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Does privatization reform alleviate ownership discrimination? Evidence from the Split-share structure reform in China[☆]

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ABSTRACT

This paper investigates the institutional origins of ownership discrimination in bank lending through a staggered quasi-natural experiment: China's Split-share Structure Reform. State-Owned Enterprises (SOEs) have an advantage over non-SOEs in securing external financing to protect investment opportunities from cash flow fluctuations. This financing privilege declined significantly after the reform, which mandatorily converted SOEs' non-tradable state-owned shares into tradable shares, sharply increasing the likelihood of further privatization. Consistent evidence also exists in terms of bank lending behaviors. Further, we show both direct and indirect evidence that the effects were more pronounced among SOEs under higher threats of privatization (e.g., firms with larger increases in tradable shares, smaller workforce, and in industries peripheral to national strategy). The evidence suggests that banks proactively prefer SOEs for the perceived safety of loans under implicit government guarantee; when this privilege disappeared after the reform, banks reacted by allocating credits more fairly. This paper provides new evidence on the bright side of share structure reforms in mitigating credit misallocation and enlightens policy makers to practical resolutions to the financing inefficiency in emerging capital markets.

1. Introduction

A growing strand of literature has indicated that in transition economies, where state-owned banks dominate the financial system, accessibility to credit unfairly tilts towards State-owned Enterprises (SOEs), a trend that cannot be explained by fundamental factors (See, for example, [Brandt and Li, 2003](#); [Cull and Xu, 2005](#); [Song et al., 2011](#)). Specifically, despite being comparatively inefficient in operations ([Grossman and Hart, 1986](#); [Boycko et al., 1995](#); [Shleifer, 1998](#)), SOEs typically receive disproportionately larger shares of bank credit than non-SOEs ([Johnson and Woodruff, 2002](#); [Behr et al., 2013](#)). This phenomenon, widely referred to as “Ownership Discrimination”, has received continuous attention and remains a key question in understanding credit allocation frictions and market

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efficiency. The ownership discrimination, if existing, may pose severe detriments to non-SOEs, as a general lack of stable long-term funding sources incur higher costs and force them to seek trade credit, costly private borrowing, and other informal financing channels (Dinh, 1997; Ge and Qiu, 2007).

Despite the abundant evidence of SOEs' comparatively higher leverage ratio and crude expansion of financing in the last decades (Faccio et al., 2006; Cull and Xu, 2005; Megginson and Wei, 2014), it remains an open question whether non-SOEs, on the other side, truly *suffer from discrimination*, or simply *choose* conservative financial strategies (Gou et al., 2018), possibly for endogenously lower debt-capacity. If discrimination really exists, what are its institutional origins? Do creditors prefer SOEs for the merits of the *state-owned property structure itself* (i.e., state-player-dominated firms have higher values and outperform those with dispersed private ownership structure),¹ or rather for the *implicit government guarantee* enjoyed by SOEs? Further, do banks *proactively* prefer SOEs for perceived safer lending, or *passively* do so, as a compromise to the government pressure of "policy lending"?

To answer these interesting and largely unsolved questions, this paper comprehensively investigates the institutional origins of ownership discrimination by taking advantage of a staggered quasi-exogenous reform in China. This landmark reform, namely the Split-share Structure Reform, dismantled the dual-share structure and introduced liberalized legitimacy in the trading rights of state-owned shares. The reform was mandatorily enacted without firms' freedom of choosing whether and when to convert their non-tradable shares. The institutional setting fits neatly in our research mission, i.e., uncovering the real origins of ownership discrimination, for two major reasons: on one hand, the reform does not directly change firms' ownership identity; on the other hand, the probability of privatization increases sharply, as non-tradable shares are switched to tradable ones.² Using a staggered Difference-in-Differences (Diff-in-Diff) design, we find salient decline in ownership discrimination after the reform. Notably, since the de jure nature of ownership structure remains after the reform, this evidence indicates that ownership discrimination isn't due to the intrinsic superiority of state-owned property structure itself, but rather originates from the anticipation of the implicit government guarantee, which is largely eliminated after the reform.

Regarding the existence of ownership discrimination, some seemingly salient facts (such as lower static debt ratio and shorter maturity structures of non-SOEs³) could be misleading, as non-SOEs may choose conservative leverage far below debt capacity. In this paper, we instead focus on the discrepancy between SOEs and non-SOEs in their capability of acquiring external financing to offset cash flow fluctuations and protect current investments. Cash flow shocks serve as a good "touch stone" of firms' financial accessibility: notwithstanding the potential intention of low-leverage policy, all firms would strive to mitigate unintended cash flow shocks and avoid sacrificing current projects; the ones with inferior financing status are forced to cut investments (Gu et al., 2018). Hence we compare SOEs and non-SOEs' "emergency response" capabilities by examining their investment and financing reactions to cash flow shocks collectively in a multi-equation model (Gatchev et al., 2010). We find that non-SOEs experience significantly more radical slash-down in investments in response to cash flow fluctuations, suggesting their relatively strained financing conditions. Further, we show that the Split-share Structure Reform substantially narrows the financing gap between SOEs and non-SOEs.

Moreover, we directly probe into the bank lending behaviors as powerful complement to our findings. Relying on a comprehensive dataset of the information on the loans extended by Chinese banks to listed firms, we investigate the influences of the Split-share Structure Reform on the differential accessibility of bank lending between SOEs and non-SOEs by employing a Diff-in-Diff design. We illustrate that SOEs' superior access to bank lending (including the higher loan amounts, longer terms, lower costs and less requirements for collaterals), is largely weakened after the reform, further justifying our arguments of the alleviation of ownership discrimination after the reform.

We then show that the impacts of the reform are more thorough among firms exposed to higher threats of privatization, such as firms with larger conversions from non-tradable shares to tradable ones, as they experience more dilution of state control; firms in non-nationally-strategic-industries, for lower market expectations of retaining governmental control⁴; firms with smaller workforces, which have lower social stability concerns; and firms with higher external financing dependence. Similar patterns exist in terms of the loan-granting on the bank side. The results survive a wide range of robustness checks, such as alternative proxy for cash flow shocks, Propensity-Score-Matched (PSM) control groups, and additional control variables, etc. We also carefully deal with the confounding impacts of other institutional changes.

A counter-argument plausibly holds when taking into consideration the marketization process of the banking sector, which makes

¹ A series of literature argues that state ownership may be suitable for the situation in China (and many other emerging markets), as the government players enhance corporate value, reduce resource-searching costs, and mitigate the free-rider problems of minor investors (Hess et al., 2010; Yu, 2013; Tian and Estrin, 2008). The merits (and flaws) of state and non-state ownership have been debated in a large body of literature (see, for example, Bardhan and Roemer, 1992, 1993; Shleifer and Vishny, 1994; Stiglitz, 1994; Villalonga, 2000). The advocates for private ownership argue that risk-sharing, resource allocation, and productivity are all increased when SOEs are privatized. In contrast, opponents criticize the possible social and economic instability, exacerbated uneven distribution of social wealth, the probable disposal of assets at low prices by government, etc. (Newbery and Pollitt, 1997; Hoff and Stiglitz, 2004).

² Anecdotal evidence and media coverage also show that a large percentage of previously non-tradable shares held by state shareholders has begun to be treated in the market after the reform. Many listed SOEs experienced huge reduction in governmental shareholding, increasing the likelihood of the SOEs being privatized (Hou and Lee, 2012).

³ According to the World Bank Report (2000), less than 1% of bank loans in the late 1990s were allocated to non-state-owned enterprises. The phenomenon of overwhelmingly higher leverage for SOEs than non-SOEs is also widely identified in academia. See, for example, Li et al. (2009)

⁴ Many documents issued by the Chinese government, such as "Guidance on the promotion of the shareholding system reform of military enterprises (2007)" and "Guidance on the restructuring and listing of listed companies and capital operation (2016)", emphasize that enterprises with national strategic security concerns and core state secrets will "remain solely in state hands".

banks more market-oriented and reduces political lending. Interestingly, another prominent feature of the privatization reform in China is that it occurred around the same period as the public listing of state-owned banks, which helps us to address this concern and to pin down the major driving force. The results show that it is the changes in *firms*, rather than *banks*, that explains the alleviated ownership discrimination after the reform, indicating that the crux of discrimination lies in the expectation that “SOEs never fail”; when this privilege is shaken by the reform, banks proactively react by adjusting credit allocations and attaching a lower weight to ownership in loan granting. Numerous studies and media reports arbitrarily attribute so-called “policy lending” to banks’ passive compromise to government manipulation and blame credit misallocation on the irrationality of the banking sector. Our findings, however, imply that banks seem to be rather rational in making lending decisions, with the implicit government guarantee expectations taken into consideration.

China provides an ideal context for investigating the ownership discrimination. As a representative transition economy, China has the salient characteristics of conflict between a swiftly booming economy, ongoing privatization reforms, and an immature financial system, offering a unique environment to test the existence and impacts of ownership discrimination (Allen et al., 2005; Liao et al., 2014; Dollar and Wei, 2007; Song et al., 2011). First, there is a long-established boundary between state-owned and non-state owned enterprises in China. Ownership type is clear and crucial. More importantly, the linkage between SOEs and the government is deep, and the latter has been arguably criticized for its “paternal love” towards SOEs. Second, the Split-share Structure Reform in China (2005–2007) occurred in our sample period, providing a unique angle on the evolution of ownership discrimination and its policy implications. Third, given China’s rising importance in the world economy, the implications from the reform provide helpful enlightenment for resolving credit misallocation and related financial system deficiencies in transition economies.

This paper contributes to the growing body of literature on ownership discrimination by providing novel insights into its institutional origins and mechanisms. Prior studies have found that SOEs rely more on domestic banks in external financing (Dollar and Wei, 2007), whereas non-SOEs finance the majority of their investments and working capital needs through retained earnings, informal networks, and inter-firm credit (Lardy, 1998; Dinh, 1997; Ge and Qiu, 2007; Song et al., 2011).⁵ The financial repression is also manifested by higher precautionary cash holdings and lower capital intensity of non-SOEs (Megginson et al., 2014; Song et al., 2011). Cultural and historical factors only partially explain this phenomenon (Arrow, 1998). Shleifer and Vishny (2002) and Sapienza (2004) attribute the different financing sources between SOEs and non-SOEs to the relationship between government and firms and the political nature of transition economies. A counterview by Gou et al. (2018) argue that banks and firms simply perform credit-rationing. In this paper, we complement this strand of research using a quasi-exogenous policy shock to distill its real effects and institutional origins.

The investigation into the pattern of credit allocation is also related to the broad literature on financial constraints⁶—especially the determinants and consequences of acquiring external financing in frictional capital markets—by financially-constrained firms, such as Small-and-Medium-sized Enterprises (SMEs) (Fazzari et al., 1988; Bhide, 1993; Alt, 2003; Beatty et al., 2010; Poncet et al., 2010; Denis, 2011; Cumming and Hou, 2014). As has been widely discussed in these studies, one should note that it is difficult to pinpoint the absolute magnitude of a firm’s financial constraints, which is not our research pursuit. Rather, our paper aims to gauge the impacts of ownership types on the relative accessibility to credits through collectively tracing firms’ investment and financing reactions to cash flow shocks. To identify the pure effects of ownership discrimination and exclude possible disturbing factors, we employ a unique exogenous policy shock and illustrate the dynamics of credit allocation culture evolutions. In this sense, our work is more institutional- and policy-relevant. Hence, we go beyond the existence of ownership discrimination and provide abundant evidence on its real attributions and political implications. We also contribute to the nascent studies on the role of banks: whether banks deliberately choose to prefer SOEs, or passively do so as a compromise to policy lending. Interestingly, we show that banks seem to “rationally” choose SOEs for the government bailout expectations; when it disappears, banks quickly react by allocating credit more fairly. A recent work by Yuan et al. (2019) finds supportive evidence that loan decisions of banks show no evidence of severe compromise to local governments’ economic stimulus plans, as speculated by some media and academic work. The findings in this paper substantially deepen our understanding of the real crux of credit misallocation.

This paper also complements the literature on gauging the effectiveness of privatization reform in emerging markets (Perotti and Van Oijen, 2001; Megginson and Sutter, 2006; Gan, 2009; Boubakri et al., 2011). Extensive work shows that privatization improves firms’ performance (Chen et al., 2008; Bai et al., 2009; Du and Liu, 2015; Gan et al., 2017), enhances market valuation (Lin and Su, 2008), triggers positive stock market reactions (Berkman et al., 2014; Calomiris et al., 2010), reduces information asymmetry (Gul et al., 2010), and prevents overinvestment (Liu and Siu, 2011). A more related paper by Chen et al. (2012) also investigates the Split-share Structure Reform and uncovers a reduction in firms’ average cash holdings and average corporate saving rate, and an increase in investments. They attribute the effects to the removal of market frictions, alignment of interests and reduced financial constraints. Our paper, from the angle of ownership-induced credit misallocation, examines firms’ investments and financing reactions to cash flow shocks in a methodologically comprehensive multi-equation model, and illustrates the heterogeneous effects among firms.

On the macro level, the paper provides abundant political implications. It identifies the role of the share structure reforms in accelerating market maturation, especially in emerging markets. On the one hand, we alert governments to the detrimental consequences of credit allocation inefficiencies under implicit government bailout protection for SOEs. On the other hand, by disentangling

⁵ Statistics show that SOEs finance more than 30% of their investments through bank loans; for non-SOEs, this percentage is less than 10% (Song et al., 2011).

⁶ For the estimations of a firm’s level of financial constraints from different perspectives, see Fazzari et al. (1988); Gertler and Gilchrist (1994); Fluck and Lynch (1999); Biddle and Hilary (2006); Almeida and Campello (2007), among others.

the impact of banking marketization from firm-level share structure reform, our findings provide a practical strategy for the governments seeking cure for credit misallocation. The Split-share Structure Reform in China sets a good example of achieving this aim without radically changing firms' ownership structures: it instead exposes SOEs to the monitoring by the capital market through transformation of their non-tradable shares to tradable ones. Finally, the paper may enlighten policy makers to potential solutions of SME financing difficulty, which is among the most intractable dilemmas faced by governments worldwide.

The remainder of the paper is organized as follows: Section 2 introduces the institutional backgrounds of the ownership structure in China and the Split-share Structure Reform. Section 3 describes the empirical approach and datasets. Section 4 discusses the empirical results. Section 5 provides further tests and Section 6 shows robustness checks. Section 7 concludes.

2. Institutional background and hypothesis development

2.1. Ownership structures and the existence of ownership discrimination

Corporate ownership structure plays a crucial role in social credit allocation, asset pricing efficiency, and economic well-being, especially in transition economies. State-ownership was proposed more than sixty years ago, with the primary purpose of addressing monopoly power in social utility sectors, achieving social welfare goals, and combating market failure (Lewis, 1949; Meade, 1949; Stiglitz and Weiss, 1981; Greenwald and Stiglitz, 1986; Bai et al., 1997; Lin et al., 1998). Over the subsequent half-century, multiple forms of nationalization evolved. In the real sector, governments exert ultimate control over SOEs by holding an overwhelmingly large percentage of state-owned shares. In the financial sector, the financial system is dominated by state-owned banks (La Porta et al., 2002), further facilitating governmental interference in credit allocation. SOEs are supposed to serve political objectives such as social security, welfare, and infrastructure constructions where social benefits exceed costs. As a compensation, SOEs have relatively relaxed profit-generating goals; commensurately, their managerial incentives are largely unaligned with value maximization (Huyghebaert and Quan, 2011).

In the institutional landscape of China, the ownership structure is especially crucial. China had long featured a highly government-dominated financial system with state-owned banks as the primary source of social financing, which laid the early foundations for the long-lasting and deeply rooted dominance of state ownership. Market mechanism was first introduced in 1978 during the third plenary session of the Eleventh Central Committee of the Communist Party of China.⁷ However, in the early 1980s, the dawn of the Chinese market economy, state-owned and collective-owned enterprises still dominated the economy (Jefferson and Su, 2006). The government undervalued market power and advocated a highly centralized regime, according to the guideline of "large in size and collective in nature". The central government owned, operated, and dominated SOEs. Admittedly, in this early stage of the economy, when pricing mechanisms and resource allocations were immature, SOEs' affiliations with the government remained somewhat reasonable in terms of propping up the embryonic-stage industry prosperity. However, controversy gradually emerged: SOEs came under fire for worsening efficiency, managerial ossification and corruption, while enjoying overwhelmingly higher proportion of social credits (Cull and Xu, 2005; Megginson and Wei, 2014). Banks were blamed for their favoritism towards SOEs. Entrepreneurs of non-SOEs openly complained of their inferiority when "knocking on banks' doors".⁸ The sharp discrepancy between SOEs and non-SOEs in financing conditions, namely the "ownership discrimination", grew to receive wide attention and was regarded as the most important side-effect of the state-ownership-dominated economy.

In response, the government began to tentatively push SOEs towards market orientation and emphasize "Non-Public Sectors of the Economy (NPSOE)" and the slogan of "the state regulates the market; the market guides enterprises", which essentially transformed SOEs from state-operated firms to state-owned but self-sustaining enterprises.⁹ Thereafter, reforms on SOEs were gradually introduced to clarify the managerial compensation, responsibilities, and incentive schemes (Jefferson and Su, 2006), e.g., the transformation of profit to tax and the introduction of enterprise contract responsibility system. In the mid-1990s, the government allowed private and foreign shareholders to take stakes in firms while maintaining control rights, and implemented a furlough policy (*Xiagang*) that helped SOEs to get rid of redundant labor forces (Rawski, 2003). However, the wave of mild, incomplete and mostly short-sighted reforms didn't thoroughly cure the persisting problems.

By pulling together the evolution of political regime into an integrated landscape, we can detect how the salient nature of credit allocation in China gradually took shape. The highly centralized economic system, as the starting point of China's economy, set the tone for the financial sector in the following years—the original aim of the capital market was to raise money for SOEs, *i.e.*, the economic backbones. SOEs have enjoyed soft-budget constraints (Cull and Xu, 2005; Megginson and Wei, 2014) and are implicitly sheltered from default, fostering their relentless borrow from the financial markets. We thus make the first hypothesis:

H1. : The phenomenon of ownership discrimination exists, *i.e.*, SOEs have preferential accessibility to credits.

As explicated in the introduction, we examine the existence of ownership discrimination by comparing the abilities to resist cash flow shocks between SOEs and non-SOEs using a dynamic multi-equation model (Gatchev et al., 2010). We will elaborate on the

⁷ During the conference, the central government set the major principle of economic development as "A Planned Economy Supplemented by Market Regulation".

⁸ During an interview, the famous private entrepreneur Liu Chuanzhi appealed to the government by saying, "For private firms, the biggest reform bonus would be for the government to create a very transparent, fair, and equitable competitive environment in the capital market."

⁹ The slogan was put forth in 1987, during the Thirteenth National Congress of the Communist Party of China.

methodologies and identification strategies in Section 3.

2.2. The split-share structure reform in China

China offers a representative background to examine the institutional origins of ownership discrimination. It has clear boundaries between state-owned and non-state owned enterprises, and has experienced numerous policy shocks on firms' ownership structure spanning the past 40 years, among which the most influential is the Split-share Structure Reform that commenced in 2005 and mostly finished in 2007 (Li et al., 2011).

Section 2.1 has elaborated on a series of inherited problems encountered by SOEs in their operations. Despite that the Chinese government had long been aware of the expanding losses of SOEs and the resulting fiscal burdens on local governments, it was extraordinarily cautious about privatization, which lagged far behind the other strands of marketization reforms. From the very beginning, the government tinkered with the problem by attempting to modernize SOEs' operations while maintaining the state ownership. The futility of its short-term palliative solutions (Lau et al., 2000) finally fueled the pace of large-scale *de facto* privatization in 1998, officially named "transformation" (*Gaizhi*) for ideological reasons (Gan, 2009), almost halved the number of SOEs through shareholding conversion.¹⁰ Instead of radically selling state-owned shares, the government chose the form of "corporatization" (Wei et al., 2005): allowing SOEs to raise equity by public offering.¹¹ Meanwhile, the government reserved control rights by retaining a large stake in about 70% of SOEs (Huyghebaert and Quan, 2011), and these shares were strictly restricted by the regulatory authorities and could not be freely traded in the secondary market to avoid market turbulence (Sun and Tong, 2003). Firms maintained a unique *split-share structure*, defined as the coexistence of two classes (tradable and non-tradable domestic shares) with otherwise identical rights. Only tradable shares could be traded by investors; non-tradable shares were unlisted, and transactions could only be conducted through negotiations between the counterparties. The persistent transaction barriers between the two types of shares put firms in a dilemma of conflicting share-pricing mechanisms; the dominant role of the government in corporate management through its controlling holdings of non-tradable state-owned shares still left the firms unmotivated to improve their performance. A series of short-term reforms was phased in to repair the system, but mostly failed in the end.

The Chinese government came to realize the importance of implementing a thorough reform to dismantle the dual share structure. On January 31, 2004, the State Council issued the document *Some Opinions of the State Council on Promoting the Reform, Opening, and Steady Growth of Capital Markets*. One year later, on April 30, 2005, the China Securities Regulatory Commission (CSRC) issued the *Notice of the China Securities Regulatory Commission on Piloting the Share-Trading Reform of Listed Companies*, which announced the official start of the Split-share Structure Reform. During the reform, state-owned shares, as well as other types of non-tradable shares, were converted into tradable shares. Following the guidelines, firms chose their conversion date, drew up and voted for the proposals, hired qualified security firms, and accomplished the reform. Extensive studies have documented substantial achievements of the reform, such as enhanced corporate governance, better risk management, and superior stock performance of listed SOEs (Liao et al., 2014; Li et al., 2011; Firth et al., 2010; Liu et al., 2014).

The reform opened up a full-share circulation environment in the secondary market and endowed SOEs with liberalized legitimacy in trading state-owned shares. As such, the SOEs' privileged position eroded with the rising expectation of privatization through sales of tradable state-owned shares after the reform. Even though the conversion of non-tradable shares to tradable shares did not immediately change firms' ownership structures, the reform essentially exposed SOEs to fierce market competition and substantial threats of being privatized. In this vein, their implicit protection from bankruptcy and corporate takeover became far less certain.¹² This weakened their advantages in securing favorable financing from banks, the bond market, etc., which, after the reform, would judge them rather by quality and growth prospects. Besides, SOEs' internal control and external monitoring by shareholders may also be strengthened as the holders of tradable shares are generally more incentivized to improve firms' performance, governance, and risk management. Accordingly, we propose [Hypothesis 2](#):

Hypothesis 2. The Split-share Structure Reform reduces ownership discrimination and enhances credit allocation efficiency.

The investigation into [Hypothesis 2](#) is largely related to our research agenda of answering why creditors prefer SOEs: from the standpoint of lenders (such as banks), they prefer SOEs either for the superiority of state ownership structure itself (*i.e.* they believe that state ownership is the optimal organization form in a transition economy like China, as the government acting as owner can improve firm value and reduce agency problems), or for the implicit government guarantee (*i.e.*, lenders are attracted by government bailout protection on SOEs, even if they are worse in quality). We describe these two plausible connotations of ownership discrimination derived from [Hypothesis 2](#) as follows:

Hypothesis 2a. Creditors prefer SOEs as they believe state-player-dominated ownership structures are superior to private ones.

¹⁰ According to Fan (2002), during this wave of privatization, more than 70% of small SOEs were privatized or restructured. As estimated by the National Bureau of Statistics, three quarters of large and medium industrial SOEs were privatized. In addition, city-level statistics show that about 85% of SOEs were privatized by 2005 (Gan et al., 2017).

¹¹ The establishment of the Shanghai and Shenzhen Exchange in the early 1990s enabled more than 1000 large and medium-sized SOEs to be listed on the primary market for equity financing.

¹² Liao et al. (2014) argue that the absolute dominance of SOE non-tradable shareholders is wiped out and external monitoring through corporate takeovers are virtually in effects after the reform.

Hypothesis 2b. Creditors prefer SOEs for the perceived implicit government guarantee behind SOEs.

Arguably, *Hypothesis 2a* relates to the long-lasting debate in academia regarding the merits and shortcomings of public and private ownership, which is a key dichotomy in shaping the basic structure of an economy (see, for example, Bardhan and Roemer, 1992, 1993; Shleifer and Vishny, 1994; Stiglitz, 1994; Megginson and Netter, 2001; Megginson, 2010). Some work advocates the merits of state-ownership, especially in underdeveloped economies with weak investor protections and law enforcements. The state ownership, to some extent, enhances firm value, strengthens social and economic stability, curbs the agency problem of large shareholders' expropriation on minority shareholders, and reduces the probability of low-price-disposal of assets by the local governments (Newbery and Pollitt, 1997; Wei and Varela, 2003; Chen et al., 2009; Hoff and Stiglitz, 2004; Yu, 2013; Hess et al., 2010).¹³ In contrast, *Hypothesis 2b* is unrelated to the value judgement of ownership structure, but refers to the inherent benefits enjoyed by SOEs: governments will bail them out if they run into distress. Along this line, even though banks also deem SOEs as less productive and lower in quality, they still prefer them, for the perceived "safer loans".

Typically, these two competing hypotheses are highly intertwined and hard to distinguish. As noted earlier, this reform helps untangle the two possible institutional origins of ownership discrimination: by transforming non-tradable state-owned shares to tradable ones, the reform increases the prospect of further privatization and cripples the "unbreakable" status of SOEs, while not altering the ownership type *per se*. Besides, this reform is mandatorily implemented without freedom for firms to endogenously choose whether and when to convert non-tradable shares.¹⁴ As such, if banks prefer SOEs for the merits of state-owned property structure (*Hypothesis 2a*), we should not observe salient changes in bank's lending preferences (since ownership type remains unchanged). If *Hypothesis 2* is identified, it essentially justifies the proposition that credit misallocation stems from the expected implicit government guarantee, which becomes largely uncertain after the reform (*Hypothesis 2b*). This hypothesis is highly compatible with the condition in China, where the government has a long history of owning, operating, and dominating SOEs. The linkage between local governments and SOEs was even strengthened after the wave of "regionally decentralized authoritarianism (RDA)", which delegates official affiliations with and regulatory power over SOEs to the provincial, municipal/prefecture, and county/township governments (Du and Liu, 2015; Gan et al., 2017). SOEs' dual economic and political orientations largely determine the cadre assessments and promotion opportunities of local officials.¹⁵ Therefore, local governments have a strong tendency to protect SOEs by closely interfering with banks, guiding loans towards state-owned sectors and rescuing financially distressed SOEs. On the other hand, shareholders of SOEs may also abuse the easy access to credits and irrationally expand lending for private benefit. Besides, SOEs' boards of directors are usually led by former party secretaries or retired politicians, elected by their largest shareholder (*i.e.* the governments).¹⁶ The "paternal love" of the local governments for SOEs may in turn encourage banks to lend "riskless money" to them (Faccio et al., 2006).

However, there is one possible counterargument that the non-marketization of the banking sector, rather than firms, should be responsible for the existence of ownership discrimination. In this sense, the alleviation of ownership discrimination after the Split-share Structure Reform essentially results from the marketization of the banking sector. Indeed, China's four largest banks are state-owned, dominate the financial system, and are primarily oriented at supporting SOEs (Boyreau-Debray and Wei, 2005).¹⁷ It is probable that the "umbilical cord" between state-owned banks and state-owned enterprises facilitates SOEs' occupation of disproportional credits, jeopardizing market efficiency (Brandt and Li, 2003; Allen et al., 2005).¹⁸

To exclude this alternative explanation, we consider the marketization reform of China's banking sector starting in 2003, which was aimed at rescuing the deteriorating operations and non-performing loans of state-owned banks. This reform was also part of the protocols when China joined the WTO in 2001—the Chinese government promised to open the banking sector to competition within five years. China Construction Bank (CCB) fired the first shot. It re-capitalized, introduced strategic investors, underwent financial restructuring, and ultimately listed its shares on the Hong Kong and Shanghai Stock Exchange. The other three state-owned banks finalized marketization in succession. Meanwhile, a series of joint-stock commercial banks burgeoned. We include the indicator of the banking-sector reform in the empirical design (details in Section 4), and show that the observed effects of the Split-share Structure Reform remain even after controlling for the wave of banking sector reform, suggesting that the latter is not the dominant power. The discussion also translates into the policy implications: in order to mitigate ownership discrimination, which one should make a change:

¹³ The opponents, in contrast, argue that private firms have much better risk-sharing, resource allocation efficiency, and higher productivity (Johnson and Woodruff, 2002; Behr et al., 2013). Using samples of firms in different countries, a large strand of literature has uncovered many side effects of state ownership: bad risk management, lower investment efficiencies, and inactiveness in blazing new trails in highly competitive markets (Megginson and Netter, 2001; Djankov and Murrell, 2002; Allen et al., 2005). Besides, the lack of legal protection for minority and outside shareholders, tunneling, and managerial perks also erode SOEs' value (Shleifer, 1998; Shleifer and Vishny, 2002; Banerjee, 1997; Hart et al., 2015; Levine, 2002).

¹⁴ The starting time and designated finishing time of the reform were set forth by the China Securities Regulatory Commission (CSRC) on August 2005 (Firth et al., 2010; Tan et al., 2020).

¹⁵ SOEs perform import roles in cadre assessments. Local officials' political pursuits hinge critically on SOEs' contribution of profit/dividend remittances and tax revenues, reduction of unemployment rates, and fundamental constructions, among others.

¹⁶ With Political interventions in SOEs' operations, managerial compensation packages remain largely opaque and unaligned with market incentives (See, for example, Allen et al., 2005).

¹⁷ These four state-owned banks are Bank of China, Industry and Commercial Bank of China, Construction Bank of China, and Agriculture Bank of China.

¹⁸ Allen et al. (2005) point out that China scores poorly on creditor rights, investor protection, accounting standards, and anti-corruption measures compared with other countries.

banks or firms? The evidence suggests the latter—the crux of credit misallocations lies more on the side of firms, rather than banks. In the following sections, we will comprehensively expound on these issues.

3. Methodology and data

3.1. Empirical methodology

3.1.1. A multi-equation model

Although it is tempting to take the existence of ownership discrimination as a given, we have to be very cautious. In reality, a firm’s leverage is distinct from its overall debt capacity, especially when there is excess liquidity in the market. A non-SOE may choose to maintain a leverage far below its debt capacity. As we have expounded in the introduction, our major focus is the differential reactions of investment and financing behaviors to abrupt cash flow shocks between SOEs and non-SOEs. Cash flow shocks (*CF*) serve as an ideal “touch stone” of a firm’s financial accessibility: firms unable to adequately fulfill financial needs have no choice but to cancel or postpone their planned investments. Hence, from a dynamic perspective, corporate investments and financing decisions have a hedging effect. When firms encounter cash flow shocks (particularly negative shocks), they have two options. *Option A) Adjusting investment decisions*: on the edge of nearly exhausted cash flow, a firm without sustainable financing may be compelled to terminate certain investments, abandon valuable projects, and thus relinquish profits. Alternatively, *Option B) Adjusting financing decisions*: the firm could seek to expand lending to maintain current investments. Apparently, firms should prefer *Option B*, as it is a much less costly strategy for accommodating fluctuations in cash flow and minimizing negative impacts on corporate investment opportunities. If ownership discrimination exists, we expect non-SOEs’ investment behaviors to be more sensitive to cash flow shocks, whereas financing behaviors should be less sensitive to cash flow shocks, since their disadvantageous status in financing decisions (*Option B*) forces them to adjust investment decisions instead (*Option A*). Along this line, we examine the existence and magnitude of ownership discrimination by comparing firms’ multifaceted financial reactions to cash flow fluctuations collectively in a multi-equation model proposed by [Gatchev et al. \(2010\)](#). The model bears the advantage of reflecting the interdependent nature of financial policies subject to the constraint of “sources of cash equal uses of cash”, as well as this interdependent of financial decision-making along periods, which facilitates our investigation into financing and investments behaviors as a whole. Specifically, the ex-post constraints that sources of funds must equal uses of funds can be expressed as¹⁹:

$$\Delta CASH_t + DIV_t + CAPX_t + ACQUI_t - \Delta SLOAN_t - \Delta LLOAN_t - \Delta OTHERSD_t - \Delta OTHERLD_t - STKISSUE_t - ASSETSALES_t \equiv CF_t \tag{1}$$

Firms target desired levels of variables subject to available investment opportunities. By using the perfect foresight model to minimize the penalty for deviating from desired levels and costs associated with adjustments, we can obtain the following system of ten equations:

$$\begin{bmatrix} -CAPX_t \\ -ACQUI_t \\ ASSETSALES_t \\ STKISSUE_t \\ -DIV_t \\ \Delta SLOAN_t \\ \Delta LLOAN_t \\ \Delta OTHERSD_t \\ \Delta OTHERLD_t \\ -\Delta CASH_t \end{bmatrix} = S [\tilde{CF}] + J \begin{bmatrix} -CAPX_{t-1} \\ -ACQUI_{t-1} \\ ASSETSALES_{t-1} \\ STKISSUE_{t-1} \\ -DIV_{t-1} \\ \Delta SLOAN_{t-1} \\ \Delta LLOAN_{t-1} \\ \Delta OTHERSD_{t-1} \\ \Delta OTHERLD_{t-1} \\ -\Delta CASH_{t-1} \end{bmatrix} + K \begin{bmatrix} MB_t \\ SIZE_t \\ ROE_t \\ DUMINDU \end{bmatrix} + \begin{bmatrix} -e_{CAPX,t} \\ -e_{ACQUI,t} \\ e_{ASSETSALES,t} \\ e_{STKISSUE,t} \\ -e_{DIV,t} \\ e_{\Delta SLOAN,t} \\ e_{\Delta LLOAN,t} \\ e_{\Delta OTHERSD,t} \\ e_{\Delta OTHERLD,t} \\ e_{\Delta CASH,t} \end{bmatrix}$$

s.t.

$$\begin{aligned} i'S &= -1, \\ i'J &= \underset{1 \times 10^7}{0}, \\ i'K &= \underset{1 \times 6}{0} \end{aligned} \tag{2}$$

where *S*, *J*, and *K* are matrices of response coefficients. The matching of cash inflow and outflow is reflected by the constraints. We control for firm-level characteristics, including book-to-market ratio, size, return on equity *etc.* to account for other factors that may affect financing and investment decisions, and include year and industry fixed effects. Table A1 in the appendix provides detailed definitions of the main variables.

¹⁹ Firms are not permitted to repurchase stocks in China, thus we omit the variable *RP* from the original model of [Gatchev et al. \(2010\)](#). To better investigate whether banks bias towards SOEs in credit allocation, we split the short-term liability in [Gatchev et al. \(2010\)](#) into short-term bank loans (*SLOAN_t*, including short loans and loans maturing in less than one year) and other short-term liabilities (*OTHERSD_t*); the long-term liability is split into long-term bank loans (*LLOAN_t*) and other long-term liabilities (*OTHERLD_t*).

3.1.2. The tests on the existence of ownership discrimination

The multi-equation model acknowledges the interdependent and intertemporal nature of firms' financial decisions on both ends: how firms adjust their investments during cash flow shocks (coefficients of $CAPX$ on CF), and how they raise funds for mitigating the shocks (coefficients of incremental short- and long-term bank loans, $\Delta SLOAN$ and $\Delta LLOAN$, on CF).

We gauge the existence of ownership discrimination by comparing the capabilities to resist cash flow shocks between SOEs and non-SOEs with the model. If non-SOEs have inferior access to bank loans, we should detect higher response of $CAPX$ and lower adjustments of $\Delta SLOAN$ and $\Delta LLOAN$ to cash flow shocks, suggesting lower flexibility in financing to protect investments (*Hypothesis 1*). Accordingly, we incorporate an interaction term of CF and the ownership dummy variable (SOE) into eq. (2) (i.e., $SOE*CF$) to identify the differences between these two types of firms.

3.1.3. The tests on the impacts of the reform

To assess the effects of the Split-share Structure Reform on ownership discrimination, we employ the Diff-in-Diff methodology by introducing a dummy variable, REF , which equals 1 when the firm has already undergone the reform in a particular year and 0 otherwise. We focus on the triple interaction term $SOE*CF*REF$ to detect the impacts of the reform: if the reform effectively reduces the discrimination, we should find a significantly positive coefficient of $CAPX$ on $CF*SOE*REF$, offsetting its negative coefficient on $SOE*CF$. Besides, on the financing side, the coefficients of $\Delta SLOAN$ and $\Delta LLOAN$ on $CF*SOE*REF$ should both be positive, opposite to their coefficients on $SOE*CF$, indicating a reduction in SOEs' comparative advantage in credit market.²⁰

Relatedly, from the angle of bank lending behaviors, we could also directly detect the changes in banks' loan-granting preferences after the reform based on a similar Diff-in-Diff design. By examining the coefficients of bank lending characteristics (including the amount, maturity, interest rate, collateral, etc.) on the interaction term of the SOE indicator (SOE) and post-reform dummy (REF), we could further gauge whether the reform effectively achieves the purpose of efficient credit re-allocation. Details will be provided in Section 4.5.

3.2. Data and descriptive analysis

The annual financial data and firms' actual controller data of Chinese A-share listed firms on Shanghai and Shenzhen stock markets are derived from the CSMAR and RESSET database, the leading and most commonly used financial data providers in mainland China. The data on Split-share Structure Reform is derived from the "Split-share Structure Reform Dataset" of the RESSET database. We restrict the sample period to around four years before and after the Split-share Structure Reform, spanning from 2002 to 2013. Chinese listed firms were not required to disclose actual controllers' information in their Annual Report until 2001 and the data available is relatively complete after 2002 for most listed firms. For a firm to be included in our sample, the firm must be normally operated without Particular Transfer (PT) or Stop Trading (ST) issues and have available information on the specific finishing time of the reform. Observations with missing values for the dependent and independent variables are deleted. Financial firms are excluded since their capital structure and financial decisions are typically different from non-financial firms.²¹ After deleting the outliers,²² in total 14,696 valid observations are obtained.

We gauge the ownership types of the firms based on the "nature of actual controllers" from the CSMAR database. Firms with state-owned shares as controllers or directly owned by the central and local government institutions are regarded as State-owned Enterprises (SOEs). Other firms, controlled by private shareholders, foreign entities etc., are categorized as non-State-owned Enterprises (non-SOEs). The dummy variable SOE equals to one when the firm is SOE in the specific year and zero otherwise.

Table 1 reports the descriptive analyses of the dependent and independent variables. We scale the variables by total assets for normalization. The sample consists of 2403 firms, including 777 SOEs and 1305 non-SOEs for the entire sample period, and 321 firms that switched ownership in certain years during the period. Notably, 43 out of the 321 firms underwent a change from SOEs to non-SOEs in the same year as it underwent the Split-share Structure Reform. As shown in Panel A of Table 1, the percentage of capital expenditure to total assets varies averages 3.479% with a maximum of 50.574%. The average cash flow over total assets is 2.241%. Our summary statistics are basically similar to those in prior research.

As we mainly focus on the differences in financial accessibility and financing behaviors of SOEs and non-SOEs, in Panel B of Table 1, we report the summary statistics of these two subsamples and the T-statistics of their differences. We find a significantly higher percentage of capital expenditure to total assets for non-SOEs, indicating their active investments and higher aspiration to expand capital spending, which, if absent of discrimination, should be favorably received by the market (McConnell and Muscarella, 1985). In sharp contrast, the cash flow of non-SOEs are lower than SOEs by 0.766% in total assets, significant at the 1% level, with a higher fluctuation. Non-SOEs' size of incremental short-term and long-term financing are both lower than those of SOEs, but their asset sales are significantly higher. We justify this evidence as a manifestation of the inferior financing conditions for non-SOEs: lacking of easy access to bank loans, they have to seek asset sales to avoid cashflow exhaustion. The differences in leverage are consistent with the

²⁰ In the regressions with interaction terms, the separate variables and interactions of variables in the triple-interaction term are all included, i.e., CF , SOE , REF , $SOE*CF$, $CF*REF$, $SOE*REF$ are all controlled.

²¹ Since the changes in cash flow and other variables cover two periods and the lagged values of the variables are involved in the regressions, the effective data set used in the multi-equation analysis spans from 2003 to 2013.

²² To remove any possible outlier effects, we cannot winsorize the continuous variables in the regression because the model requires the matching of cash inflow and outflow. Therefore, we directly cut the outliers of the continuous variables at the 0.5st and 99.5th percentiles.

Table 1

Descriptive analysis of variables.

This table provides a summary statistics of the main variables in the paper, including the capital expenditure, cash flow, incremental short- and long-term loans etc. Panel A reports the sample size, mean, standard deviation, minimum and maximum values. All the values are divided by total assets of the specific firm in the year as defined in Table 1. Panel B divides the sample into two groups based on the ownership. Mean comparison tests are conducted for each variable with T-values listed in the last column. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$).

Panel A. Summary Statistics of the full sample					
Variable	Obs.	Mean	Std. Dev.	Min	Max
CAPX	14,696	3.479	4.791	0.000	50.574
CF	14,696	2.241	14.239	-122.893	282.778
ACQUI	14,696	0.688	3.210	0.000	100.791
ASSETSALLES	14,696	0.766	3.281	0.000	139.883
EQUI	14,696	2.753	12.041	0.000	323.659
DIV	14,696	2.464	2.244	0.000	53.734
Δ SLOAN	14,696	0.662	8.938	-313.162	47.833
Δ LLLOAN	14,696	0.752	6.329	-143.648	80.865
Δ OTHERSD	14,696	2.153	9.718	-187.182	70.065
Δ OTHERLD	14,696	0.151	2.358	-84.333	142.119
Δ CASH	14,696	-0.150	11.768	-102.070	271.895
MB	14,696	1.802	1.302	0.389	10.265
SIZE	14,696	0.214	0.011	0.180	0.251
SOE	14,696	0.499	0.500	0.000	1.000
ROE	14,696	6.453	8.216	-15.058	21.285

Panel B. Mean comparison tests between SOEs and non-SOEs.						
Variables	Non-SOEs (N = 7369)		SOEs (N = 7327)		Diff	T-value
	Mean	Std. Dev	Mean	Std. Dev		
CAPX	3.633	4.887	3.326	4.688	0.307***	(3.886)
CF	1.859	16.415	2.625	11.636	-0.766***	(-3.261)
ACQUI	0.858	3.685	0.518	2.636	0.340***	(6.430)
ASSETSALLES	0.829	3.549	0.702	2.987	0.127**	(2.341)
EQUI	3.743	15.371	1.757	7.156	1.986***	(10.033)
DIV	2.460	2.267	2.468	2.220	-0.008	(-0.223)
Δ SLOAN	0.667	8.142	0.657	9.674	0.010	(0.067)
Δ LLLOAN	0.564	5.592	0.942	6.987	-0.378***	(-3.621)
Δ OTHERSD	2.168	9.670	2.137	9.767	0.031	(0.192)
Δ OTHERLD	0.136	2.053	0.166	2.630	-0.030	(-0.763)
Δ CASH	-0.755	14.420	0.459	8.241	-1.215***	(-6.264)
MB	1.904	1.412	1.699	1.172	0.205***	(9.558)
SIZE	0.210	0.009	0.217	0.011	-0.007***	(-38.631)
ROE	6.606	7.889	6.299	8.531	0.307**	(2.267)

prior literature. Besides, non-SOEs are smaller in size, but higher in market-to-book ratio (*MB*), implying favorable growth opportunities. Overall, we can tentatively infer that SOEs generally underperform non-SOEs whereas enjoy more privileged access to financial market. We will elaborate on it in the following sections.

4. Empirical results

4.1. Ownership discrimination in China

Before introducing the time node of the Split-share Structure Reform, we first get a flavor of the existence and magnitude of the ownership discrimination in China based on the dynamic model in eq. (2).

We start with a pilot regression with all firms in the sample to illustrate the patterns of firms' investment and financing decisions in reaction to cash flow shocks. The formatting of variables' coefficients, T-statistics, and the adjusted R-squares are reported in a slightly special manner: each row of the table corresponds to each of the equations in the regression model, which includes the lagged value of ten dependent variables and control variables (firm size, market-to-book ratio, and ROE). We also control for year and industry fixed effects. For brevity, we present only the core results of interest.²³ The multi-equation model is estimated under the constraints in eq. (3). Since several dependent variables in the model have a minus sign,²⁴ in the table, their signs for the coefficients and T-values are adjusted accordingly for easy reading. The results are shown in Panel A of Table 2. We find that on the whole, when a firm experiences

²³ The full results of the multi-equation regression are available upon request.

²⁴ Specifically, in the first, second, fifth, and tenth equations.

Table 2

The existence of ownership discrimination.

This table examines the existence of ownership discrimination in China. Panel A provides an overall preview of firms' reaction of investment and financing behaviors to cash flow shocks with the multi-equation regression of Gatchev et al. (2010). Each row in the table represents each of the equations in the multi-equation model. LagVars refers to the lagged values of all the dependent variables in the model. We also control for year and industry fixed effects. Panel B introduces an interaction term of ownership dummy (SOE) with cash flow (CF). For brevity, only the key independent variables of interest are presented. As several dependent variables in the model have a minus sign (specifically in the first, second, fifth and tenth equations), their signs for the coefficients and t-values in the table are adjusted accordingly to make the results more intuitive. The Adjusted R-squares for the equations are reported in the last column. Coefficients are reported with T-statistics in parentheses. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* p < 0.10 ** p < 0.05 *** p < 0.01).

Panel A. Reaction of investments and financing to cash flow shocks								
Dependent variables	Independent variables				LagVars	YEAR & IND FE	N	Adj R ²
	CF	MB	SIZE	ROE				
CAPX	0.052*** (21.66)	-0.002*** (-8.10)	-0.062* (-1.81)	0.037*** (6.73)	YES	YES	14,696	0.367
ACQUI	0.038*** (20.00)	-0.001*** (-3.56)	-0.014 (-0.50)	0.022*** (5.08)	YES	YES	14,696	0.025
ASSETSALLES	-0.043*** (-21.81)	0.002*** (8.53)	-0.213*** (-7.64)	0.013*** (2.96)	YES	YES	14,696	0.029
EQUI	-0.005 (-0.77)	-0.011*** (-12.91)	-1.395*** (-14.40)	-0.055*** (-3.55)	YES	YES	14,696	0.031
DIV	0.041*** (35.32)	-0.000 (-0.04)	0.185*** (11.13)	0.052*** (19.61)	YES	YES	14,696	0.240
ΔSLOAN	-0.303*** (-64.52)	0.001** (2.30)	0.606*** (9.10)	0.079*** (7.37)	YES	YES	14,696	0.078
ΔLLOAN	-0.109*** (-30.28)	0.002*** (4.22)	0.635*** (12.39)	0.038*** (4.67)	YES	YES	14,696	0.046
ΔOTHERSD	-0.003 (-0.77)	-0.001 (-0.97)	0.661*** (10.34)	0.052*** (5.07)	YES	YES	14,696	0.028
ΔOTHERLD	-0.038*** (-30.74)	0.000* (1.78)	0.014 (0.79)	-0.012*** (-4.34)	YES	YES	14,696	0.060
ΔCASH	0.367*** (55.40)	-0.003*** (-3.20)	0.198** (2.11)	0.004 (0.27)	YES	YES	14,696	0.206

Panel B. The existence of ownership discrimination							
Dependent variables	Independent variables			CONTROL	YEAR & IND FE	N	Adj R ²
	SOE*CF	CF	SOE				
CAPX	-0.009** (-1.97)	0.054*** (19.28)	-0.002** (-2.38)	YES	YES	14,696	0.366
ACQUI	-0.014*** (-4.25)	0.040*** (19.72)	-0.003*** (-5.50)	YES	YES	14,696	0.024
ASSETSALLES	-0.008** (-2.16)	-0.042*** (-17.24)	0.001* (1.93)	YES	YES	14,696	0.028
EQUI	-0.243*** (-18.10)	0.086*** (10.44)	-0.008*** (-4.02)	YES	YES	14,696	0.073
DIV	-0.006** (-2.57)	0.043*** (32.71)	-0.002*** (-6.42)	YES	YES	14,696	0.235
ΔSLOAN	-0.133*** (-14.32)	-0.255*** (-44.78)	0.004*** (2.95)	YES	YES	14,696	0.095
ΔLLOAN	-0.030*** (-4.23)	-0.099*** (-22.43)	0.003*** (2.94)	YES	YES	14,696	0.048
ΔOTHERSD	0.172*** (19.36)	-0.065*** (-11.92)	-0.003** (-2.55)	YES	YES	14,696	0.038
ΔOTHERLD	0.001 (0.38)	-0.039*** (-25.85)	0.001*** (2.97)	YES	YES	14,696	0.059
ΔCASH	-0.213*** (-16.28)	0.448*** (55.70)	0.004** (2.26)	YES	YES	14,696	0.223

a positive (negative) cash flow shock equivalent to 1% of total assets, its capital expenditure increases (decreases) by around 0.052%. The coefficients of incremental short-term and long-term loans are -0.303 and -0.109, respectively, both significant at the 1% level, suggesting increased bank lending in response to cash flow plummets. The same is true for other financing channels, such as an increase in asset sales. The results justify our discussion in Section 3 that when cash flow fluctuates, firms tend to reach out for financing (*Option B*) rather than slashing promising investments (*Option A*). In this vein, do SOEs have an advantage in seeking external financing to smooth the impacts of cash flow fluctuations?

To detect the existence of ownership discrimination, we introduce an interaction term of ownership dummy (*SOE*) and cash flow

(CF) into the multi-equation model. Results are shown in Panel B of Table 2. In the regression with CAPX as dependent variable, the coefficient of the interaction term $SOE*CF$ is -0.009 , significantly negative at 5% level. As for firms' financing behaviors, in the equations with $\Delta SLOAN$ and $\Delta LLOAN$ as dependent variables, the coefficients of $SOE*CF$ are both significantly negative at 1% level, indicating that SOEs eventually take out more loans than non-SOEs following cash flow fluctuations. SOEs' higher availability of bank loans guarantees flexibility in expanding leverage, mitigating the cash flow shocks on investments. In other words, higher sensitivity of financing to cash flow offsets sensitivity of investments to cash flow. In contrast, non-SOEs have no choice but to revisit *Option A*, i.e., to downsize or abandon investment projects. Supportive evidence also exists in the equation of incremental cash holding, i.e. SOEs are less motivated in cash holding management, likely due to their more flexible financing environment. Overall, the evidence proves *Hypothesis 1*.

4.2. Privatization reform and ownership discrimination

The Split-share Structure Reform provides an ideal quasi-natural experiment to uncover the underlying economic connotations of ownership discrimination. Firms' ownership types are unaffected, but they're exposed to higher risks of privatization when their non-tradable shares are converted to tradable shares. As such, 1) if banks prefer SOEs for the simple reason that they believe the state-owned property structure is superior, we should not observe any changes after the reform, as it doesn't immediately alter firms' identity of ownership *per se*; 2) otherwise, if ownership discrimination stems from the implicit government guarantee behind SOEs, it should be evidently reduced, as the reform greatly undermines the certainty of such protection.

To test *Hypothesis 2* and the two sub-hypotheses, we use a staggered Diff-in-Diff setting by interacting the time dummy variable (REF) with the $SOE*CF$ term and construct a triple interaction term, $SOE*CF*REF$, in the multi-equation model. Results are reported in Table 3. Focusing on the first equation with the firm's capital expenditure (CAPX) as dependent variable, we find a positive coefficient on $SOE*CF*REF$, opposite to the negative coefficient of $SOE*CF$ (also shown in Panel A of Table 2). The coefficient of the triple interaction term is 0.021 and significantly positive at the 5% level. *Hypothesis 2* is identified. The significant results suggest that ownership discrimination diminishes along with weakened government bailout expectation. As such, the *Hypothesis 2b* is more likely to be true.

Supportive evidence also lies in the side of firms' financing behaviors. In the equations with incremental short-term bank loans ($\Delta SLOAN$) and incremental long-term loans ($\Delta LLOAN$) as dependent variables, coefficients on $SOE*CF*REF$ are both positive, i.e., 0.046 (significant at 5% level) and 0.016, respectively, opposite to those on $SOE*CF$, suggesting that the reform narrows the gap between SOEs and non-SOEs in taking out bank loans during cash flow shocks.

Consistently, we also observe changes in corporate savings rates after the reform from the last equation of Table 3: the negative coefficient of $REF*CF$ suggests reduced sensitivity of cash holding to cash flow shocks, a widely used proxy for corporate savings rates. The reduction is more pronounced among non-SOEs (manifested as the negative coefficient of the triple interaction term, opposite to that of $REF*CF$), consistent with the evidence in Chen et al. (2012). It serves as supplementary evidence of firms' reduced propensity of excess cash accumulation after the reform, especially for non-SOEs, possibly for enhanced financing environment. The coefficients in other equations also exhibit aligned evidence with prior studies.²⁵

4.3. Parallel test and placebo test on the identification strategy

In order to verify the staggered privatization reform as a valid quasi-exogenous shock, we conduct a dynamic test on the parallel-trend assumption by examining the patterns of ownership discrimination around the time of the reform. We conduct multi-equation regressions similar to the baseline model in Table 3, while replacing the REF variable in the triple interaction term with a series of indicators: $REF(-2)$, $REF(-1)$, $REF(0)$, $REF(1)$, and $REF(2+)$, which equals to one if it is two years prior to, one year prior to, the current year of, one year after, two and more years after the firm's region has undergone the reform, respectively, and zero otherwise. If it is the reform that triggers the mitigated discrimination, we should observe significant coefficients of the triple interaction terms only after the shocks. Results in Appendix Table A.2 validate this prediction. The coefficients of pre-event periods suggest that the treatment and control groups are reasonably comparable; salient impacts of the reform on ownership discrimination gradually appear in post-event periods, both economically and statistically significant, supporting our interpretation that the reform indeed leads to a pronounced decrease in ownership discrimination, and the effects persist for at least two years.

To further verify the parallel trend assumption, we track the dynamics of the changes in ownership discrimination between the treated and untreated firms. Specifically, we divide the sample period into eight sub-periods, with -4 representing four or more years before the reform and 4 representing four or more years following the reform. Numbers in the middle represent one year in each period. We plot the point estimate of the triple interaction term for each sub-period as well as the associated 95% confidence interval, and normalize the point estimate immediately before the event date to zero for easy comparison. As shown in Appendix Fig. A.1, the treatment group and control group share a common trend before the exogenous event with insignificant differences, whereas after the event, the reduced ownership discrimination becomes prominent and remains for the following four or more periods afterward. The figure further validates the quasi-natural experiment, and indicates the effectiveness and persistence of the reform in mitigating the unfairness in credit accessibility.

²⁵ For instance, in the first equation with CAPX as the dependent variable, the coefficient of $SOE*REF$ is significantly positive, consistent with Chen et al. (2012), which validates our empirical findings.

Table 3

Ownership discrimination and split-share structure reform.

This table illustrates the effects of the Split-share Structure Reform on the ownership discrimination by introducing the firm-level finishing time of the reform (REF) and construct a triple interaction term, CF*SOE*REF. The reform time dummy (REF) equals 1 when the firm has already undergone the reform in the year and 0 otherwise. Each row in the table corresponds to each of the equations in the multi-equation model. Control variables include the lagged values of the ten dependent variables, firm size, market-to-book ratio, ROE etc. We also control for industry and year fixed effects. For brevity, only core results are presented. As several dependent variables in the model have a minus sign (specifically in the first, second, fifth and tenth equations), their signs for the coefficients and t-values in the table are adjusted accordingly to make the results more intuitive. The Adjusted R-squares for the equations are reported in the last column. Coefficients are reported with t-statistics in parentheses. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* p < 0.10 ** p < 0.05 *** p < 0.01).

Dependent variables	Independent variables								CONTROL	YEAR & IND FE	N	Adj R ²
	SOE*CF*REF	SOE*CF	SOE*REF	CF*REF	CF	REF	SOE					
CAPX	0.021** (2.16)	-0.012* (-1.73)	0.002* (1.67)	-0.059*** (-9.38)	0.060*** (17.34)	-0.006*** (-5.81)	-0.002 (-1.56)	YES	YES	14,696	0.40	
ACQUI	-0.001 (-0.14)	-0.019*** (-3.50)	0.001 (0.74)	-0.021*** (-4.23)	0.040*** (14.61)	0.000 (0.46)	-0.003*** (-3.16)	YES	YES	14,696	0.05	
ASSETS SALES	0.021*** (2.66)	-0.018*** (-3.19)	-0.005*** (-4.37)	0.004 (0.72)	-0.030*** (-10.64)	0.006*** (6.28)	0.003*** (3.18)	YES	YES	14,696	0.04	
STKISSUE	0.369*** (13.47)	-0.336*** (-17.71)	-0.002 (-0.38)	-0.309*** (-17.70)	0.212*** (22.14)	-0.016*** (-5.22)	-0.009*** (-3.13)	YES	YES	14,696	0.08	
DIV	-0.011** (-2.29)	0.002 (0.49)	0.001 (1.53)	-0.021*** (-6.84)	0.036*** (21.48)	-0.001 (-1.05)	-0.002*** (-3.78)	YES	YES	14,696	0.31	
ΔSLOAN	0.046** (2.39)	-0.140*** (-10.47)	0.002 (0.55)	0.045*** (3.62)	-0.240*** (-35.49)	-0.007*** (-3.06)	0.002 (0.85)	YES	YES	14,696	0.05	
ΔLLOAN	0.016 (1.04)	-0.022** (-2.08)	-0.002 (-0.91)	-0.013 (-1.39)	-0.077*** (-14.73)	0.005*** (3.05)	0.002 (1.28)	YES	YES	14,696	0.05	
ΔOTHERSD	-0.160*** (-8.97)	0.192*** (15.45)	-0.002 (-0.75)	0.478*** (38.90)	-0.165*** (-26.31)	-0.016*** (-6.69)	-0.000 (-0.17)	YES	YES	14,696	-0.03	
ΔOTHERLD	0.001 (0.28)	-0.001 (-0.32)	-0.000 (-0.02)	0.027*** (8.54)	-0.033*** (-19.03)	-0.001** (-2.02)	0.001 (1.10)	YES	YES	14,696	0.12	
ΔCASH	0.284*** (10.50)	-0.296*** (-15.80)	-0.005 (-1.41)	-0.337*** (-19.72)	0.530*** (56.05)	0.017*** (5.90)	0.004 (1.34)	YES	YES	14,696	0.22	

We then conduct a placebo test on the timing of the reform. Specifically, we conduct 500 times simulations to generate a series of random years in the range of the real reform years, and accordingly, construct a “false” reform indicator (*REF*) to re-estimate the benchmark model for 500 times.²⁶ We then plot the empirical cumulative distribution function and density of the estimated coefficients on $SOE*CF*REF$ in Appendix Fig. A.2. As expected, the distribution of the estimated coefficients on the placebo reform indicator is centered around zero; our benchmark estimate from Table 3 (plotted as a vertical line at the value 0.021) lies outside the range of coefficients estimated in the simulation practice, proving the credibility of our findings.

4.4. Who is responsible for ownership discrimination? Banks vs. firms

We have uncovered reduced ownership discrimination after the reform. Taking a step further, an interesting but yet not fully explored challenge is whether the results stemmed from the privatization/marketization of the lenders (banks), rather than the borrowers (firms). This counterargument posits that banks are compelled by local governments to tilt towards SOEs, while this policy lending is largely alleviated after banking sector marketization. In most of the studies on credit misallocation, it is hard to fully exclude this alternative explanation. We argue that in this paper, the staggered Diff-in-Diff setting largely alleviates this concern, as the post-reform indicator, *REF*, varies among firms. In this section, we provide further evidence by taking advantage of the marketization reform on China’s banks, which happened almost around the same period. We measure the marketization process of the whole banking sector with the loans extended by listed banks over the total bank loans in the economy (*REFBank*), and include the triple interaction term $SOE*CF*REFBank$ into the baseline model.

Table 4 reports the results. In the equation with capital expenditure as dependent variable, the coefficient on $SOE*CF*REFBank$ is insignificant, and the coefficient on $SOE*CF*REF$ remains significantly positive, indicating that the alleviation of ownership discrimination is unlikely to be caused by marketization of the banking sector; rather, banks seem to rationally adjust their credit allocations when the real-sector Split-share Structure Reform cripples the government bailout expectations on SOEs. The evidence also indirectly implies that before the reform, banks proactively (rather than compelled to) favor SOEs for “safer” loans. Therefore, the political implications for policymakers may be that the resolution of the long-lasting credit allocation distortions in the capital market lies more on the side of firms, rather than banks.

4.5. Direct evidence of accessibility to bank loans

In this section, we aim at directly gauging the influences of the Split-share Structure Reform on the differential accessibility to bank loans between SOEs and non-SOEs.²⁷ We extract a documentation of the loans issued by Chinese banks from the CSMAR database. This dataset covers the information on bank loans, including the loan covenant, the borrowers’ names and stock ID, the lending banks, etc.²⁸ To examine the effect of the reform, we perform a Diff-in-Diff design based on the staggered reform as an exogenous shock, similar to that in the baseline regressions. We employ the logarithm of the loan amount (*LnAmount*), loan term (*LnTerm*), the interest rate (*Rate*), and a dummy indicator of whether the loan is backed by collateral (*Collateral*) as dependent variables, respectively, and regress them on the interaction of the SOE indicator (*SOE*) and post-reform dummy (*REF*), and both of the separate terms. We follow the literature to include a series of control variables in the regressions, including an indicator of whether the lending bank is among the “Big Four” banks (*Bank4*), whether the loan package is syndicated (*Syndicated*), whether the loan is quoted in local currency (RMB) (*Currency*), as well as the category of the loan purpose declared by the borrower (*LoanPurpose*) (Graham et al., 2008; Demiroglu and James, 2010; Cerqueiro et al., 2016; Ertan et al., 2017). Detailed definitions of the variables are reported in Table A.1. Moreover, consistent with our baseline model, we also control for the firm-level financial characteristics (i.e. the lagged values of cash flow (*CF*) and the ten dependent variables in the baseline model, plus firm size, market-to-book ratio and ROE). We also include industry and year fixed effects in the regressions. Table 5 shows the regression results.

We find a salient decline in the differences between SOEs and non-SOEs in terms of loan amount, maturity, interest rate, and collaterals after the reform, with coefficients significant at the 5% or 1% level, and the signs are opposite to those of the coefficients on the ownership indicator (*SOE*). The evidence indicates that SOEs’ privileged accessibility to bank lending (manifested as larger-scale loan amount, longer loan terms, lower borrowing costs, and less collateral requirements) prominently diminishes after the Split-share Structure Reform, which is in line with the findings in our baseline model.

Taken together, the direct evidence on the side of bank lending powerfully complement our major findings in the previous sections that the Split-share Structure Reform ameliorates the inferior lending status for non-SOEs. The reform proves to serve as an effective catalyst to mitigate ownership discrimination towards non-SOEs and enhance the efficiency of the financing environment.

²⁶ See Chetty et al. (2009) or La Ferrara et al. (2012) for similar practice of simulations in their placebo tests.

²⁷ We thank the anonymous referee for encouraging us to complement our findings with direct evidence of bank lending behaviors.

²⁸ The China Listed Firm’s Bank Loan Research Series of the CSMAR database provides comprehensive documentation of bank lending to listed firms, which is collected from the announcements of the firms. Despite the possible limitations of incomplete coverage of entire bank loans and missing variables (especially the interest rates), the dataset arguably provides helpful evidence on the changes in bank lending towards listed firms in our sample period.

Table 4

The real origins of the privatization reform: The firms vs. the banking sector.

This table includes the impacts of the banking sector's privatization/marketization reform. We denote a variable REFBank indicating the ratio of loans extended by banks that have already gone public to all bank loans. Similar to the firm's privatization reform indicator, REF, we construct the triple interaction term, CF*SOE*REFBank, and include the other interaction terms in the regression. The results of the multi-equation regressions are reported with only the core results presented for brevity. Control variables include the lagged values of the ten dependent variables, firm size, market-to-book ratio, ROE etc. We also control for industry and year fixed effects. Definitions of variables and table structures are exactly the same as Table 3. As several dependent variables in the model have a minus sign (specifically in the first, second, fifth and tenth equations), their signs for the coefficients and t-values in the table are adjusted accordingly to make the results more intuitive. The Adjusted R-squares for the equations are reported in the last column. Coefficients are reported with t-statistics in parentheses. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* p < 0.10 ** p < 0.05 *** p < 0.01).

Dependent variables	Independent variables								CONTROL	YEAR & IND FE	N	Adj R ²
	SOE*CF*REF	SOE*CF	SOE*REF	CF*REF	SOE*CF*REFBank	SOE*REFBank	CF*REFBank					
CAPX	0.023** (2.06)	-0.034* (-1.70)	0.005*** (2.87)	-0.062*** (-9.72)	0.030 (0.90)	-0.008* (-1.94)	0.016 (0.79)		YES	YES	13,720	0.38
ACQUI	0.004 (0.41)	0.012 (0.74)	0.002* (1.73)	-0.026*** (-4.94)	-0.054** (-1.97)	-0.007* (-1.87)	0.047*** (2.78)		YES	YES	13,720	0.05
ASSETSALLES	0.031*** (3.25)	-0.015 (-0.87)	-0.005*** (-3.95)	0.005 (0.94)	-0.019 (-0.67)	-0.001 (-0.23)	-0.006 (-0.37)		YES	YES	13,720	0.05
STKISSUE	0.393*** (12.29)	-0.431*** (-7.53)	0.003 (0.73)	-0.321*** (-17.69)	0.101 (1.08)	-0.025** (-2.03)	-0.127** (-2.19)		YES	YES	13,720	0.14
DIV	-0.013** (-2.34)	0.009 (0.95)	0.002*** (3.15)	-0.023*** (-7.33)	-0.009 (-0.55)	-0.005** (-2.15)	0.002 (0.23)		YES	YES	13,720	0.32
ΔSLOAN	0.083*** (3.78)	0.013 (0.34)	0.000 (0.03)	0.013 (1.06)	-0.275*** (-4.31)	0.014 (1.64)	0.245*** (6.13)		YES	YES	13,720	0.06
ΔLLOAN	0.030* (1.73)	-0.033 (-1.07)	-0.001 (-0.41)	-0.012 (-1.19)	-0.004 (-0.08)	-0.005 (-0.73)	-0.009 (-0.28)		YES	YES	13,720	0.09
ΔOTHERSD	-0.181*** (-8.87)	0.116*** (3.17)	-0.001 (-0.33)	0.484*** (38.96)	0.140** (2.35)	-0.014* (-1.85)	-0.089** (-2.39)		YES	YES	13,720	0.00
ΔOTHERLD	-0.008 (-1.46)	0.003 (0.31)	-0.001 (-0.61)	0.027*** (8.20)	0.008 (0.49)	0.004* (1.68)	0.011 (1.01)		YES	YES	13,720	0.14
ΔCASH	0.332*** (10.62)	-0.334*** (-5.95)	-0.006 (-1.36)	-0.359*** (-20.43)	-0.017 (-0.18)	-0.008 (-0.65)	-0.041 (-0.73)		YES	YES	13,720	0.24

Table 5

The Privatization reform and bank lending.

This table reports the effects of the Split-share Structure Reform on the bank loans. Specifically, the dependent variables are the logarithm of the loan's amount ($\ln(\text{Amount})$), term ($\ln(\text{Term})$), the interest rate (Rate), and a dummy indicator of whether it is backed by a collateral (Collateral), respectively. The ownership indicator (SOE) equals 1 if the firm is state-owned and 0 otherwise. The reform time dummy (REF) equals 1 when the firm has already undergone the reform in the year and 0 otherwise. Control variables include the indicators of whether the loan is issued by "Big Four" banks (Bank4), whether the loan package is syndicated (Syndicated), whether it is quoted in local currency (RMB) (Currency), and the category of the loan purpose declared by the borrower (LoanPurpose). We also control for the lagged values of cash flow (CF) and the ten dependent variables in our baseline model (CAPX , ACQUI , ASSETSALES , STKISSUE , DIV , ΔSLOAN , ΔLLOAN , $\Delta\text{OTHERSD}$, $\Delta\text{OTHERLD}$, ΔCASH), plus firm size, market-to-book ratio, ROE and industry dummies etc. We control for year and industry fixed effects. For brevity, only core results are presented. The adjusted R -squares are reported. Coefficients are reported with t -statistics in parentheses. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$).

Dependent variable	$\ln(\text{Amount})$	$\ln(\text{Term})$	Rate	Collateral
$\text{REF}*\text{SOE}$	-0.104*** (-2.59)	-0.063** (-2.47)	0.590** (2.00)	0.853** (1.96)
SOE	0.216*** (6.20)	0.083*** (3.80)	-1.012*** (-4.12)	-0.793** (-2.22)
REF	0.066*** (2.59)	0.073*** (4.28)	0.080 (0.33)	-0.376 (-1.34)
Bank4	0.085*** (5.04)	0.074*** (6.67)	-0.320** (-2.52)	0.213 (1.09)
Syndicated	0.738*** (10.69)	0.290*** (6.26)	0.275 (0.22)	0.053 (0.07)
Currency	1.312*** (30.36)	-0.227*** (-7.26)	1.043 (1.15)	0.501 (0.40)
Collateral	-0.144 (-1.36)	0.205*** (2.83)	0.176 (0.22)	
$\ln(\text{Amount})$			-0.058 (-0.93)	0.138 (1.57)
$\ln(\text{Term})$			-0.011 (-0.10)	0.441** (2.36)
LoanPurpose	YES	YES	YES	YES
CONTROL	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
N	17,657	8461	1052	8406
$\text{Adj } R^2$	0.30	0.19	0.44	

5. Further tests

5.1. Negative cash flow shocks

One may doubt that a firm's reactions to cash flow may be asymmetrical for positive and negative shocks. Indeed, our proxy for ownership discrimination is more about firms' access to external funds after negative cash flow shocks than about retiring debt after positive cash flow shocks. Therefore, in this section, we perform a robustness check by restricting the sample to the observations with negative cash flow shocks ($\text{CF} < 0$). For brevity, we put the results in Appendix Table A.3. As shown in Panel A, the interaction of the ownership dummy and negative cash flow shocks ($\text{SOE}*\text{CF}$) is negatively correlated with investment and positively correlated with ΔSLOAN and ΔLLOAN , all significant at the 1% level. The results are consistent with those in Table 2, confirming the existence of ownership discrimination. In Panel B, the coefficient of CAPX on $\text{SOE}*\text{CF}*\text{REF}$ is significantly positive and opposite to the sign of that on $\text{SOE}*\text{CF}$, proving reduced ownership discrimination after the reform. The magnitude is even larger than that in the baseline model in Table 3. The results further confirm our main findings.

5.2. Insolvency risks and ownership discrimination

By definition, discrimination should not lie in the differences in firms' financial quality—it refers to the unfair financing conditions for firms of comparable risk level. In this section, we rule out the possibility that SOEs have better performance by considering firms' insolvency risk. Z -score, measured as the combined output of a credit-strength test, is widely used to gauge firms' likelihood of bankruptcy (Altman, 1968). We divide the full sample into two based on the annual Z -score and illustrate the results in Table 6. The coefficients of capital expenditure on $\text{SOE}*\text{CF}*\text{REF}$ and $\text{SOE}*\text{CF}$ are both insignificant in the low- Z -score group, but significant (with consistent sign as the baseline regressions in Table 3) in the high- Z -score group. Overall, the results rule out the possibility that the credit misallocation between SOEs and non-SOEs is insolvency-risk driven.

Table 6

Insolvency risks and ownership discrimination.

This table reports the impacts of the reform on firms with high or low insolvency risks. The two subsamples are divided based on the median value of the Z-scores. Each row in the table corresponds to each of the equations in the multi-equation model. Control variables include the lagged values of the ten dependent variables, firm size, market-to-book ratio, ROE etc. We also control for industry and year fixed effects. For brevity, only core results are presented. As several dependent variables in the model have a minus sign (specifically in the first, second, fifth and tenth equations), their signs for the coefficients and t-values in the table are adjusted accordingly to make the results more intuitive. The Adjusted R-squares for the equations are reported in the last column. Coefficients are reported with t-statistics in parentheses. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* p < 0.10 ** p < 0.05 *** p < 0.01).

Dependent variables	Independent variables									
	High Z-score					Low Z-score				
	<i>SOE*CF*REF</i>	<i>SOE*CF</i>	<i>CONTROL</i>	<i>YEAR & IND FE</i>	Adj R ²	<i>SOE*CF*REF</i>	<i>SOE*CF</i>	<i>CONTROL</i>	<i>YEAR & IND FE</i>	Adj R ²
<i>CAPX</i>	0.025** (2.08)	-0.017** (-2.14)	YES	YES	0.36	0.014 (0.85)	-0.007 (-0.62)	YES	YES	0.40
<i>ACQUI</i>	0.011 (1.05)	-0.026*** (-3.64)	YES	YES	0.06	0.001 (0.06)	-0.022*** (-2.80)	YES	YES	0.04
<i>ASSETSALES</i>	0.069*** (5.55)	-0.060*** (-7.30)	YES	YES	0.06	-0.005 (-0.48)	0.007 (0.94)	YES	YES	0.06
<i>STKISSUE</i>	0.590*** (16.54)	-0.570*** (-23.98)	YES	YES	0.27	-0.053 (-1.46)	0.086*** (3.62)	YES	YES	0.11
<i>DIV</i>	-0.024*** (-3.11)	0.010* (1.94)	YES	YES	0.32	-0.000 (-0.04)	-0.007 (-1.64)	YES	YES	0.29
<i>ΔSLOAN</i>	0.053** (2.15)	-0.128*** (-7.81)	YES	YES	0.06	-0.040 (-1.26)	-0.125*** (-5.96)	YES	YES	0.07
<i>ΔLLOAN</i>	-0.009 (-0.54)	-0.006 (-0.51)	YES	YES	0.06	0.049* (1.77)	-0.034* (-1.89)	YES	YES	0.13
<i>ΔOTHERSD</i>	-0.295*** (-11.81)	0.300*** (18.01)	YES	YES	-0.05	0.027 (1.05)	0.071*** (4.20)	YES	YES	0.03
<i>ΔOTHERLD</i>	0.011* (1.80)	-0.009** (-2.22)	YES	YES	0.15	-0.007 (-0.52)	0.012 (1.35)	YES	YES	0.13
<i>ΔCASH</i>	0.406*** (11.63)	-0.440*** (-18.93)	YES	YES	0.37	-0.044 (-1.22)	0.053** (2.24)	YES	YES	0.15

5.3. Privatization probability and ownership discrimination

5.3.1. The composition of shares and the effects of Split-share structure reform

The primary goal of the Split-share Structure Reform is to dismantle the dual-share structure by converting state-owned shares and other types of non-tradable shares into tradable shares. We can therefore infer that the decrease in the percentage of non-tradable shares is a determinant of the extent to which the reform impacts a firm (see also Liao et al. (2014)). Holders of newly-converted shares are free to sell those shares based on their evaluation of firms' performance; more converted shares transferred into tradable ones makes it easier for outsiders to take over firms without the protection of non-tradable state-owned shares. We thus reasonably expect that the effects of the reform should be more evident among firms with a larger surge in the percentage of tradable shares, since they generally experience more intense shocks in the state control dilution and face higher threats of privatization after the reform.

We divide all firms into two subsamples according to the ratio of the non-tradable shares transferred among total shares.²⁹ Table 7 shows that the effects of the reform exist only in the high-conversion-ratio group; in the lower-conversion-ratio group, the coefficient of the capital expenditure on the triple interaction term is insignificant. This evidence is consistent with our prediction and further justifies the effects of the reform.

5.3.2. Industrial characteristics and the effects of the Split-share structure reform

We make a further investigation into the heterogeneous effects of the reform on firms in different industries. Some industries are considered as strategically important for the country, since they bear crucial roles in social security, industrialization, and national power. The market tends to expect that even if the firms in nationally-strategic industries undergo the Split-share Structure Reform, the government will retain actual control over these firms for the sake of national competence. As such, the impacts of the reform should be comparatively weaker. We divide the sample into sub-groups of nationally-strategic industries (mining, water, electricity, public transportation, and energy) and the rest, and re-conduct the baseline regressions. Results are shown in Table 8. We find evidence consistent with our predictions.

5.3.3. Two alternative proxies for the likelihood of further privatization

Generally, if the state holds predominantly higher shares of a firm ex-ante, investors and banks may believe that the firm is tightly controlled by the government (Fan et al., 2007), and thus the conversion of non-tradable shares should not easily lead to substantive alternation of ownership type. Accordingly, we split the ownership indicator *SOE* into strongly- and weakly-controlled subgroups (*Strong* and *Weak*). Specifically, following Fan et al. (2007), for an SOE, if the government's direct shareholding is higher than 30% in the fiscal year of the reform, *Strong* equals one and *Weak* equals zero; otherwise, *Weak* equals one and *Strong* equals zero. For non-SOEs, both are zero. We replace the interaction terms in the baseline model with these two dummies and construct the interaction terms separately. Results are shown in Table IA.1 of the Online Appendix. We find stronger impact of the reform on ownership discrimination among firms with weaker government control, which is in line with our main arguments.

Another proxy for the likelihood of privatization is the scale of workforce. People usually believe that in fear of massive layoffs and social instability, the government would be very cautious in switching a firm with a large workforce into a private one, even if they accomplish the transformation of non-tradable shares. To test this prediction, we divide the sample into two groups based on the ratio of each firm's headcount to the total number of employees of all listed firms in the city where it is headquartered in the specific year. The results are shown in Online Appendix Table IA.2. We find that the significant effects of the reform only exist among firms with smaller workforce, which presumably possess a higher possibility of realized privatization.

Overall, the evidence reinforces our findings that stronger threats of privatization lead to more thorough reductions in ownership discrimination after the reform.

5.4. External financing dependence, privatization, and ownership discrimination

If the Split-share Structure Reform indeed reduces ownership discrimination and improves the external financing environment for SOEs and non-SOEs, firms in industries that rely more on external financing should benefit more. We posit that firms belonging to industries with higher external dependence should exhibit more pronounced effects of the reform relative to the financially self-sufficient firms. We follow Rajan and Zingales (1998) to construct industry-level External Financing Dependence (*FD*) proxy. *FD* measures the percentage of a firm's capital needs that cannot be met by internal financing. It is defined as the industrial average capital expenditure minus the operating cash flow divided by the capital expenditure.³⁰ We divide firms into two subsamples based on *FD*, and re-conduct the multi-equation regressions for both of the sub-groups. Results in Table 9 are aligned with our predictions.

²⁹ There is a compulsory lockup period, *i.e.*, a deliberately prolonged gap before the transferred tradable shares are eligible to be sold after the reform. Meanwhile, a large part of the tradable stocks is under constraints of selling price, shares, *etc.* The lockup period and selling constraints are aimed at maintaining the stability of the market by avoiding large supply shocks, while in effect impeding the effective marketization and privatization process of SOEs. Therefore, when we evaluate the scale of non-tradable shares transferred into tradable ones, we consider the difference between the ratio of unconstrained tradable shares to total shares after the reform and the ratio of tradable shares to total shares before the reform.

³⁰ Following Rajan and Zingales (1998), the denominator and numerator are summed for all years to avoid annual fluctuations; the median rather than the mean value is used here to avoid the impacts of outliers.

Table 7

Changes in non-tradable shares and the effects of the reform.

This table examines the effects of the reform among firms with different changes in the ratio of (unconstrained) tradable shares. We divide the sample into two subgroups according to the median value of the ratio. Each row in the table corresponds to each of the equations in the multi-equation model. Control variables include the lagged values of the ten dependent variables, firm size, market-to-book ratio, ROE etc. We also control for industry and year fixed effects. For brevity, only core results are presented. As several dependent variables in the model have a minus sign (specifically in the first, second, fifth and tenth equations), their signs for the coefficients and t-values in the table are adjusted accordingly to make the results more intuitive. The Adjusted R-squares for the equations are reported in the last column. Coefficients are reported with t-statistics in parentheses. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$).

Dependent variables	Independent variables									
	Higher changes in tradable shares					Lower changes in tradable shares				
	<i>SOE*CF*REF</i>	<i>SOE*CF</i>	<i>CONTROL</i>	<i>YEAR & IND FE</i>	Adj R ²	<i>SOE*CF*REF</i>	<i>SOE*CF</i>	<i>CONTROL</i>	<i>YEAR & IND FE</i>	Adj R ²
<i>CAPX</i>	0.037** (1.98)	-0.032** (-2.05)	YES	YES	0.34	-0.014 (-1.01)	0.029*** (2.72)	YES	YES	0.43
<i>ACQUI</i>	-0.014 (-1.16)	0.000 (0.04)	YES	YES	0.04	-0.004 (-0.29)	-0.022** (-2.09)	YES	YES	0.08
<i>ASSETS SALES</i>	0.020 (1.25)	-0.024* (-1.80)	YES	YES	0.06	0.041*** (2.68)	-0.033*** (-2.79)	YES	YES	0.06
<i>STKISSUE</i>	-0.004 (-0.13)	0.044 (1.54)	YES	YES	0.04	0.041 (1.29)	-0.016 (-0.64)	YES	YES	0.03
<i>DIV</i>	-0.006 (-0.76)	-0.013* (-1.91)	YES	YES	0.31	-0.016* (-1.96)	0.014** (2.26)	YES	YES	0.42
<i>ΔSLOAN</i>	-0.004 (-0.38)	0.006 (0.71)	YES	YES	0.16	-0.007 (-0.75)	0.006 (0.91)	YES	YES	0.18
<i>ΔLLOAN</i>	-0.048 (-1.23)	-0.081** (-2.48)	YES	YES	0.06	-0.049 (-1.54)	-0.019 (-0.77)	YES	YES	0.08
<i>ΔOTHERSD</i>	-0.005 (-0.18)	0.005 (0.18)	YES	YES	0.13	-0.013 (-0.50)	-0.004 (-0.21)	YES	YES	0.13
<i>ΔOTHERLD</i>	0.015 (0.47)	0.035 (1.29)	YES	YES	0.04	-0.061** (-2.12)	0.093*** (4.18)	YES	YES	0.04
<i>ΔCASH</i>	-0.043 (-1.21)	0.030 (1.00)	YES	YES	0.17	-0.014 (-0.42)	0.006 (0.23)	YES	YES	0.14

5.5. Heterogeneous effects of the reform: direct evidence

In the previous sections, we have illustrated the heterogeneous effects of the Split-share Structure Reform among firms with different characteristics, such as the level of insolvency risks, the threats of being privatized, and the external financing dependence, among others. In this section, we supplement these findings using the direct evidence from the perspective of bank lending behaviors, and examine whether the actual amount of funding raised from banks exhibit similar patterns.

Specifically, we follow the similar practice as in the previous sections and split the full sample into subsamples based on Z-scores, changes in non-tradable shares, whether the industry is among the nationally-strategic industries, and the external financing dependence, respectively. In each of the subsamples, we regress the logarithm of loan amount on the interaction of the ownership indicator (*SOE*) and the reform time dummy (*REF*), and both of the separate terms. Control variables are exactly the same as those in Table 5. We also control for year and industry fixed effects.

The evidence exhibited in Table A.4 is quite consistent with the results in the previous sections: the elimination in ownership discrimination after the reform exists only among the normal and relatively healthier firms, rather than high-insolvency-risk firms. Moreover, the impacts of the reform are more pronounced among firms with higher potentials of further privatization and higher external financing dependence. The direct findings regarding banks' loan-granting practices provide concrete evidence on the outcomes of the reform, and further serve as powerful validation of our main arguments.

6. Robustness checks

6.1. Alternative proxy for cash flow fluctuations

In this section, we use an alternative proxy for cash flow shocks: the cash flow volatility, measured as the coefficient of variation in a firm's quarterly cash flow over the past five years (20 quarters) preceding each of the sample years.³¹ The coefficient of variation is the standard deviation of operating cash flow scaled by the absolute value of the mean over the same period. This measurement has been widely employed by a series of literature, including Albrecht and Richardson (1990), Minton and Schrand (1999), Han and Qiu (2007),

³¹ We thank the anonymous referee for this helpful comment.

Table 8

The effects of the reform on firms in strategic and non-strategic industries.

This table examines the cross-sectional variation among firms in different industries. The mining, water, electricity, public transportation, energy industries are categorized as nationally-strategic industries. Others are regarded as non-nationally-strategic industries. Each row in the table corresponds to each of the equations in the multi-equation model. Control variables include the lagged values of the ten dependent variables, firm size, market-to-book ratio, ROE etc. We also control for industry and year fixed effects. The table structures are exactly the same as Table 3. For brevity, only core results are presented. As several dependent variables in the model have a minus sign (specifically in the first, second, fifth and tenth equations), their signs for the coefficients and t-values in the table are adjusted accordingly to make the results more intuitive. The Adjusted R-squares for the equations are reported in the last column. Coefficients are reported with t-statistics in parentheses. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$).

Dependent variables	Independent variables									
	Nation-strategic-industry					Non-nation-strategic-industry				
	$SOE*CF*REF$	$SOE*CF$	<i>CONTROL</i>	<i>YEAR & IND FE</i>	Adj R ²	$SOE*CF*REF$	$SOE*CF$	<i>CONTROL</i>	<i>YEAR & IND FE</i>	Adj R ²
<i>CAPX</i>	0.008 (0.61)	0.005 (0.62)	YES	YES	0.51	0.024** (1.99)	-0.018** (-2.08)	YES	YES	0.37
<i>ACQUI</i>	-0.008 (-1.55)	0.003 (0.94)	YES	YES	0.15	-0.000 (-0.03)	-0.018*** (-2.63)	YES	YES	0.04
<i>ASSETSALES</i>	0.008* (1.66)	-0.005* (-1.75)	YES	YES	0.14	0.003 (0.27)	-0.001 (-0.11)	YES	YES	0.05
<i>STKISSUE</i>	-0.000 (-0.00)	0.002 (0.11)	YES	YES	0.06	0.330*** (9.70)	-0.300*** (-12.39)	YES	YES	0.12
<i>DIV</i>	-0.004 (-0.72)	0.005 (1.29)	YES	YES	0.43	0.002 (0.27)	-0.012*** (-2.87)	YES	YES	0.31
Δ <i>SLOAN</i>	-0.027 (-1.07)	-0.038** (-2.25)	YES	YES	0.08	0.027 (1.14)	-0.115*** (-6.92)	YES	YES	0.07
Δ <i>LLOAN</i>	0.023 (1.21)	-0.015 (-1.15)	YES	YES	0.15	0.003 (0.17)	-0.013 (-1.09)	YES	YES	0.08
Δ <i>OTHERSD</i>	0.027 (1.19)	0.006 (0.40)	YES	YES	0.02	-0.159*** (-7.19)	0.190*** (12.05)	YES	YES	0.02
Δ <i>OTHERLD</i>	0.003 (0.89)	-0.002 (-1.10)	YES	YES	0.17	0.005 (0.92)	-0.005 (-1.23)	YES	YES	0.13
Δ <i>CASH</i>	0.038 (0.92)	-0.066** (-2.44)	YES	YES	0.07	0.184*** (5.49)	-0.198*** (-8.30)	YES	YES	0.22

and Huang (2009), etc. We require at least 12 nonmissing observations of cash flow within the estimation window.³² We replace the variable *CF* with the cash flow volatility (*CVCF*) and re-conduct the baseline regressions. Results in Table 10 show a significantly positive coefficient of $SOE*CVCF*REF$ in the first equation (with *CAPX* as the dependent variable), similar to that in the baseline model. The results based on the alternative proxy further strengthen our main findings.

6.2. Propensity-Score-Matched (PSM) alternative control groups

To address the concern that firms with different ownership structures are not fundamentally comparable, we employ the Propensity Score Matching (PSM) approach to match the SOEs in our sample with fundamentally similar non-SOEs. We then re-estimate the baseline regressions using the matched sample. As firms' characteristics may change after the reform, the selection of the matched non-SOE group is based on characteristics at the end of 2003, the last-year-end before the reform was announced. Specifically, the dependent variable is an indicator of state ownership (*SOE*). We include the set of control variables in the baseline model when estimating the logistic regression. Each of the SOEs is matched with up to two non-SOEs with the nearest estimated propensity score with replacement. Note that since some firms from the pool of potential matched non-SOEs can be suitable for multiple SOEs, we eventually construct a sample consisting of 363 SOEs and 271 non-SOEs.

Table A.5 in the Appendix reports the univariate comparisons of the pre-treatment firm-level characteristics between the two types of firms. As shown in the results, none of the observed differences between SOEs and matched non-SOEs is statistically significant, proving that the propensity score matching process removes meaningful observable differences. After forming the relatively comparable PSM control group, we re-estimate the baseline regression model using SOEs and matched non-SOEs. The results are reported in Table 11. We find that the effects of the Split-share Structure Reform continue to hold.

³² We follow the practice of the previous studies to use a five-year window in the estimation of the coefficient of variation. The results are robust if we use other estimation windows of four or six years, or if we use the standard deviation of the residuals from time-series models to deal with the seasonality of cash flow shocks.

Table 9

External financing dependence and the effects of the reform.

We divide the sample into two groups based on the industry-level dependence of external financing of the firms (Rajan and Zingales, 1998). The industry-level External Financing Dependence (FD) is calculated as the percentage of firms' capital needs that cannot be gained by internal financing. We divide the sample into two groups based on the median of FD. Each row in the table corresponds to each of the equations in the multi-equation model. Control variables include the lagged values of the ten dependent variables, firm size, market-to-book ratio, ROE etc. We also control for industry and year fixed effects. For brevity, only core results are presented. As several dependent variables in the model have a minus sign (specifically in the first, second, fifth and tenth equations), their signs for the coefficients and t-values in the table are adjusted accordingly to make the results more intuitive. The Adjusted R-squares for the equations are reported in the last column. Coefficients are reported with t-statistics in parentheses. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* p < 0.10 ** p < 0.05 *** p < 0.01).

Dependent variables	Independent variables									
	High external financing dependence					Low external financing dependence				
	SOE*CF*REF	SOE*CF	CONTROL	YEAR & IND FE	Adj R ²	SOE*CF*REF	SOE*CF	CONTROL	YEAR & IND FE	Adj R ²
CAPX	0.030** (2.06)	0.003 (1.47)	YES	YES	0.36	0.015 (1.12)	-0.008 (-0.86)	YES	YES	0.40
ACQUI	-0.005 (-0.48)	0.001 (0.88)	YES	YES	0.07	0.006 (0.54)	-0.023*** (-2.96)	YES	YES	0.04
ASSETSALES	-0.014 (-1.29)	-0.003** (-2.24)	YES	YES	0.06	0.053*** (4.54)	-0.043*** (-5.24)	YES	YES	0.06
STKISSUE	0.423*** (10.97)	0.005 (0.93)	YES	YES	0.11	0.300*** (7.72)	-0.257*** (-9.54)	YES	YES	0.16
DIV	-0.001 (-0.17)	-0.000 (-0.07)	YES	YES	0.34	-0.020*** (-2.82)	0.005 (1.01)	YES	YES	0.30
ΔSLOAN	0.028 (1.02)	0.000 (0.00)	YES	YES	0.10	0.069** (2.57)	-0.147*** (-7.93)	YES	YES	0.04
ΔLLOAN	0.033 (1.44)	-0.001 (-0.38)	YES	YES	0.08	-0.007 (-0.36)	-0.002 (-0.16)	YES	YES	0.09
ΔOTHERSD	-0.174*** (-6.83)	-0.005 (-1.39)	YES	YES	0.00	-0.136*** (-5.41)	0.155*** (8.88)	YES	YES	0.01
ΔOTHERLD	-0.001 (-0.14)	0.000 (0.29)	YES	YES	0.15	0.005 (0.80)	0.003 (0.68)	YES	YES	0.12
ΔCASH	0.271*** (7.30)	-0.006 (-1.13)	YES	YES	0.21	0.283*** (7.17)	-0.265*** (-9.69)	YES	YES	0.26

6.3. Additional control variables

One possible concern may be that the changes in other aspects of the firms (rather than in the lenders' preference) may also affect firms' investments and financing behaviors after the reform. Specifically, by transferring the non-tradable shares to tradable shares and opening the door to further privatization of SOEs, the reform reduces the conflicting interests between controlling shareholders (in SOEs, the major controller is the government agents) and private shareholders, and facilitates the incorporation of more information on firms' performance into the stock market. As such, the reform may demotivate the government to subsidize SOEs, especially those with higher probability of further privatization. Also, the reform may improve corporate governance, spur technological innovation, increase stock price informativeness, and reduce the agency costs of firms (Jiang et al., 2009; Hou et al., 2012; Cumming and Hou, 2014; Chen et al., 2015; Tan et al., 2020). To rule out these confounding effects, we conduct a series of tests by introducing further control variables into the baseline regressions and examining whether our evidence still holds.³³

First, we exclude the alternative explanation that the mitigated gap between SOEs and non-SOEs in their responses of CAPX to cash flow shocks lies not in enhanced credit allocation, but in the reduction in SOEs' financial subsidies from the government. Chinese local governments have a long history of close intervention with SOEs by means of favorable subsidies (Eckaus, 2006; Röller and Zhang, 2005). We collect the government subsidy dataset from the Financial Statement Annotations Series of the CSMAR Database, and standardize the subsidy amounts by firm's total assets.³⁴ We incorporate *Subsidy* and its interactions with the ownership indicator (*SOE*), the reform indicator (*REF*), and the triple interaction term into the baseline model.³⁵

Second, we consider whether the observed effects of the reform in our main findings are due to the increase in SOEs' motivation of technology innovations. We construct a variable *Pat* as the logarithm of one plus the total number of invention and utility model

³³ To save space, we put the results of the regressions with each of the four additional variables (and their interactions with *SOE* and *REF*) in the Online Appendix, and only report the regression results with all these variables (and their interactions with *SOE* and *REF*) in Table 12.

³⁴ We replace the observations with missing government subsidy variable with zero. The results are robust if we instead delete these observations from the sample.

³⁵ In unreported results, we incorporate each of the additional control variables (*Subsidy*, *Pat*, *Info* and *Sep*) and their triple interactions one by one into the baseline regressions, respectively. All results are consistent with our baseline findings. To save space, details are not reported but are available upon request.

Table 10

Alternative proxy for cash flow shocks: cash flow volatility.

We use the cash flow volatility (CVCF) to proxy for cash flow shocks in the multi-equation model, and reconduct our baseline regressions. CVCF is calculated as the coefficient of variation in a firm's quarterly cash flow over the past five years (20 quarters) preceding each of the sample years. The coefficient of variation is the standard deviation of operating cash flow scaled by the absolute value of the mean over the same period (Albrecht and Richardson, 1990; Minton and Schrand, 1999; Han and Qiu, 2007; Huang, 2009). Control variables include the lagged values of the ten dependent variables, firm size, market-to-book ratio, ROE etc. We also control for industry and year fixed effects. For brevity, only core results are presented. As several dependent variables in the model have a minus sign (specifically in the first, second, fifth and tenth equations), their signs for the coefficients and t-values in the table are adjusted accordingly to make the results more intuitive. The Adjusted R-squares for the equations are reported in the last column. Coefficients are reported with t-statistics in parentheses. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$).

Dependent variables	Independent variables										N	Adj R ²
	SOE*CVCF*REF	SOE*CVCF	SOE*REF	CVCF*REF	CVCF	REF	SOE	CONTROL	YEAR & IND FE			
CAPX	0.075** (2.06)	-0.051* (-1.85)	-0.004 (-1.42)	-0.053** (-2.51)	0.065*** (3.39)	-0.002 (-1.36)	0.003* (1.70)	YES	YES	12,539	0.37	
ACQUI	-0.061** (-2.02)	-0.036 (-1.59)	0.004** (2.11)	0.085*** (4.88)	0.042*** (2.67)	-0.005*** (-3.75)	-0.001 (-0.49)	YES	YES	12,539	0.06	
ASSETSALLES	0.005 (0.15)	-0.014 (-0.53)	-0.004* (-1.80)	0.010 (0.48)	0.000 (0.02)	0.005*** (3.00)	0.003 (1.41)	YES	YES	12,539	0.05	
STKISSUE	-0.169** (-2.25)	0.041 (0.73)	0.002 (0.41)	0.192*** (4.37)	-0.055 (-1.38)	0.000 (0.08)	-0.003 (-0.88)	YES	YES	12,539	0.03	
DIV	-0.001 (-0.05)	-0.018 (-1.33)	-0.001 (-0.59)	-0.005 (-0.51)	0.036*** (3.90)	0.000 (0.15)	0.001 (0.67)	YES	YES	12,539	0.39	
ΔSLOAN	0.029* (1.85)	-0.092 (-1.49)	0.003 (0.46)	0.182*** (3.77)	-0.291*** (-6.80)	-0.015*** (-3.94)	0.004 (0.92)	YES	YES	12,539	0.06	
ΔLLOAN	0.001 (0.02)	0.039 (0.81)	-0.000 (-0.04)	0.006 (0.17)	-0.098*** (-2.94)	0.003 (1.19)	-0.002 (-0.48)	YES	YES	12,539	0.03	
ΔOTHERSD	0.120 (1.41)	-0.041 (-0.63)	-0.014** (-2.36)	0.057 (1.11)	-0.328*** (-7.37)	-0.006 (-1.53)	0.006 (1.41)	YES	YES	12,539	0.04	
ΔOTHERLD	-0.001 (-0.04)	0.012 (0.80)	0.000 (0.26)	-0.003 (-0.24)	-0.009 (-0.85)	0.000 (0.07)	-0.001 (-0.66)	YES	YES	12,539	0.05	
ΔCASH	-0.029 (-0.35)	0.051 (0.81)	-0.008 (-1.46)	-0.045 (-0.92)	0.077* (1.75)	0.029*** (7.46)	0.004 (0.89)	YES	YES	12,539	0.09	

Table 11

Regression results using propensity-score-matched sample.

Using the Propensity-Score-Matched (PSM) subsample, this table estimates the impacts of the Split-share Structure Reform on the ownership discrimination in China. For brevity, we don't report the detailed coefficients on these variables. Then we reconduct the multi-equation regression of firms' investment and financing behaviors on cash flow shocks (Gatchev et al., 2010). Each row in the table corresponds to each of the equations in the multi-equation model. Only core results are presented. Control variables include the lagged values of the ten dependent variables, firm size, market-to-book ratio, ROE etc. We also control for year and industry fixed effects. As several dependent variables in the model have a minus sign (specifically in the first, second, fifth and tenth equations), their signs for the coefficients and t-values in the table are adjusted accordingly to make the results more intuitive. The Adjusted R-squares for the equations are reported in the last column. Coefficients are reported with t-statistics in parentheses. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$).

Dependent variables	Independent variables										N	Adj R ²
	SOE*CF*REF	SOE*CF	SOE*REF	CF*REF	CF	REF	SOE	CONTROL	YEAR & ID FE			
CAPX	0.023** (2.02)	-0.012 (-1.38)	-0.003* (-1.74)	-0.052*** (-6.26)	0.059*** (7.48)	0.003 (1.32)	0.003** (2.30)	YES	YES	4192	0.45	
ACQUI	0.002 (0.60)	-0.003 (-1.26)	0.000 (0.22)	-0.013*** (-6.18)	0.018*** (9.48)	0.001 (1.59)	-0.000 (-1.30)	YES	YES	4192	0.06	
ASSETSALLES	0.007 (1.37)	-0.002 (-0.50)	-0.001 (-0.71)	0.003 (0.81)	-0.018*** (-4.82)	-0.001 (-1.08)	-0.000 (-0.30)	YES	YES	4192	0.08	
STKISSUE	-0.011 (-0.62)	0.014 (1.05)	-0.004 (-1.53)	-0.000 (-0.00)	-0.048*** (-3.84)	0.020*** (5.43)	0.001 (0.36)	YES	YES	4192	0.06	
DIV	-0.000 (-0.07)	-0.007* (-1.68)	-0.001 (-0.62)	-0.019*** (-4.51)	0.041*** (10.34)	0.001 (1.12)	0.000 (0.38)	YES	YES	4192	0.42	
ΔSLOAN	-0.037 (-1.39)	-0.009 (-0.42)	-0.002 (-0.48)	0.106*** (5.41)	-0.379*** (-20.45)	0.003 (0.60)	0.006* (1.71)	YES	YES	4192	0.08	
ΔLLOAN	0.024 (1.28)	-0.010 (-0.68)	-0.002 (-0.53)	-0.006 (-0.47)	-0.079*** (-6.09)	0.003 (0.84)	0.001 (0.32)	YES	YES	4192	0.13	
ΔOTHERSD	-0.024 (-1.00)	0.033* (1.82)	-0.001 (-0.15)	0.261*** (14.43)	-0.043*** (-2.64)	0.001 (0.19)	-0.002 (-0.55)	YES	YES	4192	-0.03	
ΔOTHERLD	0.001 (0.31)	0.000 (0.08)	-0.000 (-0.69)	0.012*** (5.26)	-0.018*** (-8.36)	-0.000 (-0.24)	0.001 (1.49)	YES	YES	4192	0.19	
ΔCASH	-0.064** (-2.05)	0.049** (2.06)	-0.005 (-0.95)	-0.040* (-1.73)	0.296*** (13.66)	0.022*** (3.19)	0.003 (0.75)	YES	YES	4192	0.10	

patents that are applied for by a firm and eventually granted to a firm in a year (He and Tian, 2013; Tan et al., 2020).³⁶ We follow the literature to use the four-year-ahead innovation output variable in the regression, as the observable outputs of innovation usually take years to emerge (He and Tian, 2013; Fang et al., 2014).³⁷ The dataset is derived from the CSMAR Database.

Further, we follow Gul et al. (2010) and control for firms' stock price non-synchronicity as the proxy for the stock price informativeness. We first estimate the R^2 by regressing each firm's daily stock return on the value-weighted market return, industry return and their lagged values for each year, and then construct a variable *Info* as the logit transformation of $(1-R^2)$.³⁸ We incorporate *Info* and its interactions with the ownership, the reform indicators and the triple interaction term into the model, and present the results in Panel C of Online Appendix Table IA.3. The data is derived from the CSMAR Database.

Last, we deal with the concern that the reduced agency costs after the reform affect our findings. Under the split-share structure with a large percentage of non-tradable shares, the government agents of SOEs tend to neglect firms' market values and participate in rent-seeking activities, sacrificing the interests of minority shareholders (Shleifer, 1998; Jian and Wong, 2010). The agency problem may be largely alleviated as the reform transforms state-owned non-tradable shares into market-priced and tradable shares in the market. The counterargument may be that our findings of reduced differences between SOEs and non-SOEs in their reaction to cash flow shocks results from SOEs' sharply increased investments in risky and valuable projects, which is not attributable to credit misallocation. To rule out this possibility, we follow Masulis et al. (2009) and Chen et al. (2015) in including the degree of the separation of control rights and cash flow rights (*Sep*) and its interactions with the ownership, the reform indicators and the triple interaction term into the baseline model. The data is derived from the CSMAR Database. In unreported results, we also use the interest alignments (measured as the volume of related-party transactions scaled by lagged total assets), the board size (measured as the natural logarithm of the number of directors) and board independence (measured as the percentage of independent directors) as proxies for the agency conflicts, and find robust results.

Further, we include all of the above-mentioned additional variables (*Subsidy*, *Pat*, *Info* and *Sep*), their interactions with the ownership indicator (*SOE*) and the reform indicator (*REF*), as well as all the triple interaction terms into the baseline regressions. We show that even after accounting for these disturbing factors, the observed mitigation of ownership discrimination after the reform remains robust, lending further credence to our main findings. We report the results in Table 12.

6.4. Excluding alternative explanations of concurrent events

In addition, one may wonder whether the impacts of other institutional changes or macro events taking place during the same period mingle with the Split-share Structure Reform, which may lead to a spurious correlation between the reform and ownership discrimination. We first argue that the staggered Diff-in-Diff design, in which the exogenous shock happens in a staggered fashion, has largely remediated this concern.³⁹ Other macro-level regulatory changes, in contrast, occur nationwide in the same year for all firms, such as the reforms on the exchange rate regime in 2005, on the property law in 2006, and on the accounting standards in 2007, etc. (see Moosa, 2008; Frankel and Wei, 2007; Zhang et al., 2013; Berkowitz et al., 2015; Chen et al., 2018; Liu et al., 2018). Since we have already controlled for the year fixed effect in our regressions, the impacts of these shocks have been accounted for.

Notwithstanding these uniform national changes, there are two policy changes in China that indeed unevenly affected firms in different locations and industries in varying years:

The first one is the entry of foreign banks into China, an important shock on the domestic banking system. It was tentatively put forth in the 1990s, and comprehensively implemented in 2001 following the protocols of WTO accession. Although small in magnitude, the appearance of foreign banks may affect the credit allocation efficiency of domestic banks. We follow Lin (2011) to use four location groups to indicate the rounds of opening-up. Firms in these four groups gained access to foreign bank lending by the end of the years 2003/2004/2005/2006, respectively. We denote a foreign bank entry dummy *Dum_FB*, which equals one if the firm's location has already gained access to foreign banks by the end of the year and zero otherwise.

Another regulatory change is the Value-Added Tax (VAT) Reform. In 2004, the Ministry of Finance and the State Administration of Taxation promulgated the provisions on expanding the deduction of VAT in northeast China. The reform transformed the production-oriented VAT into consumption-oriented VAT. By partially deducting fixed-assets purchases from income tax, firms' tax burdens were alleviated. By the end of 2007, 26 old industrial-base cities in six central provinces (Shanxi, Anhui, Jiangxi, Henan, Hubei and Hunan) had completed the VAT reform; by the end of 2008, eastern Inner Mongolia and Wenchuan of Sichuan Province had undergone the VAT transformation; by the end of 2009, the reform was essentially completed nationwide. We introduce a dummy variable *Dum_VAT*, which equals one if the firm's location has already finished the VAT reform by the end of the year, and zero otherwise.

³⁶ In China, there are three types of innovation patents: invention patents, utility model patents, and design patents. Invention patents are similar to utility patents in the US, which are granted to technical innovations applicable to production processes. Utility model patents are granted to practical solutions to the shape or structure of a product. Design patents are more about the designs (such as graceful configuration, creative patterns, shapes and colors) which are suitable for industrial application, involving very limited relation to technologies. Thus, we mainly focus on the patents of the first two types (invention and utility model patents) (see Tan et al. (2020) for details). The results are robust if we use all the three types of patents.

³⁷ The results remain robust if we instead use two- or three-year-ahead innovation proxy in the regressions.

³⁸ We follow Gul et al. (2010) to require at least 200 transaction data in estimation.

³⁹ Specifically, the time dummy variable *REF* indicates the specific ending date of the reform for each firm, enabling us to disentangle the effects from potential omitted variables that coincide with this shock.

Table 12

Robustness check: ruling out confounding effects.

This table shows the robustness of the effects of the Split-share Structure Reform on the ownership discrimination by excluding the effects of other possible changes on government subsidy, firms' innovation, agency costs, and stock price informativeness etc. after the reform. The government subsidy (Subsidy) is measured as the total amount of government subsidies divided by firm's total assets. We proxy for firms' innovation as the logarithm of one plus the total number of invention and utility model patents that are applied for by a firm and eventually granted to a firm in a year (PAT) (He and Tian, 2013; Tan et al., 2020). We include the four-year-ahead proxy for innovation. The measurement of stock price informativeness (Info) is the logit transformation of (1-R2), where R2 is estimated by regressing each firm's daily stock return on the value-weighted market return, industry return and their lagged values for each year. We measure the agency conflicts as the degree of separation of control and cash flow rights (SEP). We include these variables and their interactions with the ownership indicators and reform indicators into the regressions, denoted as "ADD_CONTROL" in the eighth column of the table (including Info, PAT, SEP, their interactions with SOE and REF, and the triple interaction terms SOE*PAT*REF, SOE*Info*REF, SOE*SEP*REF). For brevity, we don't report the detailed coefficients on these variables. Then we reconduct the multi-equation regression of firms' investment and financing behaviors on cash flow shocks (Gatchev et al., 2010). Each row in the table corresponds to each of the equations in the multi-equation model. Only core results are presented. Control variables include the lagged values of the ten dependent variables, firm size, market-to-book ratio, ROE etc. We also control for year and industry fixed effects. As several dependent variables in the model have a minus sign (specifically in the first, second, fifth and tenth equations), their signs for the coefficients and t-values in the table are adjusted accordingly to make the results more intuitive. The Adjusted R-squares for the equations are reported in the last column. Coefficients are reported with t-statistics in parentheses. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* p < 0.10 ** p < 0.05 *** p < 0.01).

Dependent variables	Independent variables										N	Adj R ²
	SOE*CF*REF	SOE*CF	SOE*REF	CF*REF	CF	REF	SOE	Subsidy, PAT, Info, SEP & interactions with SOE, REF	CONTROL	YEAR & IND FE		
CAPX	0.024** (2.27)	-0.013* (-1.68)	-0.001 (-0.31)	-0.056*** (-8.36)	0.056*** (12.63)	-0.005*** (-3.04)	0.001 (0.40)	YES	YES	YES	12,858	0.43
ACQUI	-0.007 (-0.98)	-0.010* (-1.93)	-0.001 (-0.39)	-0.005 (-1.11)	0.022*** (7.47)	0.000 (0.28)	-0.002 (-1.55)	YES	YES	YES	12,858	0.09
ASSETSALLES	-0.001 (-0.10)	-0.001 (-0.10)	-0.005** (-2.48)	0.009 (1.60)	-0.033*** (-8.47)	0.008*** (5.23)	0.001 (0.62)	YES	YES	YES	12,858	0.06
STKISSUE	-0.025 (-1.00)	0.069*** (3.66)	-0.002 (-0.46)	0.090*** (5.43)	-0.204*** (-18.81)	-0.011** (-2.42)	-0.009** (-2.34)	YES	YES	YES	12,858	0.07
DIV	-0.004 (-0.93)	-0.004 (-1.23)	0.000 (0.34)	-0.025*** (-8.19)	0.037*** (18.44)	-0.001* (-1.68)	0.000 (0.62)	YES	YES	YES	12,858	0.37
ΔSLOAN	0.043* (1.95)	-0.058*** (-3.64)	0.010** (2.10)	0.084*** (5.91)	-0.284*** (-30.75)	-0.009** (-2.48)	0.001 (0.24)	YES	YES	YES	12,858	0.15
ΔLLOAN	0.027 (1.58)	-0.022* (-1.75)	-0.001 (-0.37)	-0.011 (-0.99)	-0.086*** (-11.77)	0.005 (1.56)	0.005* (1.82)	YES	YES	YES	12,858	0.07
ΔOTHERSD	-0.077*** (-3.99)	0.097*** (6.74)	0.001 (0.22)	0.405*** (29.74)	-0.089*** (-10.79)	-0.011*** (-2.80)	-0.001 (-0.29)	YES	YES	YES	12,858	0.12
ΔOTHERLD	0.005 (1.00)	-0.006 (-1.38)	-0.000 (-0.04)	0.014*** (3.98)	-0.019*** (-8.14)	-0.001 (-1.20)	0.001 (0.68)	YES	YES	YES	12,858	0.03
ΔCASH	-0.126*** (-4.75)	0.106*** (5.38)	0.000 (0.06)	0.011 (0.64)	0.171*** (15.11)	0.015*** (3.36)	-0.002 (-0.57)	YES	YES	YES	12,858	0.17

Table 13

Robustness check: regression results with additional controls of other events.

This table reports the impact of the Split-share Structure Reform on the ownership discrimination with additional control variables of other events, i.e. the Value-added Tax (VAT) reform indicator (Dum_VAT), and foreign bank entry indicator (Dum_FB). The dummy variable Dum_VAT equals 1 if the firm belongs to the specific industry and city that has already underwent the VAT Reform in the year, and 0 otherwise. The dummy variable Dum_FB equals 1 if the firm is located in the city that has already been open to foreign banks in the year, and 0 otherwise. For brevity, we don't report the detailed coefficients on these variables. Then we reconduct the multi-equation regression of firms' investment and financing behaviors on cash flow shocks (Gatchev et al., 2010). Each row in the table corresponds to each of the equations in the multi-equation model. Only core results are presented. Control variables include the lagged values of the ten dependent variables, firm size, market-to-book ratio, ROE etc. We also control for year and industry fixed effects. As several dependent variables in the model have a minus sign (specifically in the first, second, fifth and tenth equations), their signs for the coefficients and t-values in the table are adjusted accordingly to make the results more intuitive. The Adjusted R-squares for the equations are reported in the last column. Coefficients are reported with t-statistics in parentheses. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* p < 0.10 ** p < 0.05 *** p < 0.01).

Dependent variables	Independent variables										N	Adj R ²	
	SOE*CF*REF	SOE*CF	SOE*REF	CF*REF	CF	REF	SOE	Dum_VAT	Dum_FB	CONTROL			YEAR & IND FE
CAPX	0.021** (2.16)	-0.012* (-1.73)	0.002* (1.68)	-0.059*** (-9.38)	0.060*** (17.35)	-0.006*** (-5.82)	-0.002 (-1.56)	-0.001 (-0.48)	-0.000 (-0.24)	YES	YES	14,696	0.38
ACQUI	-0.001 (-0.15)	-0.019*** (-3.50)	0.001 (0.75)	-0.021*** (-4.23)	0.040*** (14.62)	0.000 (0.45)	-0.003*** (-3.17)	-0.000 (-0.24)	-0.001 (-0.50)	YES	YES	14,696	0.05
ASSETSALLES	0.022*** (2.70)	-0.018*** (-3.26)	-0.005*** (-4.38)	0.004 (0.75)	-0.030*** (-10.65)	0.006*** (6.29)	0.003*** (3.21)	-0.002 (-1.12)	0.003** (2.10)	YES	YES	14,696	0.05
STKISSUE	0.369*** (13.48)	-0.337*** (-17.72)	-0.002 (-0.39)	-0.309*** (-17.70)	0.212*** (22.13)	-0.016*** (-5.21)	-0.009*** (-3.12)	-0.003 (-0.37)	0.004 (0.71)	YES	YES	14,696	0.13
DIV	-0.011** (-2.24)	0.001 (0.39)	0.001 (1.53)	-0.021*** (-6.82)	0.036*** (21.49)	-0.001 (-1.05)	-0.002*** (-3.74)	-0.003** (-2.15)	0.002** (2.49)	YES	YES	14,696	0.31
ΔSLOAN	0.046** (2.39)	-0.140*** (-10.47)	0.002 (0.55)	0.045*** (3.62)	-0.240*** (-35.49)	-0.007*** (-3.06)	0.002 (0.85)	0.001 (0.28)	0.000 (0.14)	YES	YES	14,696	0.06
ΔLLOAN	0.015 (1.03)	-0.022** (-2.07)	-0.002 (-0.89)	-0.013 (-1.39)	-0.077*** (-14.71)	0.005*** (3.03)	0.002 (1.27)	-0.003 (-0.67)	-0.002 (-0.67)	YES	YES	14,696	0.08
ΔOTHERSD	-0.161*** (-8.98)	0.192*** (15.45)	-0.002 (-0.74)	0.478*** (38.89)	-0.165*** (-26.29)	-0.016*** (-6.70)	-0.000 (-0.18)	-0.001 (-0.25)	-0.002 (-0.54)	YES	YES	14,696	0.00
ΔOTHERLD	0.001 (0.27)	-0.001 (-0.31)	-0.000 (-0.01)	0.027*** (8.54)	-0.033*** (-19.02)	-0.001** (-2.03)	0.001 (1.09)	-0.000 (-0.07)	-0.001 (-0.67)	YES	YES	14,696	0.13
ΔCASH	0.284*** (10.50)	-0.297*** (-15.81)	-0.005 (-1.41)	-0.336*** (-19.71)	0.530*** (56.04)	0.017*** (5.90)	0.004 (1.35)	-0.003 (-0.43)	0.002 (0.39)	YES	YES	14,696	0.23

We include these two indicators of events (*Dum_FB* and *Dum_VAT*) into the baseline regressions to address the disturbing impacts of these policy shocks, and report the results in Table 13. The evidence shows that our findings still hold.

Last, we consider the massive economic stimulus plan issued by the Chinese government in November 2008, with a magnitude of 4 trillion RMB (equivalent to 586 billion USD at that time), which may affect bank loans and trigger spillover effects on firms' financial decisions (Ouyang and Peng, 2015; Burdekin and Weidenmier, 2015; Wen and Wu, 2019). Following the literature, we regard 2009 and 2010 as the stimulus period (Wen and Wu, 2019) and re-conduct the baseline regressions using the pre-stimulus sample period. Since the large wave of Split-share Structure Reform was largely concentrated in 2005–2007, this subsample essentially covers more than 99% of the privatized firms in our sample. We report robust results in Panel A of Online Appendix Table IA.3.

Further, the 4-trillion RMB economic stimulus plan features salient imbalance in industry distribution: preferential stimulus package was provided to *Agriculture, Forestry, Machinery, Building materials, Real Estate, Metallurgy, Construction, Transportation, Medicine, Geological exploration and water conservancy, Education and broadcasting, Social service, Information technology, and Financial insurance industries*.⁴⁰ Accordingly, we delete firms of these key supported industries from the full sample and re-conduct the baseline regressions. The results shown in Panel B of Online Appendix Table IA.3 provide supportive evidence to our findings. The results suggest that even after excluding the impacts of the massive stimulus package, the mitigated ownership discrimination after the reform remains prominent.

7. Conclusion

In this paper, we go beyond the widely debated existence and impacts of ownership discrimination and examine its institutional origins based on a quasi-natural experiment in China—the Split-share Structure Reform. Specifically, we employ a multi-equation model that holds cash sources equal to cash uses and reflects the interdependent nature of firm's financial decisions over time to provide solid evidence of credit misallocation between SOEs and non-SOEs. Using a staggered Diff-in-Diff design with the reform as an exogenous shock, we show that the advantageous financing status of SOEs is significantly weakened after the conversion of firms' non-tradable shares to tradable shares, which increased their probability of being privatized. Interestingly, we find that the reform on firms, rather than the near-simultaneous marketization of the banking sector, takes the major effects. The findings indicate that the implicit government guarantee is likely to be the origin of ownership discrimination.

Further, we provide supportive evidence from the perspective of the lenders: we show that SOEs' favorable accessibility to bank credits (larger-scale loan amounts, longer terms, lower borrowing costs and less collateral requirements) is indeed mitigated after the Split-share Structure Reform. We proceed to show that the impacts of the reform are more pronounced among firms with higher ratios of converted shares, firms in non-strategic industries, firms with smaller workforces, and firms that experience looser ex-ante state control.

Clarifying the institutional origins of ownership discrimination and the real effects of privatization reforms has practical implications for our understanding of the capital markets. Our work provides concrete evidence of the positive role played by the reform in improving credit allocation efficiency in the financial sector and fostering growth of non-SOEs in the real sector. In this respect, the findings should be of interest to both academia and policymakers.

Appendix A. Appendix

Table A.1
Definition of the variables.

Variables	Description
<i>CASH</i>	The cash and cash equivalents in the financial statement of cash flows divided by total assets
<i>LLOAN</i>	The long-term bank loans in the Balance Statement divided by total assets
<i>SLOAN</i>	The short-term bank loans in the Balance Statement divided by total assets, including short-term bank loans and the long term loans maturing in less than one year.
<i>OTHERLD</i>	The short-term liabilities in the Balance Statement other than the long-term bank loans divided by total assets
<i>OTHERSD</i>	The lon-term liabilities in the Balance Statement other than the short-term bank loans divided by total assets
<i>STKISSUE</i>	Sale of common and preferred stock divided by total assets
<i>DIV</i>	Dividends per share multiplied by the shares divided by total assets
<i>ASSETSALES</i>	The sales of assets divided by total assets
<i>CAPX</i>	(The increase of fixed assets + The increase of construction in process + The increase of intangible assets + The increase of deferred tax assets) divided by the total assets
<i>ACQUI</i>	Acquisitions divided by total assets
<i>SIZE</i>	The log value of total assets
<i>MB</i>	(Market value of equity - Book value of equity + Book value of total as-sets) divided by book value of total assets
<i>NWC</i>	(Total current assets - Cash and equivalents) - (Total current liabilities - Debt in current liabilities) divided by total assets

(continued on next page)

⁴⁰ Refer to the press conference with the theme of "Economics, social development, and macro-control of China" by Zhang Ping, director of the National Development and Reform Commission, on March 6, 2013. The webpage is: <http://lianghui.people.com.cn/2013npc/GB/357184/357923/>.

Table A.1 (continued)

Variables	Description
<i>CF</i>	(Operating income before depreciation - Net interest expense - Cash taxes - Change in net working capital) divided by total assets
<i>SOE</i>	A dummy variable indicating the ownership of the firm. For state-owned firms: <i>SOE</i> = 1 and 0 otherwise
<i>REF</i>	A dummy variable which equals 1 when the firm has already undergone the Split-share Structure Reform and 0 otherwise
<i>REFBank</i>	The ratio of loans extended by listed banks to the total bank loans in the economy
<i>LnAmount</i>	The logarithm of the total amount of the loan
<i>LnTerm</i>	The logarithm of loan term
<i>Rate</i>	The interest rate of the loan
<i>Collateral</i>	A dummy variable which equals 1 if the loan is backed by collaterals and 0 otherwise
<i>Bank4</i>	A dummy variable which equals 1 if the lending bank is among the "Big Four" banks in China, i.e. the Industrial and Commercial Bank of China, the China Construction Bank, the Agricultural Bank of China, the Bank of China, and 0 otherwise.
	the category of the loan purpose declared by the borrower (<i>LoanPurpose</i>).
<i>Syndicated</i>	A dummy variable which equals 1 if the loan package is syndicated and 0 otherwise.
<i>Currency</i>	A dummy variable which equals 1 if the loan is quoted in local currency (RMB) and 0 otherwise.
<i>LoanPurpose</i>	A series of indicators on the category of the loan purpose declared by the borrower. According to the database, the purpose is categorized into: supporting the ordinary operation, supporting business expansion and new projects, international trading and import/export, debt payoff, financial restructuring, and others.
<i>Strong</i>	For an SOE, if the direct shareholding by the government is higher than 30% in the fiscal year of the reform, <i>Strong</i> equals 1. For non-SOEs, it equals 0.
<i>Weak</i>	For an SOE, if the direct shareholding by the government is lower than or equal to 30% in the fiscal year of the reform, <i>Weak</i> equals 1. For non-SOEs, it equals 0.
<i>CVCF</i>	The cash flow volatility, measured as the coefficient of variation in a firm's quarterly cash flow over the past five years (20 quarters) preceding each of the sample years. The coefficient of variation is the standard deviation of operating cash flow scaled by the absolute value of the mean over the same period.
<i>FD</i>	External financing dependence, measured as the percentage of a firm's capital needs that cannot be met by internal financing.
<i>Subsidy</i>	The total amount of government subsidies enjoyed by the firm standardized by the total assets of the firms
<i>Pat</i>	The measure of firm's innovation, calculated as the logarithm of one plus the total number of invention and utility model patents that are applied for by a firm and eventually granted to a firm in a year
<i>Info</i>	Firm's stock price informativenss, calculated as first regressing each firm's daily stock return on the value-weighted market return, industry return and their lagged values for each year, and then take logit transformation of (1-R ²).
<i>Sep</i>	The degree of the separation of control rights and cash flow rights.
<i>Dum_FB</i>	A dummy indicator of the foreign bank entry in China, which equals 1 if the firm's location has already gained access to foreign banks by the end of the year and 0 otherwise.
<i>Dum_VAT</i>	A dummy indicator of the VAT reform, which equals 1 if the firm's location has already finished the VAT reform by the end of the year, and 0 otherwise.

This table provides a brief introduction of the variables in the model and empirical analysis according to eq. (3). All the variables are divided by total assets as a means of standardization following the practice of [Gatchev et al. \(2010\)](#).

Table A.2

A parallel test.

Dependent variables	Independent variable					CONTROL	YEAR & IND FE	N	Adj R2
	<i>SOE*CF*REF</i> (-2)	<i>SOE*CF*REF</i> (-1)	<i>SOE*CF*REF</i> (0)	<i>SOE*CF*REF</i> (1)	<i>SOE*CF*REF</i> (2+)				
<i>CAPX</i>	0.008 (0.49)	0.018 (1.10)	0.034* (1.82)	0.036* (1.76)	0.042*** (3.19)	YES	YES	14,696	0.42
<i>ACQUI</i>	0.005 (0.48)	0.005 (0.49)	-0.002 (-0.12)	0.011 (0.83)	0.004 (0.45)	YES	YES	14,696	0.08
<i>ASSETSALES</i>	0.004 (0.29)	0.033** (2.33)	-0.022 (-1.32)	0.031* (1.71)	0.013 (1.09)	YES	YES	14,696	0.05
<i>STKISSUE</i>	0.297*** (6.02)	0.373*** (8.05)	0.625*** (11.44)	0.573*** (9.51)	0.569*** (14.76)	YES	YES	14,696	0.18
<i>DIV</i>	0.008 (1.02)	-0.003 (-0.38)	0.010 (1.23)	0.011 (1.22)	-0.000 (-0.02)	YES	YES	14,696	0.36
<i>ΔSLOAN</i>	0.016 (0.48)	-0.015 (-0.48)	0.042 (1.16)	0.016 (0.40)	0.019 (0.73)	YES	YES	14,696	0.02
<i>ΔLLOAN</i>	-0.069** (-2.49)	-0.016 (-0.61)	-0.018 (-0.58)	-0.025 (-0.73)	-0.024 (-1.12)	YES	YES	14,696	0.15
<i>ΔOTHERSD</i>	-0.122*** (-3.97)	-0.031 (-1.09)	-0.208*** (-6.15)	-0.134*** (-3.58)	-0.176*** (-7.38)	YES	YES	14,696	0.06
<i>ΔOTHERLD</i>	0.019** (2.09)	0.004 (0.49)	0.035*** (3.45)	0.013 (1.15)	0.016** (2.19)	YES	YES	14,696	0.09
<i>ΔCASH</i>	0.124** (2.52)	0.328*** (7.08)	0.411*** (7.53)	0.415*** (6.90)	0.370*** (9.59)	YES	YES	14,696	0.26

This table estimates the dynamic effect of the privatization reform on our proxy for ownership discrimination, i.e. the reaction of firms' investments to cash flow shocks. All variables are as defined in [Table A.1](#) in Appendix. We conduct the multi-equation regressions similar to the baseline model in [Table 3](#), while replace the *REF* variable in the triple interaction term with a series of indicators: *REF*(-2), *REF*(-1), *REF*(0), *REF*(1), and *REF*(2+), which equals to one if it is two years prior to, one year prior to, the current year of, one year after, two and more years after the firm has underwent the reform, respectively and zero, otherwise. Each row in the table corresponds to each of the equations in the multi-equation model. For brevity, we omit the separate terms in the interactions, and control variables including the lagged values of the ten dependent variables, firm size, market-to-book ratio

and ROE etc. We also control for year and industry fixed effects. As several dependent variables in the model have a minus sign (specifically in the first, second, fifth and tenth equations), their signs for the coefficients and t-values in the table are adjusted accordingly to make the results more intuitive. The Adjusted R-squares for the equations are reported in the last column. Coefficients are reported with t-statistics in parentheses. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$).

Table A.3
Subsample of negative cash flow shocks.

Panel A. The ownership discrimination.							
Dependent variables	Independent variables					N	Adj R ²
	SOE*CF	CF	SOE	CONTROL	YEAR & IND FE		
CAPX	-0.028*** (-2.90)	0.063*** (10.10)	-0.005*** (-3.68)	YES	YES	5746	0.37
ACQUI	-0.012* (-1.72)	0.023*** (5.27)	-0.003*** (-3.43)	YES	YES	5746	0.05
ASSETS SALES	-0.033*** (-3.34)	-0.065*** (-10.34)	-0.001 (-0.73)	YES	YES	5746	0.08
EQUI	0.058* (1.96)	-0.332*** (-17.44)	-0.012*** (-2.97)	YES	YES	5746	0.09
DIV	-0.005 (-1.17)	0.032*** (11.79)	-0.002*** (-4.33)	YES	YES	5746	0.26
ΔSLOAN	-0.126*** (-5.80)	-0.172*** (-12.32)	-0.005* (-1.68)	YES	YES	5746	0.08
ΔLLOAN	-0.053*** (-2.99)	-0.107*** (-9.44)	-0.004* (-1.68)	YES	YES	5746	0.09
ΔOTHERSD	0.160*** (8.66)	-0.020* (-1.65)	0.012*** (5.05)	YES	YES	5746	0.00
ΔOTHERLD	0.014** (2.44)	-0.041*** (-11.48)	0.003*** (3.96)	YES	YES	5746	0.05
ΔCASH	0.065** (2.32)	0.145*** (8.00)	0.004 (1.13)	YES	YES	5746	0.14

Panel B. The effects of the Split-share Structure Reform on the ownership discrimination.												
Dependent variables	Independent variables										N	Adj R ²
	SOE*CF*REF	SOE*CF	SOE*REF	CF*REF	CF	REF	SOE	CONTROL	YEAR & IND FE			
CAPX	0.039** (2.01)	-0.034** (-2.52)	0.006** (2.50)	-0.076*** (-6.04)	0.074*** (10.21)	-0.014*** (-7.59)	-0.005*** (-2.60)	YES	YES	5746	0.39	
ACQUI	-0.008 (-0.63)	-0.001 (-0.11)	-0.000 (-0.14)	-0.027*** (-3.31)	0.022*** (4.65)	-0.002 (-1.51)	-0.002 (-1.45)	YES	YES	5746	0.07	
ASSETS SALES	0.082*** (4.06)	-0.070*** (-5.02)	0.001 (0.41)	-0.028** (-2.16)	-0.046*** (-6.18)	0.005** (2.56)	-0.002 (-1.17)	YES	YES	5746	0.09	
STKISSUE	-0.027 (-0.44)	0.088** (2.05)	-0.007 (-0.87)	0.103*** (2.58)	-0.329*** (-14.34)	-0.008 (-1.36)	-0.005 (-0.86)	YES	YES	5746	0.10	
DIV	-0.002 (-0.29)	-0.000 (-0.02)	0.001 (1.16)	-0.034*** (-6.26)	0.030*** (9.82)	-0.004*** (-4.75)	-0.002** (-2.42)	YES	YES	5746	0.30	
ΔSLOAN	-0.050 (-1.11)	-0.105*** (-3.36)	0.007 (1.09)	0.159*** (5.37)	-0.184*** (-10.95)	0.003 (0.70)	-0.011** (-2.43)	YES	YES	5746	0.09	
ΔLLOAN	0.020 (0.54)	-0.038 (-1.50)	-0.007 (-1.37)	-0.038 (-1.62)	-0.074*** (-5.44)	0.006* (1.72)	-0.000 (-0.05)	YES	YES	5746	0.12	
ΔOTHERSD	-0.108*** (-2.87)	0.151*** (5.78)	-0.015*** (-2.89)	0.533*** (19.88)	-0.124*** (-8.90)	0.027*** (6.40)	0.014*** (3.82)	YES	YES	5746	0.01	
ΔOTHERLD	0.013 (1.14)	0.008 (1.04)	0.002 (1.22)	0.015** (2.01)	-0.033*** (-7.68)	-0.000 (-0.01)	0.001 (1.23)	YES	YES	5746	0.06	
ΔCASH	-0.100* (-1.69)	0.068* (1.68)	-0.014* (-1.76)	0.113*** (2.99)	0.084*** (3.87)	0.029*** (5.25)	0.006 (1.00)	YES	YES	5746	0.15	

This table re-estimate the regression results using the subsample of negative cash flow shocks. Each row in the table corresponds to each of the equations in the multi-equation model. Panel A re-estimates the existence of ownership discrimination in Table 2. Panel B re-estimates the impacts of the reform on the discrimination in Table 3. Control variables include the lagged values of the ten dependent variables, firm size, market-to-book ratio, ROE etc. We also control for industry and year fixed effects. For brevity, only core results are presented. As several dependent variables in the model have a minus sign (specifically in the first, second, fifth and tenth equations), their signs for the coefficients and t-values in the table are adjusted accordingly to make the results more intuitive. The Adjusted R-squares for the equations are reported in the last column. Coefficients are reported with t-statistics in parentheses. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$).

Table A.4

The privatization reform and bank lending: subsample tests.

Dependent variable: <i>Ln(Amount)</i>	(1) Insolvency risks		(2) Changes in non-tradable shares	
	High Z-score	Low Z-score	High changes	Low changes
<i>REF*SOE</i>	-0.186*** (-3.30)	-0.066 (-1.11)	-0.332** (-2.32)	0.209* (1.77)
<i>SOE</i>	0.196*** (4.08)	0.266*** (5.15)	0.431*** (3.07)	-0.064 (-0.56)
<i>REF</i>	0.119*** (3.44)	0.097** (2.42)	0.239 (0.94)	-0.011 (-0.07)
CONTROL	YES	YES	YES	YES
Industry FE & Year FE	YES	YES	YES	YES
N	9381	8276	6444	6061
Adj R ²	0.31	0.32	0.35	0.34
Dependent variable: <i>Ln(Amount)</i>	(3) Strategic vs. non-strategic industries		(4) External financing dependence	
	Non-strategic-industry	Strategic-industry	High dependence	Low dependence
<i>REF*SOE</i>	-0.110** (-2.27)	-0.086 (-1.20)	-0.159*** (-2.83)	0.062 (1.06)
<i>SOE</i>	0.256*** (6.15)	0.235*** (3.69)	0.385*** (8.22)	-0.034 (-0.65)
<i>REF</i>	0.172*** (5.69)	-0.048 (-1.02)	0.040 (1.06)	0.071** (2.06)
CONTROL	YES	YES	YES	YES
Industry FE & Year FE	YES	YES	YES	YES
N	10,810	6847	9253	8404
Adj R ²	0.32	0.24	0.27	0.34

This table reports the heterogeneous effects of the Split-share Structure Reform on the scale of bank lending among firms with different characteristics. We first split the full sample into two subsamples according to the level of insolvency risks, changes in non-tradable shares, whether the industry is among the nationally-strategic industries, and the external financing dependence, respectively. In each subsample, we regress the logarithm of loan amount (*Ln(Amount)*) on the interaction of the ownership indicator (*SOE*) and the reform time dummy (*REF*), and both of the separate terms. Control variables include the indicators of whether the loan is issued by "Big Four" banks (*Bank4*), whether the loan package is syndicated (*Syndicated*), whether it is quoted in local currency (RMB) (*Currency*), and the category of the loan purpose declared by the borrower (*LoanPurpose*). We also control for the lagged values of cash flow (*CF*) and the ten dependent variables in our baseline model (*CAPX*, *ACQUI*, *ASSETSALES*, *STKISSUE*, *DIV*, *ΔSLOAN*, *ΔLLOAN*, *ΔOTHERSD*, *ΔOTHERLD*, *ΔCASH*), plus firm size, market-to-book ratio, ROE and industry dummies etc. We control for year and industry fixed effects. For brevity, only core results are presented. The adjusted R-squares are reported. Coefficients are reported with t-statistics in parentheses. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$).

Table A.5

Propensity score matching-post-match differences.

Variable	SOE	Non-SOE	Diff	t-value
<i>ACQUI</i>	0.523	0.298	-0.225	(1.16)
<i>ASSETSALES</i>	0.712	0.761	0.049	(-0.13)
<i>STKISSUE</i>	2.101	1.646	-0.455	(0.70)
<i>DIV</i>	2.502	2.549	0.047	(-0.31)
<i>ΔSLOAN</i>	2.087	1.968	-0.119	(0.11)
<i>ΔLLOAN</i>	0.593	-0.159	-0.752	(1.59)
<i>ΔOTHERSD</i>	2.565	2.279	-0.286	(0.37)
<i>ΔOTHERLD</i>	0.052	-0.016	-0.068	(0.70)
<i>ΔCASH</i>	-0.149	0.388	0.537	(-0.64)
<i>MB</i>	1.122	1.171	0.049	(-1.32)
<i>SIZE</i>	0.209	0.208	-0.001	(1.30)
<i>ROE</i>	3.607	3.231	-0.376	(0.25)

This table presents the statistics of post-match differences between SOE and matched non-SOEs, including the sample average of firm characteristics, the sample-mean differences (Non-SOEs minus SOEs) between the two groups and the T-statistics. All variables and table structures are exactly the same as those in Table 3. Coefficients are reported with t-statistics in parentheses. *** denotes test statistical significance at the 1% level; ** denotes test statistical significance at the 5% level; * denotes test statistical significance at the 10% level (* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$).

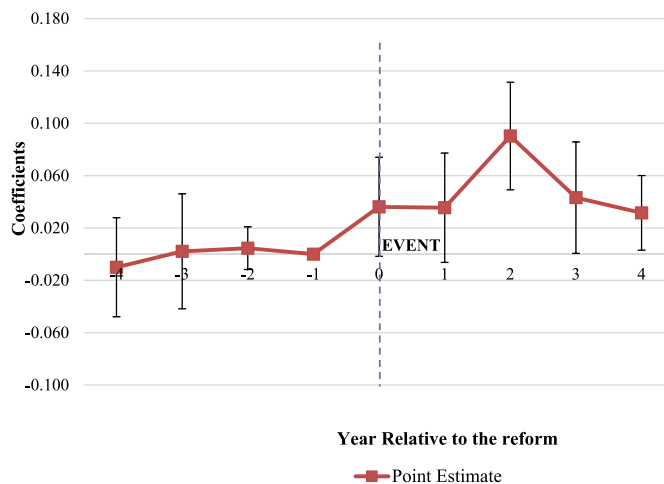


Fig. A.1. Dynamics of the Differential Reaction of Investment to Cashflow Shocks Between SOEs and Non-SOEs Around the Reform ($[-1,0)$ period as Benchmark).

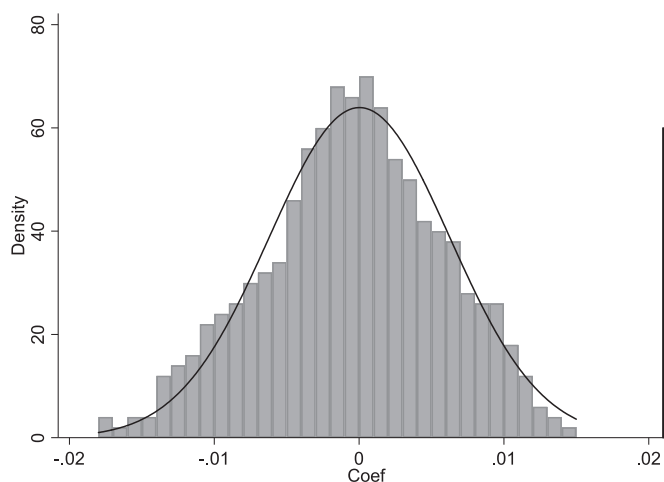


Fig. A.2. The Distribution of the Coefficients in the Placebo Test.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jcorpfin.2020.101848>.

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