



# Corporate governance of controlling shareholders and labor employment decisions: Evidence from a parent board reform in China<sup>☆</sup>



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## ABSTRACT

Controlling shareholders commonly expropriate minority shareholders in state-owned enterprises (SOEs) with concentrated ownership. To curb such behavior, studies have focused on the role of internal corporate governance structures and largely ignored the governance structure in relation to the controlling shareholders. Using a board reform that altered the governance of controlling shareholders in Chinese central SOEs between 2003 and 2019, we show that enhancing the controlling shareholders' corporate governance significantly reduces firms' overinvestment in employees. We demonstrate that strengthening the monitoring of management is the most likely underlying channel for this association. Our findings indicate that governance enhancement of controlling shareholders mitigates human capital misallocation in SOEs, suggesting that reforming the governance structure of controlling shareholders is effective in enhancing SOE efficiency.

## 1. Introduction

Studies have highlighted the importance of firms' employment decisions, especially the need for firms to invest optimally in labor (Jung et al., 2014; Kong et al., 2018; Taylor et al., 2019). It is costly for a firm to deviate from optimal levels of labor investment. For example, firms are less profitable and exhibit lower productivity when maintaining excess employees. This situation is faced by many state-owned enterprises (SOEs) in China. Reviewing a sample of 681 Chinese SOEs, Dong and Putterman (2003) estimated that as of 1994, more than two-thirds (73%) were employing redundant labor, with the average proportion of redundant workers approaching almost half the workforce (44.4%). Such overstaffing of SOEs resulted in extensive underperformance, with more

than 40% of SOEs making losses during the mid-1990s (Lin et al., 1998).

In 2003, the State-owned Assets Supervision and Administration Commission (SASAC) initiated a pilot board reform in central state-owned enterprises (CSOEs). SASAC required CSOE parent firms to establish a board and introduce at least two outside directors. This reform significantly strengthened the role of the boards and improved the governance of controlling shareholders. Some studies have investigated this impact, focusing mainly on the investment behaviors of the concerned SOEs. For example, Xie et al. (2019) found that board reforms in relation to controlling shareholders reduce overinvestment in publicly traded subsidiaries. Their study focuses primarily on physical investment and largely ignores labor investment. However, labor investment is economically significant, with its scale being larger than physical

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investment. The United States Census Bureau's annual survey of the U.S. manufacturers reports that, in 2016, firms in the manufacturing industry spent \$839 billion on salary and employee benefits, while their capital expenditure was only \$168 billion.<sup>1</sup> Furthermore, Jung et al. (2014) highlighted that labor investments approximately constituted two-thirds of economy-wide added value. Importantly, it has been widely acknowledged that human capital plays a crucial role in affecting firms' productivity (Erosa et al., 2010; Choi and Shin, 2015). Given the importance of labor investment, this study highlights the impact of the board reform on firms' labor investment decisions and, thereby, addresses this theoretical gap.<sup>2</sup>

This study is conducted in the context of China for two reasons. First, labor-related issues are critical in China (Jiang and Kim, 2020). Compared with developed countries, Chinese firms have relatively low productivity because of human capital misallocation (Hsieh and Klenow, 2009). For China's future growth, it is imperative to study firms' labor investment decisions and explore methods to alleviate such misallocation, rendering this topic great economic significance. Second, the board reform provides a valuable opportunity to observe the variation in internal governance at CSOE parent firms that control publicly traded subsidiaries.<sup>3</sup> As this board reform was enforced in different years for different CSOE parent firms, it could help establish causality between the governance of controlling shareholders and labor investment efficiency through the application of a difference-in-differences analysis.

Theoretically, we hypothesize that the board reform not only alleviates potential government intervention from above but also is effective downward in monitoring corporate executives. While before a board reform, the government can intervene in a parent firm's strategies and investment decisions by appointing or promoting executives who are willing to help local officials realize political goals, after the board reform, CSOE parent firms appoint senior executives and make important investment decisions through the board and because the board has several outside directors, the government finds it difficult to divert the SOE's resources in the pursuit of political goals, such as by overhiring or underfiring (i.e., unnecessarily retaining) staff to mitigate local unemployment pressures and concerns (Liao et al., 2009). Thus, we term our first hypothetical channel as "alleviating government intervention." Contrarily, the senior executives in CSOE parent firms are government officials, who represent the government in order to control the state's shares in the enterprise. However, they do not lay claim to the residual income of such SOEs (Alchian and Demsetz, 1972); hence, they, as controlling shareholders, do not have any incentive to monitor the management, leaving the latter free to pursue private benefits at the cost of shareholders' interests. Following the board reform, monitoring by outside directors reduces management tendencies to engage in activities for private benefit. Thus, we term our second hypothetical channel the "strengthening monitoring" channel.

Drawing on a pilot board reform in CSOE parent firms that establishes a board including outside directors, we find that enhancing the controlling shareholders' internal governance significantly increases a firm's efficiency of labor investment, and reduced overinvestment in labor is the source of this improvement. Regarding the underlying channel, we find that the impact of the board reform on labor investment efficiency is

<sup>1</sup> Data collected from the website: <https://www.census.gov/data/tables/2016/econ/asm/2016-asm.html>.

<sup>2</sup> We mainly focus on firms' labor investment efficiency. This refers to the deviations of labor investment from the optimal level based on a firm's fundamental economic factors. We follow Jung et al. (2014) and measure labor investment efficiency using abnormal net hiring, which is defined as the difference between the actual and expected change in a firm's employees.

<sup>3</sup> In this study, the CSOE parent firm refers to the controlling shareholder of publicly traded subsidiaries; thus, we use the terms "CSOE parent firm" and "controlling shareholder" interchangeably; where we focus on the publicly traded subsidiary, we use the terms "publicly traded subsidiary" and "firm" interchangeably.

more significant when firms suffer more serious agency problems. The findings confirm that strengthening the monitoring of managers represents a plausible channel for such an impact. By contrast, we do not find a significant difference between firms more and less likely to be the subject of government intervention, indicating that the "alleviating government intervention" channel is unlikely to provide the underlying mechanism. Furthermore, we show that the impact of the board reform on labor investment efficiency is stronger when more than half of the controlling shareholder's board consists of outside directors, reinforcing the "strengthening monitoring" channel as the underlying mechanism involved.

We conduct several checks to confirm the robustness of our results. First, Caliendo and Kopeinig (2008) suggested that treatment and control groups (i.e., pilot and nonpilot firms) may differ in the absence of the board reform, indicating that the difference in labor investment efficiency may stem from differences in corporate financial or governance-related characteristics that predate the board reform. We follow Caliendo and Kopeinig (2008) and perform a propensity score matching analysis to address this concern, and the empirical outcome leaves our initial results unchanged. Second, our identification may lead to concern about reverse causality, that is, firms with labor investment inefficiency compromise their market value, which, in turn, prompts the SASAC-initiated board reform. To rule out this concern, we follow Cai et al. (2019) and test the parallel trend assumption. The results of our estimations show that changes in labor investment efficiency between pilot and nonpilot firms evolve to the same trend as before the board reform, suggesting that our conclusions are not driven by reverse causality. Third, we perform a placebo test to confirm that our difference-in-differences methodology captures the causal effect of the board reform. We randomly assign our sample firms into treatment and control groups. We conduct the assignment simulation 1000 times and repeat the difference-in-differences regressions on these simulated samples. We find that the coefficient from our baseline results lies at the edge of the distribution generated by these samples, implying that it is unlikely that our results are driven by chance and that they do capture the causal effect of the board reform.

Our study makes several contributions to the existing literature. First, we augment the literature on controlling shareholders' governance by providing systematic evidence regarding the effect of the board reform at the parent firm on labor investment efficiency. Studies have mainly focused on internal corporate governance of the firm itself (La Porta et al., 2002; Lu and Wang, 2015; Jiang et al., 2018). We switch the perspective from the firm to that of its controlling shareholder. In previous anecdotal studies, Cai et al. (2019) and Xie et al. (2019) found that improving controlling shareholders' governance reduces expropriation and enhances the investment efficiency. Given that human capital is a crucial input in terms of corporate productivity, we extend the related literature by focusing on the impact of the board reform on the labor investment efficiency.

Second, our study contributes to the emerging literature that considers a firm's willingness to invest in human capital (Jung et al., 2014; Ben-Nasr and Alshwer, 2016; Ha and Feng, 2018; Kong et al., 2018; Taylor et al., 2019; Cao and Rees, 2020; Ghaly et al., 2020; Khedmati et al., 2020; Ding et al., 2021; Sualihu et al., 2021; Fan et al., 2022). We show that the board reform significantly increases firms' labor investment efficiency by strengthening management monitoring and providing new evidence of how better governance of its controlling shareholder reduces a firm's human capital misallocation from a political economy perspective.

Third, this study offers new insights to the debate on whether a thoroughgoing privatization model is the only method for improving SOE efficiency. In contrast to the thoroughgoing privatization model chosen by Russia and Eastern Europe, other developing countries (e.g., India and China) have adopted a partial privatization model wherein the government remains the ultimate owner. Many studies have reported that

partial privatization is not successful because the controlling ownership still lies with the government (Boycko et al., 1996; Sun and Tong, 2003; Chen et al., 2008). Therefore, they argued that the thoroughgoing privatization model is the only way to improve SOE performance. The board reform of CSOEs in China enhances their internal corporate governance without altering the state ownership. Using this reform in our study, we find that such enhancement of internal governance increases firms' labor investment efficiency, suggesting that such reform in relation to the controlling shareholders is an effective method for enhancing SOE efficiency and that the thoroughgoing privatization model may not be the only method to successfully reconstruct SOEs.

This study is organized as follows: Section 2 describes the institutional background and develops our hypotheses; Section 3 describes our sample, variables, and methodology; in Section 4, we discuss the empirical results and conduct several robustness checks before presenting the conclusions in Section 5.

## 2. Institutional background and hypothesis development

To understand how the board reform at the CSOE parent firm affects a firm's labor investment efficiency, we first introduce the connection between boards of parent firms and those of their subsidiaries. Then, we describe corporate governance in CSOEs and illustrate why they generate labor investment inefficiency. Next, we present the background in relation to the CSOE board reforms since 2003. Finally, we develop our theoretical hypothesis.

### 2.1. The link between parent boards and subsidiaries' boards

Publicly traded subsidiaries typically comprise the most productive assets that can be spun off from a CSOE group (Fan et al., 2013). Following the Initial Public Offerings (IPOs), the CSOE parent firm retains a significant shareholding and controls the publicly traded subsidiaries. Jiang and Kim (2015) reported that, on average, in 2012, these CSOE controlling shareholders owned 40% of the shares of the publicly traded firms, implying that the parent firm is unlikely to be challenged by other minority shareholders. Thus, despite a publicly traded subsidiary having initiated a modern internal governance system, nearly all the important decisions such as investment, financing, and senior executive hires are made by the controlling shareholder. How the controlling shareholder makes these decisions has, therefore, a direct bearing on the efficiency of its publicly traded subsidiary.

Appendix A captures a specific case: China Iron & Steel Research Institute Group (CISRI) is a CSOE that is a controlling shareholder of two publicly traded firms. Before the board reform, the central government directly appointed senior executives to this parent firm. Thus, similar to other CSOEs, the senior CISRI executives followed government policy because the government had the power to promote or demote them (Xu, 2011), and the CISRI management focused more on political goals than on corporate profitability (Wong, 2016). As the publicly traded subsidiaries have the group's most profitable assets, CISRI can expropriate their resources to realize the government's political goals. Following the board reform, CISRI established a board into which four outside directors were introduced, who account for more than half of the directors of this CSOE. Now, the government's interference with CISRI's decisions have become difficult, and its publicly traded subsidiaries also experience fewer government interventions from their controlling shareholder. Furthermore, the new CSOE board structure may strengthen monitoring of its publicly traded subsidiaries. Prior to the board reform, the CISRI senior executives were also government officials who represented the government and controlled the state's shares. However, because they do not benefit from the SOE's residual income (Alchian and Demsetz, 1972), they have little incentive to monitor the management of publicly traded subsidiaries, leaving managers free to pursue private benefits at the cost of shareholders' interests. Following the board reform, the board, especially its outside directors, will oversee the management activity.

### 2.2. Corporate governance in central state-owned enterprises

SASAC controls the CSOE parent firms and ownership is relatively highly concentrated, with SASAC acting as the sole shareholder for majority of the CSOE parent firms. A few firms, such as China Eastern Airlines, China Southern Airlines, China Southern Power Grid, and Commercial Aircraft Corporation of China, have multiple state-owned shareholders, but SASAC remains their largest shareholder. Furthermore, ownership is also concentrated in their publicly traded subsidiaries. As illustrated in Section 2.1, other minority shareholders find it difficult to challenge the parent firm.

This highly concentrated ownership structure provides an opportunity for the emergence of controlling shareholder entrenchment (Johnson et al., 2000; Bertrand and Mullainathan, 2003; Cai et al., 2019). For example, Jiang et al. (2010) found that intercorporate loans are an important tool by which the controlling shareholder extracts resources from its publicly traded subsidiaries; other mechanisms include related party loan guarantees and transactions (Berkman et al., 2009; Jian and Wong, 2010). Another form of entrenchment may be more pronounced in SOEs, that is, government transfer of corporate resources in pursuit of its political goals. For example, Prime Minister Keqiang Li stated that the whole society focuses on economic growth indicators (e.g., GDP growth and fiscal revenue), but the Chinese central government's high-priority goal is to promote employment and control the unemployment rate. In a CSOE, the publicly traded subsidiaries have the most productive assets, and thus their parent firms force them to overhire workers to realize the central government's political goals (Shleifer and Vishny, 1994; Liao et al., 2009; Kong et al., 2018). Thus, publicly traded subsidiaries misallocate their human capital when the government intervenes in their hiring decisions. Additionally, a firm's tendency to overinvest in labor may be driven by the empire-building problem: managers expand the firm beyond its optimal size with overinvestments and thereby increase their private benefits, such as higher executive compensation and greater managerial power (Masulis et al., 2007; Hope and Thomas, 2008); thus, the firm overhires or underfires employees to expand its size.

### 2.3. Board reform at central state-owned enterprises since 2003

Before the board reform, it was common for CSOE parent firms to have boards of directors overlapping with senior executives, which significantly weakened the role of boards in corporate governance. To make the board of directors of CSOE parent firms more independent and enhance corporate governance, SASAC initiated a pilot board reform at CSOEs in 2003. In 2004, the State Council approved the associated schedule and SASAC issued several policies to guide CSOEs in implementing the reform.<sup>4</sup> At the outset, SASAC required CSOEs to establish a board and introduce at least two outside directors to sit on the board (Cai et al., 2019). It then decentralized decision-making power to the board, including executive hiring, performance evaluation, investment policy, and financing policy. Boards in CSOE parent firms were required to establish several committees (e.g., audit, compensation, strategic planning, and nomination committees), and it was recommended that the outside directors be appointed to chair these committees. Thus, the outside directors could play a significant role in hiring executives and determining investment and financing strategies.

In October 2005, SASAC conducted the first trial of the board reform in the China BaoGang Steel Group. The board of the group consisted of nine directors and five outside directors. Following this initial trial, five other CSOEs implemented the board reform in 2005. In the following year, further nine CSOEs were selected to initiate the reform. SASAC completed the board reform in December 2019, by which time all CSOE

<sup>4</sup> In July 2004, SASAC issued an important policy "Conduct a trial that establishes the board of directors in central SOEs."

parent firms had established new boards. Appendix C shows this timeline in more detail.

## 2.4. Hypothesis development

As outlined in Sections 2.1 and 2.2, CSOE parent firms are the controlling shareholders of publicly traded subsidiaries, and ownership is highly concentrated, implying that the parent firm or controlling shareholder plays a dominant role in making decisions related to investment, financing, and senior executive hiring. In this situation, the governance of the controlling shareholder has a direct bearing on the efficiency of its publicly traded subsidiary.

Intuitively, improvement in the controlling shareholder's corporate governance through board reform not only mitigates government intervention from above but also makes downward monitoring of executives more effective. The former represents an agency cost between the controlling and minority shareholders, while the latter indicates an agency problem between shareholders and management.

As described in Section 2.2, unreformed boards of CSOE parent firms focus more on the political goals than corporate profitability. For example, when the government's priority is to promote employment, the senior executives in a CSOE parent firm will pursue this policy. Thus, Kong et al. (2018) found that the promotion incentives of local officials decrease the labor investment efficiency of local firms who overhire employees. The impact is more significant in SOEs, suggesting that the local government transfers this political pressure to local SOEs that feel obliged to hire otherwise-redundant labor. Similarly, because publicly traded subsidiaries own the most productive assets, parent firms place demands on them to overhire employees. Following CSOE parent firm's board reform, a more independent board improves the controlling shareholders' internal governance, and a more independent board can mitigate government intervention as outside directors challenge the inefficient hiring practices of the government officials (Fauver et al., 2017). Thus, enhancing the controlling shareholders' corporate governance through the board reform could increase firms' labor investment efficiency by alleviating government intervention.

According to the discussion in Section 2.1 on downward monitoring of executives, all senior executives of the unreformed boards of CSOE parent firms are government officials with little or no incentive to monitor firms' managers. This allows managerial entrenchment and empire building to flourish (as described in Section 2.2). The board reform establishes a board in the CSOE parent firm with the appointment of at least two outside directors. Studies have documented that such directors play an important role in monitoring both the parent firm and its publicly traded subsidiaries (Fama and Jensen, 1983; Weisbach, 1988), thus reducing management tendencies to engage in activities for their own benefit. Moreover, enhancing the controlling shareholders' internal governance via board reform enhances firms' labor investment efficiency by strengthening such monitoring.

Given these two analyses, we propose the following overall hypothesis:

**H1.** *Enhancing the corporate governance of controlling shareholders through board reform significantly increases a firm's labor investment efficiency.*

## 3. Sample construction, variable definition, and methodology

### 3.1. Sample construction

As the board reform is implemented in CSOE parent firms, our initial sample includes A-share firms controlled by CSOEs between 2003 and

**Table 1**  
Sample description.

Panel A: Sample selection		No.
Total firm-year observations from 2003 to 2019		4414
Observations in the financial industry		47
Observations with missing data to calculate key variables		881
Final Sample		3556
Panel B: Sample description by year		
Year	Frequency	Percentage
2003	134	3.77
2004	158	4.44
2005	170	4.78
2006	182	5.12
2007	198	5.57
2008	194	5.46
2009	200	5.62
2010	222	6.24
2011	228	6.41
2012	230	6.47
2013	234	6.58
2014	235	6.61
2015	240	6.75
2016	229	6.44
2017	225	6.33
2018	234	6.58
2019	243	6.83
Total	3556	100.00
Panel C: Sample description by industry		
Industry	Frequency	Percentage
Agriculture, forestry, and fishing	30	0.84
Mining	155	4.36
Manufacturing	2369	66.62
Utilities	292	8.21
Construction	127	3.57
Wholesale trade	138	3.88
Transportation	183	5.15
Information and technology	117	3.29
Real estate	47	1.32
Others	98	2.76
Total	3556	100.00

Note: This table reports the sample selection process and describes the sample by year and by industry.

2019. We choose 2003 as the beginning of our sample period because it is the first year in which SASAC required publicly traded firms to report their ownership structures and ultimate controllers. This allows us to identify the owners of publicly traded subsidiaries. Our initial sample includes 4414 firm-year observations. We exclude firms in the financial industry, and those with missing values for control variables, and our final sample incorporates 3556 firm-year observations. We provide details of the sample selection in Panel A of Table 1.

### 3.2. Variable definition

#### 3.2.1. Measuring labor investment efficiency

Labor investment efficiency refers to the deviations of labor investment from the optimal level based on a firm's fundamental economic factors. Firms' employment decisions are efficient when such deviations are relatively small. We follow Jung et al. (2014) and use the model in Equation (1) to construct our measure of labor investment efficiency as follows:



$$\begin{aligned}
 Net\_hire_{i,t} = & \beta_0 + \beta_1 Sale\_growth_{i,t} + \beta_2 Sale\_growth_{i,t-1} + \beta_3 \Delta ROA_{i,t} + \beta_4 \Delta ROA_{i,t-1} + \\
 & \beta_5 ROA_{i,t} + \beta_6 Return_{i,t} + \beta_7 Size\_R_{i,t-1} + \beta_8 Quick_{i,t-1} + \beta_9 \Delta Quick_{i,t} + \\
 & \beta_{10} \Delta Quick_{i,t-1} + \beta_{11} Lev_{i,t-1} + \beta_{12} Lossbin1_{i,t-1} + \beta_{13} Lossbin2_{i,t-1} + \beta_{14} Lossbin3_{i,t-1} + \\
 & \beta_{15} Lossbin4_{i,t-1} + \beta_{16} Lossbin5_{i,t-1} + \beta_{17} error_{i,t}
 \end{aligned} \tag{1}$$

All variables are defined in Appendix B. We use the absolute value of regression residuals to measure labor investment efficiency and denote it as *Abs\_net\_hire*.

### 3.2.2. Measuring controlling Shareholder's governance

It is difficult to measure the governance of controlling shareholders. However, the board reform in China helps observe the variation in internal governance of CSOE parent firms who control the publicly traded firms. We first identify publicly traded SOEs by choosing firms controlled by SASAC at the central government level. Next, we identify the year of the board reform for each CSOE from the official websites of either SASAC or CSOE. Finally, we use an indicator variable, *Reform*, which takes a value of 1 if the board reform of the firm's controlling shareholder has been implement in year *t* and equals 0 otherwise.

### 3.2.3. Applying control variables

Following the existing literature (e.g., Jung et al., 2014; Kong et al., 2018; Khedmati et al., 2020), we control for a series of characteristics that may affect labor investment efficiency, including market-to-book ratio (*Mb\_equity*), firm size (*Size*), quick ratio (*Quick*), liability ratio (*Lev*), dividend indicator (*Divdum*), cash flow volatility (*Std\_CFO*), sales volatility (*Std\_sales*), hiring volatility (*Std\_net\_hire*), tangible ratio (*Tangible*), institutional shareholdings (*Insti\_investor*), a loss dummy (*Loss*), labor intensity (*Labor\_intensity*), duality (*Dual*), and earnings management (*DA*). We also obtain the absolute values of residuals from the model in Equation (2) and treat it as a control variable (*Abs\_invest\_other*) (all control variables are defined in Appendix B):

$$Investor\_other_{i,t+1} = \beta_0 + \beta_1 Sales\_growth_{i,t} + \beta_2 error_{i,t} \tag{2}$$

### 3.3. Model specification

Following Cai et al. (2019), we employ a staggered difference-in-differences analysis to investigate the impact of enhancing the governance of the controlling shareholder on labor investment efficiency using the following model:

$$Abs\_net\_hire_{i,t} = \beta_0 + \beta_1 Reform_{i,t} + \beta_2 Controls_{i,t} + \beta_i + \beta_t + \varepsilon_{i,t} \tag{3}$$

where *i* denotes the publicly traded firm, *t* denotes the year, and  $\beta_i$  and  $\beta_t$  are firm- and year-fixed effects, respectively. We winsorize the continuous variable at the 1st and 99th percentiles and cluster the standard errors at the firm level. Moreover, we follow Flammer and Kacperczyk (2019) to control for any time-variant confounding factors within specific industries or provinces; thus, we add *Year\*Industry FE*, *Year\*Province FE*, and *Firm FE* to our regression.

## 4. Empirical results

### 4.1. Summary statistics

Table 2 presents descriptive statistics for the main variables. The average value of the *Reform* variable is 0.442, which is greater than the sample mean reported in Xie et al. (2019). This is because our sample period extends to 2019, whereas that of Xie et al. (2019) ends at 2015. By

**Table 2**  
Summary statistics.

Variable	N	Mean	S.D.	P25	P50	P75
<i>Abs_net_hire</i>	3556	1.084	2.714	0.100	0.293	0.811
<i>Reform</i>	3556	0.442	0.497	0.000	0.000	1.000
<i>Mb_equity</i>	3556	1.723	1.014	1.098	1.352	1.927
<i>Size</i>	3556	22.52	1.587	21.38	22.23	23.47
<i>Quick</i>	3556	1.233	1.413	0.559	0.883	1.380
<i>Lev</i>	3556	0.520	0.199	0.379	0.529	0.670
<i>Divdum</i>	3556	0.635	0.482	0.000	1.000	1.000
<i>Std_CFO</i>	3556	0.010	0.022	0.001	0.002	0.007
<i>Std_sales</i>	3556	0.029	0.052	0.003	0.007	0.023
<i>Insti_investor</i>	3556	0.059	0.069	0.008	0.034	0.085
<i>Std_net_hire</i>	3556	0.466	1.431	0.064	0.133	0.313
<i>Tangible</i>	3556	0.299	0.200	0.139	0.249	0.442
<i>Loss</i>	3556	0.114	0.318	0.000	0.000	0.000
<i>Ab_invest_other</i>	3556	0.057	0.067	0.017	0.036	0.068
<i>Labor_intensity</i>	3556	0.009	0.008	0.003	0.007	0.012
<i>Da</i>	3556	0.061	0.057	0.020	0.046	0.082
<i>Dual</i>	3556	0.062	0.242	0.000	0.000	0.000

Note: This table reports summary statistics of the main variables. All variables are defined in Appendix B. Continuous variables are winsorized at the 1st and 99th percentiles.

2019, all CSOEs had completed the board reform, whereas more than 10 CSOEs were still actively undertaking the board reform in 2015 (with more still to follow). Thus, a larger average value of the *Reform* variable is not unexpected.

The sample average for the variable *Abs\_Net\_Hire* is 1.084, while its sample median is 0.293, suggesting that more than half of the sample firms have more effective labor investments than the sample average. This right-skewed distribution of labor investment efficiency is consistent with the work of Kong et al. (2018).

### 4.2. Baseline results

Table 3 shows the empirical results in relation to the impact of the board reform within the controlling shareholder on a firm's labor investment efficiency. Column (1) includes only *Reform* as a proxy for the internal governance of the controlling shareholder. Column (2) includes variables to control for firm characteristics that may affect labor investment decisions. Column (3) includes firm- and year-fixed effects, and Column (4) includes *Year\*Industry FE*, *Year\*Province FE*, and *Firm FE* in our regression. In all the four columns, the coefficients of *Reform* are significantly negative, indicating that enhancing the internal governance of controlling shareholders through the board reform increases a firm's labor investment efficiency. In terms of economic magnitude, a one-standard-deviation increase in *Reform* increases labor investment efficiency by 243% ( $5.292 \times 0.497/1.084$ ) relative to the sample mean.

To investigate whether this increase in labor investment efficiency can be attributed to less overinvestment in labor, we repeat the regression in a sample in which the variable *Abs\_net\_hire* is greater than 0. As shown in Column (5) of Table 3, the coefficient continues to be significantly negative, suggesting that the efficiency improvement does indeed stem from reducing overinvestment in labor.

**Table 3**  
Baseline results.

	(1)	(2)	(3)	(4)	(5)
	Abs_net_hire	Abs_net_hire	Abs_net_hire	Abs_net_hire	Abs_net_hire>0
<i>Reform</i>	-0.542*** (-6.451)	-0.359*** (-3.662)	-2.437*** (-4.297)	-5.292*** (-3.081)	-9.620*** (-2.793)
<i>Control variables</i>	No	Yes	Yes	Yes	Yes
<i>Year FE</i>	No	No	Yes	No	No
<i>Firm FE</i>	No	No	Yes	Yes	Yes
<i>Year*Industry FE</i>	No	No	No	Yes	Yes
<i>Year*Region FE</i>	No	No	No	Yes	Yes
<i>N</i>	3556	3556	3556	3556	1632
<i>Adj R<sup>2</sup></i>	0.010	0.056	0.051	0.062	0.170

Note: This table estimates the relationship between controlling shareholders' board reform and firm's labor investment efficiency. The dependent variable is the abnormal net hiring, denoting the absolute value of the regression residuals of the model in Equation (1), which is consistent with Jung et al. (2014). All variables are defined in Appendix B. Robust standard errors are clustered at the firm level. T-statistics are reported in parentheses. Coefficients marked with \*, \*\*, and \*\*\* are significant at 10%, 5%, and 1% levels, respectively.

**Table 4**  
Underlying mechanism tests.

	(1)	(2)	(3)	(4)
	Abs_net_hire	Abs_net_hire	Abs_net_hire	Abs_net_hire
<i>Reform</i>	-0.383* (-1.694)	0.237 (1.037)	0.094 (0.435)	-0.510 (-1.104)
<i>G11</i>	-0.052 (-1.479)			
<i>G12</i>		0.845* (1.730)		
<i>Reform*G11</i>	-0.004 (-0.068)			
<i>Reform*G12</i>		-0.080 (-0.169)		
<i>SM1</i>			-0.558*** (-2.687)	
<i>SM2</i>				0.799 (0.315)
<i>Reform*SM1</i>			0.464** (2.318)	
<i>Reform*SM2</i>				-5.692* (-1.934)
<i>Control variables</i>	Yes	Yes	Yes	Yes
<i>Firm FE</i>	Yes	Yes	Yes	Yes
<i>Year*Industry FE</i>	Yes	Yes	Yes	Yes
<i>Year*Region FE</i>	Yes	Yes	Yes	Yes
<i>N</i>	3556	3556	3556	3556
<i>Adj R<sup>2</sup></i>	0.086	0.078	0.037	0.048

Note: This table reports the results of underlying mechanism tests. The first underlying mechanism is alleviating government intervention. We create two variables to measure the extent of intervention by government: *G11* equals the number of pyramidal layers between a publicly traded subsidiary and its parent firm; *G12* equals the percentage of directors assigned by the controlling shareholder (the government) to its publicly traded subsidiaries. The second underlying mechanism is strengthening monitoring. We create two variables to verify this mechanism: *SM1* equals the ratio of sales scaled by assets, and is negatively correlated to agency costs; *SM2* equals the interaction of firms' growth opportunities with free cash flows and is positively correlated to agency costs. All variables are defined in Appendix B. Robust standard errors are clustered at the firm level. T-statistics are reported in parentheses. Continuous variables are winsorized at the 1st and 99th percentiles. Coefficients marked with \*, \*\*, and \*\*\* are significant at 10%, 5%, and 1% levels, respectively.

#### 4.3. Underlying channels

In Section 2.4, we proposed two underlying mechanisms or channels as potential vehicles for the impact observed, namely, the alleviation of government intervention and the strengthening of monitoring. To verify which of these channels provide a plausible explanation of the effect of the board reform on the controlling shareholder on a firm's labor investment efficiency, we use a cross-sectional variation in firm

characteristics to explain which firms are most affected by the board reform and, thus, provide evidence of the underlying mechanisms.

##### 4.3.1. Alleviation of government intervention

Two variables can be used to measure alleviation of the government intervention as a possible explanation. The first variable, *G11*, is the number of pyramidal layers between a publicly traded subsidiary and its parent firm. Fan et al. (2013) argued that CSOs are organized as a pyramidal structure that distances firms from government intervention. They found that firms with more pyramidal layers experience less government intervention, and we therefore follow Fan et al. (2013) and use the number of pyramidal layers as a measure of the extent of government intervention. The second variable, *G12*, is the percentage of directors appointed by the controlling shareholder to its publicly traded subsidiaries. Appointing directors to a board is an important sign of the exercise of the controlling shareholder's rights; in our sample, the central government is the controlling shareholder. The government has a greater decision-making power over a firm's investment policy if it appoints more directors on the firm's board. Thus, the higher the number of government-appointed directors, the more likely it is that government will intervene in a firm's decisions.

Table 4 reports the estimation results of examining the "alleviating government intervention" channel. In Columns (1) and (2), we interact *Reform* with *G11* and *G12*. The coefficients on both *Reform\*G11* and *Reform\*G12* are negative but insignificant. The overall results suggest that the impact of the board reform on a firm's labor investment efficiency is not significantly different between firms subject to more government intervention and those subject to less. Thus, alleviating government intervention does not appear to offer a plausible explanation for the association between the board reform and labor investment efficiency.

##### 4.3.2. Strengthening the monitoring

"Strengthening monitoring" of managers is the second underlying mechanism. As discussed in Section 2, the controlling shareholder was unlikely to monitor management before the board reform. Without effective oversight, management interests are likely to diverge from those of shareholders and, thus, generate agency costs. We argued that enhancing the governance of controlling shareholders could strengthen such monitoring and, therefore, improve a firm's labor investment efficiency.

We generate two variables to measure the agency costs of publicly traded subsidiaries. On the one hand, we follow Ang et al. (2000) and use the asset utilization ratio, creating the variable *SM1* to measure a firm's agency cost. This ratio is calculated as sales scaled by total assets and measures how effectively a firm manages its assets. Thus, firms with larger asset utilization ratios bear lower agency costs.

On the other hand, we follow Rashid (2015) and use “Q-free cash flow interaction” ( $Q*FCF$ ) to measure a firm’s agency cost. We generate this measure by interacting a firm’s growth opportunities ( $Q$ ) with its free cash flow ( $FCF$ ) to create a term  $SM2$ . Rashid (2015) identified poor growth opportunity in a firm with an indicator variable  $Q$  that takes a value of 1 if the Tobin’s  $Q$  for the firm is less than 1 and equals 0 otherwise.<sup>5</sup> Given the size of free cash flow, a firm with poor growth opportunities has a more serious agency problem. Thus, firms with higher values of  $SM2$  suffer more serious agency problems.

Table 4 shows the empirical results of verifying the “strengthening monitoring” channel as explanatory for the impact of the board reform. In Columns (3) and (4), we interact  $Reform$  with  $SM1$  and  $SM2$ , respectively. We note that  $SM1$  is negatively correlated to agency cost, while  $SM2$  is positively correlated. The coefficient of  $Reform*SM1$  is significantly positive, suggesting that firms with higher agency costs (i.e., lower asset utilization ratios) experience a greater increase in labor investment efficiency. Similarly, the coefficient of  $Reform*SM2$  is significant but negative and suggests that firms with higher agency costs (i.e., poor growth opportunities, in this instance) experience a significant increase in labor investment efficiency. The overall results suggest that strengthening of monitoring offers a plausible underlying mechanism for the association between the board reform and labor investment efficiency.

4.4. Cross-sectional tests based on features of the board reform

In Section 2.3, we note that SASAC required CSOE parent firms to introduce at least two outside directors to sit on their boards. In practice, we observe a variation in the percentages of outside directors on CSOE boards: in some boards, more than half of the board consists of outside directors, while other CSOE parent firms introduced only two outside directors to satisfy government requirements. Many studies have documented the important role that outside directors play in enhancing internal governance (e.g., Fama and Jensen, 1983; Weisbach, 1988). Thus, more outside directors on a board indicates a more thorough board reform, and we predict that the impact of the board reform on the labor investment efficiency will be stronger when more than half of the parent firm’s board consists of outside directors.

We create a new variable,  $Outside$ , as an indicator variable that takes a value of 1 if the percentage of outside directors on the board of the controlling shareholder following the board reform is above 50% and equals 0 otherwise. Table 5 presents the outcome of the resulting estimation. The coefficient on  $Reform*Outside$  is negative and significant, suggesting that the board reform does, indeed, work better when more than half of the parent firm’s board are outside directors. These results again verify the explanatory role of the “strengthening monitoring” mechanism.

4.5. Robustness checks

4.5.1. Propensity score matching analysis

While our difference-in-differences analysis helps establish causality, one concern is that regardless of the board reform, firms that participated in the board reform pilot and those that did not may differ, suggesting that the difference in labor investment efficiency stems from characteristic differences that predate the board reform (Caliendo and Kopeinig, 2008). To address this concern, we generate a propensity-score-matched sample in which we match firms subject to the board reform pilot with similar, unreformed firms.

Table 6 shows the results of our analysis. In Panel A, the balanced test results are shown. We first report, in Columns (1) and (2), the sample means of several corporate characteristics in relation to pilot and non-pilot firms. We further present the  $t$ -statistics and corresponding  $P$ -values

Table 5  
Cross-sectional tests.

	(1)
	Abs_net_hire
<i>Reform</i>	0.361** (2.257)
<i>Outside</i>	0.187* (1.701)
<i>Reform*Outside</i>	-0.357** (-2.225)
<i>Control variables</i>	Yes
<i>Firm FE</i>	Yes
<i>Year*Industry FE</i>	Yes
<i>Year*Region FE</i>	Yes
<i>N</i>	3556
<i>Adj R<sup>2</sup></i>	0.145

Note: This table presents the results of cross-sectional tests.  $Outside$  is an indicator variable that equals one if the percentage of outside directors on the board of the controlling shareholder is above 50% after board reform, and zero otherwise. All variables are defined in Appendix B. Robust standard errors are clustered at the firm level.  $T$ -statistics are reported in parentheses. Continuous variables are winsorized at the 1st and 99th percentiles. Coefficients marked with \*, \*\*, and \*\*\* are significant at 10%, 5%, and 1% levels, respectively.

Table 6  
Propensity score matching.

Panel A: Balanced test	(1)	(2)	(3)	(4)	(5)
	Mean	Mean	Diff	$T$ -statistic	$P$ -value
	Pilot Firms	Non-pilot Firms			
<i>Mb_equity</i>	1.741	1.766	-0.025	-0.585	0.559
<i>Size</i>	22.65	22.74	-0.090	-1.375	0.169
<i>Quick</i>	1.216	1.234	-0.022	-0.382	0.703
<i>Lev</i>	0.522	0.530	-0.008	-0.861	0.389
<i>Divdum</i>	0.641	0.664	-0.023	-1.127	0.260
<i>Std_CFO</i>	0.015	0.014	0.001	0.384	0.701
<i>Std_sales</i>	0.031	0.032	-0.001	-0.247	0.805
<i>Insti_investor</i>	0.062	0.064	-0.002	-0.703	0.482
<i>Std_net_hire</i>	0.486	0.521	-0.035	-0.537	0.591
<i>Tangible</i>	0.299	0.293	0.006	0.664	0.507
<i>Loss</i>	0.118	0.116	0.002	0.136	0.894
<i>Ab_invest_other</i>	0.057	0.056	0.001	0.351	0.725
<i>Labor_intensity</i>	0.008	0.008	0.000	1.099	0.272
<i>Da</i>	0.060	0.058	0.002	0.925	0.355
<i>Dual</i>	0.063	0.065	-0.002	0.176	0.860

Panel B: Regression results	(1)	(2)	(3)
	Abs_net_hire	Abs_net_hire	Abs_net_hire
<i>Reform</i>	-0.403*** (-3.628)	-0.425*** (-4.187)	-5.358*** (-2.628)
<i>Control variables</i>	No	Yes	Yes
<i>Firm FE</i>	No	No	Yes
<i>Year*Industry FE</i>	No	No	Yes
<i>Year*Region FE</i>	No	No	Yes
<i>N</i>	2170	2170	2170
<i>Adj R<sup>2</sup></i>	0.006	0.040	0.168

Note: This table presents the results of propensity score matching analysis. In Panel A, we present the balanced tests. In Columns (1) and (2), we report the sample means for firm characteristics in, respectively, pilot and non-pilot firms; in Column (3), we calculate the difference in these means, and in Column (4) we present the  $t$ -statistic of these differences; in Column (5), we show the  $P$ -value of the  $t$ -statistic in Column (4). Panel B reports estimations based on the propensity-score-matched sample. All variables are defined in Appendix B. Robust standard errors are clustered at the firm level.  $T$ -statistics are reported in parentheses. Continuous variables are winsorized at the 1st and 99th percentiles. Coefficients marked with \*, \*\*, and \*\*\* are significant at 10%, 5%, and 1% levels, respectively.

<sup>5</sup> Note that the variable  $Q$  takes a larger value when a firm has poor growth opportunities.

of the differences between these two populations in Columns (3) and (4). The results show that the pilot and nonpilot firms do not differ significantly in their pretreatment characteristics, indicating that our propensity score matching is valid. In Panel B, we report the results of the estimation based on the matched sample. The coefficients on *Reform* in all columns continue to be significantly negative, suggesting that our baseline results are robust after controlling for any characteristic differences that predate the board reform.

4.5.2. Testing the parallel trends assumption

In our difference-in-differences methodology, we assume that the board reform is exogenous. However, another possible explanation is that firms with lower labor investment efficiency destroy their market value and thereby prompt SASAC to invoke the board reform to enhance the internal governance of their parent firms. In this case, our identification could represent a reverse causality bias. To rule out this potential bias, we follow Cai et al. (2019) and test the parallel trends assumption with the following model:

$$Abs\_net\_hire_{i,t} = \beta_0 + \beta_1 Before^{-4} + \beta_2 Before^{-3} + \beta_3 Before^{-2} + \beta_4 Before^{-1} + \beta_5 Current^0 + \beta_6 After^1 + \beta_7 After^2 + \beta_8 After^3 + \beta_9 Controls_{i,t} + \beta_i + \beta_t + \varepsilon_{i,t} \tag{4}$$

where *Before*<sup>-1</sup>, *Before*<sup>-2</sup>, *Before*<sup>-3</sup>, and *Before*<sup>-4</sup> are indicator variables that take a value of 1 if a firm-year observation is 1, 2, 3, or 4 years, respectively, before the board reform and equals 0 otherwise; *Current*<sup>0</sup> is an indicator variable that takes a value of 1 if a firm-year observation is in the year of the board reform and equals 0 otherwise; *After*<sup>1</sup>, *After*<sup>2</sup>, and *After*<sup>3</sup> are indicator variables that take a value of 1 if a firm-year observation is 1, 2, or 3 years, respectively, after the board reform and equals 0 otherwise. If there is a preexisting (parallel) trend in the labor investment efficiency of pilot versus nonpilot firms, the coefficient estimates of *Before*<sup>-1</sup>, *Before*<sup>-2</sup>, *Before*<sup>-3</sup>, and *Before*<sup>-4</sup> are statistically significant. This would also indicate that our baseline results are driven by reverse causality.

Table 7 presents the results of this test. The coefficient estimates on *Before*<sup>-1</sup>, *Before*<sup>-2</sup>, *Before*<sup>-3</sup>, and *Before*<sup>-4</sup> are negative but insignificant, suggesting that the average change of labor investment efficiency in the pilot and nonpilot firms had evolved on a common trend before the board reform. Therefore, our baseline results are not affected by causality bias.

4.5.3. Placebo tests

One remaining concern regarding our baseline results is that the results from the difference-in-differences methodology are indeed driven by chance rather than by the causal effect of the board reform. To address this concern, we conduct a placebo test by randomly assigning firms to a treatment or control group. First, we assign a specific number of firms to the treatment group for each year. The number of firms assigned depends on the actual number of firms that implemented the board reform in each year. For example, 10 publicly traded firms initiated the board reform in 2005; hence, we randomly assign 10 firms to the treatment group for that year. Then, we assign the remaining firms to the control group. Next, we perform the difference-in-differences analysis on this simulated sample using the model of Equation (3); we repeat this assignment/simulation process 1000 times.

Fig. 1 depicts the distribution for our placebo tests. We find that the distribution of estimated coefficients on *Reform* is centered on 0, whereas our baseline results from Column (3) of Table 3 are placed at the edge of this distribution. Thus, the placebo test indicates that our baseline results accurately capture the causal effect generated by the board reform.

4.5.4. Other robustness checks

We also perform several robustness checks of our findings. First, we consider our measure of labor investment efficiency, which is calculated

Table 7 Testing the parallel trends assumption.

	(1)	(2)
	Abs_net_hire	Abs_net_hire
<i>Before</i> <sup>-4</sup>	-0.053 (-0.378)	-0.063 (-0.412)
<i>Before</i> <sup>-3</sup>	-0.024 (-0.154)	0.009 (0.055)
<i>Before</i> <sup>-2</sup>	-0.182 (-1.385)	-0.187 (-1.439)
<i>Before</i> <sup>-1</sup>	-0.167 (-1.319)	-0.170 (-1.224)
<i>Current</i> <sup>0</sup>	-0.121 (-0.917)	-0.141 (-1.017)
<i>After</i> <sup>1</sup>	-0.276** (-2.136)	-0.311** (-2.192)
<i>After</i> <sup>2</sup>	-0.464*** (-4.716)	-0.496*** (-4.140)
<i>After</i> <sup>3</sup>	-0.561*** (-8.738)	-0.684*** (-6.151)
Control variables	No	Yes
Firm FE	No	Yes
Year*Industry FE	No	Yes
Year*Region FE	No	Yes
N	3556	3556
Adj R <sup>2</sup>	0.018	0.076

Note: This table reports the results of a robust check that aims to exclude potential reverse causality. We follow Cai et al. (2019) and rule out potential reverse causality by examining the parallel trends assumption. *Before*<sup>-1</sup>, *Before*<sup>-2</sup>, *Before*<sup>-3</sup>, *Before*<sup>-4</sup> are indicator variables that take a value of one if a firm-year observation is, respectively, one, two, three or four years before board reform, and zero otherwise. *Current*<sup>0</sup> is an indicator variable that equals one if a firm-year observation is in the year of board reform, and zero otherwise. *After*<sup>1</sup>, *After*<sup>2</sup> and *After*<sup>3</sup> are indicator variables that take a value of one if a firm-year observation is, respectively, one, two or three years after board reform, and zero otherwise. All variables are defined in Appendix B. Robust standard errors are clustered at the firm level. T-statistics are reported in parentheses. Continuous variables are winsorized at the 1st and 99th percentiles. Coefficients marked with \*, \*\*, and \*\*\* are significant at 10%, 5%, and 1% levels, respectively.

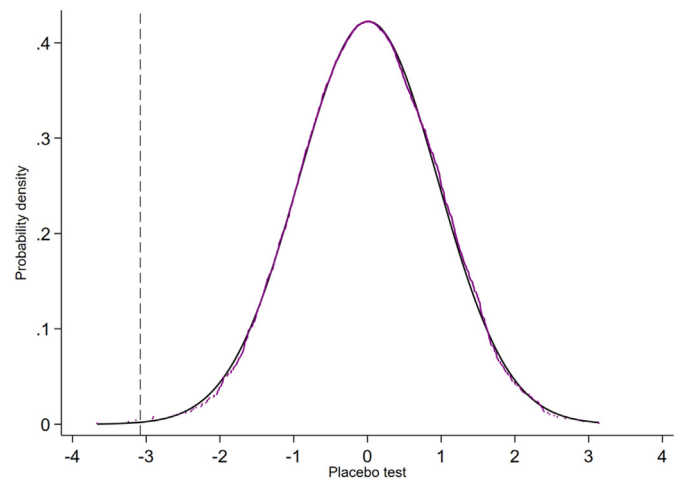


Fig. 1. Placebo test distribution.

as the actual hiring minus the expected net hiring. In our baseline results, we estimate the latter by predicting the model of Equation (1). To validate the robustness of this approach, we use two alternative measures to estimate the expected net hiring. One of these measures is from Jung et al. (2014), who used the median level of net hiring in a firm's industry for the specific year in question. The other measure is that used by Liao et al. (2009), who stripped the model of Equation (1) back to include *Size*, *Tangible*, and *Sales growth* as the independent variables by which to calculate the expected net hiring. We report the results of these



**Table 8**  
Other robustness checks.

Panel A: Alternative measures of labor investment efficiency		
	(1)	(2)
	<i>Abs_net_hire</i>	<i>Abs_net_hire</i>
<i>Reform</i>	-0.080*** (-11.439)	-0.336** (-2.515)
<i>Control variables</i>	Yes	Yes
<i>Firm FE</i>	Yes	Yes
<i>Year*Industry FE</i>	Yes	Yes
<i>Year*Region FE</i>	Yes	Yes
<i>N</i>	3556	3556
<i>Adj R<sup>2</sup></i>	0.595	0.444
Panel B: The effect of labor contract law		
	(1)	(2)
	<i>Abs_net_hire</i>	<i>Abs_net_hire</i>
<i>Reform</i>	-1.297*** (-2.887)	-0.871* (-1.891)
<i>Control variables</i>	No	Yes
<i>Firm FE</i>	Yes	Yes
<i>Year*Industry FE</i>	Yes	Yes
<i>Year*Region FE</i>	Yes	Yes
<i>N</i>	644	644
<i>Adj R<sup>2</sup></i>	0.005	0.222
Panel C: Heckman two-stage model		
	(1)	(2)
	<i>Reform</i>	<i>Abs_net_hire</i>
<i>Ind_ROE</i>	-0.322*** (-3.081)	
<i>Reform</i>		-4.126*** (-3.656)
<i>IMR</i>		2.335*** (3.435)
<i>Control variables</i>	Yes	Yes
<i>Firm FE</i>	Yes	Yes
<i>Year FE</i>	Yes	Yes
<i>N</i>	3556	3556
<i>Adj R<sup>2</sup></i>	-	0.038

Note: we present several robustness checks in this table. Panel A reports the results of using alternative measures of labor investment efficiency. In Column (1), we use the median level of net hiring in a firm's industry for the specific year to measure expected net hiring. In Column (2), we follow Liao et al. (2009) and strip the model in Equation (1) back to include *Size*, *Tangible*, and *Sales\_growth* as the independent variables to calculate the expected net hiring. Panel B shows the results of ruling out the effect of 2007's new labor contract law by excluding observations after 2007. Panel C reports the results of a Heckman two-stage model; *Ind\_ROE* denotes the industrial average of return on equity. All variables are defined in Appendix B. Robust standard errors are clustered at the firm level. *T*-statistics are reported in parentheses. Coefficients marked with \*, \*\*, and \*\*\* are significant at 10%, 5%, and 1% levels, respectively.

robustness checks in Panel A of Table 8. The coefficients of *Reform* in Columns (1) and (2) are negative and significant, suggesting that our baseline results are robust to the use of these alternative measures of labor investment efficiency.

Our second robustness check considers the labor contract law accepted by the Standing Committee of the National People's Congress in June 2007, which conveyed a strong signal in terms of employee protection. Strengthening worker protection increases the cost of firing workers and encourages overinvestment in labor. To rule out any effects of this labor contract law on our baseline findings, we exclude the observations made after 2007, and the results are presented in Panel B of

Table 8. The coefficients of *Reform* in both the columns are significantly negative, indicating that our baseline results remain robust after ruling out potential changes resulting from this new labor contract law.

Finally, our sample is disproportionately concentrated on particular industries. This suggests that the government/SASAC have chosen firms in specific industries in which to enforce the board reform, and it makes intuitive sense that it is less likely to have chosen profitable industries in this regard. Thus, we use industry-average return on equity (ROE) to run the Heckman two-stage model. We cannot control *Year\*Industry FE*, *Year\*Province FE*, and *Firm FE* in the first stage of the Heckman model because the probit model does not achieve convergence with several variables. Thus, we control *Firm FE* and *Year FE* in the regression. We report the results in Panel C of Table 8; the coefficient of *Reform* in Column (2) is negative and significant. Thus, our conclusions are consistent.

## 5. Conclusion

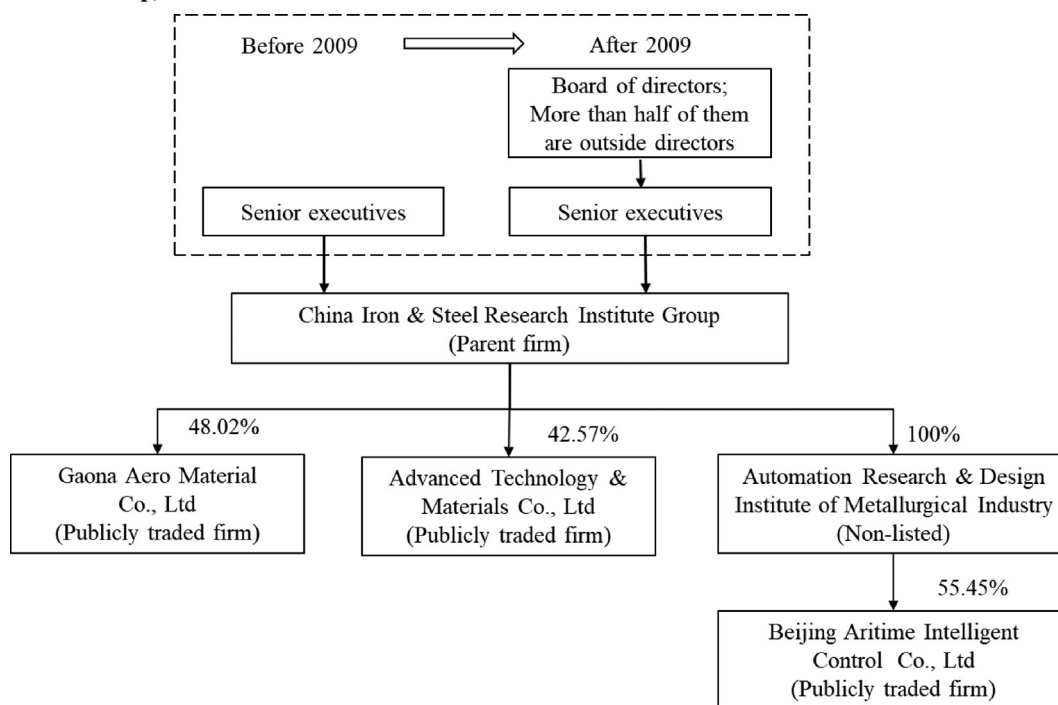
Most studies related to the expropriation behaviors of controlling shareholders focus on the internal governance of the firms, with only a few attempting to switch the perspective to the governance of the controlling shareholders themselves. In this study, we use a reform that establishes a board in CSOE parent firms and introduces outside directors as an exogenous shock, and we find that enhancing the governance of controlling shareholders in this way significantly improves firms' labor investment efficiency. Subsample analysis proves that this efficiency improvement stems from reducing overinvestment in labor. We propose two channels as theoretical underpinnings of this development: the alleviation of government intervention from above and the strengthening of the downward monitoring of management. Empirically, we find that the impact of the board reform on the labor investment efficiency does not show a significant difference between firms with higher levels of government intervention and those with lower levels; however, we do find that the impact of the board reform on the labor investment efficiency is more significant when firms suffer more serious agency problems. The overall findings suggest that strengthening the monitoring of management is a plausible channel for this impact, while the mitigation of government intervention is not. Furthermore, we find that the impact of the board reform on the labor investment efficiency is more significant when more than half of the controlling shareholder's board consists of outside directors, which reinforces the explanation provided by the "strengthening monitoring" channel.

Our findings provide an important implication for policymakers when they consider how to reform SOEs. Russia and countries in Eastern Europe chose to sell their SOEs and transfer controlling rights to private firms. China and India, however, have introduced private firms as influential shareholders, with the government retaining the ultimate ownership. Policymakers may be concerned about the post-reform efficiency of SOEs when controlling ownership still resides with the government. In our study, we provide evidence of how improving the governance of the controlling shareholders can address human capital misallocation in SOEs. Therefore, partial privatization may yet be an effective strategy for reforming an SOE if policymakers make simultaneous efforts to improve the governance structure of both the firm and its controlling shareholder in conjunction with one another.

## Author declaration

All the authors declare that there is no conflict of interest within our paper submission.

**Appendix A. The Pyramidal Structure of a CSOE: China Iron & Steel Research Institute Group, 2009.**



**Appendix B. Variable Definitions**

Variable Name	Variable Description
<i>Abs_net_hire</i>	The absolute value of regression residuals of the model in Equation (1): $Net\_hire_{i,t} = \beta_0 + \beta_1 Sales\_growth_{i,t} + \beta_2 Sales\_growth_{i,t-1} + \beta_3 \Delta ROA_{i,t} + \beta_4 \Delta ROA_{i,t-1} + \beta_5 ROA_{i,t} + \beta_6 Return_{i,t} + \beta_7 Size\_R_{i,t-1} + \beta_8 Quick_{i,t-1} + \beta_9 \Delta Quick_{i,t} + \beta_{10} \Delta Quick_{i,t-1} + \beta_{11} Lev_{i,t-1} + \beta_{12} Lossbin1_{i,t-1} + \beta_{13} Lossbin2_{i,t-1} + \beta_{14} Lossbin3_{i,t-1} + \beta_{15} Lossbin4_{i,t-1} + \beta_{16} Lossbin5_{i,t-1} + \beta_{17} error_{i,t}$
<i>Reform</i>	All variables are defined as follows: An indicator variable that equals 1 if the board reform has been carried out in year <i>t</i> at firm's controlling shareholder and equals 0 otherwise.
<i>Mb_equity</i>	The market-to-book ratio in year <i>t</i> .
<i>Size</i>	The natural logarithm of the book value of assets in year <i>t</i> .
<i>Quick</i>	The ratio of cash and short-term investments plus receivables to current liabilities in year <i>t</i> .
<i>Lev</i>	The book value of liabilities scaled to the book value of assets in year <i>t</i> .
<i>Divdum</i>	An indicator variable that equals 1 if the firm pays dividends in the previous year and equals 0 otherwise.
<i>Std_CFO</i>	The standard deviation of cash flow from operations from the years <i>t</i> –5 to <i>t</i> –1.
<i>Std_sales</i>	The standard deviation of sales from years <i>t</i> –5 to <i>t</i> –1.
<i>Insti_investor</i>	The institutional shareholdings (percent) in year <i>t</i> .
<i>Std_net_hire</i>	The standard deviation of the percentage change in the number of employees from the years <i>t</i> –5 to <i>t</i> –1.
<i>Tangible</i>	The ratio of property, plant, and equipment to assets in year <i>t</i> .
<i>Loss</i>	An indicator variable that equals 1 if a firm does not have a positive profit in the previous year and equals 0 otherwise.
<i>Abs_invest_other</i>	The absolute value of the residual from the model in Equation (2): $Investor\_other_{i,t+1} = \beta_0 + \beta_1 Sales\_growth_{i,t} + \beta_2 error_{i,t}$
<i>Labor_intensity</i>	The ratio of the size of employees to total assets in year <i>t</i> .
<i>Net_hire</i>	The change in employees (%).
<i>Sales_growth</i>	The change in sales (%).
<i>ROA</i>	Return on assets: net profit scaled by total assets.
<i>Return</i>	The annual stock return in year <i>t</i> .
<i>Size_r</i>	The natural logarithm of market value of common equity, ranked into percentiles.
<i>Lossbin1</i>	An indicator variable that equals 1 if ROA is between –0.005 and 0 in the previous year and equals 0 otherwise.
<i>Lossbin2</i>	An indicator variable that equals 1 if ROA is between –0.010 and –0.005 in the previous year and equals 0 otherwise.
<i>Lossbin3</i>	An indicator variable that equals 1 if ROA is between –0.015 and –0.010 in the previous year and equals 0 otherwise.
<i>Lossbin4</i>	An indicator variable that equals 1 if ROA is between –0.020 and –0.015 in the previous year and equals 0 otherwise.
<i>Lossbin5</i>	An indicator variable that equals one if ROA is between –0.025 and –0.020 in the previous year and equals 0 otherwise.
<i>Da</i>	The quality of accruals based on Dechow and Dichev (2002).
<i>Dual</i>	An indicator variable that equals 1 if the chairman of the board and CEO are the same person and equals 0 otherwise.

## Appendix C. Timeline of the Board Reform

Reform Year	Firms Affected
2005	Shenhua Group, China Bao Steel Group, China National Pharmaceutical Group, CITS Group Corporation, and China Chengtong Holdings Group Ltd.
2006	China National Real Estate Development Group Corporation, China National Building Material, Sinotrans, Xinxing Ductile Iron, China Railway Engineering Corporation, China Railway Construction Co., Ltd, China National Agricultural Development Group Co., Ltd., Panzhuhua Iron and Steel, China Metallurgical Corporation, China Electronic Corporation, and China Hi-Tech Group Corporation
2009	Dongfang Electric, China National Building Material Group Corporation, China National Machinery Industry Corporation, China Iron and Steel Research Institute Group, and China National Coal Group
2010	China Coal Technology Engineering Group, China Poly Group Corporation, China Energy Conservation and Environmental Protection Group Corporation, and China State Construction Engineering Corporation
2011	China Datang Corporation, China Three Gorges Corporation, COFCO Group, Dongfeng Motor Corporation, China South Industries Group, China Ocean Shipping (Group) Company, SDIC, China Railway Material Group Corporation, Chinatex Corporation, China Mobile, and China National Aviation Fuel
2012	China National Offshore Oil Corporation, China Shipping Group, China Telecommunications Corporation, China Petrochemical Corporation, Ansteel Group, and HKCTS Group Corporation
2013	China National Nuclear Corporation, FAW Group, Aviation Industry Corporation of China, and China National Salt Industry Corporation
2014	SINOLIGHT Group, Aluminum Corporation of China Limited, China Guodian Corporation, China North Industries Group Co., Ltd, Wuhan Iron and Steel Corporation, China Aerospace Science and Technology Corporation, China Aerospace Science and Industry Corporation, China General Nuclear Power Group, China National Petroleum Corporation, and China General Technology Group
2015	China National Chemical Corporation, China Huadian Corporation, State Grid Corporation of China, China Minmetals, China State Shipbuilding Corporation, China Merchants Group, China Electronics Technology Group Corporation, China Shipbuilding Industry Corporation, and China Xidian Group Co., Ltd
2016	State Power Investment Corporation, SINOCEM Group, China National Chemical Engineering Group Co., Ltd, AERO Engine Corporation of China, China National Airlines Group Co., Ltd, China Eastern Airlines Group Co., Ltd, China Southern Airlines Group Co., Ltd, SINOSTEEL Group Co., Ltd, and CRRSC
2017	Beijing General Research Institute of Mining & Metallurgy, General Research Institute for Nonferrous Metals, Harbin Electric Corporation, Overseas Chinese Town Holdings Company, China Southern Power Grid Company, Fiberhome Technologies Group, Power Construction Corporation of China, China Hualu Group, China Huaneng Group, China National Gold Group Co., Ltd., China Communications Construction, China Unicom, China Energy Engineering Group Co., Ltd., China Putian Corporation, China Nonferrous Metal Mining (Group) Co., Ltd., and China First Heavy Industries

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