No. 2404 [EN]

IMI Working Paper

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Holding Cash for Corruption? Evidence from China's Anti-corruption Campaign*

By **Yulin Chen, Changyun Wang (Corresponding Author)[1], Yang Yi, and Jianyu Zeng***

September 2024

Abstract

Exploiting China's anti-corruption campaign in 2012 as a quasi-natural experiment, we find that firms with higher prior entertainment and travel costs (ETC), a proxy for corruption, decrease their cash holdings more than firms with lower ETC because of the campaign. The result is robust to the parallel trends test, alternative measures of cash and corruption, alternative sample periods, propensity score matching, and the placebo tests. We further observe a greater decline in the value of cash for the prior more corrupt firms, implying that the past cash holding is more valuable to these firms. Moreover, the baseline pattern is more pronounced in financially constrained, better-governed, and private enterprises. We also conduct additional tests to rule out possible confounders from the perspectives of firms' financing conditions and investment decisions. Overall, the evidence favors the liquidity hypothesis that firms demand less cash as they anticipate fewer corrupt opportunities in the business environment in the post-campaign era.

JEL Classification: G30, G32, D22

Keywords: Anti-corruption; Corporate cash holdings; Liquidity hypothesis

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* Published in Accounting & Finance, Volume 00, September 2024.

[1] Changyun Wang acknowledges the financial support from the National Science Foundation of China (Grant No.: 72341023).

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1. Introduction

The decision of managers to hold cash has been proved to have a significant impact on the firm operation and firm value, making cash holdings a center of academic attention. The extant literature studies two primary motives for firms to hold cash. The first one is the precautionary motive: firms can use liquid assets to hedge against the risk of future cash shortfalls, especially when financing is not available or is excessively costly (Opler et al., 1999; Bates et al., 2009). The second one is the agency motive. Agency theory predicts that managers have a greater preference for cash because it increases their discretion (Jensen, 1986). The agency conflict helps explain why firms deviate from holding the levels of cash that would maximize shareholder value (Pinkowitz et al., 2006; Dittmar and Mahrt-Smith, 2007). While the classic literature conducted in-depth research on the internal determinants of corporate cash policies (Opler et al., 1999; Harford et al., 2008; Bates et al., 2009), they didn't notice the significant impact of external shocks.

A growing literature has extended the research focus to the potential influence of firms' external environment (Duchin et al., 2010; Boutin et al., 2013; Xu et al., 2016; Phan et al., 2019; Chang et al., 2021; Cai et al., 2022). Duchin et al. (2010) find that, compared to those investing heavily in noncash, risky assets, firms holding more cash are less affected by the financial crisis. Their research highlights the importance of hoarding cash to self-insure against macroeconomic shocks. The uncertainty of economic policy is also considered a vital influencing factor (Phan et al., 2019; Duong et al., 2020). Phan et al. (2019) show that managers tend to increase precautionary savings to cope with unexpected adjustments in policies. Besides, political concerns and government intervention have been proven to have a significant impact on cash holdings (Xu et al., 2016; Xie and Zhang, 2020; Chang et al., 2021; Cai et al., 2022). While among all the relevant research, the studies linking corruption and anti-corruption to corporate cash holdings are not much.

The effect of corruption on individual firms has been the subject of considerable debate among scholars for many years. Some studies claim that corruption lowers aggregate productivity by deteriorating firm management practices (Athanasouli and Goujard, 2015), inhibits corporate innovation (Paunov, 2016), impedes firm growth (Fisman and Svensson, 2007; Colonnelli and Prem, 2022), and consequently hurts shareholder value (Lin et al., 2016). However, others argue that corruption is an efficient grease because it helps firms to secure government contracts (Colonnelli et al., 2022), access bank loans (Chen et al., 2013), and hence increase firm value (Borisov et al., 2016; Xu, 2018). Literature has not yet reached a consistent conclusion on how corruption affects corporate decisions and firm value. And theoretically, how firms make decisions on cash policies with the impact of corruption and anti-corruption is also undetermined.

This paper aims to investigate the impact of anti-corruption on corporate cash holdings. We propose two potential channels: the liquidity and the agency cost hypotheses. Both hypotheses predict a decline in cash holdings after the anti-corruption but result in the opposite impact on the market value of holding cash. The liquidity hypothesis suggests that both the level and value of cash holdings decrease in response to the anti-corruption. Some studies argue that corruption greases bureaucratic wheels, improves efficiency, and facilitates business activities in certain countries (Chen et al., 2013; Lin et al., 2016; Zeume, 2017). Thus, when firms can purchase favors from corrupt officials, they would reserve excess cash to take advantage of randomly arising bribing opportunities. For example, if a corrupt official was using bribes to auction off a government contract, a firm that could quickly pay a high bribe could benefit. After anti-corruption, firms lose the chance to connect with politicians and gain competitive advantages through bribery. Then the past

"bribing reserves" become redundant, and firms may utilize them for other purposes, leading to a decline in cash holdings. If this is the dominant channel, firms are presumed to reduce their cash reserves as they demand less liquidity now that there are fewer corrupt opportunities in the business environment. And in that case, the margin benefits of holding cash accordingly decrease, which results in a lower cash value after the anti-corruption.

The agency cost hypothesis also predicts a negative relationship between anti-corruption and cash holdings, but it stems from different mechanisms. Some propose that corruption exacerbates agency conflicts because managers are more exposed to bribery and connection. They tend to offer bribes to officials either for short-term goals or for their private benefits. Corruption is also found to be positively associated with poor corporate governance since it distorts market-based rules and institutional constraints (La Porta et al., 2000; Stulz, 2005; Chaney et al., 2011; Cao et al., 2018). If anti-corruption prevents the rent-seeking and bribe-taking of government officials, it may help alleviate the agency problem and cause managers to hold less non-operational cash. And the mitigation of agency conflicts helps to achieve an increase in the value of cash (Pinkowitz et al., 2006; Mahrt-Smith, 2007).

To examine our hypotheses, we exploit China's anti-corruption reform in 2012 as an exogenous shock to corporate bribery to establish the causal effect of corruption on cash holdings. The existing research on corruption and anti-corruption may be subject to a host of endogeneity biases, since government officials may build connections with local elite firms to enhance their reputation and advance their careers, or they may intentionally connect with poorly-governed firms to seek rents. Using the exogenous anti-corruption campaign in China as a quasi-natural experiment helps us to alleviate such endogeneity concerns. To limit the phenomena of trading bribes for political favors, such as local businesses trying to secure large government contracts or subordinates seeking promotions for higher office, China carried out an unprecedented anti-corruption campaign. On December 4, 2012, following the conclusion of the 18th National Congress of the Chinese Communist Party (CCP), the Eight-point Regulation was announced at a meeting of the Politburo of the CCP (content provided in Appendix B). It is a prelude to the most extensive organized anti-graft reform in the history of the CCP. The campaign led to increased press coverage of corruption and a sharp increase in court cases dedicated to the offense. The crackdown on corruption makes it difficult for government officials to take bribes or seek rent. Griffin et al. (2022) observe that, since the campaign, firms have significantly reduced their spending on connection or corruption.

Our initial sample includes Chinese A-share listed firms from 2010 to 2015. Empirical results indicate that the prior more corrupt firms cut down more cash holdings because anti-corruption reduces their liquidity demand to save for emerging corrupt opportunities, consistent with the liquidity hypothesis. Specifically, we find first that firms with ex-ante higher corruption expenditures experience a greater decline in their cash levels after the event. We check the robustness of the result by performing a parallel trends test, repeating the baseline regression using alternative measures of cash holdings and corruption, alternative sample periods, a propensity score matching method, and placebo tests. The main results remain valid. Besides, we find that the campaign reduces the value of cash holdings to a greater extent for more corrupt firms, which supports the liquidity hypothesis and could not be explained by the agency cost hypothesis. The evidence from cross-sectional tests further shows that the negative impact of anti-corruption on cash holdings is more evident in firms with a higher degree of financing constraints, fewer agency conflicts, and private ownership, which consolidates the liquidity hypothesis. For example, if the agency cost hypothesis holds, the negative relationship between anti-corruption and cash holdings should be more pronounced in firms with severer agency

problems, which is inconsistent with the empirical results that better-governed firms are more affected. Furthermore, we rule out two possible channels that anti-corruption could reduce cash holdings by (a) creating a better financing environment for the more corrupt firms or (b) mitigating the willingness of corrupt firms to invest. Using the cash flow sensitivity of cash, we compare the financing constraints faced by the two groups before and after the campaign and observe no significant difference in the changes. Therefore, the baseline result is unlikely to be driven by the assumption that anti-corruption directly changes the financing conditions of corrupt firms and leads to cash reduction. We also test whether the investment changes distinguish between the treated and controlled firms and find that the changing trends are almost the same. The results eliminate the conjecture that under pressure from the campaign, firms tend to cut down investment plans to avoid the risk of penalty, rendering the excessive holding of cash useless. These additional tests are also supportive of the liquidity hypothesis.

There are several recent papers that focus on the effect of China's anti-corruption campaign on corporate cash holdings. Several researchers documented a positive relationship between the anti-corruption campaign and the level of cash holdings. Chang et al. (2021) exploit the depoliticization regulation (Rule 18) as a quasi-experiment and document that politically connected firms increase their cash holdings 12.7% more than non-connected firms because of these resignations. Cai et al. (2022) find that firms increase cash holdings after their local political leaders are investigated for political corruption. While some researchers showed a negative impact of anti-corruption on cash holdings. For example, Xie and Zhang (2020) find that firms in provinces with more corruption cases tend to hold more cash and they pay attention to government intervention in the market. The inconsistent conclusions imply that the impact and the influencing mechanism of corruption and anti-corruption on firms' cash policies need further discussion and examination.

In fact, the reasons for firms' involvement in corruption can be broadly divided into two categories: actively trading cash with local bureaucrats for political favors to gain competitive advantages, or just passively being involved and having to pay bribes to facilitate their daily business activities. For firms in the former case, the crackdown on corruption could be bad news in the sense that they have lost political connections and many priorities. But for the latter firms, the anti-corruption campaign could be good news, if they could get things done without having to spend a lot on entertaining and bribing the officials. The heterogeneous effects of the downfall of corrupt local politicians lead to different impacts on firms' cash holdings. Our paper distinguishes from the above studies because the identification of corruption in those papers is essentially different from that in our setting. Some province-level corrupt indicators used in prior studies reflect the corrupt environment of firms and the portrayal of firms' corruption involvements is more similar to the second type of passive participation. By contrast, our adoption of ETC as a proxy concentrates more on firms' behaviors over corruption, making our findings different from theirs. Besides, our measurement is a more direct measure of corruption. In their research, a firm in a region awaiting central inspection or without corrupt accuses of chiefs would not be viewed as treated, even if it is a corrupt firm. Our measurement is consistent for all sample firms, identifying the treatment group more effectively. In short, the capture of different types of corruption could be the cause of the different results, which is also one of the contributions of this paper to the literature.

This paper also contributes to the existing literature in at least the following ways. First, it enriches the literature that studies firms' motives for holding cash. Relevant studies pay more attention to analyzing how internal factors impact firms' cash policies. Our research

links firms' decisions on cash to anti-corruption, extending the determinant of corporate cash holdings to external shocks. Also, as the precautionary motive is one of the major drivers of holding cash, the prior studies mostly assume that firms make precautionary savings because they are financially constrained (Almeida et al., 2004; Harford et al., 2014). We provide evidence that firms could also make precautionary savings for investment in potential bribe-paying, enriching the relevant literature.

Second, this paper is related to the broad research of firm-level effects of corruption or anti-corruption. To date, researchers have not reached a consensus on the consequences of anti-corruption. Some argue that anti-corruption improves the efficiency of capital and labor allocation (Giannetti et al., 2021). However, there is also ample evidence of the negative impact of anti-corruption on firms. For example, Ang et al. (2015) find that the political risks of anti-corruption increase the financing costs of some investment firms. Xu (2018) shows that anti-corruption harms firm value by blocking external financing and dampening manager incentives. Pan and Tian (2020) document a significant decline in the investment and investment efficiency of politically-connected firms. In contrast, we study the consequence of the crackdown on corruption from the perspective of corporate cash policies. We show that the campaign causes corrupt firms to reduce cash holdings. More importantly, we attempt to answer the questions of why firms pay bribes and what firms value bribes more. While cash is not the direct target of the campaign, it is relevant in that firms with different attitudes toward corruption manage cash differently, and hence the change in cash policies enables us to make inferences on firms' motives for bribing.

Third, we exploit China's anti-corruption campaign in 2012 as an exogenous shock to corruption, which helps avoid some of the endogeneity issues existing in the previous literature. For instance, a corrupt official could prefer firms with more cash to grab, which results in misleading effects when analyzing the impact of corruption on cash holdings. Therefore, our paper could identify a causal relationship between corruption and corporate cash holdings. That is, the existence of corrupt opportunities incentivizes firms to build bribing reserves, especially for constrained, well-governed, private firms.

The remainder of the paper proceeds as follows. Section 2 introduces the institutional background. Section 3 reviews the literature on cash holdings and corruption and develops hypotheses. Section 4 describes the data and the research design. Section 5 presents the results of the baseline regression and robustness tests. Section 6 provides the results of disentangling competing hypotheses and further discussions. Section 7 concludes.

2. Institutional Background

2.1 Corruption in China

Due to the extensive fiscal decentralization, local governments in China often control the key necessities and resources for enterprise development. For instance, they determine land use, award large contracts, and influence tax collection. This way of allocating resources and contracts has created an environment for political rent-seeking. Besides, the compensation of Chinese officials is generally low relative to that in private industry and other countries, which incentivizes them to seek alternative compensation in monetary and non-monetary forms. In this environment, entrepreneurs invest in "entertaining" officials with the expectation of securing regulatory forbearances, tax favors, subsidies, and the like. Firms appoint CEOs and directors who are former government officials to obtain direct connections to political power. They also spend on lavish banquets, private club memberships, expensive travels and gifts, or other de facto bribes, to attract the favors of government officials. These costs are recorded as entertainment expenses in Chinese firms' profits and loss accounts (Li et al., 2008; Cai et al., 2011).

A critical feature of political corruption in China, as Bai et al. (2020) point out, is that local governments extract rents from a few favored firms to further their political careers and get personal benefits. In addition to that, Chen et al. (2013) argue that corruption acts in China as the proverbial "grease", indicating that a close connection has been established through corruption for facilitating firms' access to better investment opportunities. China's institutional characteristics make it a good testing ground for examining the alternative hypotheses of the relationship between corruption and firm policies because alternative theories are possible to explain various phenomena.

2.2 China's Anti-corruption Campaign

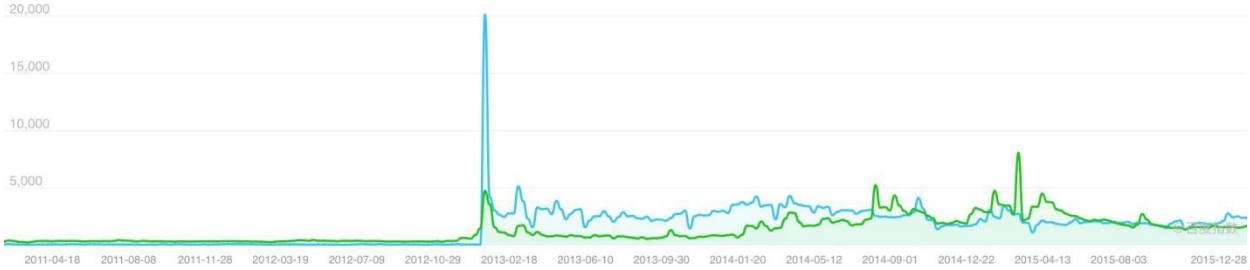
Shortly after the conclusion of the 18th National Congress of the CCP on November 14, 2012, the boldest and most far-reaching anti-corruption campaign was initiated in China. On December 4, the Politburo of the Central Committee of the CCP issued Eight-point Regulation, which provides clear guidance for the party and government officials to crack down on corruption (content provided in Appendix B). Individual provinces and province-level jurisdictions quickly rolled out more detailed rules. The announcement of the Eight-Point Regulation gained immediate and widespread media prominence, as evident in Figure 1, which graphs Baidu searches for the keywords "Eight-Point Regulation (八项规定)" and "anti-corruption (反腐)" between 2011 and 2015. It is noticeable that public attention to anti-corruption is weak and stable before the 18th National Congress. There was a sharp jump in attention in 2012, and the search frequency remained at a much higher level afterward.

There is ample evidence that these measures were effective from the onset. According to the Central Commission for Discipline and Inspection, in 2013 alone, more than 182,000 officials were investigated or arrested for corruption and abuse of power, including 43 at the level of vice-minister or above. Firms decreased their entertainment and travel expenses, a common proxy for connection and corruption (Griffin et al., 2022), and those with high pre-event entertainment expenses experienced negative abnormal returns on November 8, 2012, the day of the announcement of the anti-corruption campaign (Lin et al., 2016). Politically connected firms also experienced negative returns in May 2013, when the actual regional inspections were announced (Ding et al., 2020). Other statistics reinforce the effectiveness of the campaign. Apart from the reported significant drops in restaurant bookings, domestic sales of cigarettes, alcohol, Gucci, and Ferraris all dropped abruptly in 2013.

Overall, the anti-corruption campaign has increased the expected punishment associated with corruption, thus dampening local government officials' incentive to concede political favors and grease the wheel for private firms. Notably, the campaign provides an ideal setting for a quasi-natural experiment in this research. First, given its sudden and swift announcement, the campaign came as a surprise event, largely exogenous to firms' policies and performance. Besides, there were no other major policy reforms or other changes in industrial policy that may weaken the main results or have affected firms differentially (Giannetti et al., 2021). Understanding the nature of this campaign is of academic and practical importance.

Figure 1: Baidu Searches for Eight-point Regulation (blue) and Anti-corruption

(green)



3. Literature and Hypothesis Development

3.1 Literature on Corporate Cash Holdings

The extant literature has proposed and tested two primary motives of firms to hold cash: precautionary motive and agency cost. Precautionary motive refers to a firm's propensity to reserve cash to hedge for the risk of future liquidity shortfalls. Opler et al. (1999) find that firms hold more cash when their cash flows are more volatile and when they face a lower degree of financing constraints. Almeida et al. (2004) link the financing constraints with the cash flow sensitivity and conclude that the more constrained firms retain more cash from the cash inflows. Bates et al. (2009) suggest that the positive relationship between cash flow volatility and corporate cash holdings is due to the precautionary motive. Harford et al. (2014) claim that refinancing risk is a crucial determinant of cash holdings since firms mitigate refinancing risk by increasing their cash holdings and saving cash from cash flows. The literature also underscores the importance of investment opportunities when studying the precautionary savings motive for excess cash holdings (Mikkelson and Partch, 2003; Haushalter et al., 2007; Denis and Sibilkov, 2010). Denis and Sibilkov (2010) provide evidence that excess cash holdings help firms to seize more investment opportunities.

Many other researchers study corporate cash holdings from the perspective of agency costs. Jensen (1986) mentions that managers tend to hold excess cash for private interests. Harford (1999) finds that firms with higher cash reserves are more likely to participate in mergers and acquisitions (M&A) that damage the operating performance and corporate value, indicating that managers can abuse the excess cash. Dittmar and Mahrt-Smith (2007) demonstrate that better shareholder protection lowers the level of cash holdings. In contrast, Harford et al. (2008) use the US data to show that worse-governed firms tend to have higher capital expenditures and more M&A activities, implying that managers are more motivated to consume than to save cash.

While the above theories focus more on firms' internal determinants of cash holdings. A growing literature reveals that the external environment also significantly affects firms' cash policies. Firms could hold cash in a strategic and flexible manner (Fresard, 2010; Boutin et al., 2013). Boutin et al. (2013) propose that when facing competition in the product market, firms tend to strategically hold more cash to intimidate competitors and gain negotiating advantages. Besides, the political environment can be a factor affecting firms' cash strategies. Xu et al. (2016) suggest that before the adjustment of government officials, firms tend to hold less cash to deal with the potential threats of "grabbing hands". The impact of uncertainty on cash holdings has also been documented. Phan et al. (2019) and Duong et al. (2020) propose that economic policy uncertainty can intensify firms' motives for precautionary savings, leading to an increased level of cash holdings. Hanlon et al. (2017) point out that if a firm is faced with high uncertainty of tax payment, it tends to hold more cash to satisfy unexpected future demands. Also, as we have already mentioned in the section of Introduction, political connections, corruption, and government intervention all have unignorable impacts on corporate cash holdings (Xie and Zhang, 2020;

Chang et al., 2021; Cai et al., 2022). Smith (2016) finds firms in corrupt regions also tend to hold less cash to prevent rent-seeking from government officials. Our research studying the influencing factors of corporate cash holdings from the perspective of anti-corruption belongs to and contributes to this line of literature.

Prior works also examine the value of cash holdings. Pinkowitz et al. (2006) claim that the market value of cash is lower in regions with poorer investor protection. Dittmar and Mahrt-Smith (2007) suggest that improving corporate governance can raise the marginal value of holding cash. Frésard and Salva (2010) document that the value investors attach to excess cash reserves is substantially larger for foreign firms listed on US exchanges and over-the-counter than for their domestic peers because a US listing constrains insiders' inefficient allocation of corporate cash reserves significantly.

3.2 Literature on Corruption and Anti-corruption

This paper also relates to the broad literature on the economic consequences of corruption. Prior studies have explored the relationship between corruption and economic growth, yet no consistent conclusion has been made (Bardhan, 1997). Some argue that corruption is helpful for business production and operation and hence can promote economic growth. Specifically, corruption creates a suboptimal equilibrium by offering bribery opportunities to the most efficient firms (Lui, 1985). Moreover, firms can alleviate the inhibition of policy distortions by actively paying bribes, in which case corruption serves as grease and may increase firm value (Chen et al., 2013; Lin et al., 2016; Zeume, 2017). In contrast, many studies point out that corruption harms production and growth. The most common critique of corruption is about the misallocation of resources: a corrupt local government may allocate resources to firms based on connections and bribes rather than their productivity (Murphy et al., 1991). Besides, corruption distorts redistribution and hence slows down economic growth (Shleifer and Vishny, 1993; Mauro, 1995; Smarzynska and Shang-Jin, 2000).

Besides, our research is relevant to the literature on the impact of corruption on corporate behavior. Fisman and Svensson (2007) find that a one percent increase in corruption expenditure leads to a three percent decrease in firm growth. The negative impact is about three times that of the tax burden. Ayyagari et al. (2014) observe that innovating firms spend more on bribe payments, implying that government officials are more likely to seek rents from innovating firms. Athanasouli and Goujard (2015) show that corruption can decrease aggregate productivity by deteriorating firm management practices. Liu (2016) notices that corrupt firms are more involved in earnings management, financial fraud, insider trading, and other misconduct. Paunov (2016) documents that corruption significantly inhibits corporate innovation and has a greater impact on small firms.

This paper is closely related to the literature that uses the government's anti-corruption campaign to identify the causal effect of corruption. Borisov et al. (2016) find a value-enhancing effect of corrupt lobbying by studying the US government's restriction on corporate lobbying expenditure. Zeume (2017) takes the passage of the UK Bribery Act 2010 as an exogenous shock to UK firms' cost of doing business in corrupt regions and concludes that the unilateral anti-bribery restrictions on some firms can increase the value of other firms in the industry. Notably, a stream of studies exploits the event that Brazil's government began to randomly audit municipalities' expenditures of federally transferred funds in 2003 as a quasi-natural experiment to estimate the real economic effects of corruption (Ferraz and Finan, 2008, 2011; Avis et al., 2018; Colonnelli et al., 2022; Colonnelli and Prem, 2022). Colonnelli and Prem (2022) show that politically connected firms suffer after anti-corruption audits, indicating the anti-corruption program generates

significant local multipliers which are consistent with the presence of a giant corruption tax on government-dependent firms.

Our work contributes most directly to the literature that studies the relationship between corruption and corporate behaviors using China's anti-corruption campaign as an exogenous shock (Ang et al., 2015; Lin et al., 2016; Xu and Yano, 2017; Zhou, 2017; Cao et al., 2018; Xu, 2018; Ding et al., 2020; Hao et al., 2020; Hu et al., 2020; Pan and Tian, 2020; Giannetti et al., 2021; Li et al., 2021; Griffin et al., 2022; Fang et al., 2023). Lin et al. (2016) find that the campaign boosts firm valuation for state-owned enterprises (SOEs) and non-SOEs in provinces with more developed market institutions. The reaction is negative for non-SOEs in provinces with weak market institutions, probably because anti-corruption limits these non-SOEs' ability to utilize "connections" where these are more important. Xu and Yano (2017) reveal that the corruption crackdown significantly alleviates political extraction, which encourages firms to obtain more external funding and actively participate in R&D activities. On the contrary, Xu (2018) reports that the mandated resignation of directors damages firm value because the regulation depresses corporate financing and destroys the incentives of CEOs and government officials. Fang et al. (2023) identify a substitution effect of bribes and productivity in helping firms to secure government subsidies. After the campaign, it is productivity instead of bribery that determines which firms obtain these innovation subsidies. Furthermore, anti-corruption significantly enhances the role of government subsidies in promoting innovation. Recently, Pan and Tian (2020) document a significant decline in corporate investment expenditures and investment efficiency of politically connected firms after the anti-corruption campaign.

3.3 Research Hypotheses

This paper analyzes how firms adjust their holdings of cash when facing the shock of anti-corruption. We propose two testable hypotheses that both indicate a mitigating effect of anti-corruption on cash holdings and aim to identify the main driver of the negative relationship.

The first is referred to as the liquidity hypothesis. Firms will strategically use cash holdings to adapt to the business environment (Klasa et al., 2009; Frésard 2010; Smith, 2016). If business activities are suppressed by policy distortions, establishing connections with officials through bribery spending can act as a "grease" (Chen et al., 2013; Lin et al., 2016; Zeume, 2017). Hence, when firms can purchase favors from corrupt officials to achieve better performance, they may reserve excess cash to avoid missing bribing opportunities (Smith, 2016; Thakur and Kannadhasan, 2019)[2]. After the anti-corruption campaign, however, firms do not anticipate as many political favors through bribery, so they demand less liquidity and are less willing to hold excess cash.

The agency cost hypothesis also predicts a negative impact of anti-corruption on cash holdings. Prior studies argue that corruption is usually associated with agency conflicts. Stulz (2005) mentions the "twin agency problems" that rent-seeking by officials and grabbing by controlling shareholders or managers reinforce each other, and hence agency conflicts are severer in more corrupt areas. Also, firms that obtain political connections with corruption expenditure are proved to disclose lower-quality accounting information (Leuz and Oberholzer-Gee, 2006; Chaney et al., 2011), which leads to poor corporate governance and severe agency problems. Yu and Yu (2011) notice that lobbying significantly reduces the probability of corporate fraud being investigated. As we mentioned above, the agency problem serves as one of the major inducements motivating

[2] For example, if a corrupt official were using bribes to auction off a government contract, a firm that could quickly pay a high bribe could benefit.

firms to hold more cash (Jensen, 1986; Chen et al., 2012). So, corruption can lead to higher cash holdings due to its positive correlation with agency costs. Since the anti-corruption campaign prevents the rent-seeking and bribe-taking of government officials, it may help alleviate the agency problem and reduce corporate cash holdings.

To sum up, the liquidity hypothesis predicts that anti-corruption campaign discourages firms from maintaining a high level of cash holdings given fewer corrupt opportunities in the business environment to seize. And the agency cost hypothesis suggests that the campaign makes it difficult for government officials to seek rents and alleviate agency conflicts, leading to lower cash holding levels. Thus, we propose our hypothesis H1 as follows:

$\boldsymbol{H_1}$: The anti-corruption campaign decreases corporate cash holdings.

While the two hypotheses both indicate a reduction in the levels of cash holdings after the anti-corruption campaign, they could lead to opposite changes in the market value of cash holdings. Previous studies suggest that the agency problem significantly affects cash value. The controlling shareholders and managers tend to overhold cash for tunneling activities and managerial entrenchment (Jensen, 1986; Chen et al., 2012), both of which reduce the value of cash. Pinkowitz et al. (2006) observe a lower value of cash holdings in regions with poorer investor protection. Dittmar and Mahrt-Smith (2007) claim that better corporate governance raises the market value of cash. So, if the anti-corruption campaign reduces corporate cash holdings by weakening the agency motive (agency cost hypothesis), then we expect an increase in the market value of cash holdings. So, our hypothesis H2a would be:

$\boldsymbol{H_{2a}}$: The anti-corruption campaign increases the market value of cash holdings.

The prior literature also asserts that firms may hold cash to meet the actual needs of business and investment activities (Opler et al., 1999; Almeida et al., 2004; Harford et al., 2014). Such precautionary saving is conducive to firm growth and thus has a higher level of market value (Faulkender and Wang, 2006). In a corrupt environment, to alleviate the policy distortions on business activities and achieve better development, firms will reserve excess cash to seize potential bribery opportunities for political favors. This demand for liquidity is generated by corruption, but it is for better operation rather than entertainment, so it can be of marginal benefit to firm value and lead to a higher value of cash holdings (Chen et al., 2013; Lin et al., 2016; Zeume, 2017).

After the campaign, however, firms anticipate rare needs to seize corrupt opportunities in the future, so they are less motivated to keep these non-operational bribe cash reserves (liquidity hypothesis). The effectiveness of using bribery to gain operational advantages for firms also decreases, making the cash held for corruption purposes less of a contribution to the growth of firm value. Consequently, the value of cash holdings should decline as well. Accordingly, our hypothesis H2b is proposed as follows:

$\boldsymbol{H_{2b}}$: *The anti-corruption campaign decreases the market value of cash holdings.*

4. Research Design

4.1 Identification, Methodology, and Variables

This paper intends to establish the causal effect of anti-corruption on corporate cash holdings. Our identification strategy is to exploit a quasi-natural experiment in China. We consider the anti-corruption campaign starting in late 2012 as an exogenous shock to firm-level corruption and perform a 6-year-window difference-in-differences (DID) test. This approach is embodied in the following specification:

$$Cash_{i,t} = \alpha + \beta Corrupt_i \times Post_t + \gamma X_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (1)$$

where $Corrupt_i$ and $Post_t$ should have been included in the model but are absorbed because we control for firm and year fixed effects in all regressions. $Cash_{i,t}$ represents firm i's cash holdings in year t. Based on Opler et al. (1999), Fritz Foley et al. (2007), and Bates et al. (2009), we adopt several methods to measure corporate cash holdings: (1) cash and cash equivalents scaled by total assets ($Cash/Assets$); (2) cash and cash equivalents scaled by net assets[3] ($Cash/Net\ Assets$); (3) the natural logarithm of cash and cash equivalents ($Log\ Cash$); (4) cash and cash equivalents scaled by sales ($Cash/Sales$). Besides, we adjust firm i's cash holdings by subtracting its industry median and propose (5) industry-adjusted cash and cash equivalents scaled by total assets ($Cash1$) and (6) industry-adjusted cash and cash equivalents scaled by net assets ($Cash2$). In addition, we consider a broader definition of cash by including the tradable financial assets and construct (7) the sum of cash and cash equivalents and tradable financial assets scaled by total assets ($Cash3$) and (8) the sum of cash and cash equivalents and tradable financial assets scaled by net assets ($Cash4$). We report the results for the first two cash holdings measures in subsequent analysis and use the other six measures for robustness checks.

$Corrupt_i$ and $Post_t$ are the central variables to the design of the DID approach. $Post_t$ is an indicator for post-event that equals one if year t is in 2013-2015 and equals zero for years 2010-2012. $Corrupt_i$ is a dummy variable that takes the value of one if firm i's corruption expenditures in 2011 (one year before the event) is above the sample median, and zero otherwise. Following prior research (Cai et al., 2011; Chen et al., 2013; Lin et al., 2016; Fang et al., 2023), we employ the firm's entertainment and travel costs (ETC) as a fraction of total sales to proxy for firm-level corrupt payments. The measurement is first proposed by Cai et al. (2011). In Chinese firms, the expenditures used to bribe government officials are usually under the ETC accounting category for the purpose of reimbursement (Cai et al., 2011; Griffin et al., 2022). Although firms' ETC is a mixed measurement, the variable is proved to be valid and adopted for measuring corruption in China in many relevant studies. Therefore, we use ETC/Sales to split our sample into the treated and control groups in the main regressions. And for robustness, we use the average ETC/Sales in the three years prior to the campaign, that is, 2009-2011, to split the sample into two quantiles ($Corrupt2$). In addition, to address the concern of potential measurement error due to the difficulties of distinguish corrupt expenses from the other components in ETC, we follow Cai et al. (2011) and Fang et al. (2023) and run a cross-sectional regression of ETC/Sales. In the regression, we control for major systematic variations in legitimate business costs using the pre-event subsample and take the residual from the estimation as another measure of corruption and refer to it as the abnormal ETC (see Section 5.3.2 for details). Sorting on abnormal ETC, we label firms with a third dummy variable for their corruption level ($Corrupt3$). Finally, we adjust each firm's ETC/Sales by subtracting the province-industry mean and use the adjusted measure to divide firms into high and low corrupt groups ($Corrupt4$).

[3] The net assets are calculated by total assets less cash and cash equivalents.

$X_{i,t}$ denotes the control variables. We draw controls from previous research on the determinants of cash holdings (Opler et al., 1999; Bates et al., 2009): (1) market to book ratio (MB), defined as the market value divided by the book value of equity; (2) size ($Size$), measured by the natural logarithm of one plus the book value of total assets; (3) age (Age), calculated by the natural logarithm of one plus the year since the firm's establishment; (4) operating cash flow (OCF), defined as the net cash flow from operating activities scaled by the book value of total assets; (5) net working capital (NWC), equal to the ratio of net working capital less cash and cash equivalents to total assets; (6) capital expenditures ($Capex$), which is the net cash used to buy and maintain fixed assets, intangible assets, and other long-term assets, scaled by total assets; (7) industry volatility of cash flows ($Industry\ Vol$), the standard deviation of the operating cash flows of all firms within the same industry; (8) leverage ($Leverage$), measured by the ratio of interest-bearing liabilities to total assets; (9) paying dividend or not ($Dividend$), a dummy variable that equals one if a firm pays a common dividend in a year, and zero otherwise. Besides, we control for corporate governance factors: (10) the independence of the board of directors ($Independence$), defined as the proportion of independent directors in the number of the board of directors; (11) board size ($Board\ Size$), which takes the natural logarithm of one plus the total number of directors.

We incorporate firm fixed effect in the regressions to control for the firm-level invariant unobserved factors and year-fixed effect to control for the macroeconomic shocks. Moreover, since corruption is deeply rooted in certain areas while less so in others, and since it has many covariates, the regional factor and other omitted variables could drive the association between corruption and corporate financial policies (Smith, 2016). To address this endogeneity concern, we include the interaction between province and year to control for the time-varying regional-level unobserved factors. The parameter of interest is the coefficient β. Robust standard errors clustered at the firm level are used in our analysis.

4.2 Data and Sample Statistics

The implementation of the anti-corruption policy was in late 2012 and we analyze a sample of Chinese A-share listed firms from 2010 to 2015. Following the sample selection criteria in the related literature, we exclude (1) firms in the financial sector, (2) observations with missing values of key variables, (3) firms listed in or after the event year, and (4) observations that are less than 1 year since the firm went public. Our final sample consists of 9,928 firm-year observations. We retrieve most of the variables from the China Securities Market and Accounting Research (CSMAR) database, except that the Entertainment and Travel Costs are from the Chinese Research Data Services (CNRDS) database, the regional sales and the per capita GDP in different provinces, municipalities, and autonomous regions are from WIND database. To eliminate the influence of extreme values on the regression results, we winsorize all continuous variables at the 1% and 99% cutoff points.

Table 1 presents the summary statistics. During the sample period, the cash and cash equivalents of non-financial listed firms in China account for 19.1% of total assets and 28.8% of net assets on average. The latter is higher than the average cash-to-net assets ratio of 23.4% as documented by Chen et al. (2012) who analyze a sample from 2000 to 2008. This is consistent with the recent rising trend of cash holdings in listed firms worldwide (Bates et al., 2009; Harford et al., 2014; Graham and Leary, 2018). The average proportion of ETC in sales is 0.9% and the quartile difference is also 0.9%, which implies a wide

variation in corrupt payments among Chinese firms. In terms of control variables, the average market-to-book ratio is 4.04, the average log of total assets is 21.86, the average log of firm age is 2.7, the average net operating cash flows are about 3.6% of total assets, the average net working capital less cash and cash equivalents accounts for 1.1% of total assets, the average capital expenditures equal 5.2% of total assets, the average industry volatility of operating cash flows is 0.092, the average ratio of interest-bearing liabilities to total assets is 19.9%, about two-thirds of the firm-year observations issue common dividends, the board has over one-third of independent directors on average, and the average log of total directors is 2.15.

Table 1. Descriptive Statistics

This table reports sample statistics. All variables are calculated for each firm-year, while grouping variables are calculated using a pre-event subsample. Variables are defined in Table A1 in the Appendix.

Variable	Obs.	Mean	Std.	p5	p25	Median	p75	p95
Measures of Cash Holdings								
Cash/Assets	9,928	0.191	0.138	0.037	0.093	0.152	0.251	0.489
Cash/Net Assets	9,928	0.288	0.320	0.038	0.102	0.179	0.335	0.957
Log Cash	9,928	19.920	1.300	17.800	19.180	19.930	20.710	22.080
Cash/Sales	9,928	0.471	0.582	0.055	0.146	0.276	0.544	1.561
Cash1	9,928	0.029	0.126	-0.126	-0.052	0.000	0.082	0.292
Cash2	9,928	0.087	0.296	-0.172	-0.067	0.000	0.128	0.693
Cash3	9,928	0.192	0.139	0.037	0.094	0.153	0.253	0.491
Cash4	9,928	0.292	0.324	0.039	0.103	0.181	0.339	0.964
Measures of ETC (year = 2011)								
ETC/Sales	1,804	0.009	0.013	0.001	0.002	0.005	0.011	0.032
Average ETC/Sales	1,804	0.011	0.033	0.001	0.002	0.005	0.011	0.032
Abnormal ETC/Sales	1,699	-0.001	0.014	-0.015	-0.008	-0.003	0.002	0.017
Demeaned ETC/Sales	1,804	0.000	0.014	-0.011	-0.006	0.005	0.011	0.032
Control Variables								
MB	9,928	4.041	4.321	1.097	1.913	2.893	4.667	10.880
Size	9,928	21.860	1.178	20.200	21.050	21.760	22.560	24.010
Age	9,928	2.705	0.378	1.946	2.485	2.773	2.996	3.178
OCF	9,928	0.036	0.075	-0.087	-0.003	0.036	0.079	0.156
NWC	9,928	0.011	0.221	-0.369	-0.118	0.030	0.160	0.339
Capex	9,928	0.052	0.053	0.000	0.014	0.038	0.075	0.160
Industry VOL	9,928	0.092	0.129	0.050	0.063	0.072	0.088	0.150
Leverage	9,928	0.199	0.175	0.000	0.038	0.170	0.319	0.521
Dividend	9,928	0.670	0.470	0.000	0.000	1.000	1.000	1.000
Independence	9,928	0.372	0.053	0.333	0.333	0.333	0.400	0.462
Board Size	9,928	2.150	0.199	1.792	2.079	2.197	2.197	2.485

Note: This table reports sample statistics. All variables are calculated for each firm-year, while grouping variables are calculated using a pre- event subsample. Variables are defined in Table A1 in Appendix 1.

5. Anti-corruption and Corporate Cash Holdings

5.1 Main Regressions

Table 2 reports the baseline regression results in this paper. Columns (1) and (2) are estimates with cash to total assets as the dependent variable and, in Columns (3) and (4), the dependent variable is cash to net assets. All the regressions include the firm and year fixed effects, while Columns (2) and (4) also include the interaction between province and year to account for the time-varying regional heterogeneity. The key variable of interest is the interaction term $Corrupt \times Post$ in Equation (1), as the sign of its coefficient β captures the difference in the effect of anti-corruption on cash holdings between the two groups. As shown in Table 2, the coefficients of the interaction term are negative and significant at the 1% level for all regressions, which means that firms that spend more on corruption ex-ante experience a sharper drop in cash holdings ex-post. Specifically, take Column (1) as an example, compared to firms with less past corrupt payments, firms in the more corrupt group reduce their cash holdings by 0.035 more. We interpret the coefficient as follows: given that the average cash to total assets ratio is 0.191 for the full sample, after the campaign, ceteris paribus, firms with prior higher bribery expenditures hold 18% (=0.035/0.191) less cash than those bribing less. This suggests that the campaign has a more significant impact on the prior more corrupt firms.

The included controls are mostly of the expected signs. Firm age is negatively correlated with cash holdings, consistent with the findings of Opler et al. (1999) and Chen et al. (2012). The operating cash flows are positively associated with cash holdings, indicating that firms are saving cash out of cash flows (Almeida et al., 2004). The net working capital exhibits a negative relationship with cash holdings, implying a substitution effect between both. Capital expenditures also have a negative effect on cash, in line with Bates et al. (2009). Finally, higher leverage ratios are associated with lower cash holdings, probably because firms with higher debt ratios use more cash for interest payments (Chen et al., 2012).

Overall, the results support hypothesis H1 that anti-corruption significantly reduces corporate cash holdings and the post-campaign reduction is greater for firms with higher corrupt payments before the campaign.

Table 2. Anti-corruption and Corporate Cash Holdings

This table reports the effect of anti-corruption on corporate cash holdings. Firm-level clustered standard errors are in parenthesis. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Variables are defined in Table A1 in the Appendix.

Variables	(1)	(2)	(3)	(4)
	Cash/Assets		Cash/Net Assets	
Corrupt × Post	-0.035***	-0.033***	-0.090***	-0.084***
	(0.005)	(0.005)	(0.011)	(0.011)
MB	-0.000	0.000	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Size	0.014**	0.015***	0.021	0.023
	(0.006)	(0.006)	(0.015)	(0.015)
Age	-0.363***	-0.333***	-0.838***	-0.788***
	(0.028)	(0.028)	(0.071)	(0.074)
OCF	0.103***	0.113***	0.219***	0.243***
	(0.019)	(0.019)	(0.046)	(0.045)

NWC	-0.150***	-0.144***	-0.372***	-0.362***
	(0.017)	(0.017)	(0.044)	(0.044)
Capex	-0.154***	-0.158***	-0.496***	-0.499***
	(0.029)	(0.029)	(0.072)	(0.072)
Industry VOL	0.004	0.006	0.004	0.006
	(0.011)	(0.012)	(0.030)	(0.032)
Leverage	-0.286***	-0.282***	-0.612***	-0.601***
	(0.021)	(0.021)	(0.052)	(0.053)
Dividend	0.015***	0.014***	0.028***	0.026***
	(0.003)	(0.003)	(0.006)	(0.006)
Independence	-0.044	-0.055	-0.098	-0.123
	(0.038)	(0.039)	(0.092)	(0.093)
Board Size	-0.006	-0.006	0.001	0.001
	(0.015)	(0.015)	(0.036)	(0.036)
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	9,928	9,928	9,928	9,928
Adj. R^2	0.679	0.683	0.653	0.657

5.2 Parallel Trends Test

The DID setting assumes that the treatment group (firms with higher corrupt payments ex-ante) and the control group (firms with lower corrupt payments ex-ante) have similar trends in their cash holding levels before the campaign. Otherwise, our estimation can be biased. Therefore, we estimate the following regression model to ensure that our examinations satisfy the parallel trends assumption:

$$Cash_{i,t} = \alpha + \sum_{j=1}^{5} \beta_j Corrupt_i \times Year_{201j} + \gamma X_{i,t} + \lambda_t + \mu_i + \varepsilon_{i,t} \qquad (2)$$

where $Year_{201j}$ is a time dummy that takes one if the year is $201j$. We choose 2010 as the base year. Other variables are consistent with those in Equation (1). Also, the terms $Corrupt_i$ and $Year_{201j}$ are absorbed because we control for firm and year fixed effects in the regressions.

The results are shown in Table 3. Before the anti-corruption campaign in late 2012, the differences in the cash holdings between the two groups are not distinguishable from zero, as evidenced by the coefficients β_1 for the year 2011 and β_2 for the year 2012. This verifies the parallel trends assumption. And as we expected, in the three years following the campaign (2013-2015), the more corrupt group shows a significantly larger reduction in their cash holdings. Based on the increasing magnitude of β_3 to β_5, we can infer that the reform has a dynamic impact on corporate cash holdings. This trend is accordant with the persistent high pressure against corruption in China in recent years.

Table 3. Testing for Parallel Trends

This table reports the results of the parallel trends test. Firm-level clustered standard errors are in parenthesis. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Variables are defined in Table A1 in the Appendix.

Variables	(1)	(2)	(3)	(4)
	Cash/Assets		Cash/Net Assets	
$Corrupt_i \times Year_{2011}$	0.006	0.006	0.023	0.022
	(0.006)	(0.006)	(0.014)	(0.014)
$Corrupt_i \times Year_{2012}$	0.005	0.007	0.010	0.013
	(0.006)	(0.006)	(0.015)	(0.015)
$Corrupt_i \times Year_{2013}$	-0.017**	-0.014**	-0.049***	-0.044***
	(0.007)	(0.007)	(0.016)	(0.016)
$Corrupt_i \times Year_{2014}$	-0.034***	-0.031***	-0.082***	-0.076***
	(0.007)	(0.007)	(0.017)	(0.017)
$Corrupt_i \times Year_{2015}$	-0.042***	-0.038***	-0.104***	-0.096***
	(0.008)	(0.008)	(0.019)	(0.019)
MB	0.000	0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Size	0.015***	0.016***	0.023	0.025
	(0.006)	(0.006)	(0.015)	(0.015)
Age	-0.360***	-0.331***	-0.830***	-0.782***
	(0.028)	(0.028)	(0.072)	(0.074)
OCF	0.104***	0.114***	0.222***	0.246***
	(0.019)	(0.019)	(0.046)	(0.045)
NWC	-0.149***	-0.144***	-0.371***	-0.361***
	(0.017)	(0.017)	(0.045)	(0.044)
Capex	-0.157***	-0.162***	-0.502***	-0.506***
	(0.029)	(0.029)	(0.073)	(0.072)
Industry VOL	0.004	0.006	0.004	0.006
	(0.011)	(0.011)	(0.030)	(0.031)
Leverage	-0.285***	-0.282***	-0.610***	-0.599***
	(0.021)	(0.021)	(0.052)	(0.053)
Dividend	0.015***	0.014***	0.028***	0.026***
	(0.003)	(0.003)	(0.006)	(0.006)
Independence	-0.041	-0.053	-0.092	-0.118
	(0.038)	(0.039)	(0.091)	(0.093)
Board Size	-0.005	-0.005	0.002	0.003
	(0.015)	(0.015)	(0.036)	(0.036)
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	9,928	9,928	9,928	9,928
Adj. R^2	0.680	0.683	0.654	0.657

5.3 Robustness

In this subsection, we check the robustness of the main results from the following aspects. We first substitute the other six measures of corporate cash holdings, sort firms according to three different measures of corruption, and conduct the tests using alternative sample periods. Then, we conduct a propensity score matching analysis to avoid selection bias. Last, we show that the main conclusion is not a placebo effect.

5.3.1 Alternative Measures of Cash Holdings

Firstly, we repeat the regressions using alternative measures of cash holdings in literature (Opler et al., 1999; Fritz Foley et al., 2007; Bates et al., 2009). Panel A of Table 4 reports the estimates with the $Log\,Cash$ and $Cash/Sales$ as dependent variables. From the signs and significant levels of the interaction term, we conclude that changing measures of cash holdings does not affect the main result.

Besides, corporate cash holdings may be associated with specific industry characteristics, and there can be systematic variation among different industries. Thus, we make industry adjustments to each firm's cash holdings. Specifically, we subtract the industry median from the firm's annual cash holdings and use these de-medianed cash measures as dependent variables. The results, as shown in Panel B of Table 4, are consistent with the baseline regressions.

Finally, we modify the definition of cash by incorporating the influence of tradable financial assets (short-term investments). Since firms may hold tradable financial assets to substitute cash, we include these liquid assets in the measurement of corporate cash holdings. As Panel C of Table 4 shows, the regression results are robust to this adjustment.

Table 4. Robustness: Alternative Measures of Cash Holdings

This table reports the regression results with respect to alternative measures of cash holdings. Panel A shows the results with respect to alternative measures. Panel B shows the results with respect to industry-adjusted cash holdings. Panel C shows the results with tradable financial assets included in cash holdings. Firm-level clustered standard errors are in parenthesis. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Variables are defined in Table A1 in the Appendix.

Panel A: Alternative Measures				
Variables	(1)	(2)	(3)	(4)
	Log Cash		Cash/Sales	
Corrupt × *Post*	-0.128***	-0.117***	-0.127***	-0.120***
	(0.029)	(0.029)	(0.021)	(0.021)
Controls	√	√	√	√
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	9,928	9,928	9,928	9,928
Adj. R^2	0.859	0.861	0.614	0.619
Panel B: Industry-adjusted Cash Holdings				
Variables	(1)	(2)	(3)	(4)
	Cash1		Cash2	
Corrupt × *Post*	-0.024***	-0.022***	-0.067***	-0.061***

	(0.005)	(0.005)	(0.011)	(0.011)
Controls	√	√	√	√
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	9,928	9,928	9,928	9,928
Adj. R^2	0.613	0.616	0.604	0.607

Panel C: Tradable Financial Assets

Variables	(1)	(2)	(3)	(4)
	Cash3		Cash4	
Corrupt × *Post*	-0.035***	-0.033***	-0.090***	-0.085***
	(0.005)	(0.005)	(0.012)	(0.012)
Controls	√	√	√	√
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	9,928	9,928	9,928	9,928
Adj. R^2	0.681	0.685	0.656	0.660

5.3.2 Alternative Measures of Corruption

To begin with, considering the possible fluctuations of corrupt expenditures in different years, instead of splitting the sample into halves using the ETC/Sales in 2011 alone, we sort firms based on the average ETC/Sales in the three years before the campaign (2009-2011). The regression results are reported in Panel A of Table 5. The results from this alternative approach are in line with the earlier evidence.

In addition, despite that ETC is commonly adopted for measuring firm corruption in China, one concern is that it is difficult to distinguish legitimate business expenses from corrupt payments. Therefore, this proxy could be subject to a measurement error. To address this issue, we control for systematic variations in these legitimate costs. Based on Cai et al. (2011) and Fang et al. (2023), we estimate the following cross-sectional regression using the sample from 2009 to 2011:

$$\frac{ETC}{Sales} = a_0 + a_1 Size + a_2 Per\ Capita\ GDP + a_3 Sales\ in\ Other\ Regions + Province\ FE + Industry\ FE + \varepsilon \quad (3)$$

where $Size$ is the log of one plus the firm's total assets, $Per\ Capita\ GDP$ is the log of one plus GDP per capita of the province where the firm headquarters, $Sales\ in\ Other\ Regions$ is the ratio of sales outside the firm's home province. We take the residuals from Equation (3) as the abnormal ETC and sort firms into high versus low corrupt groups according to their abnormal ETC in 2011. Panel B of Table 5 reports estimation with this alternative grouping. The sign of the coefficients of interest is consistent with the baseline regression.

Besides, noticing that corruption and political rent-seeking have great heterogeneity across different provinces and industries, we adjust each firm's ETC/Sales by subtracting the province-industry mean and use the adjusted measure to group firms. Panel C of Table

5 shows that the coefficient of the interaction term is still negative and significant after the province-industry adjustment.[4]

Last, due to managerial excesses being a component of ETC (Cai et al., 2011), there exists some concern that the measure could also be used as a proxy for agency costs, thus interfering with our main conclusions. We conduct several empirical tests to address this issue. We use the widely used measures of agency costs: a firm's operating expense ratio and the extent of related-party transactions (Ang et al., 2000; Chen et al., 2012), and find that: (1) in contrary to the significant reduction in ETC, firms' agency costs tend to increase after the event year, and (2) there is no significant post-campaign difference in agency costs for firms in treated and controlled group.[5] The evidence consolidates the effectiveness of ETC and verifies the robustness of our main findings.

Table 5. Robustness: Alternative Identifications of the Treated Firms

This table reports the regression results with respect to alternative identifications of the treated firms. Panel A shows the results where we group firms based on their average ETC from 2009 to 2011. Panel B shows the results where we group firms based on their abnormal ETC in 2011. Panel C shows the results where we group firms based on their province-industry adjusted ETC in 2011. Firm-level clustered standard errors are in parenthesis. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Variables are defined in Table A1 in the Appendix.

Panel A: Sorting Firms on Average ETC				
Variables	(1)	(2)	(3)	(4)
	Cash/Assets		Cash/Net Assets	
Corrupt2 × *Post*	-0.036***	-0.034***	-0.091***	-0.086***
	(0.005)	(0.005)	(0.011)	(0.011)
Controls	√	√	√	√
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	9,928	9,928	9,928	9,928
Adj. R^2	0.679	0.683	0.653	0.657
Panel B: Sorting Firms on Abnormal ETC				
Variables	(1)	(2)	(3)	(4)
	Cash/Assets		Cash/Net Assets	
Corrupt3 × *Post*	-0.015***	-0.013**	-0.035***	-0.028**
	(0.005)	(0.005)	(0.012)	(0.012)
Controls	√	√	√	√
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	9,344	9,344	9,344	9,344
Adj. R^2	0.675	0.679	0.647	0.651

[4] In unreported results, we subtract ETC/Sales by the firm's province-industry median, and the conclusion remains unchanged.

[5] The results are available upon request.

Panel C: Sorting Firms on Province-Industry Adjusted ETC				
Variables	(1)	(2)	(3)	(4)
	Cash/Assets		Cash/Net Assets	
Corrupt4 × *Post*	-0.014***	-0.017***	-0.044***	-0.051***
	(0.005)	(0.005)	(0.011)	(0.011)
Controls	√	√	√	√
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	9,928	9,928	9,928	9,928
Adj. R^2	0.675	0.680	0.649	0.653

5.3.3 Alternative Sample Periods with Different Time Windows

The DID method is widely used in the literature to capture the impact of an exogenous shock, which in this study is the anti-corruption campaign. The empirical tests are conducted in a specific time window around the event year, so the regression results may be subject to the selection of the sample period. In the baseline regression, we use a 6-year window from 2010 to 2015 to examine how firms adjust their cash reserves in response to the anti-corruption campaign. In this subsection, we try to figure out whether our main results remain valid in regressions at different time windows. We change the window of sample selection from the current 6 years to 8 years and 4 years, respectively. The results are collected in Table 6. Panel A shows the results of conducting the DID regression over an 8-year window from 2009 to 2016 and Panel B reports the results with respect to a 4-year window and the sample period is from 2011 to 2014. In all the regressions, the coefficients of interest are still negative and significant at the 1% level, consistent with those in the baseline regression. The evidence consolidates our main findings.

Table 6. Robustness: Alternative Sample Periods with Different Time Windows

This table reports the regression results with respect to alternative identifications of the treated firms. Panel A shows the results of conducting the DID model over an 8-year window from 2009 to 2016. Panel B shows the results where we use a 4-year window to conduct the DID model and the sample period is from 2011 to 2014. Firm-level clustered standard errors are in parenthesis. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Variables are defined in Table A1 in the Appendix.

Panel A: 8-year Window from 2009 to 2016				
Variables	(1)	(2)	(3)	(4)
	Cash/Assets		Cash/Net Assets	
Corrupt × *Post*	-0.031***	-0.029***	-0.081***	-0.074***
	(0.005)	(0.005)	(0.011)	(0.011)
Controls	√	√	√	√
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	12,698	12,698	12,698	12,698

Adj. R^2	0.631	0.636	0.604	0.609

Panel B: 4-year Window from 2011 to 2014

Variables	(1)	(2)	(3)	(4)
	Cash/Assets		Cash/Net Assets	
Corrupt × *Post*	-0.033***	-0.031***	-0.087***	-0.082***
	(0.004)	(0.004)	(0.011)	(0.011)
Controls	√	√	√	√
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	6,928	6,928	6,928	6,928
Adj. R^2	0.758	0.759	0.742	0.743

5.3.4 Propensity Score Matching Method

Another potential concern is that the different initial conditions of the treatment and control groups may lead to a selection bias. We adopt the propensity score matching (PSM) method to alleviate the impact of non-random sample selection on the results. Firstly, we conduct a probit regression to estimate the probability of a firm falling in the treatment group using the pre-campaign data. The control variables and fixed effects are the same as those in the baseline regression. Next, we apply the nearest neighbor matching method to match each treated unit to one comparison unit[6]. Table 7 reports the estimations based on the PSM-DID analysis. The coefficients of $Corrupt \times Post$ are smaller in magnitude but are still significantly negative. We conclude that the baseline results remain robust after accounting for the potential selection bias.

Table 7. Robustness: Propensity Score Matching

This table reports the regression results using the propensity score matching method. Firm-level clustered standard errors are in parenthesis. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Variables are defined in Table A1 in the Appendix.

Variables	(1)	(2)	(3)	(4)
	Cash/Assets		Cash/Net Assets	
Corrupt × *Post*	-0.022***	-0.023***	-0.043**	-0.046***
	(0.007)	(0.007)	(0.017)	(0.017)
MB	-0.001**	-0.001**	-0.003**	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Size	0.023**	0.023**	0.045*	0.047**
	(0.009)	(0.009)	(0.023)	(0.024)
Age	-0.375***	-0.334***	-0.847***	-0.780***
	(0.041)	(0.041)	(0.108)	(0.108)
OCF	0.102***	0.114***	0.229***	0.262***
	(0.027)	(0.027)	(0.060)	(0.061)
NWC	-0.182***	-0.182***	-0.401***	-0.404***

[6] The caliper width is set to 0.005 (smaller than one-fourth of the standard deviation of the propensity score, satisfying the robustness requirement).

	(0.025)	(0.024)	(0.064)	(0.060)
Capex	-0.152***	-0.162***	-0.442***	-0.459***
	(0.047)	(0.046)	(0.105)	(0.101)
Industry VOL	-0.001	0.001	-0.005	-0.004
	(0.012)	(0.012)	(0.025)	(0.028)
Leverage	-0.300***	-0.301***	-0.614***	-0.609***
	(0.036)	(0.036)	(0.087)	(0.085)
Dividend	0.015***	0.012***	0.027***	0.021**
	(0.004)	(0.005)	(0.010)	(0.011)
Independence	-0.064	-0.100	-0.192	-0.269*
	(0.063)	(0.064)	(0.147)	(0.150)
Board Size	-0.017	-0.029	-0.046	-0.068
	(0.025)	(0.025)	(0.059)	(0.060)
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	4,019	4,019	4,019	4,019
Adj. R^2	0.630	0.637	0.604	0.609

5.3.5 Placebo Tests

Finally, to rule out the confounding effects of other policies or events on cash holdings, we conduct placebo tests from two perspectives. First, we replicate our DID analysis using different periods. The anti-corruption campaign began in late 2012. So, we use the sample from 2006 to 2011 and treat 2008 as a placebo event year to repeat our baseline regression. The results are collected in Panel A of Table 8. The coefficients of interest are not significant, consistent with our prediction. To consolidate the results, we further use 2007 as an alternative placebo event year and use the data from 2005 to 2010 to conduct a placebo test. Panel B of Table 8 shows the results. The sign of the coefficients is negative, but none of them are significant.

Second, we conduct a placebo test by random assignments, following Bernile et al. (2017). In our analysis, we use ETC/Sales to proxy for firm-level corruption. Since bribery and corruption are not directly observable, we want to validate that ETC/Sales reflects an economically meaningful characterization of connection and corruption. Since the grouping basis used in the baseline regression follows a binomial distribution with a mean of 0.5, we randomly assign the samples into treatment and control groups and re-run the baseline regression. To avoid the influence of extreme cases on the results, we repeat the above process 500 times and report the mean value of the regression coefficients and standard deviation in Panel C of Table 8. Consistent with our expectations, we on average obtain insignificant results. This provides strong evidence that the negative impact of anti-corruption on corporate cash holdings is unlikely to be driven by some other events or random noise.

Table 8. Robustness: Placebo Tests

This table reports the regression results of the placebo test. Panels A and B report the results based on placebo event years. Panel A shows the results using data from 2006 to 2011 with 2008 as the placebo event year, and Panel B shows the results using data from 2005 to 2010 with 2007 as the placebo event

year. While Panel C reports the results based on random assignment of treated firms. Firm-level clustered standard errors are in parenthesis. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Variables are defined in Table A1 in the Appendix.

Panel A: Taking 2008 as Placebo Event Year

Variables	(1)	(2)	(3)	(4)
	Cash/Assets		Cash/Net Assets	
Corrupt × *Post2008*	0.008	0.007	0.012	0.011
	(0.005)	(0.005)	(0.010)	(0.010)
Controls	√	√	√	√
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	6,562	6,562	6,562	6,562
Adj. R^2	0.712	0.712	0.733	0.731

Panel B: Taking 2007 as Placebo Event Year

Variables	(1)	(2)	(3)	(4)
	Cash/Assets		Cash/Net Assets	
Corrupt × *Post2007*	-0.001	-0.002	-0.005	-0.006
	(0.005)	(0.005)	(0.009)	(0.010)
Controls	√	√	√	√
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	6,193	6,193	6,193	6,193
Adj. R^2	0.690	0.689	0.697	0.694

Panel C: Identifying Treated Firms with Random Assignment

Variables	(1)	(2)	(3)	(4)
	Cash/Assets		Cash/Net Assets	
Placebo Corrupt × *Post*	0.000	0.000	0.000	0.001
	(0.005)	(0.005)	(0.015)	(0.015)
Controls	√	√	√	√
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	9,928	9,928	9,928	9,928
Adj. R^2	0.679	0.683	0.599	0.603

6. Disentanglement of Competing Hypotheses

6.1 Anti-corruption and the Market Value of Cash Holdings

The baseline regression results show that anti-corruption reduces cash holdings more for the prior more corrupt firms. As mentioned earlier, there are two possible explanations for the post-campaign reduction. First, the liquidity hypothesis predicts that firms are less motivated to hold extra cash when they anticipate fewer corrupt opportunities in the future.

Alternatively, the agency cost hypothesis predicts that there are fewer agency conflicts due to the reduction in corruption and that better corporate governance leads to lower excess cash holdings. While the two mechanisms point in opposite directions in terms of the change in cash value. To distinguish the dominant channel, we are inspired to further examine the impact of the anti-corruption campaign on the value of cash holdings.

The market value of cash is estimated by how a marginal change in cash holdings leads to a change in a firm's market valuation. Following Faulkender and Wang (2006) and Dittmar and Mahrt-Smith (2007), we construct the regression model:

$$\begin{aligned} r_{i,t} - R_{i,t} = {} & \gamma_0 + \gamma_1 Corrupt_i \times Post_t \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + \gamma_2 Corrupt_i \times Post_t \\ & + \gamma_3 Corrupt_i \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + \gamma_4 Post_t \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + \gamma_5 \frac{\Delta C_{i,t}}{M_{i,t-1}} \\ & + \gamma_6 \frac{C_{i,t-1}}{M_{i,t-1}} + \gamma_7 \frac{\Delta E_{i,t}}{M_{i,t-1}} + \gamma_8 \frac{\Delta NA_{i,t}}{M_{i,t-1}} + \gamma_9 \frac{\Delta Capex_{i,t}}{M_{i,t-1}} \\ & + \gamma_{10} \frac{\Delta I_{i,t}}{M_{i,t-1}} + \gamma_{11} \frac{\Delta D_{i,t}}{M_{i,t-1}} + \gamma_{12} L_{i,t} + \gamma_{13} \frac{NF_{i,t}}{M_{i,t-1}} + \gamma_{14} \frac{C_{i,t-1}}{M_{i,t-1}} \\ & \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + \gamma_{15} L_{i,t} \times \frac{\Delta C_{i,t}}{M_{i,t-1}} + \mu_i + \lambda_t + \varepsilon_{i,t} \end{aligned} \tag{4}$$

where $M_{i,t-1}$ is firm i's market value of equity at the end of year t-1; ΔX indicates changes in the variable X; C denotes cash and cash equivalents; E is earnings before interest and taxes (EBIT); NA is net assets; $Capex$ is capital expenditures; I is financial expenses; D is common stock dividend; NF is net external financing, proxied by the net cash flows generated from financing activities; L is the market leverage. The dependent variable is the excess return, $r_{i,t} - R_{i,t}$, where $r_{i,t}$ is stock i's annual return during year t, and $R_{i,t}$ is the value-weighted return of all the stocks in firm i's industry at year t. The difference in cash value differences is captured by the coefficient γ_1.

Table 9 reports the results. Columns (1) and (2) use stock return $r_{i,t}$ and Columns (3) and (4) use excess return $r_{i,t} - R_{i,t}$ as the dependent variable. The coefficients of the triple interaction term $Corrupt \times Post \times \Delta C$ are negative and significant at the 1% level, indicating that anti-corruption lowers the market value of cash more for the prior more corrupt firms. Empirical evidence supports the liquidity channel and hypothesis H2b.

Our interpretation is as follows. Prior to the campaign, the cash firms hold for corruption is valuable in the sense that it facilitates business activities and prevents liquidity difficulties. Firms that used to spend more on connection and corruption reduce more cash holdings due to a sudden decrease in corrupt opportunities in the post-campaign business environment. Accordingly, their liquidity demand to use cash to trade for favors drops, making excess cash holdings of little value to the firm. However, firms profiting from bribes do not imply that corruption is value-increasing. On the margin, it could be suboptimal for firms, but a corrupt environment could reduce the firm value on average.

Table 9. Anti-corruption and the Market Value of Cash Holdings

This table reports the effect of anti-corruption on the value of cash holdings. All variables except L and excess returns are deflated by the lagged market value of equity M_{t-1}. Firm-level clustered standard errors are in parenthesis. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Variables are defined in Table A1 in the Appendix.

Variables	(1)	(2)	(3)	(4)
	Raw Return		Excess Return	
Corrupt × *Post* × Δ*C*	-0.921***	-0.843***	-0.724***	-0.742***
	(0.239)	(0.239)	(0.218)	(0.218)
Corrupt × *Post*	0.161***	0.152***	0.094***	0.088***
	(0.018)	(0.018)	(0.016)	(0.016)
Corrupt ×Δ*C*	0.696***	0.599***	0.418***	0.394***
	(0.171)	(0.171)	(0.152)	(0.153)
Post ×Δ*C*	-0.426***	-0.400***	-0.222*	-0.193
	(0.144)	(0.143)	(0.134)	(0.133)
Δ*C*	1.322***	1.326***	1.134***	1.109***
	(0.168)	(0.167)	(0.155)	(0.157)
C_{t-1}	1.302***	1.324***	0.906***	0.911***
	(0.078)	(0.077)	(0.074)	(0.074)
Δ*E*	0.670***	0.632***	0.708***	0.698***
	(0.124)	(0.125)	(0.121)	(0.120)
Δ*NA*	0.220***	0.210***	0.178***	0.171***
	(0.043)	(0.043)	(0.040)	(0.041)
Δ*Capex*	-0.126	-0.123	-0.132	-0.131
	(0.101)	(0.104)	(0.094)	(0.095)
Δ*I*	4.236***	4.036***	2.304***	2.313***
	(0.714)	(0.721)	(0.656)	(0.663)
Δ*D*	2.020***	2.136***	1.335**	1.393**
	(0.635)	(0.633)	(0.582)	(0.586)
L	-1.865***	-1.796***	-1.538***	-1.512***
	(0.083)	(0.083)	(0.077)	(0.077)
NF	0.142**	0.133**	0.131**	0.132**
	(0.068)	(0.067)	(0.064)	(0.063)
C_{t-1} ×Δ*C*	0.672	0.586	0.371	0.324
	(0.449)	(0.440)	(0.452)	(0.446)
L × Δ*C*	-1.889***	-1.838***	-1.863***	-1.799***
	(0.356)	(0.349)	(0.350)	(0.347)
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	9,900	9,900	9,900	9,900
Adj. R^2	0.428	0.437	0.062	0.063

6.2 Cross-sectional Variations

In the previous analysis, we prove that the ani-corruption campaign has a significant negative impact on corporate cash holdings and that the liquidity hypothesis is the main channel attributing to the effect. In this subsection, we characterize the dominant channel by looking at the cross-sectional variation.

To verify the liquidity hypothesis, we compare firm characteristics on the cross sections. Specifically, we set up the following model:

$$Cash_{i,t} = b_0 + b_1 Char_i \times Corrupt_i \times Post_t + b_2 Corrupt_i \times Post_t + b_3 Char_i \times Post_t + \gamma X_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (5)$$

where $Char_i$ is a grouping dummy for firm-specific characteristics. Other variables and fixed effects are consistent with the baseline regression. The parameter of interest is the coefficient of the triple interaction term, b_1.

6.2.1 Financing Constraints

To begin with, we check whether and how financing constraints affect the interaction between anti-corruption and corporate cash holdings. If the liquidity hypothesis holds, then before the reform, firms facing more funding difficulties have a stronger incentive to bribe government officials to access financing support. After the shock, they are more likely to cut the excess cash once saved for entertaining the local leaders if there is no sudden improvement in their financial condition. So, we expect the prior distressed firms to react more intensely to the anti-corruption campaign.

To figure out whether the hypothesis is supported by empirical evidence, we adopt two methods to proxy for the financing needs of firms. The first is the SA index. In fact, the literature often uses indices, such as KZ, WW, and SA, to measure firms' financing constraints. Considering that the link between dividend payout policy and financing constraints is weak for Chinese public firms and that there is potential endogeneity concern in using the accounting and financial data, we choose the SA index proposed by Hadlock and Pierce (2010) as the first measure. The SA index is calculated as: $-0.737 \times Size + 0.043 \times Size^2 - 0.040 \times Age$. We sort the sample firms into two groups based on their SA index in 2011 (one year before the event). $High\,SA$ is an indicator variable that takes the value of one if a firm's SA index in 2011 is above the sample median, indicating that the firm is more financially constrained, and zero otherwise.

Besides the indices, the dependence on external finance of firms also serves as a common measure of financing constraints. The difficulty of financing grows if a large amount of liquidity demand cannot be satisfied through internal cash flows (Rajan and Zingales, 1998). Firms with higher external financing dependence are usually faced with more stressed financing conditions. So, following Rajan and Zingales (1998), we construct a variable EFD to measure the degree of firms' external financial dependence, where EFD is defined as a firm's capital expenditures minus cash flow from operations, scaled by its capital expenditures. We use the industry median of EFD to divide sample firms into two subsamples. $High\,EFD$ is a dummy equal to one if a firm's industry has an EFD above the median level in 2011, indicating that the firm has stronger financing needs, and zero otherwise.

The regression results are collected in Table 10. Panels A and B show the causal impact of the campaign on cash reserves between subsamples formed based on the SA index and external financing dependence, respectively. The coefficients of the triple interaction term $High\,SA \times Corrupt \times Post$ and $High\,SA \times Corrupt \times Post$ are

negative and statistically significant, showing that the relationship between anti-corruption and cash holdings is greater in firms that are more financially constrained, ceteris paribus. This is in line with our prediction based on the liquidity hypothesis.

Table 10. The Effects of Financing Constraints

This table reports the effects of anti-corruption on cash holdings between subsamples formed based on financing constraints as of the year 2011. Financing constraints are measured in terms of the SA index and external financing dependence of firms, and the corresponding results are shown in Panels A and B, respectively. Firm-level clustered standard errors are in parenthesis. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Variables are defined in Table A1 in the Appendix.

Panel A: SA Index

Variables	(1)	(2)	(3)	(4)
	Cash/Assets		Cash/Net Assets	
High SA × Corrupt × Post	-0.066***	-0.067***	-0.186***	-0.187***
	(0.009)	(0.009)	(0.022)	(0.022)
Corrupt × Post	0.007	0.008	0.024**	0.028**
	(0.006)	(0.006)	(0.012)	(0.012)
High SA × Post	-0.041***	-0.038***	-0.087***	-0.083***
	(0.006)	(0.006)	(0.015)	(0.015)
Controls	√	√	√	√
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	9,928	9,928	9,928	9,928
Adj. R^2	0.697	0.700	0.675	0.677

Panel B: External Financing Dependence

Variables	(1)	(2)	(3)	(4)
	Cash/Assets		Cash/Net Assets	
High EFD × Corrupt × Post	-0.034**	-0.033**	-0.087**	-0.084**
	(0.014)	(0.015)	(0.038)	(0.039)
Corrupt × Post	-0.004	-0.002	-0.011	-0.008
	(0.014)	(0.014)	(0.036)	(0.037)
High EFD × Post	-0.002	-0.001	-0.002	-0.001
	(0.006)	(0.006)	(0.013)	(0.014)
Controls	√	√	√	√
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	9,928	9,928	9,928	9,928
Adj. R^2	0.680	0.683	0.654	0.657

6.2.2 Agency Problems

Further, we examine whether agency problems affect the response of corrupt firms to the anti-corruption shock. Previous empirical results have demonstrated that impacted by the anti-corruption campaign, firms tend to reduce their cash holdings as a response. The liquidity hypothesis explains that it is because the campaign deprives firms of the opportunities to trade benefits through bribery, rendering the cash reserved with the motive of corruption useless. If the hypothesis holds, then once controlling shareholders or firm managers realize that holding cash to seize bribing opportunities can no longer bring advantages to firms' operations, they will optimize their behaviors based on the operating environment and allocate the excessive cash to other uses. However, the efficiency of the cash reallocation might vary across firms. In firms with fewer agency conflicts, controlling shareholders or managers have more incentives to optimize cash reserves in a timelier manner, so we expect the mitigating effect of the anti-corruption campaign on cash holdings to be more pronounced for firms with fewer agency problems.

We use two proxies for the agency problem in the empirical tests: analyst coverage and the separation between ownership and control rights. Prior works point out that analysts can work as external monitors to firms and are effective in reducing information asymmetry, which is one of the main causes of agency conflicts (Yu, 2008; Chen et al., 2015). We define a firm's analyst coverage as the number of analysts covering this firm each year following Hong and Kacperczyk (2010). We sort firms into two groups based on their analyst coverage in 2011 and construct $High\ Ana$, a dummy variable that takes the value of one if a firm's analyst coverage in 2011 is above the sample median, and zero otherwise.

The separation between ownership and control rights is also a common measure for agency costs because the separation leads to tunneling and managerial entrenchment of minority shareholder interests, which is the major agency problem for firms in East Asia, especially China (Claessens et al., 2000; Cheung et al., 2006; Jiang et al., 2010; Liu and Tian, 2012). We sort firms into two groups based on their separation of ownership and control in 2011 and construct $Wedge$, a dummy variable that is equal to one if the gap between ownership and control rights of a firm in 2011 is above zero. Firms with higher analyst coverage and a positive wedge face fewer agency problems.

The results are shown in Table 11. In Panel A, the coefficients of the triple interaction term $High\ Ana \times Corrupt \times Post$ are negative and significant, indicating that the negative impact of anti-corruption on corporate cash holdings is more evident in better-governed firms. And the coefficients of $Wedge \times Corrupt \times Post$ reported in Panel B are significantly positive, which is also compatible with the liquidity hypothesis. The evidence is also contrary to what the agency cost hypothesis predicts, further proving that the prior excess cash reserves are indeed a sign of incentive alignment instead of conflict.

Table 11. The Effects of Agency Conflicts

This table reports the effects of anti-corruption on cash holdings between subsamples formed based on agency conflicts as of the year 2011. Agency conflicts are measured in terms of analyst coverage and the separation between ownership and control rights, and the corresponding results are shown in Panels A and B, respectively. Firm-level clustered standard errors are in parenthesis. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Variables are defined in Table A1 in the Appendix.

Panel A: Analyst Coverage

Variables	(1)	(2)	(3)	(4)
	Cash/Assets		Cash/Net Assets	
High Ana × *Corrupt* × *Post*	-0.033***	-0.032***	-0.100***	-0.097***
	(0.009)	(0.009)	(0.027)	(0.028)
Corrupt × *Post*	-0.021***	-0.019***	-0.053***	-0.048***
	(0.006)	(0.006)	(0.017)	(0.017)
High Ana × *Post*	-0.024***	-0.023***	-0.061***	-0.059***
	(0.006)	(0.006)	(0.014)	(0.015)
Controls	√	√	√	√
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	9,928	9,928	9,928	9,928
Adj. R^2	0.688	0.691	0.645	0.647

Panel B: Separation between Ownership and Control Rights

Variables	(1)	(2)	(3)	(4)
	Cash/Assets		Cash/Net Assets	
Wedge × *Corrupt* × *Post*	0.034***	0.032***	0.081***	0.077***
	(0.010)	(0.010)	(0.025)	(0.025)
Corrupt × *Post*	-0.048***	-0.045***	-0.117***	-0.110***
	(0.007)	(0.007)	(0.018)	(0.018)
Wedge × *Post*	-0.008	-0.007	-0.011	-0.010
	(0.006)	(0.006)	(0.012)	(0.013)
Controls	√	√	√	√
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	8,512	8,512	8,512	8,512
Adj. R^2	0.674	0.677	0.648	0.650

6.2.3 State Ownership

Last but not least, we check whether state ownership differentiates the relationship between anti-corruption and corporate cash holdings. In China, government and firms are inextricably linked. As previously mentioned, the local government in China makes important administrative decisions and has powerful control over the financial markets (Zhou, 2017). Firms have motives to bribe with cash to obtain government support for the operation and development. So, if the liquidity hypothesis holds the post-campaign reduction in cash holdings is attributable to the decline in firms' demand to trade cash for political favors through bribery, then the negative impact should be more evident for firms that are more eager to gain political support before. In China, private enterprises often have a stronger incentive to invest in connections through bribes. It is crucial for non-SOEs to gain government support whether they compete for subsidies, land, loans, and other substantial projects, or simply wish to get around hurdles and speed things up. In contrast, for SOEs, since they are naturally more connected with the government and they bear more

responsibilities in stabilizing economic growth and promoting employment (Sapienza, 2004; Wang, 2015; Faccio and Hsu, 2017; Bertrand et al., 2018), local government tends to give them more privileges (Khwaja and Mian, 2005; Leuz and Oberholzer-Gee, 2006; Claessens et al., 2008; Houston et al., 2014). Therefore, we posit that the campaign will exert a weaker impact on SOEs and a stronger impact on private enterprises.

We define a firm as state-owned if its ultimate controlling shareholder in 2011 is the government. Otherwise, it is classified as a private enterprise. SOE is an indicator for a firm being SOE. Table 12 presents the regression results. The coefficients of the interaction term $SOE \times Corrupt \times Post$ are positive and significant, indicating that the negative impact of the campaign is more pronounced in private enterprises. This is in line with the liquidity hypothesis: before the anti-corruption campaign, private enterprises benefit more from bribing as this is the major channel for them to connect with government officials, and they hold excess cash to seize any potential bribing opportunities. After anti-corruption, a decrease in corrupt needs causes non-SOEs to reduce their bribing reserves.

Table 12. The Impact of State Ownership

This table reports the different impacts of anti-corruption on cash holdings between SOEs and private firms. Firm-level clustered standard errors are in parenthesis. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Variables are defined in Table A1 in the Appendix.

Variables	(1)	(2)	(3)	(4)
	Cash/Assets		Cash/Net Assets	
SOE × Corrupt × Post	0.024***	0.022**	0.085***	0.078***
	(0.009)	(0.009)	(0.022)	(0.022)
Corrupt × Post	-0.036***	-0.035***	-0.106***	-0.100***
	(0.007)	(0.007)	(0.016)	(0.016)
SOE × Post	0.025***	0.023***	0.047***	0.050***
	(0.006)	(0.006)	(0.013)	(0.014)
MB	-0.001	-0.001	-0.003**	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)
Size	0.012**	0.013***	0.016	0.019
	(0.005)	(0.005)	(0.012)	(0.012)
Age	-0.305***	-0.286***	-0.697***	-0.667***
	(0.028)	(0.029)	(0.073)	(0.076)
OCF	0.099***	0.109***	0.215***	0.240***
	(0.019)	(0.018)	(0.043)	(0.042)
NWC	-0.180***	-0.172***	-0.437***	-0.421***
	(0.017)	(0.017)	(0.042)	(0.041)
Capex	-0.174***	-0.175***	-0.541***	-0.536***
	(0.029)	(0.029)	(0.072)	(0.071)
Industry VOL	-0.003	-0.003	-0.020	-0.020
	(0.006)	(0.007)	(0.014)	(0.015)
Leverage	-0.281***	-0.278***	-0.575***	-0.565***
	(0.019)	(0.019)	(0.044)	(0.044)

Dividend	0.016***	0.015***	0.031***	0.029***
	(0.003)	(0.003)	(0.006)	(0.006)
Independence	-0.037	-0.047	-0.078	-0.099
	(0.037)	(0.037)	(0.086)	(0.087)
Board Size	-0.002	-0.002	0.014	0.017
	(0.014)	(0.014)	(0.032)	(0.033)
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	9,734	9,734	9,734	9,734
Adj. R^2	0.695	0.697	0.674	0.677

6.3 Other Explanations

6.3.1 *Anti-corruption and the Market Value of Cash Holdings*

One possible confounder in our analysis could be the firms' financing condition. Being financially constrained may cause a firm to save more cash (to prevent future liquidity shortfalls) and also to bribe more (to access cheaper or more external financing). If anti-corruption has a direct impact on firms' financial condition, say, it relaxes the financing constraints to a greater extent for the prior more corrupt firms, then we could also observe a greater reduction in both cash holdings and value of cash holdings for the corrupt firms. In fact, the literature has not reached a consistent conclusion about whether and how anti-corruption affects financing constraints. Some claim that bribery is vital for private enterprises to access bank loans (Chen et al., 2013), while anti-corruption impedes corporate external financing (Xu, 2018). Others argue that anti-corruption promotes firm growth (Colonnelli and Prem, 2022) and alleviates the financing constraints for private enterprises (Li et al., 2021). If there is a fundamental change in firms' financing constraints after the campaign, this alternative explanation could invalidate the causality between corruption and cash holdings.

To rule out this possibility, we estimate a firm's financing constraints by its cash flow sensitivity of cash as proposed by Almeida et al. (2004). Constrained firms tend to reserve more cash from the operating cash flows and therefore show a higher degree of cash flow sensitivity. If anti-corruption improves the overall external financing environment and eases firms' financial constraints, then firms are less likely to save cash out of incremental cash inflows, that is, the cash flow sensitivity of cash will decline. Following Almeida et al. (2004) and Chen et al. (2012), we construct a regression model as below:

$$\begin{aligned}\Delta Cash_{i,t} = {} & \alpha_0 + \alpha_1 OCF_{i,t} \times Corrupt_i \times Post_t + \alpha_2 Corrupt_i \\ & \times Post_t + \alpha_3 OCF_{i,t} \times Corrupt_i + \alpha_4 OCF_{i,t} \times Post_t \\ & + \alpha_5 OCF_{i,t} + \alpha_6 Size_{i,t} + \alpha_7 Q_{i,t-1} + \alpha_8 Capex_{i,t} \\ & + \alpha_9 \Delta Leverage_{i,t} + \alpha_{10} \Delta NWC_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t}\end{aligned} \tag{6}$$

where $\Delta Cash_{i,t}$ is the change of cash holdings from year t-1 to t, $OCF_{i,t}$ is the operating cash flow in the current year, and $Q_{i,t-1}$ is Tobin's Q value in the previous year, calculated as the sum of the market capitalization and the book value of liabilities divided by the total book assets. Other variables and fixed effects are the same as in previous models. If anti-corruption alleviates the financing constraints of the corrupt firms, then we expect the coefficient of the triple interaction term, α_1, to be negative, which

means that the campaign reduces the cash flow sensitivity of the prior more corrupt firms to a greater extent by cutting down their cash demand.

Empirical evidence is against this explanation. Table 13 presents the regression results. The coefficients of the interaction term $OCF \times Corrupt \times Post$ are indistinguishable from zero, implying that the change in financing constraints of the prior more corrupt firms before and after the campaign is not significantly different from that of the prior less corrupt firms. Therefore, the main result is unlikely to be driven by the confounding effect of financing constraints. Besides, this additional test further validates the liquidity hypothesis: anti-corruption causes corrupt firms to reduce more bribery reserves while not significantly affecting their financing constraints differently.

Table 13. Anti-corruption and Cash Flow Sensitivity

This table reports the effect of anti-corruption on corporate cash flow sensitivity. Firm-level clustered standard errors are in parenthesis. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Variables are defined in Table A1 in the Appendix. Variables are defined in Table A1 in the Appendix.

Variables	(1)	(2)	(3)	(4)
	ΔCash/Assets		ΔCash/Net Assets	
OCF × Corrupt × Post	0.015	0.005	0.081	0.056
	(0.052)	(0.052)	(0.108)	(0.108)
Corrupt × Post	-0.002	-0.002	0.009	0.008
	(0.004)	(0.004)	(0.007)	(0.008)
OCF × Corrupt	0.088**	0.095**	0.177*	0.197**
	(0.042)	(0.041)	(0.092)	(0.091)
OCF × Post	-0.091***	-0.094***	-0.205***	-0.214***
	(0.032)	(0.032)	(0.065)	(0.066)
OCF	0.264***	0.267***	0.490***	0.493***
	(0.025)	(0.026)	(0.059)	(0.059)
Size	0.014***	0.014***	0.022***	0.020***
	(0.003)	(0.003)	(0.007)	(0.007)
Q_{t-1}	0.002***	0.001***	0.003**	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)
Capex	-0.522***	-0.520***	-1.121***	-1.120***
	(0.030)	(0.030)	(0.066)	(0.066)
Δ*Leverage*	-0.088***	-0.087***	-0.144***	-0.141***
	(0.019)	(0.019)	(0.037)	(0.037)
Δ*NWC*	-0.182***	-0.180***	-0.382***	-0.382***
	(0.013)	(0.013)	(0.027)	(0.027)
Firm FE	√	√	√	√
Year FE	√		√	
Province × Year FE		√		√
Obs.	9,226	9,226	9,226	9,226
Adj. R^2	0.177	0.173	0.239	0.235

6.3.2 Investment Decisions

Another concern is the potential influence of anti-corruption on firms' investment decisions. Previous literature has proved that the precautionary motive is one of the major explanations for firms' behaviors of holding more cash. When firms anticipate that there will be valuable investment opportunities, they will use excess cash reserves as a financial policy to cope with potential financing shortages in the future and ensure the smooth progress of investment (Acharya et al., 2007). These precaution-driven cash holdings are conducive to firm growth, which can promote the value of cash. During the anti-corruption campaign, the supervision of enterprises by the authorities has been strengthened (Zhang, 2018). In face of the stricter monitoring, firms might prudently cut down their investment decisions to reduce the risk of penalties, thus leading to the post-campaign decline in both cash holdings and the market value of cash. So, if such impact is more pronounced for firms with higher prior corrupt expenditures, it might lead to empirical results similar to those obtained in our main tests, making the liquidity hypothesis vulnerable.

To alleviate this worry, we develop the following model to test whether there is a significant difference in changes in firm investment between the treatment and control groups after the campaign:

$$I_{i,t} = \delta_0 + \delta_1 Corrupt_i \times Post_t + \gamma X_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (7)$$

where $I_{i,t}$ represent firm i's investment in year t. There has been extensive literature studying the topic of investment. One of the most popular proxies for investment is the capital expenditures scaled by the beginning-of-year total assets. We also adopt this measurement and denote it as $Investment1$. Besides, following Chen et al. (2007) and Julio and Yook (2012), we further take into consideration the R&D expenses of firms. We develop a variable $Investment2$ as the sum of capital expenditures and R&D expending, scaled by the beginning-of-year total assets. $Investment1$ and $Investment2$ are used as the dependent variable in the regressions, respectively. If the hypothesis holds that the anti-corruption campaign depresses the corrupt firms more from engaging in investment projects and thus mitigates their cash needs, then the coefficient δ_1 is expected to be negative and significant.

We obtain the regression results as reported in Table 14. The coefficients of $Corrupt \times Post$ are neither negative nor statistically significant. The results do not support the above conjecture and suggest that there is no distinguishable difference in the investment changes brought about by the anti-corruption campaign between prior more corrupt and less corrupt firms. As such, our main findings are not subject to the potential confounding effect of anti-corruption on firm investment. And the results also suggest that when firms hoard excess cash and try to seek political advantage through bribery, the scope of such benefits may extend far beyond investment projects.

Table 14. Anti-corruption and Investment

This table reports the effect of anti-corruption on corporate investment. Firm-level clustered standard errors are in parenthesis. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. Variables are defined in Table A1 in the Appendix. Variables are defined in Table A1 in the Appendix.

Variables	(1)	(2)	(3)	(4)
	Investment1		Investment2	
Corrupt × Post	0.001	0.000	0.003	0.003

	(0.003)	(0.003)	(0.003)	(0.003)
MB	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Size	0.034***	0.034***	0.040***	0.039***
	(0.004)	(0.004)	(0.004)	(0.004)
Age	-0.117***	-0.115***	-0.128***	-0.129***
	(0.020)	(0.020)	(0.021)	(0.022)
OCF	0.017	0.022**	0.022*	0.026**
	(0.011)	(0.011)	(0.011)	(0.012)
NWC	0.021***	0.022***	0.023***	0.024***
	(0.008)	(0.008)	(0.009)	(0.009)
Industry VOL	-0.011**	-0.011**	-0.010*	-0.009*
	(0.005)	(0.005)	(0.005)	(0.005)
Leverage	-0.005	-0.006	-0.013	-0.015
	(0.012)	(0.012)	(0.013)	(0.013)
Dividend	0.004	0.003	0.004	0.003
	(0.002)	(0.002)	(0.002)	(0.002)
Independence	-0.019	-0.021	-0.024	-0.025
	(0.025)	(0.025)	(0.026)	(0.026)
Board Size	-0.005	-0.005	-0.006	-0.006
	(0.009)	(0.009)	(0.010)	(0.010)
Firm FE	√	√	√	√
Year FE	√		√	
Prov × Year FE		√		√
Obs.	9,226	9,226	9,226	9,226
Adj. R^2	0.420	0.421	0.461	0.461

7. Conclusion

This paper exploits China's anti-corruption campaign in 2012 as an exogenous shock to corruption to estimate the causal effect of anti-corruption on firm cash policies. We find that firms with higher prior entertainment and travel costs (ETC), a proxy for corporate corrupt payments, decrease their cash holdings to a greater degree than firms with lower ETC because of the campaign. The result is robust to parallel trend tests, alternative measures of cash holdings and corruption, alternative sample periods, and propensity score matching, and is not a placebo effect.

We propose two potential hypotheses to explain the post-campaign reduction in cash holdings. If bribery is a trade for government officials' favors to firms, then the change in cash levels may reflect a lower liquidity demand since firms anticipate fewer corrupt opportunities in the environment after anti-corruption (liquidity hypothesis). If bribes increase agency costs to firms, then the decrease may be due to that anti-corruption alleviates agency conflicts and thus motivates managers to hold less non-operational cash (agency cost hypothesis). But only the liquidity hypothesis accounts for the further test results that prior more corrupt firms experience a greater decline in the value of cash holdings. Moreover, the cross-sectional comparison shows that the pattern in the baseline regression is more pronounced in firms that appear more financially constrained, those with fewer agency conflicts, and private enterprises. The intuition is that the constrained and

private firms have stronger incentives to bribe government officials when they have the chance, and corruption is more of marginal benefits rather than agency conflicts in certain circumstances. Furthermore, we estimate the change in cash flow sensitivity of cash and investment to exclude the confounding effect of financing conditions and investment decisions. Taken together, the evidence again favors the liquidity hypothesis that before anti-corruption, firms reserve cash to seize emerging corrupt opportunities. The post-campaign reduction in cash holdings reflects a lower liquidity demand since firms anticipate fewer corrupt opportunities in the future.

This paper contributes to the literature on the determinants of firms' liquidity policies and the real effects of corruption by establishing that the existence of bribing opportunities causes firms to save more cash. Our study underscores the importance of optimizing the business environment. In the post-anti-corruption era, the distressed and private firms that used to trade huge amounts of bribes for political favors or fair treatment need proper substitutes to solve their funding needs and facilitate their operations. The policy implication of this paper is easily generalized to other countries, especially where the financial market and business environment are underdeveloped.

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Appendix A. Variable Definitions

Table A1. Variable Definitions

Variable	Definition
Cash/Assets	Cash and cash equivalents scaled by total assets.
Cash/Net Assets	Cash and cash equivalents scaled by noncash assets.
Log Cash	The natural logarithm of cash and cash equivalents.
Cash/Sales	Cash and cash equivalents scaled by sales.
Cash1	A firm's Cash/Assets less its industry median.
Cash2	A firm's Cash/Net Assets less its industry median.
Cash3	Cash and cash equivalents plus tradable financial assets, scaled by total assets.
Cash4	Cash and cash equivalents plus tradable financial assets, scaled by net assets.
Post	An indicator that equals one if the year is after 2012 and zero otherwise.
ETC/Sales	Entertainment and travel costs scaled by sales.
Corrupt	A dummy variable that takes one if a firm's ETC/Sales in 2011 is above the sample median, indicating that the firm has more prior corrupt payments, and zero otherwise.
Corrupt2	A dummy variable that takes one if a firm's average ETC/Sales during 2009-2011 is above the sample median, and zero otherwise.
Corrupt3	A dummy variable that takes one if a firm's abnormal ETC/Sales (the residual from regression (3)) in 2011 is above the sample median, and zero otherwise.
Corrupt4	A dummy variable that takes one if a firm's province-industry adjusted ETC/Sales in 2011 is above the sample median, and zero otherwise.
MB	The market value divided by the book value of equity.
Size	The natural logarithm of the book value of total assets.
Age	The natural logarithm of one plus the years since a firm is established.
OCF	The net cash flow from operating activities scaled by total assets.
NWC	Net working capital less cash and cash equivalents scaled by total assets.
Capex	Capital expenditures scaled by total assets, where capital expenditure is the net cash used to buy and maintain fixed assets, intangible assets, and other long-term assets.
Industry VOL	The standard deviation of the operating cash flows of all firms within a firm's industry.
Leverage	The ratio of interest-bearing liabilities to total assets.
Dividend	A dummy variable that equals one if a firm pays a common dividend in a year, and zero otherwise.
Independence	The proportion of independent directors on the board.
Board Size	The natural logarithm of one plus the number of directors.
r	Annual stock return.
R	Value-weighted stock return of a firm's industry.
M_{t-1}	A firm's market value of equity at the end of year t-1.
C_{t-1}	A firm's cash and cash equivalents at the end of year t-1.

Continued on the next page

Table A1 - continued from the previous page

Variable	Definition
ΔC	Change in cash and cash equivalents.
ΔE	Change in earnings before interest and taxes.
ΔNA	Change in net assets.
$\Delta Capex$	Change in capital expenditures.
ΔI	Change in financial expenses.
ΔD	Change in common dividends paid.
L	Market leverage.
NF	Net cash flows generated from financing activities.
High SA	A dummy variable that takes one if a firm's SA index (Hadlock and Pierce, 2010) in 2011 is above the sample median, and zero otherwise.
High EFD	A dummy that equals one if a firm belongs to an industry with EFD above the median level in 2011, and zero otherwise, where industry-level EFD is the industry median of firm-level EFD and firm-level EFD is calculated as capital expenditures minus cash flow from operations, scaled by its capital expenditures.
High Ana	A dummy variable that takes one if a firm's analyst coverage in 2011 is above the sample median, and zero otherwise.
Wedge	A dummy variable that is equal to one if the gap between ownership and control rights of a firm in 2011 is above zero, and zero otherwise.
SOE	An indicator for state-owned enterprises, i.e., the ultimate controlling shareholder in 2011 is the government.
ΔCash/Assets	Change of cash holdings from year t-1 to t, with cash holdings calculated as cash and cash equivalents scaled by total assets.
ΔCash/Net Assets	Change of cash holdings from year t-1 to t, with cash holdings calculated as cash and cash equivalents scaled by noncash assets.
Q_{t-1}	The sum of the market capitalization and the book value of liabilities divided by the total book assets at the end of year t-1.
$\Delta Leverage$	Change in leverage.
ΔNWC	Change in net working capital.
Investment1	Capital expenditures scaled by the beginning-of-year total assets.
Investment2	The sum of capital expenditures and R&D expending, scaled by the beginning-of-year total assets.

Appendix B. The Eight-point Regulation

1. Leaders must maintain close contact with the grassroots. They must understand the real situation facing society through in-depth visits at the grassroots level. Greater attention should be focused on places where social problems are more acute, and inspection tours must be carried out more thoroughly. Inspection tours that are a mere formality should be strictly prohibited. Leaders should work and listen to the public and lower-level officials; the most practical problems facing ordinary people must be tackled. For official visits, there should be no welcome banner, no red carpet, no floral arrangement, or grand receptions for officials.
2. Meetings and major events should be strictly regulated, and their efficiency improved. Politburo members are not allowed to attend ribbon-cutting or cornerstone-laying ceremonies, or celebrations and seminars unless they get approval from the Central Committee. Official meetings should be shortened, be specific and to the point, and be free of empty talk and blather.
3. The issuing of official documents should be reduced.
4. Officials' visits to foreign countries should only be arranged when necessary, with fewer accompanying members; on most occasions, there is no need to mobilize a reception by Chinese expatriates, institutions, and students at the airport.
5. There should be fewer traffic controls when leaders travel by car to avoid unnecessary inconvenience to the public.
6. The media should seek to reduce the number of news reports related to members of Politburo, their work, and their activities. The media should also seek to reduce the amount of time spent on these news pieces and minimize their scope. Such stories should only be reported depending on work needs, news value, and potential social impact.
7. Leaders should not publish any works by themselves or issue any congratulatory letters in their name unless an arrangement has been made with the central authorities. Official documents without much meaningful content and much actual importance should be withheld. Publications dedicated to senior officials' work and activities are also restricted.
8. Leaders must practice thrift and strictly follow relevant regulations on accommodation and cars.