



What do private firms do after losing political capital? Evidence from China



Zhimin Li^{a,1}, Lei Cheng^{b,*,2}

^a HSBC Business School, Peking University, China

^b Economics and Management School, Wuhan University, China

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ABSTRACT

This paper studies the real effects of losing political capital by exploiting exogenous shocks from the sudden deaths of politically connected independent directors in Chinese firms. Using difference-in-differences estimation, we find that upon losing political capital, a firm boosts its physical capital expenditures by 28%, or 2.93 percentage points, which is an order of magnitude larger than estimates from the United States. The loss of political capital leads to a decrease in the economic benefits a firm can obtain, in terms of bank loans, tax benefits, and government subsidies, and an increase in its production costs. Our evidence suggests that private firms use physical capital investment as a substitute for political capital.

1. Introduction

Political capital contributes to firm value worldwide (Faccio, 2006). Politically connected firms can benefit from a wide range of advantages, including government protection against competitors (Allen et al., 2005; Bai et al., 2006); favorable bank loans (Claessens et al., 2008; Houston et al., 2014); tax benefits and subsidies (Shleifer and Vishny, 1994; Adhikari et al., 2006; Knight, 2008; Wu et al., 2012). Consequently, the loss of political connections can have a detrimental effect on firm performance (Fisman, 2001; Fan et al., 2008; Faccio and Parsley, 2009; Pan and Tian, 2017; Kim, 2018). Less is known, however, about how a firm would respond after losing its political capital to mitigate the adverse impact, particularly in a developing country.

In this paper, we investigate the real effects of losing political connections by exploiting an exogenous shock from the sudden deaths of politically connected independent directors in Chinese firms.³ China provides an excellent context for our research, given the vital role of relationships (*guanxi* in Chinese pinyin) in business transactions there. Firms often gain political connections by hiring retired government officials as independent directors, who leverage their social networks to help firms obtain various government-related benefits. The death of this type of independent director will deal a negative blow to a firm's political capital. We examine how firms respond in terms of their investment in physical capital upon unexpectedly losing political capital.

To measure the loss of political capital, we use a unique dataset of sudden deaths of independent directors of the universe of A-share private firms listed on the Shanghai and Shenzhen Stock Exchanges from 2003 to 2012. Data are manually collected from companies' annual and quarterly reports and from major search platforms such as Baidu, Google, Sina, Sohu, and Netease. We

* Corresponding author.

E-mail addresses: zhimin.li@phbs.pku.edu.cn (Z. Li), chenglei2016@whu.edu.cn (L. Cheng).

¹ HSBC Business School, Peking University, University Town, Shenzhen, China, 518,055.

² Bayi Road #299, Wuhan University, Wuchang District, Wuhan, China, 430,072.

³ An independent director (also known as an outside director) is a member of the board of directors who does not have any material or pecuniary relationship with the company or its stakeholders, except for salary.

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combine sudden death data with quarterly financial data at the firm level from the China Stock Market & Accounting Research database. Our merged dataset enables us to examine firm behavior over time following the sudden death of a politically connected independent director.

Our identification relies on a difference-in-differences design that employs the exogenous timing of sudden deaths of independent directors who were retired government officials. Treated firms are those that experience the unexpected death of a politically connected independent director. For each treated firm, we construct a control group from firms that have not experienced a sudden death event concurrently. By comparing across treated and control firms before and after the treatment—the sudden death of a politically connected independent director—we estimate the causal impact of a loss of political capital on firms' investment behavior.

We find that that upon losing political capital, a firm raises its physical capital expenditures by 28%, or 2.93 percentage points. This estimate is an order of magnitude larger than estimates in the United States, which reflects the heavier influence of political connections in developing economies such as China.⁴ Once lost, political capital is hard to regain in a short time: Only 16% of the firms that experienced the sudden death of a politically connected independent director succeeded in hiring another retired government official within 3 years. We show that when a firm loses its political connections it receives fewer economic benefits, as measured by access to bank loans, effective tax rates, and government subsidies. Firms respond by increasing their investment in physical capital to mitigate the negative impact from the lost political capital.

We run a battery of tests to reinforce the validity of our research design and the robustness of our results. First, investment dynamics do not appear to diverge across treated and control firms until the sudden death of a politically connected independent director in treated firms. Second, we do not find statistically or economically significant effects of the sudden deaths of nonpolitically connected independent directors (e.g., academic or business elites). To further support the argument that a firm's investment response is due to a loss of political capital rather than other reasons, we show that the investment increase is larger for firms that had stronger political connections. Specifically, the increase is particularly pronounced if the independent director previously held a higher-level government position, if the firm is located within his or her former jurisdiction, or if the firm is located in a region with a less developed market economy. In contrast, we do not find differential investment responses along dimensions unrelated to the strength of political connections. Our results are robust to alternative specifications: (a) alternative measures of investment; (b) adjustment of the time horizon around sudden death events; and (c) alternative matching strategies.

We investigate the mechanism that drives the increase in a firm's investment following a loss of political capital: rebuilding an entry barrier previously imposed by its political capital. We illustrate the effects of this channel both theoretically and empirically. We incorporate the role of political capital into a simple theoretical model on imperfectly competitive markets using a leader-follower game (Stackelberg, 1934) and demonstrate the strategic substitution between physical and political capital. If private firms are unable to regain political capital in the short term after they lose it, they may choose capacity accumulation as a threat to deter potential competitors from entering the market (Spence, 1977). We then test our theoretical prediction empirically. First, an unexpected loss of political capital reduces the economic benefits—in terms of bank loans, tax benefits, and government subsidies—that can be obtained by a private firm. Second, the reduction in economic benefits increases the firm's production costs. Finally, although a rise in costs depresses physical capital investment for an average firm in the data, in firms that have experienced the unexpected loss of political capital the negative impact is dominated by a strategic increase in physical capital investment in order to rebuild an entry barrier.

Our paper is related to several strands of literature. First, it closes the gap in the literature on corporate behavior in response to a loss of political capital. While a large literature has established the adverse impact of losing political connections on firm value (Fisman, 2001; Fan et al., 2008; Faccio and Parsley, 2009; Cheng, 2018; Kim, 2018), less is known about firms' strategic responses. Kim (2018) is closest to our paper in this regard. Using legislator exits from Congress as identification, she estimates that a loss of political capital increases firms' capital investment by 0.12 percentage points in the US. Our paper contributes to this line of research by studying the issue in a developing country, where political connections have much more prominent effects on firm decisions. Indeed, the magnitude of our estimated response is > 20 times that of Kim (2018). Our findings highlight the strategic substitution between political and physical capital, especially in the context of developing countries in which legal and financial institutions are likely weak.

Our paper adds to the literature that seeks to identify the causal impact of external factors on firm performance. Other studies have also used sudden death events as a natural experiment. For example, Faccio and Parsley (2009) use the sudden deaths of politicians to measure the value of political connections, and Nguyen and Nielsen (2010) use the sudden deaths of independent directors to measure their contribution to firm value. We employ a measure for the loss of political capital appropriate for the Chinese setting: the sudden deaths of independent directors who were retired government officials. Given the importance of connections in business transactions in China, firms tend to hire retired government officials as independent directors to leverage their social networks and obtain preferential treatment from the government.⁵ Exploiting the sudden deaths of those independent directors allows us to identify a clean and exogenous shock to a firm's political connections.

Our empirical results is related to studies on how and why political connections affect corporate behavior more generally. Research has shown that politically connected firms have a higher probability of obtaining government loans or contracts, which can affect employment and investment decisions (Carvalho, 2014; Brogaard et al., 2015; Cohen and Malloy, 2016). Political favoritism

⁴ Using legislator exits from the Congress as identification, Kim (2018) estimates that a loss of political capital increases firms' capital investment by merely 0.12 percentage points in the US.

⁵ Incumbent government officials are prohibited by law from serving as independent directors.

imposes a high entry barrier for connected firms and impedes market competition. Moreover, our finding on the sizable increase in investment amount and efficiency following a loss of political capital suggests that political connections may lead to resource misallocation (Schoenherr, 2019).

The rest of the paper is structured as follows. Section 2 presents the theoretical framework. Section 3 describes the data and empirical strategy. Section 4 discusses the results on the real effects of losing political connections. Section 5 explores the mechanism driving the results, and Section 6 concludes.

2. Theoretical framework

We develop a simple model to (a) discipline our thinking on how a loss of political capital affects a firm's investment in physical capital and (b) derive a prediction for empirical tests. Consider a Stackelberg (1934) two-period leader-follower game with an incumbent firm (Firm 1) and a potential entrant (Firm 2). Firms (denoted by i) choose their production q , which in turn depends on their physical capital level k . We assume that the firms are identical, but they differ on a key dimension: Firm 1 possesses political capital and Firm 2 does not. The political capital protects Firm 1 against market competition by effectively blocking other entrants and allows Firm 1 to act as a monopoly. Another way to think of this case is that Firm 2 has to pay a prohibitive fixed cost if it wishes to enter the market. In practice, the incumbent firm can use its political capital to establish connections and obtain preferential treatment from the government to block the entry of competitors. After its political capital is lost, entry is no longer blocked, and our simple model will show that the incumbent firm will use its physical capital as a strategic substitute to deter entry.

The intuition goes as follows. Firms choose quantity or production to maximize profits. When the incumbent has political capital, it enables the firm to earn monopoly rent by producing less quantity, and thus it invests in lower physical capital (as in input). After losing political capital, the incumbent is forced to increase quantities to deter entry, and hence investment in physical capital increases. Therefore, political capital and physical capital are strategic substitutes for the incumbent firm.

We illustrate the model's key insight by making some simplifying assumptions. Let the production function be $q_i = g(k_i)$, where $g(\cdot)$ is some increasing function, and the cost function be $C_i = cq_b$, where c is the (constant) marginal cost of production. Let the demand function be $P(Q) = a - bQ$, where $Q = q_1 + q_2$ is aggregate production. Firms choose production levels to maximize profits: $\pi_1(q_1, q_2) = P(Q)q_1 - C_1$ for Firm 1 and $\pi_2(q_1, q_2) = \max\{P(Q)q_2 - C_2 - F, 0\}$ for Firm 2, where F is the fixed cost of entry a firm must pay to enter the market. Firm 2 will only participate in the market if the profit from doing so exceeds zero.

If Firm 2 chooses to enter the market, as a follower, it takes Firm 1's decision q_1 as given and chooses q_2 to maximize its profit. In this case, its optimal production would be $q_2^* \equiv \frac{a-c-bq_1}{2b}$. Firm 2 will join the market if the profit is nonnegative, i.e., $\pi_2(q_1, q_2^*) \geq 0$ or $q_1 \leq \frac{a-c-2\sqrt{bF}}{b} \equiv \bar{q}_1$. We call production level \bar{q}_1 the "deterrence cutoff." In other words, Firm 2 has an incentive to enter only when Firm 1's production capacity is not too large (i.e., below the deterrence cutoff), or when Firm 1's capital level is not too large (since capital is an input to production).

2.1. Equilibrium when the incumbent firm has political capital

When the incumbent firm possesses political capital, it can obtain economic benefits from the government that create a high barrier to entry in the market. Suppose that fixed cost F is so high that entry is blocked and the incumbent firm can maintain a monopoly status. In this case, the incumbent's optimal production level is

$$q_1^{old} = \frac{a-c}{2b}$$

We assume that F is high enough that the incumbent's optimal production $q_1^{old} > \bar{q}_1$ and thus other firms' entry is effectively deterred by the incumbent's political connections.⁶

2.2. Equilibrium when the incumbent firm loses political capital

When the incumbent firm loses its political capital, it can no longer maintain an artificially high entry barrier. To model this simply, we assume that the fixed cost drops to zero, i.e., $F = 0$. The monopoly production level q_1^{old} will no longer be large enough to deter Firm 2 from entering the market: $q_1^{old} = \frac{a-c}{2b} < \frac{a-c}{b} = \bar{q}_1$. In this case, the initial optimal level of production under monopoly is below the deterrence cutoff and entry is no longer blocked. If Firm 1 wants to prevent other entrants from diluting its market shares, it will raise its production, and thus also its physical capital, to deter entry.⁷

Taking Firm 2's decision into account, Firm 1 will choose a plan to drive Firm 2's potential profit to zero if it enters, i.e., $\pi_2(q_1, q_2^*) = 0$. In this case,

$$q_1^{new} = \bar{q}_1 = \frac{a-c}{b} > q_1^{old} \quad (1)$$

⁶ Notice the inverse relationship between F and \bar{q}_1 . If F is high enough, it can even force \bar{q}_1 to be negative, and it becomes trivial to satisfy $q_1^{old} > \bar{q}_1$.

⁷ It is also possible that the incumbent wants to accommodate entry after its political connections are lost if deterrence is too costly, but in our simple model setup, the incumbent's optimal capital will be exactly the same as the monopoly level. Since this is counterfactual to what we observe in the data, we restrict our attention to the case of entry deterrence.

Eq. (1) shows that when the incumbent firm loses political capital, it will increase its production to rebuild an entry barrier to deter Firm 2 from entering. Physical capital, being an input to production, will also increase. In other words, the incumbent firm overinvests in capacity in order to appear aggressive. Since physical capital investment is irreversible in reality—at least in the short term—it can serve as a credible commitment to deter potential entrants.

In the context of our paper, if the incumbent firm loses political capital due to the sudden death of an independent director who was a former government official, it will respond strategically by expanding its production capacity to prevent rival firms from entering the market. By doing so, the incumbent firm signals that it may use all of its capacity to render entry unprofitable. The model delivers a prediction for empirical testing:

Proposition. *When a firm loses its political capital, it will expand its physical capital investment to rebuild entry barriers that were previously imposed by political connections.*

In the empirical section, we show that this prediction is borne out by the data, and provide evidence that private firms use physical capital investment as a strategic substitute for political capital.

3. Data and empirical strategy

3.1. Data

We use data on all A-share private Chinese firms listed on the Shanghai Stock Exchange and Shenzhen Stock Exchange from 2003 to 2012.⁸ We manually collected a unique dataset on sudden death events from prominent financial websites and annual (or quarterly) reports of listed firms to search for firms' independent directors.⁹ Detailed financial variables at the firm level come from the China Stock Market & Accounting Research (CSMAR) database.¹⁰ We conduct our analysis at quarterly frequency. Our sample contains 1497 firms and 29,257 firm-quarter observations.

3.2. Measurement of variables

3.2.1. Measurement of unexpected loss of political capital

We measure a firm's unexpected loss of political capital due to the sudden death of an independent director who was a former government official. We follow earlier studies that define sudden death based on the medical literature; for instance, “an unexpected and non-traumatic death that occurs instantaneously or within a few hours of an abrupt change in the person's previous clinical state” (Faccio and Parsley, 2009; Nguyen and Nielsen, 2010). We also include accidental and traumatic deaths that cannot be expected by firms. We searched major financial websites for reports of such events for the firms in our sample; our sources include Baidu, Google, Sina, Sohu, and NetEase (mainly their financial sections).¹¹ As a supplemental source, we used annual (or quarterly) reports to confirm the causes of sudden deaths. Online Appendix A details our search algorithm for sudden death events.

We identified 92 sudden deaths among 2103 independent directors who were former government officials. Table 1 shows the characteristics of two types of independent directors in our sample: politically connected (retired government officials) and not politically connected (academic or business elites). From columns (1) and (2), we see that the majority of politically connected independent directors, unlike the nonpolitically connected group, lack professional knowledge and relevant work experience, and more than one-third are absent from half of the board meetings during their tenure as independent directors. Since these independent directors are unlikely to provide substantive advice on a firm's operations, the firm's chief motive to hire a politically connected independent director is to leverage their social network and obtain economic benefits from the government. The strength of political connections may differ depending on the administrative levels of the retired government officials once held. These are divided into state, provincial and ministerial, bureau, county, and township levels (with the state level being the highest, and the township level the lowest). Not surprisingly, more than half of retired government officials in the sample had state or provincial and ministerial administrative level experience. These independent directors, therefore, can be regarded as political capital for private firms in China.

We also identified the sudden deaths of independent directors from academia (54) and business (86). Because most do not have a background in politics, we group them as nonpolitically connected independent directors. From columns (3)–(4), we see that most of them have relevant work experience and rarely miss board meetings. Unlike the retired government officials, the major reason for hiring academic and business elites is to leverage their expertise to enhance firms' economic performance. In the empirical analysis, we use these nonpolitically connected independent directors to conduct a placebo test, because their sudden deaths should not represent a loss of political capital.

⁸ Types of firm ownership in China include public (i.e., state-owned enterprises or SOEs), private, and foreign, as well as Hong Kong, Macao, and Taiwan ownership (i.e., HMT firms). We focus on privately owned firms. These firms have strong incentives to establish political connections with the government, often by hiring a retired government official as an independent director, to gain access to economic benefits such as bank loans, tax benefits, and government subsidies.

⁹ This dataset was used by one of our authors in a previous paper on a different topic (see Cheng, 2018), so parts of the data description are similar to that paper.

¹⁰ The CSMAR database is maintained by GTA, a leading provider of China financial market data, and accessible at <http://www.gtarsc.com/>.

¹¹ <http://finance.baidu.com/>; <http://finance.sina.com.cn/>; <http://business.sohu.com/>; <http://money.163.com/>.

Table 1
Characteristics of politically connected and nonpolitically connected independent directors.

Characteristics of two types of independent directors		Politically connected independent directors		Nonpolitically connected independent directors	
		Full sample	Sudden deaths	Full sample	Sudden deaths
		(1)	(2)	(3)	(4)
Having bachelor degree?	Yes	0.439	0.435	0.915	0.921
	No	0.561	0.565	0.085	0.079
Did he or she ever do a business-related job before being hired as an independent director?	Yes	0.351	0.359	0.932	0.929
	No	0.649	0.641	0.068	0.071
Is his or her work experience related to the firm's main business?	Yes	0.393	0.391	0.896	0.900
	No	0.607	0.609	0.104	0.100
Government administrative level	> Bureau level	0.520	0.511	–	–
	≤ Bureau level	0.480	0.489	–	–
How old was he or she when he or she was hired as an independent director?	≥ 65	0.668	0.674	0.148	0.150
	< 65	0.332	0.326	0.852	0.850
Was he or she absent from at least 50% of board meetings during the tenure as independent director?	Yes	0.344	0.348	0.075	0.071
	No	0.656	0.652	0.925	0.929
Number of independent directors		2103	92	8995	140

Notes: China's government administrative levels are divided into state, provincial and ministerial, bureau, county, and township levels. The non-politically connected independent directors refer to those who are academic or business elites, since most of them do not have political backgrounds (so the table does not report their administrative levels).

Table 1 also compares the characteristics of independent directors in both the full and sudden death samples. These are highly similar, which suggests that the sudden death events are random. In the empirical section, we use *Polcon* to denote the unexpected loss of political connections due to the sudden death of a firm's politically connected independent director; this variable takes a value 1 from the period when a firm experienced such an event and 0 otherwise. We use *Non-Polcon* to denote the sudden death of a nonpolitically connected independent director.

3.2.2. Measurement of physical capital investment

Our key dependent variable is physical capital investment, which we denote as *Capital*. Following previous literature, we measure *Capital* as cash payments for fixed assets, intangible assets, and other long-term assets reported on the cash flow statement minus cash receipts from selling these assets, scaled by total assets (Chen et al., 2011; Xu et al., 2013; Pan and Tian, 2017; Kim, 2018). This definition is equivalent to the capital expenditure measure (COMPUSTAT Item 128#) used in many US-based studies. Because Chinese firms were not required to disclose R&D expenditure before 2007, we did not include this component in the construction of *Capital*. However, our measure included payment for intangible assets, which already reflected some innovative activities.

3.2.3. Other variables

Following previous studies on corporate investment (Chen et al., 2011; Xu et al., 2013; Kim, 2018), we also collected additional control variables that may affect firms' investment behavior: firm size (*Log(assets)*), asset-liability ratio (*Leverage*), number of years since the firm went public (*Listing age*), cash flow (*Cash flow*), concentration of top five shareholders (*HHI5*), CEO or senior executive's work experience in government agencies (*Experience*), indicator variables of membership in the People's Congress (PC) or Chinese People's Political Consultative Conference (CPPCC) (*PC member*),¹² academic elite dummy (*Academic elite*), business elite dummy (*Business elite*), and industry dummy (*Industry*).¹³ Online Appendix B details the definitions of key variables. Table 2 displays summary statistics.

3.3. Regression strategy: difference-in-differences estimation

We apply a difference-in-differences methodology to conduct the empirical analysis. Since the treatment (i.e., the sudden death of a politically connected independent director) occurred at different times for different firms, we define the quarter in which an independent director died suddenly as time 0. We use negative and positive numbers to represent the quarters before and after the

¹² In China, private firms can establish political connections in three ways. This paper focuses on the hiring of a retired government official as an independent director, but a private firm can also obtain political capital if the firm's CEO or senior executives work for government agencies or are elected to be members of the PC or CPPCC. We control for these using two indicator variables, *Experience* and *PC member*.

¹³ A few private firms (16, or 1%) in our sample changed their industry categories for various reasons (e.g., industrial upgrading or mergers and acquisitions [M&As]), which is why we could include industry dummy variables in addition to firm fixed effects in regression specifications in the empirical analysis; results are nearly unchanged with or without industry dummy variables.

Table 2
Summary statistics of key variables.

Variables	N	Mean	Std. Dev.	Min	25th Pctile	Median	75th Pctile	Max
Capital	9709	0.105	0.046	0.024	0.074	0.084	0.125	0.548
Log(assets)	9709	21.305	0.914	16.650	20.680	21.185	21.864	24.984
Leverage	9709	0.490	1.840	0.010	0.258	0.426	0.580	54.308
Listing age	9709	6.847	5.201	0	2	6	11	21
Cash flow	9709	0.198	0.694	0	0.066	0.121	0.219	22.244
HHIS	9709	0.149	0.110	0.003	0.070	0.118	0.200	0.749
Experience	9709	0.755	0.430	0	1	1	1	1
PC member	9709	0.348	0.476	0	0	0	1	1
Academic elite	9709	0.699	0.459	0	0	1	1	1
Business elite	9709	0.493	0.500	0	0	0	1	1
Bank loan	9709	0.284	0.157	0.0003	0.170	0.284	0.405	0.814
Tax rate	9709	0.192	0.148	0	0.110	0.170	0.228	0.872
Subsidy	9709	0.147	0.112	-0.155	0.132	0.141	0.149	6.522
Cost	9709	0.696	0.179	0.017	0.616	0.736	0.823	1.545
TobinQ	9709	2.560	1.618	0.692	1.509	2.062	3.043	19.102

Notes: This table displays summary statistics of key variables. Detailed definitions of the variables are contained in Online Appendix B.

event. For instance, -2 and 2 represent 2 quarters before and 2 quarters after, respectively. We focus the time period of analysis to be the range of quarters $(-8, 12)$, i.e., 2 years before and 3 years after the treatment. There are two reasons for this choice. First, the post-treatment period needs to be long enough: After a politically connected independent director dies, the effects of losing political capital may take some time to materialize. On the other hand, the post-treatment period cannot be too long; firms may respond in various ways after losing its political capital (e.g., by attempting to hire another retired government official as an independent director), so the impact on corporate investment may dissipate over time. As a robustness check, we find that our main results remain nearly unchanged when we vary the time period.

We first construct a control group for the treated firms.¹⁴ A treated firm is one whose politically connected independent director died suddenly at time 0. The ideal control firm is identical to the treated firm in all respects except that its politically connected independent director was still alive at time 0. Following a matching procedure similar to those used by Faccio et al. (2006) and Cheng (2018), we identify a control unit as one whose politically connected independent director was alive at time 0 and that operated in the same industry (using the two-digit Standard Industrial Classification code) and geographical region as the treated firm, but in a different province.^{15,16} The decision to select control firms from a different province is motivated by potential concern about the stable unit treatment value assumption (SUTVA), which is also known as “no interference”: A firm's treatment status should not affect the potential outcome of another firm. One might worry that this assumption could fail in our context, since local fiscal policies in China are usually decided at the provincial level and listed firms tend to be large. When a firm loses its political connections, therefore, government subsidies may be diverted to its competitors in the same province and thus potentially impact their investment behavior as well. To alleviate this concern, we select untreated firms in a different province from the treated firm.¹⁷ Additionally, we focus on firms with only one politically connected independent director to ease the matching.

We identified 643 untreated firms to match our 92 treated firms. On average, each treated firm has about seven control firms. In the empirical analysis, we assign a weight to each control firm that is equal to the inverse of the number of control firms.¹⁸ For example, if a treated firm has four control firms, a weight of one-fourth is assigned to each. We obtained a final sample of 9713 observations, which we use in our main empirical analysis.¹⁹ Table 2 reports the summary statistics of key variables for this sample.

¹⁴ Given the random nature of sudden death events, the treatment probability is not associated with firm characteristics, so the standard propensity score matching strategy is not applicable.

¹⁵ The country can be divided into seven regions based on their geographic features: northern China (Beijing, Tianjin, Hebei, Shanxi, and Inner Mongolia); northeastern China (Liaoning, Jilin, and Heilongjiang); eastern China (Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, and Shandong); central China (Henan, Hubei, and Hunan); southern China (Guangdong, Hainan, and Guangxi); southwest China (Chongqing, Sichuan, Guizhou, Yunnan, and Tibet); and northwest China (Shaanxi, Gansu, Ningxia, Qinghai, and Xinjiang).

¹⁶ As noted previously, a few private firms (16) in our sample changed their industry categories for various reasons (e.g., industrial upgrading or M&As) during the time period of analysis. We condition on the industry classification at the treatment time (i.e., time 0) for the purpose of matching. Our results are robust to excluding firms that changed industries or controlling for industry indicator variables.

¹⁷ As a robustness check, we alternatively select untreated firms from the same province as the treated firm. The result is largely unchanged, which suggests that SUTVA is unlikely to be violated. See Section 4.2.3 for a discussion.

¹⁸ This weighting scheme is chosen for simplicity. To check for robustness, we also use a nearest neighborhood matching method and find the results to be highly similar. See Section 4.2.3 for details.

¹⁹ Because the time period of analysis was $(-8, 12)$, each firm in either the treatment or control group can have a maximum of 20 observations (period 0 is the reference). However, many firms have fewer than 20 observations. For example, if a treated firm regained political capital because it hired another retired government official at time t ($1 \leq t \leq 12$), this firm's time period of analysis becomes $(-8, t-1)$ and it has only $t+7$ observations. For an untreated firm, if it hired a retired government official at time t_1 ($-8 \leq t_1 \leq -1$) who died at time t_2 ($1 \leq t_2 \leq 12$), the firm's time period of analysis is (t_1+1, t_2-1) .

To conduct a placebo test, we also identified 498 untreated firms to match the 140 treated firms where the treatment is defined as the sudden death of an academic or business elite independent director and arrived at a secondary sample of 8495 observations.²⁰

Table 3 reports a comparison of key variables in the treated and control groups during the pre-treatment period ($-8, -1$). No statistically significant differences at conventional levels are observed in any variables between the two groups before the treatment occurred, which suggests that our selection criteria for the control group performed well in balancing firm characteristics.²¹

4. Empirical results

Before examining how a firm responds to an unexpected loss of its political capital, we first check whether this loss affects the firm's economic performance. We use return on assets (ROA) and profitability (*Profitability*) to measure firm performance. As these are not our main results, we report them in Online Appendix C. We make two observations. First, the loss of political capital has adverse effects on economic performance. This finding is consistent with prior studies in the literature (Fisman, 2001; Faccio and Parsley, 2009; Cheng, 2018; Kim, 2018). After a firm loses its political capital, competitors may enter the market and capture some market shares, which impedes the incumbent's economic performance (Kim, 2018). Second, if we extend the post-treatment period, the negative impact becomes smaller and even insignificant, which indicates that the incumbent firm may have taken measures to rebuild entry barriers and regain its competitive advantage. We now investigate what firms do after an unexpected loss of their political capital.

4.1. Reestablishment of political connections after an unexpected loss of political capital

After the loss of political capital, a private firm could in principle reestablish its political connections by hiring another retired government official to fill the position of an independent director.²² We obtained information about the feasibility of this decision from the annual (or quarterly) reports of listed firms. Table 4 lists the number of private firms that succeeded in doing so over the next 3 and 5 years after the sudden death of a politically connected independent director. Only 15 private firms (or 16.3%) hired another retired government official 3 years after the sudden death of a previous one. It appears to be infeasible for most firms to reestablish political connections by hiring another retired government official as a replacement. Retired government officials, particularly those with strong political ties, are a scarce resource, and it is difficult to find another government official with a political network similar to that of the deceased director in a short period of time. Even if a firm succeeded in doing so, it would take time to rebuild connections with the government using the new director's social network. We note, however, that about half of the firms in the sample hired another government official 5 years after losing their previous political capital. This observation motivated our choice to limit the time period of analysis to within 3 years after the treatment.

By contrast, there are a large number of academic and business elites in China. If these nonpolitically connected independent directors suddenly died, private firms could quickly search for and hire another a replacement. Table D1. of Online Appendix D confirms this conjecture. > 70% of the firms successfully hired a replacement after the sudden death of an academic or business elite independent director. Given the difficulty and infeasibility of reestablishing political connections after losing previous political capital in the short term, we examine how firms respond in terms of their physical capital investment to counteract the adverse effect.

4.2. Increasing investment in physical capital after an unexpected loss of political capital

4.2.1. Baseline results

As described in the theoretical framework, a private firm can accumulate physical capital as a threat to prevent potential rivals from entering the market. We empirically investigate how a loss of political capital affects a firm's investment in physical capital. The regression equation takes a difference-in-differences framework:

$$Capital_{it} = \alpha + \beta Polcon_{it-1} + \gamma X_{it-1} + \mu_i + \eta_t + \varepsilon_{it} \quad (2)$$

where subscript i denotes a firm and t denotes a quarter-year pair. Because the time period of analysis is $(-8, 12)$, t takes an integer value in this interval ($t = 0$ is the reference period). *Capital* represents a firm's physical capital investment. *Polcon* is a dummy variable that takes the value 1 for the treated firm in the post-treatment period (1, 12) and 0 otherwise. Control variables X include *Log(assets)*, *Leverage*, *Listing age*, *Cash flow*, *HHI5*, *Experience*, *PC member*, *Academic elite*, and *Business elite*.²³ We also include firm and

²⁰ Like the selection for the sample with politically connected independent directors, we focus on firms with only one academic or business elite independent director for the matching.

²¹ We note that the differences are close to significant at the 10% level for three variables: *Leverage*, *Listing age*, and *PC member*. This is driven by a few outliers in these variables. When we drop the extreme values, the p -value of the differences increases substantially (for example, the p -value becomes 0.35 for *Leverage*). Our main results are nearly unchanged if we drop these outliers from the analysis.

²² Obtaining political status for CEOs or senior executives could also help firms regain political capital. However, this is not easy for most private entrepreneurs. As shown in Online Appendix Table D2, only four private firms in our sample (around 4%) had their CEOs or senior executives successfully elected as PC or CPPCC members within 3 years after the sudden death of an independent director.

²³ A few private firms (16, or 1%) in our sample changed their industry category for various reasons (e.g., industrial upgrading or M&As). Except as otherwise noted, we include industry dummy variables in the empirical analysis; results are nearly unchanged with or without industry dummy variables.

Table 3

Comparison of key variables of treatment and control groups during the pre-treatment period.

Variables	Treated group			Control group			p-value of Diff.
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	
<i>Capital</i>	660	0.105	0.043	3711	0.104	0.049	0.8312
<i>Log(assets)</i>	660	21.186	0.753	3711	21.232	0.880	0.2103
<i>Leverage</i>	660	0.373	0.168	3711	0.466	1.490	0.1072
<i>Listing age</i>	660	6.292	4.694	3711	5.947	5.102	0.1049
<i>Cash flow</i>	660	0.152	0.156	3711	0.178	0.548	0.2289
<i>HHIS</i>	660	0.149	0.092	3711	0.154	0.109	0.2185
<i>Experience</i>	660	0.733	0.443	3711	0.754	0.431	0.2524
<i>PC member</i>	660	0.330	0.471	3711	0.363	0.481	0.1096
<i>Academic elite</i>	660	0.632	0.483	3711	0.658	0.474	0.1919
<i>Business elite</i>	660	0.474	0.500	3711	0.501	0.500	0.2109
<i>Bank loan</i>	660	0.297	0.142	3711	0.291	0.149	0.3351
<i>Tax rate</i>	660	0.189	0.147	3711	0.189	0.144	0.9743
<i>Subsidy</i>	660	0.149	0.060	3711	0.153	0.156	0.5450
<i>Cost</i>	660	0.697	0.153	3711	0.693	0.171	0.5452
<i>TobinQ</i>	660	2.654	1.776	3711	2.606	1.490	0.4622

Notes: This table shows a comparison of summary statistics of key variables across treated and control groups during the pre-treatment period. The last column shows the p-value of testing the null hypothesis that the variables of the treatment and control groups equal each other. A treated firm is one that experiences a sudden death of a politically connected independent director. A control firm is one whose politically connected independent director was alive at the treatment time and which operated in the same industry and geographical region as the treated firm, but in a different province. See the text for details on the selection criteria.

Table 4

Reestablishing political connections with the government.

Year	Number of sudden deaths	Number of firms which successfully hired another retired government official after the loss of political capital	
		Over the next three years	Over the next five years
2003	3	1	3
2004	1	0	0
2005	6	2	3
2006	8	1	5
2007	7	1	3
2008	13	1	5
2009	10	1	3
2010	14	2	7
2011	12	3	7
2012	18	3	9
Total number	92	15	45
Ratio		16.3%	48.9%

Notes: This table lists the number of private firms that succeeded in hiring another retired government official over the next three and five years after the sudden death of a former one.

quarter-year fixed effects (μ_i and η_t) to control for time-invariant factors at the firm level and aggregate shocks. The variable *Polcon* and all control variables *X* are lagged by one quarter because it takes time for firms to adjust their investment plans. The coefficient on *Polcon*, β , captures the effect of the unexpected loss of political capital on a firm's physical capital investment. Because the treatment assignment is at the firm level, we cluster standard errors by firms to account for dependence in the residuals.

We first check the parallel trends assumption: Were the investment dynamics of the control group similar to those of the treated group during the pre-treatment period? Fig. 1 shows the trends of *Capital* for the treated and control groups during the entire period (−8, 12). Investment across the two groups shared similar trends before the treatment occurred (at time 0), which provides reassuring evidence that the parallel trends assumption is likely to hold.²⁴ After the treatment began, investment behavior by the treated and control groups started to diverge: Treated firms upped their investment, while untreated firms kept the same investment trajectory as before. We use a regression model to conduct a more formal analysis of the real effects of a sudden loss of political capital.

Regression results from estimating Eq. (2) are presented in Table 5.²⁵ Across all specifications, with or without fixed effects or

²⁴ In unreported results, we test the parallel trend assumption by estimating the coefficients on the treatment—sudden death—period by period. We find that almost all coefficients before time 0 are statistically insignificant, which provides further support for the parallel trends assumption. These results are available upon request.

²⁵ If a politically connected independent director dies other than suddenly, the private firm might take preemptive measures to alleviate the

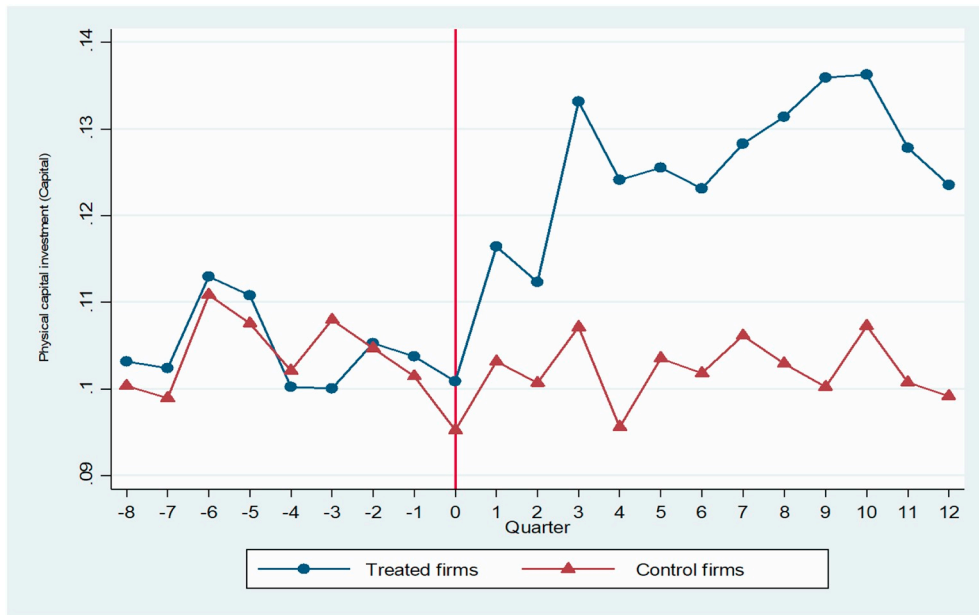


Fig. 1. Trends of physical capital investment for treated and control firms.

Notes: This figure shows the investment dynamics across treated and control firms. The y-axis is physical capital investment measured as capital expenditures scaled by total assets, and the x-axis is the quarter number relative to the treatment time (time 0). A treated firm is one that experiences a sudden death of a politically connected independent director. A control firm is one whose politically connected independent director was alive at the treatment time and which operated in the same industry and geographical region as the treated firm, but in a different province. See the text for details on the selection criteria.

control variables, the coefficients on *Polcon* are quite robust and significantly positive, which means that the sudden loss of political capital had positive effects on a firm's investment in physical capital. Taking column (5) as our preferred specification, if a private firm loses political capital because of the sudden death of its politically connected independent director, its physical capital investment increases by 2.93 percentage points compared to an untreated firm and holding other variables constant. As shown in the summary statistics table (Table 3), the sample mean of the variable *Capital* of the treatment group in the pre-treatment period is 0.105, so our estimated coefficient represents an increase of 28% of physical capital expenditures ($0.0293/0.105 = 0.279$). This estimate is much larger than that in the US: As previously noted, Kim (2018) estimates that a loss of political capital increases firms' capital investment by 0.12 percentage points in the US. The estimated response in our paper is > 20 times larger. This difference probably reflects the important role of political connections in the context of developing countries, whose legal and financial institutions are likely weak. Our results confirm the theoretical prediction: If a private firm loses political capital, it will increase its physical capital investment to accumulate production capacity. Private firms thus use physical capital as a strategic substitute for political capital.

The coefficients on the control variables are also presented in Table 5, but we omit discussion of these results as they are not our primary focus. In subsequent regressions, we do not report these coefficients for brevity. However, the coefficient on *Experience* is significantly negative, which means that the CEO or senior executive's work experience in government agencies (i.e., a kind of political connection) reduces the firm's physical investment. Although this type of political connection differs from one established by hiring a politically connected independent director, we reach the same conclusion: Political connections crowd out a firm's physical capital investment.

As a comparison, we investigate the effect of losing nonpolitically connected independent directors on corporate investment. As mentioned before, the majority of academic or business elites in China do not have a political background. If physical capital is a substitute for political capital, the sudden death of a nonpolitically connected independent director should not affect the firm's investment behavior. We reestimate Eq. (2) with the dependent variable *Polcon* replaced by the variable *Non-Polcon*, which represents the sudden deaths of nonpolitically connected independent directors. Its definition is similar to the variable *Polcon*, with details shown in Online Appendix B. The results are presented in Online Appendix E. As shown in columns (1)–(3), not only are the coefficients on the variable *Non-Polcon* statistically insignificant; their magnitude is also small.²⁶ That is, the sudden death of a

(footnote continued)

negative effects of losing its political capital. Using the non-sudden death sample, we find that the magnitudes of the coefficients on the variable *Polcon* are indeed smaller than the coefficients in Table 5. For our purposes, using the sudden death sample makes more sense.

²⁶ These results are consistent with those in columns (4) and (5) of Table 5, which show that hiring an academic or business elite independent director has no significant effect on the firm's physical investment. On the other hand, column (3) in Appendix E shows that hiring a retired

Table 5
Effects of losing political capital on a private firm's physical capital investment.

Variables	Capital					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Polcon</i> _{<i>i,t-1</i>}	0.0229*** (0.0039)	0.0267*** (0.0044)	0.0292*** (0.0045)	0.0295*** (0.0046)	0.0293*** (0.0046)	0.0298*** (0.0047)
<i>Log(assets)</i> _{<i>i,t-1</i>}			0.0116*** (0.0033)	0.0118*** (0.0033)	0.0115*** (0.0033)	0.0108*** (0.0033)
<i>Leverage</i> _{<i>i,t-1</i>}			-0.0111*** (0.0040)	-0.0112*** (0.0040)	-0.0109*** (0.0041)	-0.0103** (0.0042)
<i>Listing age</i> _{<i>i,t-1</i>}			-0.0050*** (0.0013)	-0.0050*** (0.0013)	-0.0045*** (0.0014)	-0.0043*** (0.0014)
<i>Cash flow</i> _{<i>i,t-1</i>}			0.0304*** (0.0062)	0.0304*** (0.0062)	0.0301*** (0.0062)	0.0307*** (0.0063)
<i>HHI5</i> _{<i>i,t-1</i>}			-0.0099 (0.0246)	-0.0084 (0.0251)	-0.0148 (0.0239)	-0.0181 (0.0233)
<i>Experience</i> _{<i>i,t-1</i>}				-0.0231** (0.0103)	-0.0241** (0.0110)	-0.0253** (0.0107)
<i>PC member</i> _{<i>i,t-1</i>}				0.0006 (0.0027)	0.0007 (0.0027)	0.0006 (0.0027)
<i>Academic elite</i> _{<i>i,t-1</i>}					-0.0062 (0.0047)	-0.0066 (0.0047)
<i>Business elite</i> _{<i>i,t-1</i>}					0.0041 (0.0040)	0.0042 (0.0040)
<i>Cost</i> _{<i>i,t-1</i>}						-0.0230*** (0.0067)
<i>Constant</i>	0.0981*** (0.0000)	0.1336*** (0.0085)	-0.1443** (0.0693)	-0.1165* (0.0682)	-0.1087 (0.0677)	-0.0779 (0.0680)
Firm fixed effects	NO	YES	YES	YES	YES	YES
Quarter-year fixed effects	NO	YES	YES	YES	YES	YES
Observations	8288	8288	8288	8288	8288	8288

Notes: A few private firms (16, or 1%) in our sample changed their industry categories for various reasons (e.g., industrial upgrading or M&As). We include industry dummy variables in addition to firm fixed effects in all specifications except column (1); results are nearly unchanged with or without industry dummy variables. Robust standard errors clustered at the firm level are in parentheses. Asterisks indicate statistical significance at 1% ***, 5% **, and 10% * levels.

nonpolitically independent director hardly affects the firm's physical capital investment because, as previously discussed, hiring them has nothing to do with obtaining political capital. As shown in Online Appendix D, private firms can quickly search for and hire another academic or business elite independent director to replace the deceased one.

One might argue that a firm does not have to readjust its investment plans after losing a nonpolitically connected independent director simply because the replacement is easy and fast enough, so our results may not reflect the substitution between political capital and physical capital. To test this argument, we exclude those firms that successfully hired another academic or business elite director after the loss of an independent director from either of those two categories, and the result is shown in column (4). The coefficient on *Non-Polcon* is still insignificant, which provides evidence that (a) physical capital investment is not affected if non-politically connected independent directors suddenly die and (b) a private firm increases its physical capital investment as a response to a loss of political capital.

4.2.2. Heterogeneous effects of losing political capital on physical capital investment

Although we have shown the substitution effect between political and physical capital, one may still be concerned that the unconditional effect we document may be due to other reasons. For example, politician-specific factors may affect the strength of political connections, and hence the firm's response to the sudden loss of political capital. To further support our results, we need to show whether the increase in physical capital investment was even larger for those firms that had stronger political connections and thus could maintain a higher entry barrier. If readjustment of the investment plan was due to the loss of political capital, we should observe a larger increase in physical capital investment for firms with stronger political connections. To test this argument, we analyze the heterogeneity effects in several ways.

We first consider three factors that may be related to the strength of political capital. First, we analyze differential effects based on government administrative levels (as described in Table 1). Since government officials at higher levels tend to have greater political power and wider social networks, they can bring more economic benefits to private firms. This, in turn, lowers production costs and helps maintain a high entry barrier. Second, one might expect the death of a retired government official to impact private firms more

(footnote continued)

government official negatively affects the firm's physical investment, which is also consistent with our baseline results.

Table 6
Heterogeneous effects of losing political capital on a private firm's physical capital investment.

Panel A: Factors that may affect the strength of political connections				
Variables	Capital			
	(1)	(2)	(3)	(4)
$Polcon_{i,t-1}$	0.0202*** (0.0049)	0.0190*** (0.0049)	0.0224*** (0.0049)	0.0125** (0.0056)
$Polcon_{i,t-1} \times Top\ politician_i$	0.0170** (0.0077)			0.0180 (0.0114)
$Polcon_{i,t-1} \times Within\ jurisdiction_i$		0.0158** (0.0070)		-0.0001 (0.0109)
$Polcon_{i,t-1} \times Low\ marketization_i$			0.0220*** (0.0090)	0.0229*** (0.0083)
Control variables	YES	YES	YES	YES
Firm fixed effects	YES	YES	YES	YES
Quarter-year fixed effects	YES	YES	YES	YES
Observations	8288	8288	8288	8288

Panel B: Factors that may not affect the strength of political connections				
Variables	Capital			
	(1)	(2)	(3)	(4)
$Polcon_{i,t-1}$	0.0311*** (0.0053)	0.0304*** (0.0054)	0.0275*** (0.0057)	0.0299*** (0.0060)
$Polcon_{i,t-1} \times Bachelor_i$	-0.0051 (0.0090)			-0.0034 (0.0092)
$Polcon_{i,t-1} \times Work\ experience_i$		-0.0031 (0.0088)		-0.0021 (0.0094)
$Polcon_{i,t-1} \times Meeting\ absence_i$			0.0045 (0.0082)	0.0034 (0.0078)
Control variables	YES	YES	YES	YES
Firm fixed effects	YES	YES	YES	YES
Quarter-year fixed effects	YES	YES	YES	YES
Observations	8288	8288	8288	8288

Notes: *Top politician* takes 1 if the administrative level of the politically connected independent director is above bureau level (e.g., state level or provincial and ministerial level) and 0 otherwise. *Within jurisdiction* takes 1 if the politically connected independent director once worked in the province where the firm is located and 0 otherwise. *Low marketization* takes 1 if the firm is located in the middle or western part of China where the degree of marketization is relatively low and 0 otherwise. *Bachelor* takes 1 if the retired government official received higher education and 0 otherwise. *Work experience* takes 1 if the retired government official had business-related work experience before being hired as an independent director and 0 otherwise. *Meeting absence* takes 1 if the retired government official was absent from at least 50% of board meetings during his or her tenure as independent director and 0 otherwise. A few private firms (16, or 1%) in our sample changed their industry categories for various reasons (e.g., industrial upgrading or M&As). We include industry dummy variables as well; results are nearly unchanged with or without industry dummy variables. We omit the reporting of the coefficients on control variables for brevity. Robust standard errors clustered at the firm level are in parentheses. Asterisks indicate statistical significance at 1% ***, 5% **, and 10% * levels.

if they operate in the province in which the deceased official had direct jurisdiction before retirement. In our sample, around 37% of private firms had retired government officials as independent directors from other provinces. Such officials might not have wide social networks in the jurisdiction to which they relocated, so firms that hire these officials might be unable to establish a high barrier to entry. Third, it may be more likely that firms establish political connections and obtain preferential treatment in areas with underdeveloped financial systems and extensive government intervention (Zhang et al., 2016; Cheng, 2018), because entry barriers may be easier to create with political connections in those areas. If this is true, the sudden deaths of politically connected independent directors should affect corporate investment more in regions with lower degrees of marketization. The degree of development varies greatly across provinces in China: Eastern provinces tend to be more developed than central or western provinces (Fan et al., 2011). To address heterogeneity in these three respects, we constructed three dummy variable, *Top politician*, which takes a value of 1 if the administrative level of a politically connected independent director is above the bureau level (e.g., state or provincial and ministerial level) and 0 otherwise; *Within jurisdiction*, which takes a value of 1 if the official worked in the government agency in the province where the private firm is located and 0 otherwise; and *Low marketization* that takes a value of 1 if the firm is located in a central or western province and 0 otherwise.

Table 6 presents the estimation results on heterogeneity tests. Our discussion focuses on the coefficients on the interaction terms. First, as shown in columns (1)–(3) in Panel A, the coefficients on $Polcon \times Top\ politician$, $Polcon \times Within\ jurisdiction$, and $Polcon \times Low$

marketization are all significantly positive.²⁷ The increase in physical capital investment is greater if the retired government official serving as an independent director had a higher administrative level, if the firm is situated within his or her jurisdiction, or if the firm is located in central or western China, where the market economy is less developed. Since these three factors are related to the strength of political capital, these results jibe with our hypotheses.

We next eliminate three politician-specific explanations, which are unrelated to the strength of political connections, for our finding of a positive effect on physical capital investment. First, more than half of the independent directors who were retired government officials did not receive higher education (see Table 1). As discussed earlier, the primary reason for hiring a retired government official is to employ the social network they accumulated before retirement, which in most cases has nothing to do with their education level. If the increase in physical capital investment is due to a loss of political capital, we should not notice a significant difference in the effect across firms regardless of whether their politically connected independent director received higher education. Second, > 60% of the retired government officials did not have business-related jobs or related work experience before they were hired as independent directors. Because these directors are probably unable to offer constructive guidance in any case, we expect that whether a politically connected independent director had relevant business-related experience before retirement should not affect physical capital investment. Finally, more than one-third of retired politically connected independent directors were absent from board meetings at least half of the time. Using a similar argument as before, these absences are not expected to have any effect on the firm's investment decisions. To address heterogeneity along these dimensions, we constructed three dummy variables, *Bachelor*, which takes a value of 1 if the retired government official received higher education and 0 otherwise; *Work experience*, which takes a value of 1 if the retired government official had business-related work experience before they were hired as an independent director and 0 otherwise; and *Meeting absence*, which takes a value of 1 if the retired government official was absent from at least half of board meetings during his or her tenure as independent director and 0 otherwise. In these three cases, if physical capital is a substitute for political capital, we should not observe significantly different investment reactions.

As shown in Panel B of Table 6, indeed, the coefficients on *Polcon* × *Bachelor*, *Polcon* × *Work experience*, and *Polcon* × *Meeting absence* are all statistically insignificant, regardless of whether the interaction terms enter separately or jointly; that is, the increase in physical capital does not appear to differ regardless of whether politically connected independent directors received higher education, had previous business-related work experience, or missed at least 50% of board meetings during their tenure.²⁸ These results also coincide with our conjecture that there should not be differential effects along dimensions that have nothing to do with the firm's political capital. These heterogeneity tests further support our argument that the rise in physical capital investment is due to the loss of political capital.

4.2.3. Robustness checks

We perform a series of tests to check the robustness of our baseline results in Tables 5. First, we use alternative measures for physical capital investment. Following previous studies (Firth et al., 2008; Chen et al., 2011; Pan and Tian, 2017), we consider two alternative measures: (a) the ratio of net capital expenditure (i.e., capital expenditure minus depreciation) to total assets (*Capital*₁) and (b) the change in total values of fixed assets and construction in progress (*Capital*₂), which is calculated as the difference between the ending and beginning value of these assets, scaled by the beginning value. The results are presented in Panel A of Online Appendix F. Our findings are robust to these alternative measures for physical capital investment.

Second, our results are robust to varying the time period. We shorten the pre- and post-treatment periods quarter by quarter.²⁹ To save space, we only report the regression results in the time periods $(-4, 0) \cup (0, 12)$ and $(-8, 0) \cup (0, 8)$, as shown in columns (1) and (2) of Panel B of Online Appendix F. Moreover, to eliminate the potentially confounding factor of China's fiscal stimulus after the financial crisis in 2008 (Erkens et al., 2012), we run a regression using a subsample with sudden death events that occurred before 2008. The results, shown in column (3), remain mostly unchanged.

Lastly, we use different matching strategies to check whether our results are sensitive to the selection criteria of the control group. In our baseline results, we selected untreated firms from the pool of politically connected firms. We now select control units from the pool of nonpolitically connected firms, i.e., those that did not hire a politically connected independent director during the time period of analysis (while keeping the other selection criteria the same as before). These results are shown in column (1) of Panel C in Online Appendix F. We also use nearest neighbor matching instead of using inverse weighting, with results shown in column (2). Our results are robust to this alternative matching method. To mitigate the potential concern of interference, we selected control firms from a different province (but in the same region) to match with treated firms in our baseline results. We alternatively choose firms from the same province to construct the control group and find that the result is highly similar, as shown in column (3). This suggests that the

²⁷ When we include all three variables and their interaction terms in the model, as shown in column (4) of Panel A, the coefficients on *Polcon* × *Top politician* and *Polcon* × *Within jurisdiction* become insignificant. The reason may be the strong correlation between *Top politician* and *Within jurisdiction* (the correlation coefficient is 0.92). However, the coefficients on *Polcon* and *Polcon* × *Low marketization* remain significant.

²⁸ Although education and work experience do not affect physical capital investment in our baseline sample, it does not imply those factors do not matter for firm performance. Using our placebo sample, we show in unreported results that the sudden death of a nonpolitically connected independent director does have a negative effect on a firm's profitability (though not on physical capital levels), which is more pronounced when the director was more educated or more experienced. Of course, this may not be surprising given that the chief reason firms hire academic and business elites is to leverage their expertise on firm management.

²⁹ We do not extend the post-treatment period beyond 3 years, because about one-third of private firms hired another retired government official within 3 years after the sudden death of a former one. Also, our focus is on firm behavior in the short/medium term upon a sudden loss of political capital.

Table 7
The effect of losing political capital on investment efficiency.

Variables	Full sample		Subsample	
			Ruling out the effect of director expertise	
	(1)	(2)	(3)	(4)
$Polcon_{i,t-1}$	0.0200*** (0.0058)	0.0274*** (0.0045)	0.0191** (0.0097)	0.0301*** (0.0065)
$TobinQ_{i,t-1}$	0.0017*** (0.0007)		0.0010 (0.0011)	
$Polcon_{i,t-1} \times TobinQ_{i,t-1}$	0.0033*** (0.0013)		0.0046** (0.0023)	
$Growth_{i,t-1}$		0.0017** (0.0007)		0.0054*** (0.0018)
$Polcon_{i,t-1} \times Growth_{i,t-1}$		0.0040** (0.0018)		0.0050** (0.0024)
Control variables	YES	YES	YES	YES
Firm fixed effects	YES	YES	YES	YES
Quarter-year fixed effects	YES	YES	YES	YES
Observations	8288	8288	3370	3370

Notes: This table shows the effect of losing political capital on investment efficiency (using the sensitivity of investment to Tobin's Q as a proxy). To rule out the effect of director expertise, we focus on the subsample of retired government officials without higher education or relevant work experience in columns (3) and (4). A few private firms (16, or 1%) in our sample changed their industry categories for various reasons (e.g., industrial upgrading or M&As). We include industry dummy variables as well; results are nearly unchanged with or without industry dummy variables. We omit the reporting of the coefficients on control variables for brevity. Robust standard errors clustered at the firm level are in parentheses. Asterisks indicate statistical significance at 1% ***, 5% **, and 10% * levels.

“no interference” assumption is unlikely to be violated in our context. We do not know this a priori, of course, so we still choose control firms from a different province for our baseline estimates.

4.2.4. The loss of political capital and investment efficiency

We have empirically shown that a private firm increases its physical capital investment in response to a loss of political capital. We now turn to the effect on investment efficiency. A firm's investment decisions chiefly depend on future expected returns, as measured by Tobin's Q (Tobin, 1969). Due to various market frictions such as information asymmetry and moral hazard, however, firms often deviate from this optimal investment behavior. Some researchers suggest that government intervention might play an important role in a firm's investment efficiency, especially in transitional economies such as China's (Chen et al., 2011; Xu et al., 2013; Pan and Tian, 2017). In China, a firm with political connections may be required to make suboptimal investment—sometimes in unprofitable fields—to attain local GDP growth targets. This practice leads to investment inefficiency. The problem can be exacerbated by soft budget constraints and easy access to credits supported by local governments. We conjecture, therefore, that a private firm's investment efficiency will improve if it loses political capital. To test this hypothesis, we follow the literature by examining the sensitivity of investment expenditures to investment opportunities, as measured by Tobin's Q, with the following regression specification (Lang et al., 1996; Chen et al., 2011; Xu et al., 2013):

$$Capital_{it} = \alpha + \beta Polcon_{it-1} + \delta Polcon_{it-1} \times TobinQ_{it-1} + \theta TobinQ_{it-1} + \gamma X_{it-1} + \mu_i + \eta_t + \varepsilon_{it} \quad (3)$$

where $TobinQ$ is calculated as the sum of the market value of tradable shares, book value of nontradable shares, and liabilities, divided by the book value of total assets. All other variables are the same as before. If we observe a jump in the sensitivity of investment to Tobin's Q following a sudden loss of political capital, this implies that capital is being allocated to more efficient uses based on investment opportunities. The coefficient on the interaction term, δ , captures the effect of losing political connections on a firm's investment efficiency. The regression results of Eq. (3) are shown in Table 7.

As shown in column (1) of Table 7, the coefficient on the interaction term is statistically significant and positive, which is consistent with our hypothesis. After the loss of political capital, private firms with limited financial resources respond by making an additional investment, with higher efficiency, to rebuild entry barriers. Moreover, with less government intervention, private firms can more freely choose investment projects that maximize their profits. This result is consistent with that of Schoenherr (2019), who uses data from Korea and finds that procurement contracts are more likely to be allocated to private firms with political connections—and that these contracts tend to be executed in a less cost-effective manner.

Similar to what we did in Section 4.2.2, to eliminate potential confounding factors related to director expertise, we use a subsample of retired government officials without higher education or relevant work experience to rerun the regressions. The results,

reported in column (3), are similar to those in column (1).^{30,31} Prior studies sometimes use sales growth to measure investment opportunities (e.g., Biddle et al., 2009). We use *Growth*, defined as the quarterly growth rate of total revenues, as an alternative measure to replace *TobinQ* and rerun the regressions. As shown in columns (2) and (4), our results are robust to this alternative measure. To summarize, after the loss of political capital, private firms not only increase their investment in physical capital, but do so more efficiently.

5. Discussion of the substitution between political capital and physical capital

We explore a possible channel through which the loss of political capital impacts a firm's investment decisions to better understand the substitution between political and physical capital. Research has documented that politically connected firms can obtain various economic benefits from the government. For example, Bao et al. (2016) and Cumming et al. (2016) find that political connections reduce the cost of raising capital and increase the propensity to receive direct governmental support for investment in innovation. Benefits can include access to bank loans (especially from state-owned banks), government subsidies, and tax benefits, which can significantly lower a firm's production costs and help maintain a high entry barrier in the market. A firm with strong political capital thus may find little incentive to increase its investment in physical capital. If a firm unexpectedly loses its political capital, the economic benefits it obtains will be reduced, which leads to an increase in production costs. As predicted by our theoretical framework, the firm must make an additional investment in physical capital to rebuild an entry barrier.

We provide evidence on this channel in three steps. First, we show that an unexpected loss of political capital leads to a decrease in the economic benefits obtained by a politically connected firm. Second, we find that a reduction in economic benefits raises the firm's production costs. Finally, we show that although an increase in production costs tends to decrease physical capital investment in general, private firms that experience a loss of political capital boost their physical capital investment despite a hike in costs.

The first step is to run the following regression:

$$Benefit_{it} = \alpha + \beta Polcon_{it} + \gamma X_{it} + \mu_i + \eta_t + \varepsilon_{it} \quad (4)$$

where *Benefit* represents economic benefits. We focus on three categories: bank loans (*Bank loan*), tax benefits (*Tax rate*), and government subsidies (*Subsidy*). The definitions of these three variables are given in Online Appendix B, and their descriptive statistics are reported in Table 2. All other variables are the same as before.

Regression results are shown in Panel A of Table 8. Coefficients on the variable *Polcon* are significant in all columns, which means that the unexpected loss of political capital has significant effects on the economic benefits a private firm can obtain. Specifically, if a private firm loses political capital, the ratio of total loans to total assets (*Bank loan*) and the ratio of government subsidies to net profits (*Subsidy*) decrease by about 5 and 2 percentage points, respectively, while the effective tax rate (*Tax rate*) faced by the private firm increases by about 3 percentage points. Private firms, therefore, experience a drop in the economic benefits they can obtain after they lose political capital.

As a comparison, we investigate whether the loss of nonpolitically connected independent directors affects economic benefits. Since most of these directors lack political backgrounds, we do not expect them to be able to bring economic benefits to firms to the extent that retired government officials can, even if they can offer suggestions on how to obtain such benefits. To test this hypothesis, we reestimate Eq. (4) with the variable *Polcon* replaced by *Non-Polcon*. As shown in Panel B of Table 8, the unexpected loss of independent directors from academic or business elites hardly affects the economic benefits that private firms can obtain.

Second, we test how the reduction in economic benefits affects production costs. We regress the following model:

$$Cost_{it} = \alpha + \beta Polcon_{it} + \delta Benefit_{it} + \gamma X_{it} + \mu_i + \eta_t + \varepsilon_{it} \quad (5)$$

where *Cost* represents the firm's production costs, measured as the ratio of production costs to sales revenue. All other variables are the same as before. We first run a regression without controlling for economic benefits. As shown in column (1) of Panel A of Table 9, we find that the coefficient on the variable *Polcon* is significantly positive, which indicates that the unexpected loss of political capital does indeed lead to an increase in the firm's production costs. As we add variables representing the three economic benefits to the model one at a time, as shown in columns (2)–(4), we observe that the coefficients on the variable *Polcon* decrease and even become insignificant when, in column (5), we add all three variables. These results indicate that the unexpected loss of political capital increases the firm's production costs primarily through the reduction in the economic benefits it can obtain.

Finally, we investigate how the increase in the firm's production costs affects its physical capital investment by regressing the following model³²:

$$Capital_{it} = \alpha + \beta Cost_{it-1} + \delta Cost_{it-1} \times Polcon_{it-1} + \gamma X_{it-1} + \mu_i + \eta_t + \varepsilon_{it} \quad (6)$$

³⁰ One may be concerned that outliers of Tobin's Q may affect the estimation, because the maximum value is significantly higher than the 75th percentile value (see Table 2). We rerun the model after removing the outliers and find that the results are almost unchanged.

³¹ In column (3) of Table 7, the coefficient on *TobinQ* becomes statistically insignificant due to a large drop in the sample size when we use the subsample of politically connected independent directors without higher education or relevant work experience. However, the coefficient on the interaction term remains significantly positive. Also, all of the coefficients are consistent with our expectation in column (4) when we use *Growth* as an alternative measure for investment opportunities.

³² We find that the variables $Cost \times Polcon$ and *Polcon* are highly correlated, so we exclude *Polcon* in the regression equation to avoid multicollinearity.

Table 8
Effects of losing politically connected and nonpolitically connected independent directors on economic benefits.

Panel A: Politically connected independent director			
Variables	Bank loan	Tax rate	Subsidy
	(1)	(2)	(3)
$Polcon_{i,t}$	-0.0501*** (0.0147)	0.0292** (0.0140)	-0.0222*** (0.0077)
Control variables	YES	YES	YES
Firm fixed effects	YES	YES	YES
Quarter-year fixed effects	YES	YES	YES
Observations	9007	9007	9007
Panel B: Nonpolitically connected independent director			
Variables	Bank loan	Tax rate	Subsidy
	(1)	(2)	(3)
$Non-Polcon_{i,t}$	-0.0022 (0.0104)	0.0108 (0.0139)	-0.0008 (0.0084)
Control variables	YES	YES	YES
Firm fixed effects	YES	YES	YES
Quarter-year fixed effects	YES	YES	YES
Observations	7843	7843	7843

Notes: This table shows the effects of sudden deaths of independent directors, both those who are politically connected (Panel A) and otherwise (Panel B), on the economic benefits obtained by private firms in terms of bank loans, tax benefits, and government subsidies. A few private firms (16, or 1%) in our sample changed their industry categories for various reasons (e.g., industrial upgrading or M&As). We include industry dummy variables as well; results are nearly unchanged with or without industry dummy variables. We omit the reporting of the coefficients on control variables for brevity. Robust standard errors clustered at the firm level are in parentheses. Asterisks indicate statistical significance at 1% ***, 5% **, and 10% * levels.

Table 9
Economic benefits, production costs, and physical capital investment.

Variables	Panel A: Effects of losing political capital on production costs through a change in economic benefits					Panel B: Effects of production costs on capital investment	
	<i>Cost</i>					<i>Capital</i>	
	(1)	(2)	(3)	(4)	(5)	(1)	(2)
$Polcon_{i,t}$	0.0213** (0.0106)	0.0174 (0.0109)	0.0202* (0.0105)	0.0199* (0.0106)	0.0147 (0.0107)		
$Bank\ loan_{i,t}$		-0.0765*** (0.0193)			-0.0792*** (0.0187)		
$Tax\ rate_{i,t}$			0.0372*** (0.0095)		0.0405*** (0.0090)		
$Subsidy_{i,t}$				-0.0604*** (0.0115)	-0.0633*** (0.0104)		
$Cost_{i,t-1}$						-0.0225*** (0.0067)	-0.0236*** (0.0067)
$Cost_{i,t-1} \times Polcon_{i,t-1}$							0.0400*** (0.0063)
Control variables	YES	YES	YES	YES	YES	YES	YES
Firm fixed effects	YES	YES	YES	YES	YES	YES	YES
Quarter-year fixed effects	YES	YES	YES	YES	YES	YES	YES
Observations	9007	9007	9007	9007	9007	8288	8288

Notes: This table shows the effects of losing political capital on a private firm's production costs through a change in economic benefits (Panel A) and the effects of production costs on a private firm's physical capital investment (Panel B). A few private firms (16, or 1%) in our sample changed their industry categories for various reasons (e.g., industrial upgrading or M&As). We include industry dummy variables as well; results are nearly unchanged with or without industry dummy variables. We omit the reporting of the coefficients on control variables for brevity. Robust standard errors clustered at the firm level are in parentheses. Asterisks indicate statistical significance at 1% ***, 5% **, and 10% * levels.

Regression results are shown in Panel B of Table 9. As shown in columns (1) and (2), coefficients on the variable *Cost* are significantly negative, which conforms to the prediction in classical economic theory: An increase in production costs reduces the profits that could be used for further investment. On the other hand, we find that the coefficient on the interaction term, $Cost \times Polcon$, is significantly positive, and its magnitude is greater than that of the variable *Cost*. Although a rise in costs depresses physical capital investment for an average firm in the sample, the negative effect is dominated by the strategic increase in physical capital investment for firms that lose their political capital unexpectedly.

To show that our baseline findings are robust to considering the channel of access to capital, we add the control variable *Cost* to the baseline regression Eq. (2) to explicitly account for the effect of political capital loss through production costs. The result is shown in column (6) of Table 5. As expected, the coefficient on *Cost* is negative: A rise in costs leads to a decrease in capital investment. Our coefficient of interest on *Polcon*, importantly, remains robust, and even increases slightly by 0.05 percentage points relative to the baseline magnitude. This finding further confirms that the downward effect on capital investment, despite a loss of political capital leading to an increase in costs, is more than offset by the upward effect driven by a firm's desire to use capacity accumulation to threaten potential rivals.

Taken together, our results show that the loss of political capital reduces the economic benefits obtained by a private firm, which increases its production costs. As a strategic response, the private firm is incentivized to make an additional investment in physical capital to deter potential rival firms from entering the market.

6. Conclusion

This paper exploits the sudden deaths of politically connected independent directors, who can be regarded as private firms' political capital, as exogenous shocks to investigate what firms do after they lose their political capital. Given the infeasibility of reestablishing political connections in the short term, we find that private firms in China increase their physical capital investment substantially upon losing their political capital. Our evidence suggests that private firms use physical capital investment as a strategic substitute for political capital.

Our results have policy implications for developing countries such as China, in which political connections play an important role in the economy. The substitution effect between political and physical capital we find in this paper is much larger than estimates from the US. This may be due to weaker institutions in developing economies. Strengthening the rule of law or fighting corruption in such settings (as in China's recent anti-corruption campaign) may reduce the influence of political connections on firms' investment behavior and improve the efficiency of corporate investment.

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Appendix A. Supplementary data

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