Square)	P-value
(1)	(2)	(3)	(4)
For Firms	whose Size is Comparable (Assets above the 90th	e to Those of Listed Firms Percentile)	
0.146	0.013	1299.29	0.000
(0.004)	(0.114)		
	For All Firms	5	
0.201	0.424	1.60E+05	0.000
(0.001)	(0.001)		

(The null hypothesis: sum of the labor and capital shares = one)

Note: Data from 2003-2006 Manufacturing Survey Data. TFP, labor and capital are in logs. For the first two columns, standard errors are in parentheses. In Column 3, Wald test for constant returns to scale is shown. And Column 4 presents the p-value of the Wald test.

#### Appendix Table 12: Summary Statistics on Social Insurance Fee Rates and Competitiveness Proxies

			Std				
	Mean	Median	Dev	Max	Min	P95	P5
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Social Insurance Fee Rates	0.307	0.313	0.035	0.370	0.234	0.370	0.234
Total Trade	0.2678	0.2366	0.2879	2.3699	0.000	1.013	0.000
HHI (for manufacturing industries)	0.0019	0.0017	0.0015	0.0067	0.0007	0.007	0.001
Industry Level Profit Margin	0.0404	0.0363	0.0367	0.1852	-0.0993	0.0839	0.0140

Note: The social insurance fee rates are across provinces. The three competitive measures are across sectors. Please see the Appendix Data Source for the definition details of each variable.

Appendix Table 13: Tabulations on Political Connection						
Political Connection Proxy	Obs.	Percent				
Political Connection 1	263	19.94				
Political Connection 2	301	22.82				
Political Connection 3	253	19.18				

Note: Please see the Appendix Data Source for the definition of each political connection proxy.