Spillover Effects of State-owned Enterprises under Imperfect Competition: Evidence from China

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Abstract

This study investigates how the performance of private-owned enterprises (POEs) is indirectly affected by the prevalence of state-owned enterprises (SOEs) in the same industry through competitive interaction. We focus on how political pressure transmitted through resource reallocation by the 2016 Supply-Side Structural Reform (SSSR) impacts the competitive relationship between SOEs and POEs. We reveal the industry-level spillover effects of SOEs using Chinese listed firms to compare the post-reform changes in POEs' market share across industries with varying levels of pre-reform SOE prevalence. Our analysis shows that POEs gain a relative market share in industries with higher SOE prevalence, suggesting a positive spillover from SOEs to POEs. We further find that family POEs gain from spillover effects, whereas non-family POEs do not experience any significant impact.

Keywords: Spillover Effect, Imperfect competition, State-owned Enterprises, China, Structural Reform

1. Introduction

Firms are engaged in continues competition and interaction at the industry-level, rather than existing as isolated entities. These interactions create conditions for spillover effects, as the behavior of a firm can indirectly affect the performance or strategy of its peers (Leary and Roberts, 2014). Berg et al. (2018) argue that spillover effects play a significant role in identifying corporate activities, particularly in the context of spatial interaction or imperfect competition. For example, Naaraayanan and Wolfenzon (2024) examine the spillover effects of affiliated business group (BG) firms on standalone (SA) firms in the context of a government-led transportation infrastructure project in India. They find that in cities with a higher prevalence of BGs, SA firms reduce investment. The overall investment growth results from a reallocation of investment opportunities away from SA firms and toward to BGs, which suggesting a negative spillover from BGs to SA peers. These findings underscore the importance of spillovers in shaping firm behavior. Building upon this theoretical framework, we investigate the mechanisms through which spillovers are generated in contexts of imperfect competition. Specifically, we explore how alterations in institutional advantages for politically connected firms give rise to novel forms of inter-firm spillovers.

We use a sample of Chinese listed firms to investigate how the higher prevalence of state-owned enterprises (SOEs) indirectly affects the performance of private-owned enterprises (POEs) within the same industries. Our aim is to understand how politically driven institutional dynamics shape competitive interactions between these two types of firms. In this framework, SOEs serve not only as economic entities but also as instruments of government intervention, allowing us to study how political considerations shape firm behavior in the marketplace. The Chinese business context provides an ideal empirical setting for this investigation.

China's government-led resource allocation creates a setting of imperfect competition, where SOE firms hold institutional advantages over their private-sector peers (He et al., 2013).

These advantages include preferential access to credit, policy support, and reduced financial constraints (Bai et al., 2004; Chen, 2010; Hu et al., 2024). Leveraging these institutional privileges, SOEs have served as instruments for fulfilling public policy objectives, including undertaking fixed investments to meet GDP growth. According to An et al. (2016), fixed asset investment accounts for about 50 percent of China's GDP, with SOEs leading these efforts. Recent data showing that the total fixed investment of SOEs were 7 trillion RMB (about 976.22 billing U.S. dollars) in 2024, an increase of 4.2 percent to the previous year[1] (SCIO, 2025). In contrast, POEs are primarily motivated by firm-level value maximization rather than public goals, and generally lack the political connections and institutional support enjoyed by SOEs (Chen et al., 2011). This institutional asymmetry places POEs at a competitive disadvantage in politically interval markets.

Despite facing weaker institutional standing, POEs are regarded as the most active component of the Chinese economy (Huang et al., 2020). They contribute more than 50 percent of the tax revenue, over 60 percent of GDP, 70 percent of technological innovation, and 80 percent of urban employment[2] (SCIO, 2022). Recognizing the critical role of the private sector, the Chinese government has shown strong motivation to adjust institutional conditions to better facilitate POE development, as reflected in recent initiatives to boost private enterprise financing and innovation (State Council, 2025)[3]. Changes in the institutional environment have the potential to reshape the institutional advantages historically enjoyed by SOEs, thereby altering competitive interactions with POEs. This context offers a unique empirical opportunity to investigate politically driven institutional dynamics under imperfect competition.

[1] The State Council Information Office (2025). *China's local state-owned enterprises maintained steady operations in 2024.* Retrieved from: http://english.scio.gov.cn/pressroom/2025-02/20/content_117723229.html

[2] The State Council Information Office (2022). *China's private enterprises quadruple in last 10 years* Retrieved from: http://english.scio.gov.cn/m/pressroom/2022-06/29/content_78295756.htm

[3] The State Council (2025). *China signals stronger financial support for private enterprises.* Retrieved from https://english.www.gov.cn/news/202503/03/content_WS67c4e6c0c6d0868f4e8f03c9.html

The ownership structure of POEs categorizes them into family firm POEs (FFP) and non-family POEs (NFP). This classification allows us to explore the influence of family ownership on the presence of political pressure. FFPs behave different from NFPs due to the involvement of family members in decision-making and the hybridity of family and business systems, which shape their strategic responses to institutional environments (Klein et al., 2005; Xu et al., 2015). In contrast, NFPs may have relatively more dispersed ownership and weaker control rights, resulting in a relatively weaker influence of the personal characteristic of the owners or managers (Zeng et al., 2025). Furthermore, FFPs rely more on informal relationships than on formal rules and structures (Hoffman et al., 2006). These distinctive governance features associated with family ownership also led to performance differences between FFPs and NFPs. For example, D'Aurizio et al. (2015) find that FFPs, due to their stronger willingness to disclose inside information, face significantly lower financial constraints compared to NFPs. Similarly, Anderson and Reeb (2003) suggest that family ownership mitigates managerial opportunism, resulting in better accounting and market performance for FFPs relative to NFPs.

FFPs are highly prevalent and as the key component in private sector in China. They are widely spread across provinces and broadly distributed across industries (Ma, 2021)[4]. We explore how SOEs interact differently with FFPs and NFPs across industries. The distinctive interactions between FFP and NFP with SOEs in China can enhance our understanding of family behavior with respect to the industry-level dynamics, especially in industries where SOEs are higher prevalence. Thus, by incorporating both ownership heterogeneity and institutional advantages differences, our study extends the literature on spillover effects by

[4] Ma (2021) documents that the private sector contributes over 60% of China's GDP, with family-owned enterprises accounting for 85% of this output and playing a major role in innovation and job creation. Family firms are widely present across 29 provinces and are broadly distributed across sectors such as energy, materials, industrials, consumer discretionary, consumer staples, healthcare, financials, and information technology.

highlighting how politically intervention firms influence private-sector dynamics under imperfect competition.

The main methodological challenge in identifying industry-level spillover effects is that SOE prevalence is not randomly distributed across industries. SOEs are more likely to be concentrated in resource-intensive or policy-oriented industries, making it difficult to disentangle spillovers from industry-specific factors. In addition, firm ownership is also endogenous. Even within the same industry, SOEs and POEs differ systematically in governance structure, access to financing, and institutional environments. As a result, direct comparisons between ownership types may conflate spillover effects with pre-existing differences at both the industry and firm levels. To address this potential endogeneity concern, we examine whether the market share of POEs responds differently to an external exogenous shock across industries with varying levels of SOE prevalence. This strategy follows Berg et al. (2021), who emphasize the approach of using exogenous shocks to rigorously identify spillover effects in empirical studies.

In this regard, we introduce China's Supply-Side Structural Reform (SSSR), launched in 2016, as an exogenous policy shock to explore spillover dynamics. The SSSR was a nationwide, industry-oriented structural adjustment program designed to address persistent structural imbalances in the Chinese economy. It consisted of five pillars: overcapacity reduction, inventory destocking, corporate deleveraging, cost reduction, and the improvement of weak links. Each pillar targeted a distinct structural issue: overcapacity reduction focused on industries of steel and coal, thereby improving profitability through consolidation; inventory reduction aimed to stabilize the real estate sector; deleveraging sought to reduce firm-level debt burdens, particularly for SOEs; cost reduction emphasized cutting administrative red tape; and improving weak links promoted industrial upgrading and innovation.

Among these pillars, our theoretical setting for identifying spillover effects of SOEs aligns closely with corporate deleveraging, which aimed to reduce excessive debt across firms. While the reform had multifaceted effects, this pillar offers the most direct and observable link to firm-level contraction and restructuring. It is therefore the most theoretically relevant channel for examining changes in competitive dynamics.

Although the deleveraging measures applied to all firms, SOEs were likely more exposed due to their higher pre-reform leverage and greater reliance on debt financing. As a result, many SOEs faced increased pressure to restructure or scale back operations. These developments provide a unique opportunity to examine whether such state-led contraction reshaped market structure, and whether POEs were able to gain market share as a result, consistent with spillovers under imperfect competition. We use a sample of Chinese A-share listed firms from 2013 to 2019 (7,320 firm-year observations), we apply a difference-in-difference to compare whether the POEs' market share changes differently across industries after the SSSR with varying level of pre-reform SOE prevalence. Figure 1 illustrates the intuition behind this approach: while all POEs exposure to the same reform shock, those in industries with higher SOE prevalence prior to the reform were more likely to experience competitive spillovers. This variation creates a quasi-experimental setting that allows us to identify the SOE spillover effects by comparing POE outcomes across industries.

We first demonstrate that both SOEs and POEs experienced an increase in total sales at the industry level after the reform, suggesting that the SSSR serves as a positive external shock that stimulated firm development. However, despite this growth, both groups are observed a decline in their market share, a pattern that may seem counterintuitive at first glance. It is important to clarify that this result does not reflect a contradiction in firm performance. Rather, it results from the way that market share measured in our analysis. Specifically, firm-level market share is calculated as a firm's total sales divided by total industry sales, where the total

industry sales cover all firms in the industry, including newly listed firms each year, as reported by the database. By using total industry sales instead of the aggregate sales of sample firms, we aim to provide a more accurate and objective measure of firms' relative market positions and to mitigate potential biases arising from sample selection.

As a result of this measurement structure, even if incumbents maintained or slightly improved their absolute performance, their relative market share could decline mechanically due to the rapid expansion of the industry and the continuous entry of new firms. This highlights that while the reform itself was effective in expanding market opportunities, incumbent firms failed to fully capture them, as they were gradually outpaced by newer and more adaptive entrants in the post-reform market landscape. An illustration of this dynamic is shown in Figure 2, focusing on the electronics manufacturing industry (C39), where both SOEs and POEs steadily increased total sales over time, but their market shares declined after 2017, likely due to intensified competition from new entrants.

As of our main analysis, we find that, POEs' market share is less dropped within industries which SOE intensity were higher pre-reform. SOEs in such industries are positively spillover on POEs. We find that FFs are also received positive spillover from SOE, in contrast, this spillover is not observed from NFPs.

We interpret the observed spillover through a bank loan-based mechanism. In imperfectly competitive markets, access to bank loan is central to sustaining expansion and defending market position. Before the reform, SOEs benefited from institutional advantages in obtaining credit and maintained higher bank loan dependence than POEs. The reform, however, tightened financial conditions for SOEs, leading to a reversal in this pattern. This change, particularly in industries with higher pre-reform SOE loan dependence, likely constrained their expansion capacity and created room for POEs to grow. This channel provides a plausible explanation for the competitive spillover dynamics we observe. These findings support the

proposed mechanism that reform-induced financial pressure on SOEs contributed to the observed competitive spillovers in the product market by reshaping the industry's competitive dynamics.

This study contributes to the literature in several important ways. First, we uncover how the undermine of SOEs' institutional privileges, particularly under the deleveraging pillar of SSSR led to a relative reallocation of market share in favor of POEs, highlighting the retreat of SOEs when financial protection is withdrawn. Second, by examining how POEs benefit indirectly from SOEs' retreat under SSSR, we demonstrate that the reform's deleveraging component, rather than shielding SOEs as in previous cycles, imposed genuine financial discipline. This shift not only curtailed misallocation but also amplified reform effectiveness by creating room for more efficient private firms to grow Third, we provide empirical evidence of spillover effects under the mechanism of imperfect competition, a channel that has received relatively less attention compared to spatial spillovers.

The remainder of this paper is organized as follows. In Section 2, we discuss the characteristics of firm's types, financial institutional factors, and details of SSSR. Section 3 presents the data and methodology of the study. Section 4 contains the results of the empirical analysis. Section 5 contains the potential mechanism for the results. Section 6 contains the robustness checks, and Section 7 concludes the paper.

2. Ownership, Financial Institutional Factors, and Supply-Side Structural Reform

2.1 Ownership in China

2.1.1 State-owned enterprises

Chinese SOEs originated in the 1950s under the centrally planned economy, with some enterprises directly evolving from government offices into Industrial firms (Hahn & Lee, 2006). This institutional genesis established a governance paradigm characterized by direct

state control—a legacy persisting even after the 1978 market-oriented reforms (Hu et al., 2024). While these reforms introduced mixed-ownership structures and decentralized supervisory mechanisms, the state retained decisive influence through two channels, first collective decision-making via Party committees embedded in corporate governance, and second policy-driven oversight mandating alignment with national strategic priorities (OECD, 2011). Consequently, SOEs exhibit a hybrid nature: they operate as market entities while remaining key instruments for implementing industrial policy.

The government maintains influence over SOE decision-making primarily through two channels: personnel control and resource allocation, both embedded within government political management framework. Top executives (e.g., CEOs) are often appointed by government authorities, with many having strong political ties or previous government experience (S. Chen et al., 2011). At the local level, provincial governors frequently install politically aligned executives in SOE leadership roles to advance political agendas (Ru 2018; Z. Song 2011). These executives are typically better positioned to interpret and implement local government priorities. This pattern reflects a broader institutional logic shaped by China's fiscal decentralization since 1978, which gave local governments both the responsibility and the incentive to promote regional economic performance. To safeguard their tax base and political standing, local officials often seek to protect and support SOEs under their jurisdiction, which serve not only as sources of fiscal revenue, but also as key vehicles for local development and political leverage (Bai et al., 2004).

In parallel with personnel control, capital allocation provides another key channel through which governments shape SOE behavior (Z. Chen et a., 2020, Cull et al., 2015; He et al., 2013). SOEs enjoy preferential access to financing from both commercial and policy banks (H. Chen et al., 2010; Cong et al., 2019; Firth et al., 2012). This advantage is particularly pronounced in the case of policy bank lending (Ru 2018), which is heavily directed toward

SOEs to support large-scale infrastructure, public service, and urban development projects. By allocating financial resources through state-backed channels, local governments can ensure that SOEs play an instrumental role in delivering policy outcomes—such as expanding fixed investment, stabilizing employment, or executing national strategies at the local level (S. Chen et al., 2011). This embedded resource advantage reinforces the role of SOEs not only as economic entities, but also as extensions of the administrative state. However, this form of government intervention is a double-edged sword. Although government support offers SOEs a competitive edge in capital access and policy protection, it may also result in inefficiencies. Empirical evidence suggests that political intervention can reduce investment efficiency, lower profitability (Cong et al., 2019), and increase SOEs' sensitivity to political uncertainty, which is leading to missed investment opportunities (An et al., 2016).

Beyond personnel appointments and financial privileges, policy-driven oversight institutionalizes the role of SOEs in serving national strategic priorities. According to the *Guiding Opinions on Adjusting the Layout and Structure of the State-Owned Economy*[5], sectors such as national defense, power generation and distribution, and other strategically vital industries are mandated to maintain full state ownership or absolute control, with explicit targets to expand state-owned capital in these areas. These directives are consistent with the broader governance logic described by the OECD (2011), wherein SOEs are expected to act as instruments of state policy rather than purely market-driven firms.

In such sectors, SOEs are not primarily evaluated by market efficiency or profitability, but by their ability to fulfill national and policy objectives. This reflects a broader institutional environment in which economic goals are closely linked to political priorities. Even outside of these strategic sectors, this logic influences how SOEs behave in markets that are less

[5] State Council of the People's Republic of China. (2006). *Guiding opinions on adjusting the layout and structure of the state-owned economy* [original language: 关于调整国有经济布局和结构的指导意见]. Retrieved from http://www.gov.cn/zwgk/2006-12/18/content_472257.htm

competitive, where administrative guidance and policy considerations continue to shape business decisions.

2.1.2 Private-owned enterprise, family, and non-family

Private-owned enterprises (POEs) are the most dynamic component of China's economy, and their behavior are notably different from that of SOEs. First, with a profit-driven orientation, POEs allocate resources and make investments more efficiently than SOEs, which are often burdened with political and social agendas beyond profitability (Cull et al., 2015; Song et al., 2011). Second, POEs, with limited political connections, are more market-oriented and less constrained by bureaucratic expectations. However, they may seek political ties, when such connections generate tangible economic benefits (S. Chen et al., 2011; Li et al., 2008). Third, lacking institutional support, POEs are more financially vulnerable during external shocks or credit tightening, whereas SOEs benefit from preferential access to state financing (H. Chen et al., 2010; Cull et al., 2015; Firth et al., 2012). Finally, POEs are relatively less affected by political uncertainty. An et al. (2016) find that while political turnover reduces investment overall, the impact is less pronounced for POEs, indicating that they are more insulated from politically driven disruptions.

Within the POE sector, we further indentify the family and non-family firms to examine whether the ownership matters in this study. Family firms exhibit distinctive financing behaviors compared to non-family firms. Due to a strong desire to maintain control and avoid external interference, family firms are more likely to rely on internal financing and relationship-based capital rather than external equity or arm's-length bank lending (Anderson, Mansi, & Reeb, 2003; Villalonga & Amit, 2006). This preference often results in underinvestment when internal funds are insufficient, especially in environments with weak legal protections or limited capital market access. Moreover, family firms embedded social networks and long-term orientation can partially offset financing frictions by facilitating trust-

based borrowing or informal capital support (Ellul, Pagano, & Panunzi, 2010). However, this reliance on informal or internal sources also constrains financial flexibility and may inhibit risk-taking or innovation investment.

In sum, POEs in China are characterized by market-oriented goals, higher investment efficiency, and greater responsiveness to economic incentives, yet they also face greater exposure to market risks and institutional weaknesses. These differences highlight the contrasting logic of operation between POEs and SOEs in China's hybrid economic system.

2.2 Institutional factors and imperfect competition in China

China's financial system has expanded continuously over the past decades, incorporating sectors such as securities, insurance, and asset management. However, banking sector remains the dominat channel for corporate financing. The total assets of the banking industry account for about 90% of the total assets of the financial industry (People's Bank of China, 2024). In 2023, bank loans to the real economy amounted to 222.2 trillion RMB, representing 62% of aggregate social financing.[6] Despite this diversification, the banking sector remains the dominant channel for corporate financing, accounting for the majority of credit extended to the real economy.

Building on this structure, China has maintained a state-dominated financial system in which governments at various levels exert significant control over the allocation of financial resources, particularly within the banking sector (He et al., 2013). This institutional arrangement leads to systematic differences in credit access and cost across different ownership types. Policy-oriented lending is heavily skewed toward SOEs. For instance, the China Development Bank, as the country's only one development financial institution, primarily

[6] Data sourced from People's Bank of China. Aggregate Financing to the Real Economy (2023). Retrieved from: http://www.pbc.gov.cn/en/3688247/3688975/4787948/4787989/index.html

extends credit to SOEs in strategic industries such as energy and mining, as well as to local governments for infrastructure investment (Ru, 2018). Similarly, during large-scale stimulus programs—such as the RMB 4 trillion package launched in response to the 2008 global financial crisis—credit expansion disproportionately benefited SOEs (Cong et al., 2019).

As a result, credit allocation in China is not solely based on tradition bank lending model. In theory, banks should restrict lending to firms with weaker collateral or higher default risk. In practice, however, political connections and implicit government guarantees often influence financing toward SOEs, making them appear less risky in the eyes of both commercial and policy lenders. This not only ensures greater stability in SOE credit access, but also results in lower financing costs relative to POEs. Empirical studies confirm this pattern: Cull et al. (2015) find that politically connected firms in China face significantly fewer financial constraints, in consistent Chen et al. (2010) show that banks apply less conservative lending standards to SOEs, due to lower perceived downside risk.

These financing advantages reinforce SOEs' dominant position in markets characterized by imperfect competition. By securing cheaper and more stable capital, SOEs can maintain market presence even when their investment efficiency is lower (An et al., 2016; S. Chen et al., 2011; Firth et al., 2012). This dynamic places POEs at a disadvantage position, particularly in industries with constrained credit supply. Indeed, studies show that SOEs' preferential access to financial resources crowds out private investment, exacerbating allocative distortions (Ru, 2018; Huang et al., 2020). In this context, financial favoritism not only affects firm-level outcomes, but also contributes to persistent misallocation in China's broader economic structure (Wu, 2018).

2.3 The External Shock: Supply-Side Structural Reform

China's Supply-Side Structural Reform (SSSR) is an industrial to national-wide level reform,

introduced in 2016 by China's State Council[7]. It was launched in response to growing structural imbalances. Because on the demand side, growth momentum had weakened, and expansion through traditional investment and credit channels had become less effective. At the same time, domestic consumption began shifting from basic quantity needs to higher quality demands, revealing mismatches between existing production and evolving market expectations.

To address these issues, the government introduced SSSR contains five specific pillars: overcapacity reduction, destocking property inventory, corporate deleveraging, lower corporate costs, and improvement weak links. They are also known as the "three cuts, one reduction, and one improvement". Each pillars targeted a specific problem. Overcapacity reduction focused on cutting overcapacity in industries of steel and coal, therefore improve the profitability of firms within these two industries. Inventory reduction aimed to reduce excess real estate stock. Deleveraging focused on lowering high levels of corporate debt at firm-level, particularly among SOEs. Lower corporate costs involved cutting administrative burdens and red tapes which generated from government side. Improving weak links was about promoting industrial upgrading, technology innovation, and supporting long-term strategies like "Made in China 2025."

In this study, we particularly focus on the Pillar 3 of corporate deleveraging. Corporate-sector debt has been a key concern and top priority under the deleveraging pillar of SSSR. As noted in the Economist Intelligence Unit's report[8] China's Supply-Side Structural Reforms: Progress and Outlook, corporate debt accounted for about 65% of total debt and reached 166.2% of GDP by end-September 2016. Among this, SOEs were the major contributors, with their liabilities representing approximately 70% of total corporate debt, according to domestic

[7] First announced at the Central Economic Work Conference in December 2015. The first official document was issued in February 2016 focused on overcapacity reduction in the steel and coal industries, with other pillars introduced later that year.

[8] Unit, E. I. (2017). China's Supply-Side Structural Reforms: Progress and Outlook. *Report.* Retrieved from: https://www.andrewleunginternationalconsultants.com/files/chinas-supply-side-structural-reform.pdf

sources.

Traditional monetary tightening was not adopted as the main tool for corporate deleveraging. As mentioned earlier, bank lending in China structurally favors SOEs, which are perceived as less risky due to implicit government backing. In contrast, despite POEs are relatively more efficient and generating more output per unit of debt, they are more likely to face credit constraints under tighter financial conditions.

Instead of relying on monetary tightening, the deleveraging strategy under SSSR introduced debt-for-equity swaps (DES) as a key policy instrument. The DES program typically involved by three parties: a heavily indebted firm, the bank(s) holding the firms' debt, and an implementing fund. The fund raises capital from wealth management products (WMPs) or social capital (e.g., pension funds) to purchase the firms' debt from the banks, and then negotiates a swap of that debt for a portion of the firms' equity.

While banks have the nominal authority to select target firms and negotiate terms, in practice, political considerations remain influential particularly for SOEs, which require government approval to participate. To avoid regulatory capital pressure, banks do not hold equity directly, but instead set up subsidiaries or partner with third-party WMP firms to conduct the swaps. Notably, all swaps are executed at face value, raising concerns about valuation distortions. For example, Caixin Global (2016)[9] documents a DES case involving a SOE firm Yunnan Tin Group, offering opportunity into the implementation process. The mechanism involved three core parities: Yunnan Tin Group, the bank (China Construction Bank and its subsidiary CCB Trust), and external institutional investors. CCB Trust established a fund with the firm, raising capital from third parties, including WMP to convert RMB 10 billion of debt into equity.

[9] Caixin Global (2016). Yunnan Tin Strikes Debt-For-Equity Swap Deal. Retrieved from https://www.caixinglobal.com/2016-10-17/101053000.html

Although the DES program helped reduce firms' debt burden and optimize their capital structure, it did not involve new financing. Unlike earlier practices where SOEs could rely on implicit state guarantees to roll over debt, this reform marked a shift away from unconditional support. SOEs were no longer benefited by shielded from financial constraints but instead required to undergo structural adjustments. This change may have weakened the institutional advantages that previously sustained SOE dominance, especially in sectors marked by imperfect competition.

3. Data and Methodology

3.1 Firm type classification by ownership

Based on our empirical strategy, we classify firms into two major groups, state-owned enterprises (SOEs) and private-owned enterprises (POEs), according to the nature of their ultimate controllers. (1) SOE, where the ultimate controller is a state-owned firm or government agency; (2) POE, where the ultimate controller is neither a state-owned firm nor government agency.

Within the POE category, we further separate them into family and non-family firms to capture ownership-based heterogeneity in response to the reform and SOE potential spillover effects. (1) family firm (FF), where the ultimate controller is a natural person or family; (2) non-family POE (NFP), where the ultimate controller is a non-state-owned entity such as non-state-owned firm or other non-government agency, or a natural person/family that does not meet the requirements of a family firm defined below.

We also apply the ownership threshold conditionally when identifying the FF and NFP to ensure the sufficient controlling power from ultimate controller for the firm to perform as the designated type. We define the ownership by voting rights rather than cash flow rights, as voting rights are more accurately reflect the controlling power of the ultimate controller (La

Porta et al., 1999). Additionally, the classification of these firms must meet specific conditions outlined below.

3.1.1 State-owned enterprises

We follow the classification criteria used in An et al. (2016), Chen et al. (2011), and Cull et al. (2015) to classify firms in our samples as SOEs if the ultimate controller is a SOE firm, administrative departments or institutions (e.g., Chinese Academy of Sciences), central institutions (e.g., State-owned Assets Supervision and Administration Commission of the State of Council), or local institutions (e.g., State-owned Assets Supervision and Administration Commission of Hangzhou).

3.1.2 Private-owned enterprises, family and non-family

A POE firm is where the ultimate controller is neither a state-owned firm nor government agency. Under the POE category we further distinguish them into FFs and NFPs.

Family firms

We classify firms in our sample as FF if the ultimate controller is a natural person or family and meets at least meet one of the following criteria:

(1) The ultimate controller of the firm is a single person who, either personally or along with at least one family member, serves as a director, supervisor, or senior manager. This individual must also be the largest shareholder, either directly or through a holding firm, with at least 20% of the voting rights. For example, in 2019, we classify *Shenzhen Universe Group Co., Ltd.* (stock code 000023) is a family firm because its single controller, Hongrun Lin, served as the director of the firm and is the largest shareholder, holding 27.39% of the voting rights.

(2) The ultimate controller is a family in which either family members hold voting rights, or at least one family member serves as a director, supervisor, or senior manager. This family must also be the largest shareholder aggregately, either directly or through a

holding firm, with at least 20% of the total voting rights. For example, in 2018, we classify *Ningbo GQY Video & Telecom Joint Stock Co., Ltd.* (stock code 300076) as a family firm because its controllers, Qiyin Guo and his wife Xiangyang Yuan, are the largest shareholders. And their family aggregately holding 43.31% of the voting rights. Although the database does not provide specific share percentages for each spouse, Qiyin Guo's role as director that year meets the requirement, allowing us to identify the firm as a family firm.

(3) The ultimate controllers are multiple individuals with kinship ties, or at least one family member serves as a director, supervisor, or senior manager, collectively hold at least 20% of the voting rights. For example, in 2020, we identify *Shanghai Taisheng Wind Power Equipment Co., Ltd.* (stock code: 300129) as a family firm. Its ultimate controllers—Xia Quanguang, Liu Zhicheng, Zhang Fulin, Zhang Jinnan, and Huang Jingming—hold 2.72%, 8.09%, 1.98%, 2.49%, and 7.23% of the voting rights, respectively. Collectively, they form the largest controlling group, with a combined total of 22.51% of the voting rights. Therefore, we classify *Shanghai Taisheng Wind Power Equipment Co., Ltd.* as a family firm.

We adopt a 20% voting rights threshold to define control, following prior research (e.g., Aminadav & Papaioannou, 2020), because this level is widely recognized as the minimum stake required for an ultimate controller to exert effective influence over corporate decisions (La Porta et al., 1999). At this threshold, the controller typically holds disproportionate decision-making power relative to their ownership stake, allowing them to shape strategic direction, appoint key executives, and override minority shareholders. This distinction is particularly critical in the context of family firms, where a relatively small ownership stake can translate into substantial control, influencing firm behavior and long-term governance dynamics

Non-family POE

We classify firms in our sample as NFPs if they meet one of the following criteria:

(1) The ultimate controller is a non-family or non-state-owned entity, such as a private firm, collective-owned firm, firm funded by Hong Kong, Macau, or Taiwan, foreign-funded firm, or social organization. This entity must be the largest shareholder.

(2) The ultimate controller is an individual or family that does not meet the requirements for classification as a family firm. This may occur if the individual or family does not meet the ownership or managerial criteria (e.g., holding less than 20% of voting rights or lacking active involvement in management). For example, in 2021, the ultimate controllers of *Careray Digital Medical Technology Co., Ltd.* (stock code 688607) were Gao Peng and Liu Jianqiang, who have kinship ties. However, their combined voting rights were 19.2%, below the 20% threshold. Thus, we classify this firm as an NFP for that year.

(3) The ultimate controllers are multiple individuals without kinship ties to each other, and none of their family members hold shares or serve as directors, supervisors, or senior managers in the listed firm or its controlling shareholder. For example, in 2023, the ultimate controllers of *Wuxi ETEK Microelectronics Co., Ltd.* (stock code 688601) included Wang Fang, Tang Dayong, Ni Donghui, Zhang Liang, Zhou Baoming, Yuan Minmin, Wang Dong, and Mao Chenglie. Given the lack of kinship ties and absence of family involvement in management or ownership, we classify this firm as an NFP for that year.

3.2 Sample

We obtained firm-level and industry-level data from the China Securities Market and Accounting Research (CSMAR) database. This database provides comprehensive information

on the financial performance, ownership structure and corporate governance of Chinese publicly listed A-share firms traded on the Shanghai, Shenzhen, and Beijing stock exchanges. Our sample comprises 7,350 firm-year balanced observations from 2013 to 2019 (2016 excluded as the reform year), meaning that each firm is required to have three years of data both before and after the reform.

We restrict the sample period to 2013–2019 for two main reasons. First, the 2008 global financial crisis prompted the Chinese government to launch a large-scale stimulus package of RMB 4 trillion, its impact—particularly in the form of overinvestment and resource misallocation—persisted for several years (Chen et al., 2020; Yuan et al., 2022). By 2013, the residual effects of these stimulus-driven distortions had largely subsided, allowing for a cleaner post-reform observation window. Second, the sample ends in 2019 to avoid distortion from the COVID-19 pandemic, which began in 2020 and triggered widespread disruptions to the Chinese economy, including strict lockdown policies and government interventions. Truncating the sample in 2019 helps ensure that our results are not confounded by the global health crisis.

We use the China Securities Regulatory Commission (CSRC) Guidelines for the Industry Classification of Listed Companies (2012 Revision) to classify each firm's industry. The CSRC assigns an industry code comprising a Latin letter (e.g., A, B, C) and two digits, where the letter represents a broader industry sector, and the digits specify a sub-industry. For instance, "C31" represents the ferrous metal smelting and rolling processing industry (commonly called the steel industry), with "C" indicating the manufacturing sector and "31" specifying the steel sub-industry. The CSRC system categorizes firms into 19 broad sectors and 90 sub-industries, providing a comprehensive framework for industry classification. To precisely capture the POE market share changes conditionally on the variation of SOE-intensity across industries, we apply specific sub-industries for industry classification.

We exclude financial institutions (sector J, K, and L) from our sample due to their distinct characteristics (Guo et al., 2023; Masulis et al., 2023). This is particularly relevant in the Chinese context, where most financial institutions are state-owned, with ultimate controllers often being government agencies or SOE firms, such as the Ministry of Finance (Song et al., 2011). Their objectives and behaviors differ significantly from those of non-financial firms, which could distort analyses focusing on ownership types or corporate governance. Additionally, financial institutions operate under unique regulatory frameworks that shape their ownership structures and decision-making processes, making them fundamentally incomparable to other firms (Laeven & Levine, 2009). Including these institutions, even in small numbers, risks skewing results, particularly in studies on ownership dynamics.

We exclude the steel (C31) and coal (B06) industries from our sample, as both are directly and heavily targeted under the Pillar 1 of the SSSR—overcapacity reduction. These two industries were subject to specific government mandates on capacity cuts, as outlined in the *Opinions on Reducing Overcapacity and Achieving Recovery in the Steel Industry*[10] and the *Opinions on Reducing Overcapacity in the Coal Industry*[11], both issued by the State Council in early 2016.

As our empirical focus is on Pillar 3—deleveraging and its impact on ownership-related spillovers. Including industries that are simultaneously and directly affected by other reform pillars, such as overcapacity reduction, which may introduce confounding effects that bias the estimation. To ensure that our analysis isolates the effects of deleveraging, we therefore exclude these two industries from the baseline sample.

We also exclude industries in which SOEs account for more than 90% of firms, as these

[10] State Council of the People's Republic of China. (2016). Opinions on reducing overcapacity and achieving recovery in the steel industry [original language: 国务院关于钢铁行业化解过剩产能实现脱困发展的意见]. Retrieved from https://www.gov.cn/zhengce/content/2016-02/04/content_5039353.htm

[11] State Council of the People's Republic of China. (2016). Opinions on reducing overcapacity in the coal industry [original language: 国务院关于煤炭行业化解过剩产能实现脱困发展的意见]. Retrieved from https://www.gov.cn/zhengce/content/2016-02/05/content_5039686.htm

sectors are typically designated by the Chinese government for absolute state control (L. Song, 2018). According to the *Guiding Opinions on Adjusting the Layout and Structure of the State-Owned Economy* issued by the State Council in 2006, industries related to national defense, power generation and distribution, and other strategically important sectors are required to maintain either 100% state ownership or absolute state control, with a mandate to increase state-owned asset presence in these areas. In such industries, POEs are either entirely absent or structurally constrained, making it unlikely to observe meaningful market share changes. Moreover, the state is expected to intervene unconditionally in these sectors to safeguard national security and strategic interests, which may distort normal market dynamics.

3.2.1 Sample statistics

Table 1 presents the distribution of SOEs, family firms (FF), and non-family private firms (NFP) across industries. The total number of listed firms in our sample is 1,226, with 432 firms (35.2%) identified as SOEs, 628 (51.2%) as family firms, and 166 (13.5%) as non-family POEs.

Family firms are widely distributed across labor-intensive and manufacturing sectors such as garment manufacturing (C18), electronics manufacturing (C39), and chemical products (C26). In the garment industry, for example, 15 out of 19 firms are family-owned, highlighting the dominant role of POEs in this sector. In high-tech sectors such as IT services (I65) and internet services (I64), most firms are also POEs, particularly family-owned, which is consistent with lower entry barriers and stronger innovation capacity among private firms. In contrast, SOEs are more concentrated in capital-intensive and strategic sectors such as civil engineering (E48), beverage and tea (C15), and transportation equipment (C37), reflecting the government's stronger presence and policy support in these industries.

Several industries also show a relatively balanced mix of ownership types. In the chemical products sector (C26), for instance, the sample includes 41 SOEs, 45 FFs, and 12

NFP firms, suggesting an industry that is contested by both state and private actors. On the other hand, some industries such as environmental protection (N77), cultural arts (R87), and gas supply (D45) contain very few listed firms, typically fewer than ten. This limited presence may be due to a combination of factors, including underdeveloped market size, regulatory restrictions, and limited access to public capital markets in these sectors.

3.3 Methodology

Our study focuses on testing if POEs' market share holding change would indirectly affect by their SOEs rivals within the industry due to imperfect competition shaped by China's unique institutional business context. To achieve this, we follow Berg et al. (2021) to introduce an external exogenous shock SSSR to examine whether POEs experience differential market share outcomes depending on the intensity of SOE presence in their respective industries following the reform. Market share is defined as a firm's sales divided by the total industry sales reported in CSMAR. Using total industry sales of full population rather than the sum of sample firms' sales as denominator improves comparability across firms and industries and reduces bias due to partial sampling.

First, we examine whether the SSSR qualifies as a suitable external exogenous shock, as suggest that spillover effects can be captured under a plausible external shock (Naaraayanan and Wolfenzon, 2024). We begin by analysing the dynamics of sample firms' total sales at the industry level to measure whether the reform had an overall positive or negative effect on firm performance. The industry-level total sales of sample firms are calculated as the logarithm of the sum of firm-level total sales within each industry. We then examine the direct impact of the reform on firms' market share, providing a basis for further investigating spillover effects across industries with varying levels of SOE presence. We start with the industry-level examine as shown in the model below.

$$Y_{jt} = \alpha + \beta_1 PostReform16_t + \theta_j + \varepsilon_{jt} \quad (1)$$

where subscripts *j* and *t* refer to industry and year, respectively. The dependent variable Y_{jt} refers to firms' total sales and mark share at the industry-level by SOE and POE, respectively. $Postreform16_t$ is dummy variable takes the values of 1 for years after 2016 (exclude 2016, the year of the SSSR implementation) and 0 otherwise. This variable allows us to investigate differences in market share holding before and after the reform. We include respective random effects (RE) and industry fixed effects (FE), both with cluster on industry-level.

Second, we examine whether the results of market share change by SOE and POE are consistent at the firm-level. The setting is similar to Model (1), we replace the dependent variable Y_{jt} by firm-level mark share held by SOE and POE, respectively. A set of firm-level lagged control variables (X_{it-1}) introduced in the model includes Tobin's Q, tangibility, cash holdings, firm size as outlined in Jia et al. (2013) and Fang et al. (2017). We apply two alternative FEs specifications to test the robustness of our results: one with firm fixed effects and clustering at the firm level, and another with industry fixed effects and clustering at the industry level.

Third, we address our primary research question: whether POEs' market share is indirectly influenced by the market retreat of SOEs following the reform, as POEs exhibit significantly different market share outcomes across industries with varying levels of SOE intensity. We test with the model below.

$$\begin{aligned} Marketshare_{it} = \alpha + \beta_1 PostReform16_t + \beta_2 SOEAS\_15_j \\ + \beta_3 PostReform16_t \times SOEAS\_15_j + \gamma X_{it} + \theta_j + \varepsilon_{ijt} \end{aligned} \quad (2)$$

where subscripts *i, j* and *t* refer to firm, industry, and year, respectively. The dependent variable $Marketshare_{it}$ denotes the market share of POEs only. $SOEAS_j$ is an industry-level variable refers to the overall assets share of SOEs within industry *j* immediately prior to the reform. We use this measure as an exposure of SOE prevalence to account for variation in SOE presence across industries. The coefficient on interaction term $PostReform16_t$ * $SOEAS\_15_j$ is our key

interest, as it captures the spillover effects of SOE on their POE peers within the same industry. We include industry FE to control for any unobserved industry-specific factors that may change annually, and we cluster standard errors on industry level.

We further test the heterogeneity of ownerships in response to the SOE spillover by respectively using market share of FFs and NFPs as the dependent variable. The empirical specification remains the same as in Model (2), allowing us to compare the differential impact of SOE prevalence across ownership types within the POE sector.

4. Results

4.1 Direct and heterogeneous impacts of the SSSR on SOE and POE

We start by examining outcomes at the industry level. Given that the SSSR was implemented as an industrial to nationwide structural reform aimed at improving supply-side efficiency, its most immediate impact is expected to capture in aggregate shifts in market structure across industries. Analyzing changes in total sales at the industry-level allows us to observe whether the reform had an overall positive or negative effect on industry growth and development. Examining market share dynamics at the industry level enables us to capture broad directional shifts in resource allocation and competitive intensity, serving as a foundational step for more granular firm-level analysis.

Table 4 reports the direct and heterogeneous impacts of reform on outcomes for SOE and POE separately. Panel A presents the annual trends in total sales (Columns 1 to 4) and market share (Columns 5-8) for respective SOE and POE at the industry-level. We use 2015 as a baseline year, which is the year before SSSR issued. We estimate the models with both random effects (RE) and industry fixed effects (FE).

We find that both groups show an upward trend in total sales over time. Specifically, SOEs' total sales remained relatively stable before the reform, with no statistically significant

changes. However, SOEs experience a significant and continuous increase in total sales following the reform, with the extent of growth expanding over time. POEs show statistically significant and consistent increases in total sales throughout the sample period, with the growth becoming more pronounced after the reform. The increasing scale are larger than SOEs. For example, in 2018, POEs' total sales had increased by 52.2 percentage points relative to 2015, compared to a 26.7 percentage point increase for SOEs. These results suggest that the reform had a positive effect on firms' development. Moreover, the positive impact is more pronounced for POEs, who benefited more strongly from the post-reform sales relative to SOEs.

Columns (5) to (8) present the annual changes in market share for both groups. SOEs' market share exhibits a persistent downward trend, particularly after 2016. The coefficients for 2017, 2018, and 2019 are all negative and significant at the 1% level, with the most pronounced decline reaching 4 percentage points relative to the 2015 baseline by 2019. In contrast, POEs show a more volatile pattern. As shown in Columns (7) and (8), their market share declined in some years but partially recover in others. The coefficient for 2018 is statistically insignificant and close to the 2015 baseline. While the coefficients for 2017 and 2019 are negative and statistically significant, the magnitude of the decline is notably smaller than that for SOEs.

However, these patterns should not be mis-interpreted as evidence that the reform negatively impacted firm performance. As discussed earlier, market share is measured at the industry level by aggregating firm-level market shares, where each firm's market share calculated as its sales divided by total industry sales reported in CSMAR (with full population of firms). By using total industry sales as the denominator rather than aggregating only sample firms, we obtain a more accurate and robust measure of relative market positioning, mitigating potential biases from sample selection.

These results indicate that although both SOEs and POEs increased their total sales over time, their relative market shares were diluted by the entry of new listed firms and the overall

expansion of industry size. It implies that although incumbents benefited from the positive effects of the reform (as reflected in total sales), they did not fully capture the new growth opportunities created by the structural adjustment.

Panel B compare the changes in total sales (Columns 1 to 4) and market share (Columns 4 to 8) for SOEs and POEs before and after the reform at the industry level. Consistent with the findings from Panel A, the results show that the reform had a significantly positive effect on total sales for both groups. Specifically, SOEs' total sales increased by approximately 24.9 percentage points after the reform, while POEs' total sales increased by approximately 54.0 percentage points. All coefficients are statistically significant at the 1% level. The positive and larger coefficient for POEs indicates that POEs benefited more strongly from the reform-induced expansion compared to SOEs. These results are robust to the inclusion of industry fixed effects and clustering of standard errors at the industry level.

In Columns (5) and (6), the coefficient on PostReform16 indicates that the average market share of SOEs during the postreform period is 5 percentage points lower than pre-reform period (significant at the 1% level). Columns (7) and (8) present the corresponding results for POEs, which also observed 3 percentage points lower than pre-reform period (significant at the 5% level). These findings suggest that, on average, the reform led to a market share contraction for both SOEs and POEs. However, the impact was more pronounced for SOEs, which experienced a roughly 2 percentage point greater decline at the industry level.

These findings reinforce the results from Panel A and further confirm that the SSSR served as a positive external shock, promoting industry-wide growth as reflected by increases in total sales for both SOEs and POEs. Although incumbents' market shares declined, this pattern primarily reflects the structure of our measurement approach: market shares were diluted by the entry of new listed firms and the overall expansion of industry size. Overall, while incumbents benefited from the reform, they did not fully capitalize on the new growth

opportunities created by the structural adjustment.

Table 5 presents the heterogeneous impacts of the SSSR on the firm-level market share reallocation between SOEs and POEs under various model specifications. Columns (1) to (6) estimate the reform's effect on SOEs' market share using different combinations of random effects (RE), firm fixed effects (FE), and industry fixed effects (FE). Columns (7) to (12) report the corresponding results for POEs.

Across all specifications, SOEs experienced a statistically significant decline in market share following the reform, with estimates ranging from 0.5 to 1.2 percentage points. POEs also exhibited a statistically significant, though smaller, decline—ranging from 0.2 to 1.0 percentage points—suggesting that the reform had a more pronounced negative effect on SOEs. These firm-level findings are consistent with the industry-level results reported in Table 4.

Taken together, the results suggest that the reform positively affected firm development by promoting sales growth. However, although incumbents benefited from this overall market expansion, their relative market shares declined due to the entry of new firms and the broader expansion of industry size. This pattern indicates that incumbent sample firms were less successful in fully capturing the new growth opportunities created by the structural reform

4.2 Spillover effects of SOE on POE market share reallocation

Table 6 reports the findings that are related to the spillover effect as the main investigation of this study, focusing on the differential impacts of the reform on POEs across industries with varying levels of SOE presence. We estimate the results using random effects models (Columns 1–3) and industry fixed effects models, both without and with controls (Columns 4–7).

The coefficient on *SOEAS_15* is negative and highly significant in Columns (2) and (3), suggesting that prior to the reform, POE operating in SOE-intensive industries held lower market share. However, the interaction term *Post16_SOEAS15* is positive and statistically

significant at the 5% level across Columns (3), (5), and (7), indicating that the market share of POEs operating in SOE-intensive industries after the reform is significantly higher than in the pre-reform period. This, this evidence demonstrates that the reform generated positive spillover effects for POEs in SOE-dominated industries.

Specifically, in Column (7), consistent with earlier results, we observe a 1.9 percentage point decrease in POE market share in industries with lower SOE prevalence, as indicated by the coefficient on *PostReform16*. However, in the industries with higher prevalence of SOEs, POEs benefit from positive spillovers from their SOE peers, as reflected in the significant interaction effect. The coefficient on *Post16_SOEAS15* is positive and statistically significant at the 5% level. This result is also economically significant, the overall effect for POEs in industries with high SOE prevalence indicating that a one standard deviation (SD = 0.1920) increase in SOE prevalence is associated with 1.5 (-0.019 + (0.023 * 0.1920) = - 0.015) percentage points decrease in market share for POEs after the reform. This also means a smaller decline relative to POE market shares in less (1.9 percentage points) SOE-intensive industries. In fact, when SOE prevalence is sufficiently high (e.g., roughly in the last two quartiles), the net effect could even become positive. This difference between industries with low and high SOE prevalence marginal corresponds to approximately 21% lower in mean value of POE market shares (-0.015 / 0.017 = -0.882, compared to baseline -0.019 / 0.017 = -1.118).

These findings suggest that SOEs backed by state support, held dominant positions in imperfectly competitive markets prior to the reform. However, the SSSR changes this advantages, resulting their market retreat and leading to a substantial contraction in their market share. This unexpected withdrawal inadvertently created growth opportunities for POEs, particularly in SOE-intensive industries likely through the reallocation of market resources and shifts in competitive dynamics.

4.3 Placebo tests

To strengthen the causal interpretation of our findings, we conduct in-time placebo tests to examine whether the observed SOE spillover effects are indeed driven by the SSSR rather than by other temporal trends or coincidental shocks.

We extend the sample period for two years earlier as the maximum data we are able to access. The sample period is from 2011 to 2015, all the years are unaffected by reform. We define a falsification reform year in 2013 (2013 excluded as same approach we have done before). We re-estimate our main specification using these placebo reform dummies (*PostReform13*). In consistent with our main specification, we measure industry-level SOE prevalence in 2012 as the exposure. If the SOE spillover effects are genuinely induced by the SSSR, we would expect the interaction terms in these placebo settings to be statistically insignificant.

Table 7 reports the results of placebo tests. First, we do not observe the direct effects from the falsified reform effect as the coefficient on *PostReform13* is negative but statistically insignificant. Second, the coefficient on *Post13_SOEAS12* is positive but statistically insignificant across all specifications. These results suggest that the spillover patterns documented in the main analysis are unlikely to be driven by pre-existing trends or spurious shocks prior to the actual reform, thereby reinforcing the validity of our identification strategy.

4.4 Heterogeneity within POEs: Family Ownership Matters

In this section, we investigate whether family ownership shapes firms' responses to the SSSR within the POE sector. Specifically, we examine whether family and non-family private firms exhibit heterogeneous reactions to the reform itself, as well as to the spillover effects arising from SOE market reallocation. This distinction matters because family firms and non-family private firms differ in governance structure, strategic priorities, and risk tolerance.

Disentangling their responses helps reveal how ownership heterogeneity shapes firms' adaptation to institutional reform.

We start by showing results in Table 8, which compares the market share trajectories of FFPs and NFPs following the reform. Columns (1) to (4) employ firm fixed effects models, estimated both without and with control variables, while Columns (5) to (10) use industry fixed effects with similar specifications. The coefficient on *PostReform16* is negative and statistically significant in most specifications (except Column 7), which is generally consistent with earlier findings showing that incumbents did not fully capture the benefit from reform.

To test whether family firms responded differently to the reform, we introduce an interaction term (*Post16_FF*) between *PostReform16* and the family firm dummy (*FF*). The coefficients on *Post16_FF* are negative across all specifications, suggesting that family firms may have experienced slightly larger but statistically insignificant declines in market share relative to non-family private firms following the reform. In Columns (2), (4), (8), and (10), the coefficients on *Post16_FF* are consistently negative, with the effect reaching statistical significance at the 10% level in Column (10). The significance is weak and the magnitude modest, suggesting limited differences between FF and NFP in response to the reform itself.

The main effect of *FF* is statistically insignificant across all models, indicating no substantial difference in market share levels between family and non-family firms prior to the reform. Overall, the results suggest a weak heterogeneity in reform response within the POE sector.

We next explore whether family firms experienced heterogeneous spillover effects from SOEs by conducting subsample regressions within the FF and NFP group, respectively. Panel A of Table 9 presents the results for FF group. Across specifications, the coefficient on *PostReform16* remains negative and statistically significant, indicating that family firms generally experienced a decline in market share following the reform.

Importantly, the coefficient on *SOEAS_15* is negative and highly significant in Columns (2) and (3), suggesting that, prior to the reform, family firms operating in SOE-intensive industries had lower market share. However, the interaction term *Post16_SOEAS15* is positive and statistically significant at the 10% and 5% level across Columns (3), (5), and (7), indicating that the reform generated positive spillover effects for family firms in SOE-dominated industries.

This result implies that although family firms were negatively affected by the reform on average, those located in industries with higher SOE presence benefited from the market space vacated by SOEs. The magnitude of the interaction term (ranging from 0.023 to 0.027) further confirms that SOE contraction during the reform period created unexpected growth opportunities for family firms, partially mitigating the overall negative effect.

Panel B of Table 9 presents the estimation results for NFP group, the coefficient on *PostReform16* remains negative and statistically significant in most columns, indicating that NFPs also experienced a decline in market share following the reform. However, the magnitude of the effect is generally smaller than that observed among family firms.

The coefficient on *SOEAS_15* is negative and statistically significant in Columns (2) and (3), suggesting that, prior to the reform, NFPs like FFs tended to have lower market shares in SOE-intensive industries. However, in contrast to the FF results, the interaction term *Post16_SOEAS15* is positive but statistically insignificant most specifications except a weak statistically significant results in Column (10). This implies that non-family firms did not benefit in a systematic or robust way from SOE contraction after the reform.

Taken together, these findings suggest that while both family and non-family private firms experienced negative impacts from the SSSR, positive spillover effects from SOEs were concentrated primarily among family firms, potentially due to differences in firm behavior, adaptability, or competitive positioning within SOE-dominated industries.

4.4 A Potential Mechanism

To examine whether the observed spillover effects are driven by changes in firm-level access to bank credit, we conduct a series of empirical tests based on the principles of the SSSR, with particular attention to the pillar of deleveraging. In imperfectly competitive markets, access to bank financing plays a critical role in supporting firm expansion and maintaining market position. When SOEs benefit from institutional advantages that grant them preferential credit access, they are better equipped to sustain competitive dominance. If the reform limited credit access for SOEs, this may have constrained their expansion capacity and created market opportunities for POEs, giving rise to competitive spillovers.

Panel A of Table 10 compares bank loan dependence, measured by the loan-to-liability ratio, between SOEs and POEs before and after the reform. Prior to the reform, SOEs displayed significantly higher loan dependence than POEs in terms of both the mean (0.284 versus 0.271) and the median (0.273 versus 0.255), and the differences are statistically significant. After the reform, this pattern reversed. POEs experienced a significantly higher loan dependence than SOEs, with a mean of 0.333 versus 0.294 and a median of 0.326 versus 0.284. The differences remain statistically significant based on both the t-test and the Wilcoxon rank-sum test. These findings suggest that the reform restructured bank credit allocation in a way that reduced SOEs' institutional advantage in financing access.

Panel B further explores this mechanism by testing whether the convergence in loan dependence between SOEs and POEs was stronger in industries where SOEs were more reliant on bank credit prior to the reform. To capture pre-reform exposure, we construct an industry-level variable, *SOELS_15*, defined as the total SOE loan share in 2015. The dependent variable is the annual changes in the difference between POEs' loan-to-liability ratios and the industry average for SOEs. The results indicate that in industries with higher level of SOE loan dependence, the reduction in the loan gap is more pronounced, supporting the notion that credit

tightening affected SOEs more severely in industries with greater initial loan reliance.

As a robustness check, we replace the dependent variable with the change in the loan-to-equity ratio and re-estimate the model. The coefficients in this specification are statistically insignificant, suggesting that the effects are driven specifically by changes in bank loan access rather than by broader shifts in capital structure or equity-based financing.

Panel C provides additional support by examining the relationship between *SOELS_15* and *SOEAS_15*, the SOE asset share in 2015. The correlation between the two is strong and positive, with a coefficient of 0.822 and statistical significance at the 1 % level. This confirms that both variables capture similar patterns of SOE prevalence across industries. Nevertheless, SOE loan share exposure is more closely tied to the proposed mechanism since it directly reflects pre-reform dependence on bank credit.

Collectively, the results from all three panels provide consistent evidence that the restructuring of credit access under the SSSR contributed to the observed spillover effects by limiting SOEs' financing advantage and creating space for POEs to expand.

5. Robustness Tests

6.1 Robustness test: SOE spillover on POE using a high vs. low SOE dummy

To assess the robustness of the identified SOE spillover effect, we replace the continuous measure of SOE prevalence (*SOEAS_15*) with a binary indicator variable, *High_SOE15*, which equals one if the industry's SOE share in 2015 is above the median (q50), and zero otherwise. Table 11 presents the results using this alternative specification.

Across all columns, the coefficient on *PostReform16* remains negative and statistically significant, indicating that POEs experienced a decline in market share following the reform. The coefficient on *High_SOE15* is significantly negative in Columns (2) and (3), suggesting that, prior to the reform, POEs in SOE-intensive industries had relatively lower market shares.

Importantly, the interaction term *Post16_HighSOE* is consistently positive and statistically significant at the 5% level across Columns (3), (5), and (7). This confirms that POEs located in industries with higher SOE presence benefited more from the reform, consistent with the main findings using the continuous SOE prevalence measure. These results reinforce the robustness of the positive spillover effect from SOEs and indicate that the observed heterogeneity is not sensitive to the specific construction of the SOE exposure variable.

6.2 Robustness test for family firms: SOE spillover using high vs. low SOE indicator

Panel A of Table 11 presents the results for FF subsample. The coefficient on *PostReform16* remains negative and statistically significant, indicating that FF continued to experience a decline in market share following the reform. The coefficient on *High_SOE15* is significantly negative in Columns (2) and (3), suggesting that, prior to the reform, FF in SOE-intensive industries held lower market shares.

Importantly, the interaction term *Post16_HighSOE* is consistently positive and statistically significant at the 5% level in Columns (3), (5), and (7). These results confirm that the positive spillover effects of SOE contraction are robust to alternative definitions of SOE exposure, and that FF in high-SOE industries benefited more from the market space created by the reform.

6.3 Robustness test for non-family POE: SOE spillover using high vs. low SOE indicator

We further assess the robustness of the spillover effects among NFPs using the binary *High_SOE15* indicator. Panel B of Table 11 presents the results for the NFP subsample. As shown in Columns (1) through (7), the coefficient on *PostReform16* remains negative and statistically significant in most specifications, confirming that non-family firms were adversely

affected by the reform. The coefficient on *High_SOE15* is negative and statistically significant in Columns (2) and (3), indicating that, before the reform, non-family firms in SOE-intensive industries held lower market shares—similar to the pattern observed for family firms.

However, the interaction term *Post16_HighSOE* is mostly statistically insignificant, except for Column (7), where it reaches significance at the 5% level. Compared to family firms, the evidence for positive spillover effects among non-family firms is much weaker and less consistent. This result reinforces the earlier finding that the reform-induced spillover effects were more pronounced among family firms, while non-family firms appear to have benefited less from SOE contraction in SOE-dominated industries.

6. Conclusion

This study examines how SOEs indirectly affect the market share of POEs under China's unique market competition dynamics. We use the 2016 Supply-Side Structural Reform (SSSR), particularly its corporate deleveraging pillar, as a quasi-natural experiment, we identify a novel spillover mechanism driven by imperfect competition rather than spatial proximity. By analyzing listed Chinese firms from 2013 to 2019 and differentiating POEs into FFs and non-family firms NFPs, we uncover three key findings.

First, both SOEs and POEs experienced direct negative impacts from the SSSR's deleveraging policies, reflecting the reform's broad disciplinary effect on corporate debt. Second, in industries with higher pre-reform SOE intensity, POEs exhibited resilience, losing less market share compared to peers in low-SOE industries. This suggests that SOEs' retreat under financial constraints created competitive space for POEs to capture market opportunities. Third, ownership structure critically mediated spillover effects: family-owned POEs uniquely benefited from SOE retrenchment, whereas non-family POEs showed no

significant gains. This heterogeneity underscores the role of governance flexibility and long-term orientation in enabling FFs to exploit market reallocations.

Our findings advance the literature in two ways. Theoretically, we demonstrate that SOEs' institutional privileges historically distorted competition, and their withdrawal under reform can trigger positive spillovers through industry-level market rebalancing—a mechanism distinct from spatial crowding-out effects. Practically, the results highlight that reforms targeting SOE financial discipline, rather than shielding them, can enhance market efficiency by empowering agile private actors. The divergent responses of family and non-family POEs further emphasize the need for policymakers to consider ownership heterogeneity when designing institutional reforms.

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Figure 1
This figure illustrates the intuition of market share spillover dynamics from SOEs to POEs. We capture these effects by comparing changes in POEs market share across industries with different levels of pre-reform SOE presence after the structural reform.

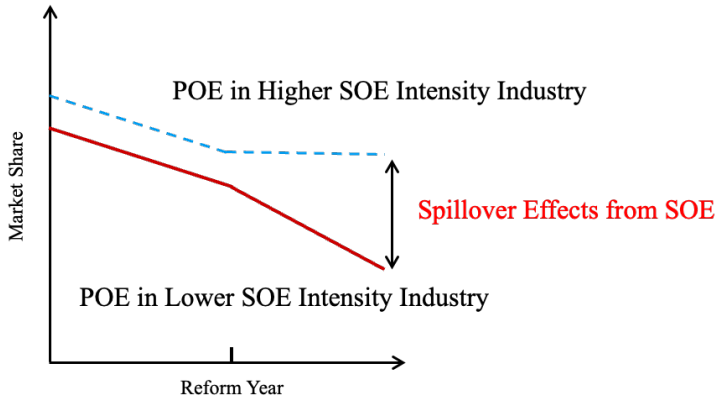

Figure 2
This figure reports the industry-level annual structure of total sales (in billion RMB) and market share for SOEs and POEs in the electronics manufacturing industry (C39) from 2013 to 2019. The bar chart shows the total industry sales each year, which are composed of three components: the total sales of sample SOEs, the total sales of sample POEs, and the sales of unobserved out-of-sample firms. Sales for unobserved firms are calculated as the difference between the total industry sales, as reported by the database, and the sum of the total sales of sample firms for each year. The lines represent the annual industry-level market share of sample SOEs and POEs, respectively.

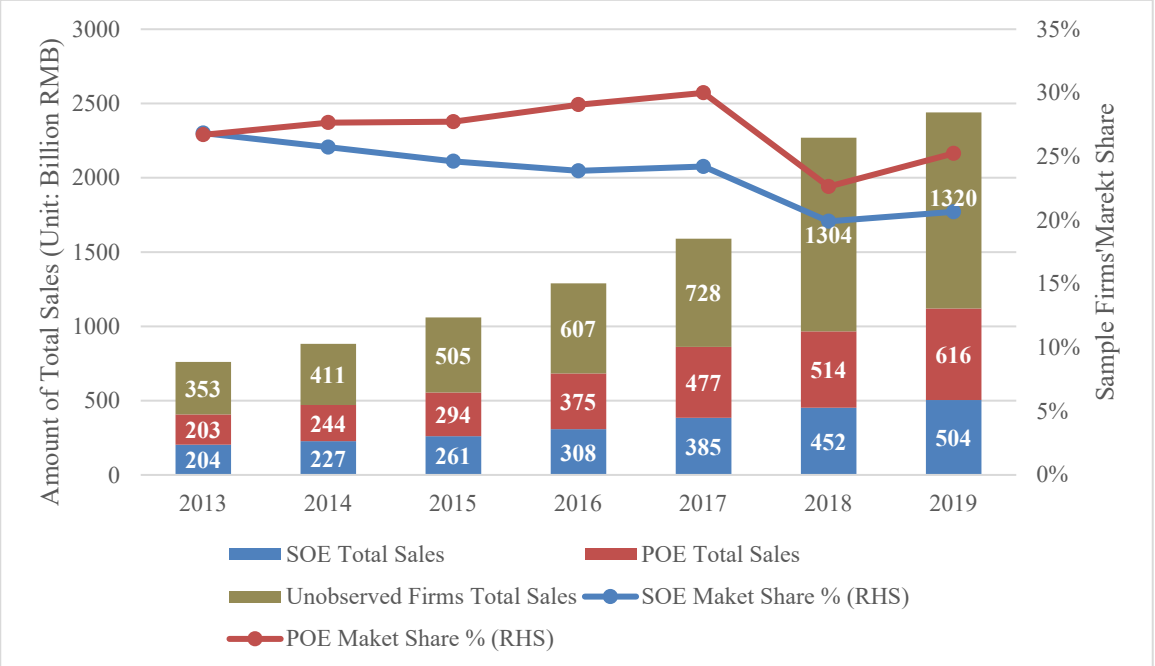

Table 1: Firm distribution by industry

This table presents the descriptive statistics of firm distribution across industries for SOEs, family firms, and non-family POEs. The analysis is based on balanced firm-year observations from 2013 to 2019. Industries are classified according to the China Securities Regulatory Commission (CSRC) Guidelines for the Industry Classification of Listed Companies (2012 Revision), which divide listed firms into 19 sectors and 90 specific industries. Each industry code consists of a Latin letter and two digits, where the letter indicates the sector. We use specific industry classifications. Financial institutions (J, K, L), steel (C31), coal (B06), and industries in which SOEs account for over 90% of firms are excluded.

Industry Name	Firm number			
	SOE	FFP	NFP	Total
A01 Agriculture	5	1	2	8
A03 Animal Husbandry	2	4	1	7
A04 Fishery	2	4	0	6
B07 Oil & Gas Exploitation	3	0	1	4
B08 Ferrous Metal Mining	2	0	1	3
B09 Non-Ferrous Metal Mining	9	3	2	14
B11 Mining Support	5	2	2	9
C13 Agri-Food Processing	7	12	3	22
C14 Food Manufacturing	7	8	1	16
C15 Beverage & Tea	15	3	4	22
C17 Textile Industry	8	9	4	21
C18 Garment Manufacturing	1	14	3	18
C19 Leather & Footwear	0	5	0	5
C20 Wood & Bamboo Products	0	5	0	5
C21 Furniture Manufacturing	1	2	0	3
C22 Paper Industry	5	7	3	15
C23 Printing & Media	0	5	1	6
C24 Stationery & Sports Goods	1	5	0	6
C25 Petrochemical Processing	7	4	0	11
C26 Chemical Products	41	45	12	98
C27 Pharmaceuticals	22	54	9	85
C28 Chemical Fibers	4	7	2	13
C29 Rubber & Plastics	7	16	5	28
C30 Non-Metallic Minerals	16	18	8	42
C32 Non-Ferrous Metal Processing	18	12	2	32
C33 Metal Products	4	18	3	25
C34 General Equipment	22	26	3	51
C35 Specialized Equipment	27	46	6	79
C36 Automobile Manufacturing	25	24	4	53
C37 Transportation Equipment	14	4	1	19
C38 Electrical Machinery	15	66	15	96
C39 Electronics Manufacturing	34	65	20	119
C40 Instruments & Meters	2	10	4	16
C41 Other Manufacturing	0	5	0	5
C42 Waste Utilization	0	1	0	1
D45 Gas Supply	4	5	3	12
E48 Civil Engineering	23	6	2	31
E50 Construction Services	0	11	0	11
F51 Wholesale Trade	24	13	3	40
F52 Retail Trade	25	19	6	50
G58 Logistics & Transport	0	1	0	1
I63 Telecom & Broadcasting	5	1	1	7
I64 Internet Services	0	12	6	18
I65 IT Services	12	30	20	62
M74 Technical Services	2	3	1	6
N77 Environmental Protection	1	7	1	9
R86 Media Production	2	4	0	6
R87 Cultural Arts	0	4	0	4
Total	429	626	165	1,220

Table 2: Variable definitions

This table shows the variable define approach

Variable	Definition	Data Source
Market share	Market share of firm is calculated as the firm's total sales (Operating Revenue) divided by industry total sales (Business Revenue of the Industry)	CSMAR
Total sales	Total sales of firm is calculated as the natural logarithm of total sales (Operating Revenue)	CSMAR
Tobin's Q	Tobin's Q is calculated as the sum of market value of equity (Market Value) and total assets (Total Assets), minus the book value of equity (Total Shareholders' Equity), divided by total assets (Total Assets). The market value (Market Value) is calculated as the number of A shares multiplied by their closing price plus the number of B shares multiplied by their closing price.	CSMAR
Tangibility	Tangibility is the PP&E (Net Fixed Assets) over assets (Total Assets)	CSMAR
Cash holding	Cash is the ratio of cash (Cash and Cash Equivalents) to total assets (Total Assets).	CSMAR
Firm size	The firm size is the natural logarithm of total assets (Total Assets).	CSMAR
Bank loan dependence	The bank loan dependence is calculated as the sum of total short-term loan (Total Short Term Loan) and total long-term loan (Total Long term Loan) over total labilities (Total Liabilities).	CSMAR
Bank loan dependence difference changes	The bank loan dependence difference is computed as the difference between the bank loan dependence of POEs and the industry-level mean for SOEs in year t, minus the same difference in year t-1.	The authors' calculation
Equity financing dependence	The change in loan-to-equity is computed as the difference between the loan-to-liability ratio of POEs and the industry-level mean for SOEs in year t, minus the same difference in year t-1. The loan-to-equity is calculated as the sum of total short-term loan (Total Short Term Loan) and total long-term loan (Total Long term Loan) over total equity (Total Shareholders' Equity).	The authors' calculation
SOEAS	SOEAS is an industry-level variable to define the overall SOE firms' assets share by industry and year.	The authors' calculation
SOELS	SOELS is an industry-level variable to define the overall SOE firms' total loan share by industry and year.	The authors' calculation
PostReform16	PorstReform16 is a dummy variable equal to one if the year after 2016 (exclude 2016), and zero otherwise.	The authors' calculation

Table 3: Statistic summary

This table summarizes the descriptive statistics for firm-level and industry-level variables across different subsamples. Panel A presents the industry-level summary statistics for SOE and SOE. Panel B presents the firm-level summary statistics for the full sample, SOEs, and POEs. Panel B reports firm-level statistics for family and non-family POEs, respectively.

Panel A: SOE and POE industry-level variables summary statistics

	SOE firm sample (N = 234)			POE firm sample (N = 288)		
Variables	Mean	Median	SD	Mean	Median	SD
Market share	0.341	0.260	0.263	0.281	0.243	0.225
Total sales	24.613	24.778	2.214	23.958	23.947	1.619
SOEAS_12	0.390	0.309	0.223	/	/	/
SOEAS_15	0.309	0.256	0.192	/	/	/
SOELS_15	0.332	0.261	0.197	/	/	/

Panel B: Full sample, SOE, and POE firm-level variables summary statistics

	Full firm sample				SOE firm sample				POE firm sample			
Variables	N	Mean	Median	SD	N	Mean	Median	SD	N	Mean	Median	SD
Market share	7.320	0.022	0.005	0.049	2,574	0.031	0.008	0.062	4,746	0.017	0.004	0.039
Tobin's Q	7.320	2.547	2.130	1.309	2,574	2.375	2.027	1.122	4,746	2.658	2.198	1.432
Tangibility	7.320	0.217	0.189	0.146	2,574	0.239	0.203	0.161	4,746	0.204	0.183	0.137
Firm size	7.320	22.258	22.113	1.203	2,574	22.725	22.507	1.343	4,746	21.997	21.922	1.044
Cash holding	7.320	0.172	0.140	0.120	2,574	0.171	0.144	0.112	4,746	0.173	0.138	0.125
Bank loan dependence	6,792	0.295	0.289	0.212	2,396	0.288	0.276	0.206	4,396	0.299	0.295	0.216
Bank loan dependence difference changes	/	/	/	/	/	/	/	/	4,226	0.007	0.006	0.143
Equity financing dependence	/	/	/	/	/	/	/	/	4,226	0.024	0.0004	0.964

Panel C: Family and non-family POE firm-level variables summary statistics

	Family-firm POE sample (N = 3,759)			Non-family POE firm sample (N = 987)		
Variables	Mean	Median	SD	Mean	Median	SD
Market share	0.018	0.004	0.041	0.013	0.004	0.029
Tobin's Q	2.587	2.181	1.305	2.844	2.260	1.662
Tangibility	0.207	0.187	0.133	0.197	0.165	0.147
Firm size	21.992	21.912	1.012	22.056	21.975	1.123
Cash holding	0.174	0.138	0.126	0.166	0.137	0.114

Table 4: Industry-level market share changes for SOE and POE post-reform

This table reports the direct effects of the reform on SOE and POE total sales and market shares of sample firms at the industry level. Panel A reports the temporal effects on SOE and POE financial outcomes. The baseline year is 2015, which immediately before SSSR. The sample period is 2013–2019 (2016 excluded). The dependent variables are industry-level aggregated sales and market shares, calculated by summing firm-level sales and market shares by industry and year. Firm-level total sales are measured as the logarithm of sales. Firm-level market share is defined as a firm's sales divided by total industry sales in the same year, with industry sales sourced from the CSMAR database. Random effects are applied in Column (1), (3), (5), (7). Industry fixed effects are used in Column (2), (4), (6), (8). Standard errors are clustered at the industry level. Panel B reports the direct effects of SSSR on SOE and POE financial outcomes. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A: Temporal effects of SSSR on SOE and POE financial outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Total sales				Market share			
	SOE	SOE	POE	POE	SOE	SOE	POE	POE
Year2013	-0.006	-0.006	-0.250***	-0.250***	0.058**	0.058**	0.028*	0.028*
	(0.038)	(0.041)	(0.042)	(0.045)	(0.023)	(0.026)	(0.015)	(0.016)
Year2014	0.019	0.019	-0.125***	-0.125***	0.021**	0.021*	0.010	0.010
	(0.028)	(0.030)	(0.027)	(0.029)	(0.010)	(0.011)	(0.013)	(0.014)
Year2017	0.194***	0.194***	0.394***	0.394***	-0.027***	-0.027***	-0.023**	-0.023*
	(0.026)	(0.028)	(0.040)	(0.043)	(0.009)	(0.009)	(0.011)	(0.012)
Year2018	0.267***	0.267***	0.522***	0.522***	-0.032***	-0.032***	-0.022	-0.022
	(0.037)	(0.040)	(0.053)	(0.057)	(0.010)	(0.011)	(0.013)	(0.015)
Year2019	0.351***	0.351***	0.546***	0.546***	-0.041***	-0.041***	-0.037**	-0.037**
	(0.040)	(0.043)	(0.069)	(0.074)	(0.011)	(0.012)	(0.016)	(0.017)
Constant	24.484***	24.484***	23.779***	23.779***	0.345***	0.345***	0.288***	0.288***
	(0.355)	(0.018)	(0.231)	(0.023)	(0.040)	(0.009)	(0.033)	(0.008)
Industry FE	No	Yes	No	Yes	No	Yes	No	Yes
Cluster (Industry)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	280	280	336	336	234	234	288	288

Panel B: SSSR direct effects on SOE and POE financial outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Total sales				Market share			
	SOE	SOE	POE	POE	SOE	SOE	POE	POE
PostReform16	0.249***	0.249***	0.540***	0.540***	-0.060***	-0.060***	-0.040**	-0.040**
	(0.033)	(0.036)	(0.054)	(0.058)	(0.012)	(0.013)	(0.016)	(0.018)
Constant	24.506***	24.506***	23.727***	23.727***	0.371***	0.371***	0.301***	0.301***
	(0.351)	(0.015)	(0.231)	(0.025)	(0.043)	(0.007)	(0.036)	(0.009)
Industry FE	No	Yes	No	Yes	No	Yes	No	Yes
Cluster (Industry)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	234	234	288	288	234	234	288	288

Table 5: Firm-level SOE and POE market share change post-reform

This table reports the direct effects of the reform on SOE and POE market shares at the firm level. The sample period is 2013–2019. The dependent variable is the firm-level market share of SOEs (Columns 1–2) and POEs (Columns 3–4), respectively. Firm-level market share is measured as a firm's sales divided by total industry sales in the same year, where industry-level sales are sourced from the CSMAR database. Standard errors are clustered at the firm level for firm FE, and clustered on industry level for random effects and industry FE. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

	(1) SOE	(2) SOE	(3) SOE	(4) SOE	(5) SOE	(6) SOE	(7) POE	(8) POE	(9) POE	(10) POE	(11) POE	(12) POE
PostReform16	-0.005***	-0.016***	-0.005***	-0.009***	-0.005***	-0.016***	-0.002**	-0.012***	-0.002***	-0.006***	-0.002**	-0.013***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Tobin's Q_t-1		0.008***		0.002***		0.008***		0.001		0.001**		0.002***
		(0.002)		(0.001)		(0.001)		(0.001)		(0.000)		(0.000)
Tangibility_t-1		0.048		-0.026*		-0.006		0.004		-0.008		-0.008
		(0.030)		(0.015)		(0.014)		(0.014)		(0.007)		(0.009)
Firm size_t-1		0.029***		0.010***		0.029***		0.014***		0.005***		0.015***
		(0.004)		(0.003)		(0.004)		(0.002)		(0.001)		(0.002)
Cash holding_t-1		0.016		0.007		0.009		-0.001		0.001		0.002
		(0.021)		(0.010)		(0.015)		(0.007)		(0.003)		(0.006)
Constant	0.034***	-0.660***	0.034***	-0.192***	0.034***	-0.633***	0.018***	-0.282***	0.018***	-0.096***	0.018***	-0.305***
	(0.006)	(0.094)	(0.001)	(0.071)	(0.001)	(0.089)	(0.004)	(0.051)	(0.000)	(0.033)	(0.001)	(0.053)
Firm FE	No	No	Yes	Yes	No	No	No	No	Yes	Yes	No	No
Industry FE	No	No	No	No	Yes	Yes	No	No	No	No	Yes	Yes
Cluster (Firm)	No	No	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Cluster (Industry)	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2574	2563	2574	2563	2574	2563	4746	4735	4746	4735	4746	4735

Table 6: SOE spillover on POE market share

This table reports the effects of the reform on POE market share, particularly focusing on spillovers from SOEs. The interaction term *Post16_SOEAS15* captures the reform-induced spillover effect. Standard errors are clustered at the industry level. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	POE	POE	POE	POE	POE	POE	POE
PostReform16	-0.012***	-0.012***	-0.018***	-0.002**	-0.008**	-0.013***	-0.019***
	(0.002)	(0.002)	(0.004)	(0.001)	(0.003)	(0.002)	(0.004)
SOEAS_15		-0.080***	-0.091***				
		(0.019)	(0.022)				
Post16_SOEAS15			0.023**		0.020**		0.023**
			(0.010)		(0.009)		(0.010)
Tobin's Q_t-1	0.001	0.001	0.001			0.002***	0.002***
	(0.001)	(0.001)	(0.001)			(0.000)	(0.000)
Tangibility_t-1	0.004	0.012	0.012			-0.008	-0.009
	(0.014)	(0.012)	(0.012)			(0.009)	(0.009)
Firm size_t-1	0.014***	0.015***	0.015***			0.015***	0.015***
	(0.002)	(0.002)	(0.002)			(0.002)	(0.002)
Cash holding_t-1	-0.001	-0.001	-0.002			0.002	0.002
	(0.007)	(0.007)	(0.007)			(0.006)	(0.006)
Constant	-0.282***	-0.280***	-0.278***	0.018***	0.018***	-0.305***	-0.305***
	(0.051)	(0.051)	(0.051)	(0.001)	(0.001)	(0.053)	(0.053)
Industry FE	No	No	No	Yes	Yes	Yes	Yes
Cluster (Industry)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4735	4735	4735	4746	4746	4735	4735

Table 7: SOE spillover placebo test

This table reports placebo tests based on alternative reform timings. Panel A treats 2013 as a placebo reform year and uses the sample period 2011–2015, comparing outcomes two years before and two years after the placebo year. Industry-level SOE prevalence is measured using the aggregated SOE asset ratio in 2012. Standard errors are clustered at the industry level. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

Panel A: Placebo test using 2013 as reform year

	(1) POE	(2) POE	(3) POE	(4) POE	(5) POE	(6) POE	(7) POE
PostReform13	-0.010***	-0.010***	-0.011	-0.002	-0.000	-0.009***	-0.010
	(0.003)	(0.003)	(0.009)	(0.001)	(0.004)	(0.003)	(0.009)
SOEAS_12		-0.065***	-0.066*				
		(0.022)	(0.035)				
Post13_SOEAS12			0.002		-0.004		0.003
			(0.021)		(0.010)		(0.021)
Tobin's Q_t-1	0.003**	0.002*	0.002*			0.002***	0.002***
	(0.001)	(0.001)	(0.001)			(0.001)	(0.001)
Tangibility_t-1	0.009	0.013	0.013			-0.005	-0.005
	(0.017)	(0.015)	(0.015)			(0.010)	(0.010)
Firm size_t-1	0.015***	0.015***	0.015***			0.017***	0.017***
	(0.003)	(0.003)	(0.003)			(0.003)	(0.003)
Cash holding_t-1	0.001	-0.004	-0.004			0.000	0.000
	(0.009)	(0.011)	(0.011)			(0.010)	(0.010)
Constant	-0.308***	-0.284***	-0.283***	0.019***	0.019***	-0.339***	-0.339***
	(0.058)	(0.056)	(0.056)	(0.000)	(0.000)	(0.064)	(0.064)
Industry FE	No	No	No	Yes	Yes	Yes	Yes
Cluster (Industry)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2322	2322	2322	3096	3096	2322	2322

Table 8: Family vs. non-family POEs

This table reports the differential effects of the reform on market share between family and non-family POEs. The interaction term *Post16_FF* captures whether family firms responded differently to the reform. Columns (1) – (4) include firm fixed effects with standard errors clustered at the firm level, while Columns (5)– (10) include industry fixed effects with standard errors clustered at the industry level. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

	(1) Market share	(2) Market share	(3) Market share	(4) Market share	(5) Market share	(6) Market share	(7) Market share	(8) Market share	(9) Market share	(10) Market share
PostReform16	-0.002***	-0.002	-0.006***	-0.005***	-0.002**	-0.002**	-0.001	-0.013***	-0.013***	-0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
FF						0.000	0.001		0.002	0.004
						(0.002)	(0.002)		(0.002)	(0.002)
Post16_FF		-0.001		-0.001			-0.002			-0.004**
		(0.001)		(0.001)			(0.002)			(0.002)
Tobin's Q_t-1			0.001**	0.001**				0.002***	0.002***	0.002***
			(0.000)	(0.000)				(0.000)	(0.000)	(0.000)
Tangibility_t-1			-0.008	-0.007				-0.008	-0.008	-0.008
			(0.007)	(0.007)				(0.009)	(0.009)	(0.009)
Firm size_t-1			0.005***	0.005***				0.015***	0.015***	0.015***
			(0.001)	(0.001)				(0.002)	(0.002)	(0.002)
Cash holding_t-1			0.001	0.000				0.002	0.002	0.001
			(0.003)	(0.003)				(0.006)	(0.005)	(0.005)
Constant	0.018***	0.018***	-0.096***	-0.097***	0.018***	0.018***	0.017***	-0.305***	-0.307***	-0.309***
	(0.000)	(0.000)	(0.033)	(0.033)	(0.001)	(0.002)	(0.002)	(0.053)	(0.053)	(0.054)
Firm FE	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Industry FE	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Cluster (Firm)	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Cluster (Industry)	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4746	4746	4735	4735	4746	4746	4746	4735	4735	4735

Table 9: SOE spillover on family and non-family POEs' market share

his table reports the spillover effects of SOEs on family and non-family POEs. Panel A presents how family firms responded to the reform, including the spillover effects from SOEs. Panel B shows the corresponding results for non-family firms. The interaction term *Post16_SOEAS15* captures the reform-induced spillover effect. Standard errors are clustered at the industry level. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

Panel A: SOE spillover on family firms' market share

	(1) FFP	(2) FFP	(3) FFP	(4) FFP	(5) FFP	(6) FFP	(7) FFP
PostReform16	-0.013***	-0.014***	-0.020***	-0.003*	-0.009**	-0.014***	-0.021***
	(0.003)	(0.003)	(0.005)	(0.001)	(0.004)	(0.003)	(0.005)
SOEAS_15		-0.091***	-0.102***				
		(0.022)	(0.024)				
Post16_SOEAS15			0.023*		0.025**		0.027**
			(0.012)		(0.012)		(0.012)
Tobin's Q_t-1	0.001	0.000	0.000			0.002***	0.002***
	(0.001)	(0.001)	(0.001)			(0.001)	(0.001)
Tangibility_t-1	0.004	0.014	0.013			-0.011	-0.013
	(0.016)	(0.013)	(0.013)			(0.012)	(0.012)
Firm size_t-1	0.015***	0.016***	0.016***			0.015***	0.015***
	(0.003)	(0.003)	(0.003)			(0.003)	(0.003)
Cash holding_t-1	-0.001	0.000	-0.000			0.003	0.002
	(0.008)	(0.008)	(0.008)			(0.004)	(0.005)
Constant	-0.312***	-0.301***	-0.298***	0.019***	0.020***	-0.311***	-0.311***
	(0.064)	(0.063)	(0.063)	(0.001)	(0.001)	(0.060)	(0.060)
Industry FE	No	No	No	Yes	Yes	Yes	Yes
Cluster (Industry)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3752	3752	3752	3759	3759	3752	3752

Panel B: SOE spillover on non-family POEs' market share

	(1) NFP	(2) NFP	(3) NFP	(4) NFP	(5) NFP	(6) NFP	(7) NFP
PostReform16	-0.007***	-0.007***	-0.010**	-0.001	-0.003	-0.008***	-0.012***
	(0.002)	(0.002)	(0.004)	(0.001)	(0.002)	(0.002)	(0.003)
SOEAS_15		-0.043**	-0.048**				
		(0.019)	(0.021)				
Post16_SOEAS15			0.009		0.006		0.013*
			(0.008)		(0.005)		(0.007)
Tobin's Q_t-1	0.002***	0.002***	0.002***			0.002**	0.002**
	(0.001)	(0.001)	(0.001)			(0.001)	(0.001)
Tangibility_t-1	0.006	0.010	0.010			0.000	0.000
	(0.015)	(0.012)	(0.012)			(0.008)	(0.008)
Firm size_t-1	0.010***	0.011***	0.011***			0.013***	0.013***
	(0.002)	(0.002)	(0.002)			(0.002)	(0.002)
Cash holding_t-1	-0.004	-0.007	-0.007			-0.004	-0.005
	(0.013)	(0.013)	(0.013)			(0.007)	(0.007)
Constant	-0.204***	-0.216***	-0.215***	0.014***	0.014***	-0.265***	-0.267***
	(0.036)	(0.034)	(0.034)	(0.001)	(0.000)	(0.041)	(0.041)
Industry FE	No	No	No	Yes	Yes	Yes	Yes
Cluster (Industry)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	983	983	983	987	987	983	983

Table 10: Mechanism test

This table reports the mechanism analysis for SOE spillover effects. Panel A compares bank loan dependence, measured by the loan-to-liability ratio, between SOEs and POEs before and after the reform. Panel B tests whether this convergence in loan dependence was more pronounced in industries where SOEs were more dependent on bank loans before the reform. Panel C examines the correlation between SOELS_15 and SOEAS_15 (the SOE asset share in 2015) to validate the interpretive consistency of the exposure measure. *SOELS15* is the SOE exposure and is defined as the industry-level average of the loan-to-liability ratio for SOEs in 2015. Columns (1) – (4) measure the differential changes in the loan-to-total liabilities changes between SOEs and POEs after the reform. Columns (5) – (6) measure the differential changes of loan-to-equity changes between SOEs and POEs after the reform. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

Panel A: Comparison of bank loan dependence between SOE and POE

	Pre-Reform						Post-Reform					
	SOE		POE		Difference		SOE		POE		Difference	
	Mean	Median	Mean	Median	t-statistics	Wilcoxon rank-sum test	Mean	Median	Mean	Median	t-statistics	Wilcoxon rank-sum test
Bank loan dependence	0.284	0.273	0.271	0.255	0.013**	2.943***	0.294	0.284	0.333	0.326	-0.039***	-5.344***

Panel B: Bank loan changes differences

	(1) Bank loan dependence difference changes	(2) Bank loan dependence difference changes	(3) Bank loan dependence difference changes	(4) Bank loan dependence difference changes	(5) Equity financing dependence	(6) Equity financing dependence	(7) Equity financing dependence	(8) Equity financing dependence
PostReform16	-0.013*	0.004	-0.009	0.009	0.071	0.070	0.067	0.065
	(0.007)	(0.011)	(0.007)	(0.012)	(0.045)	(0.071)	(0.057)	(0.079)
Post16_SOELS15		-0.063**		-0.065**		0.004		0.008
		(0.028)		(0.028)		(0.254)		(0.253)
Tobin's Q_t-1			0.002	0.002			-0.020	-0.020
			(0.002)	(0.002)			(0.031)	(0.031)
Tangibility_t-1			-0.045**	-0.044**			-0.011	-0.011
			(0.018)	(0.018)			(0.093)	(0.091)
Firm size_t-1			-0.002	-0.002			-0.007	-0.007
			(0.002)	(0.002)			(0.017)	(0.017)
Cash holding_t-1			0.034*	0.036*			-0.160*	-0.161*
			(0.020)	(0.019)			(0.087)	(0.086)
Constant	0.013***	0.013***	0.049	0.050	-0.008	-0.008	0.235	0.235
	(0.003)	(0.003)	(0.056)	(0.056)	(0.021)	(0.021)	(0.394)	(0.394)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster (Industry)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4226	4226	4219	4219	4226	4226	4219	4219

Panel C: Pairwise correlations

Variables	(1)	(2)
(1) SOEAS_15	1.000	
(2) SOELS_15	0.822***	1.000

Table 11: Robustness tests for SOE spillover on POE market share

This table reports robustness checks for the main model by replacing the continuous SOE exposure variable (*SOEAS15*) with a binary indicator (*High_SOE15*), which equals one if industry SOE prevalence in 2015 is above the median. The interaction term *Post16_HighSOE* captures the reform-induced spillover effect. The results remain consistent with the main findings, confirming the robustness of the positive spillover effects from SOEs to POEs. Standard errors are clustered at the industry level. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively

	(1) POE	(2) POE	(3) POE	(4) POE	(5) POE	(6) POE	(7) POE
PostReform16	-0.012***	-0.012***	-0.014***	-0.002**	-0.005**	-0.013***	-0.015***
	(0.002)	(0.002)	(0.003)	(0.001)	(0.002)	(0.002)	(0.003)
High_SOE15		-0.019***	-0.022***				
		(0.007)	(0.007)				
Post16_HighSOE			0.006**		0.005**		0.006**
			(0.002)		(0.002)		(0.002)
Tobin's Q_t-1	0.001	0.001	0.001			0.002***	0.002***
	(0.001)	(0.001)	(0.001)			(0.000)	(0.000)
Tangibility_t-1	0.004	0.012	0.011			-0.008	-0.008
	(0.014)	(0.012)	(0.012)			(0.009)	(0.009)
Firm size_t-1	0.014***	0.014***	0.014***			0.015***	0.015***
	(0.002)	(0.003)	(0.003)			(0.002)	(0.002)
Cash holding_t-1	-0.001	-0.002	-0.002			0.002	0.002
	(0.007)	(0.007)	(0.007)			(0.006)	(0.006)
Constant	-0.282***	-0.282***	-0.280***	0.018***	0.018***	-0.305***	-0.305***
	(0.051)	(0.054)	(0.054)	(0.001)	(0.001)	(0.053)	(0.053)
Industry FE	No	No	No	Yes	Yes	Yes	Yes
Cluster (Industry)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4735	4735	4735	4746	4746	4735	4735

Table 12: Robustness tests for SOE spillover on family and non-family POEs' market share

This table presents robustness checks for the SOE spillover effects among family and non-family POEs, using a binary indicator (*High_SOE15*) to capture high SOE prevalence. Panel A reports results for family firms, where the interaction term *Post16_HighSOE* is positive and statistically significant, confirming robust spillover effects. Panel B reports results for non-family firms, where the interaction term is smaller in magnitude and mostly insignificant. These findings are consistent with the main results. All regressions include industry fixed effects, and standard errors are clustered at the industry level. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

Panel A: Robustness tests for SOE spillover on family market share

	(1) FFP	(2) FFP	(3) FFP	(4) FFP	(5) FFP	(6) FFP	(7) FFP
PostReform16	-0.013***	-0.014***	-0.016***	-0.003*	-0.005**	-0.014***	-0.016***
	(0.003)	(0.003)	(0.004)	(0.001)	(0.003)	(0.003)	(0.004)
High_SOE15		-0.020***	-0.023***				
		(0.007)	(0.008)				
Post16_HighSOE			0.006**		0.006**		0.006**
			(0.003)		(0.003)		(0.003)
Tobin's Q_t-1	0.001	0.001	0.001			0.002***	0.002***
	(0.001)	(0.001)	(0.001)			(0.001)	(0.001)
Tangibility_t-1	0.004	0.011	0.011			-0.011	-0.012
	(0.016)	(0.014)	(0.014)			(0.012)	(0.012)
Firm size_t-1	0.015***	0.015***	0.015***			0.015***	0.015***
	(0.003)	(0.003)	(0.003)			(0.003)	(0.003)
Cash holding_t-1	-0.001	-0.001	-0.002			0.003	0.003
	(0.008)	(0.008)	(0.008)			(0.004)	(0.004)
Constant	-0.312***	-0.305***	-0.304***	0.019***	0.020***	-0.311***	-0.311***
	(0.064)	(0.067)	(0.067)	(0.001)	(0.001)	(0.060)	(0.060)
Industry FE	No	No	No	Yes	Yes	Yes	Yes
Cluster (Industry)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3752	3752	3752	3759	3759	3752	3752

Panel B: Robustness tests for SOE spillover on non-family market share

	(1) NFP	(2) NFP	(3) NFP	(4) NFP	(5) NFP	(6) NFP	(7) NFP
PostReform16	-0.007***	-0.006***	-0.008**	-0.001	-0.002	-0.008***	-0.011***
	(0.002)	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.003)
High_SOE15		-0.013*	-0.014**				
		(0.006)	(0.007)				
Post16_HighSOE			0.003		0.002		0.005**
			(0.003)		(0.002)		(0.002)
Tobin's Q_t-1	0.002***	0.002***	0.002***			0.002**	0.002**
	(0.001)	(0.001)	(0.001)			(0.001)	(0.001)
Tangibility_t-1	0.006	0.012	0.012			0.000	0.000
	(0.015)	(0.011)	(0.011)			(0.008)	(0.008)
Firm size_t-1	0.010***	0.011***	0.011***			0.013***	0.013***
	(0.002)	(0.002)	(0.002)			(0.002)	(0.002)
Cash holding_t-1	-0.004	-0.006	-0.006			-0.004	-0.005
	(0.013)	(0.013)	(0.013)			(0.007)	(0.007)
Constant	-0.204***	-0.216***	-0.216***	0.014***	0.014***	-0.265***	-0.267***
	(0.036)	(0.037)	(0.037)	(0.001)	(0.001)	(0.041)	(0.041)
Industry FE	No	No	No	Yes	Yes	Yes	Yes
Cluster (Industry)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	983	983	983	987	987	983	983