Share Pledging in China: Funding Listed Firms or Funding Entrepreneurship?*

Zhiguo He Bibo Liu Feifei Zhu

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Abstract

This paper studies the connection between share pledging and entrepreneurial activities in the context of China. Share pledging is prevalent across markets, and the usage of funds is at the discretion of the pledging shareholders. Survey evidence shows that a majority of the largest shareholders (67.3%) used pledging funds outside their listed firms, with 33.0% of them investing the funds in creating new firms. By linking firm registration data with share pledging data, we show a positive relation between shareholders' pledging transactions and entrepreneurial activities. Utilizing the launch of the exchange market in 2013 as a quasi-natural experiment that favors share pledging by private shareholders over state-owned shareholders, our difference-in-differences (DiD) analysis shows that, relative to state-owned shareholders, private shareholders increased their entrepreneurial activities significantly in response to the policy shock. In addition to various robustness checks, we also demonstrate that shareholders invest in industries encouraged by the government and follow a momentum-like strategy by investing in past winners.

JEL Classification: G12, G32, M13

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*He: Graduate School of Business, Stanford University and NBER, hezhg@stanford.edu; Liu: PBC School of Finance, Tsinghua University, liubb@pbcsf.tsinghua.edu.cn; Zhu: School of Finance, Central University of Finance and Economics, feifei.zhu@cufe.edu.cn. We are grateful for helpful comments from Ling Cen, Ying Dou, Hanming Fang, Bin Han, Pengfei Han, Ping He, Dongxu Li, Hang Liu, Zehao Liu, Kasper Meisner Nielsen, Hongbo Pan, Meijun Qian, Tao Shu, Ya Tang, Jian Wang, Yongxiang Wang, Wei Xiong, Jun Yang, Xiaojia Zheng, and seminar and conference participants at the 2022 NBER Chinese Economy Working Group Meeting, the 2022 China Financial Research Conference (CFRC), the 2023 China International Conference in Finance (CICF), the 2023 China Banking & Corporate Finance Conference (CBCF), Peking University, Tsinghua University, Wuhan University, Sun Yat-Sen University, Xiamen University, Dongbei University of Finance and Economics, University of International Business and Economics, Capital University of Economics and Business, Shenzhen University and Nanjing University. We thank the Tsinghua University–University of Chicago Joint Research Center for Economics and Finance and the Becker Friedman Institute China for financial support. Zhiguo He acknowledges financial support from the John E. Jeuck Endowment at the University of Chicago Booth School of Business as the majority of this paper was completed while he was working at the University of Chicago. All errors are our own.

1 Introduction

The financial system, which broadly consists of indirect financing (e.g., the traditional banking system) and direct financing (e.g., stock and/or bond markets) schemes, can affect economic growth via a variety of channels, including evaluating prospective entrepreneurs, financing productive projects, diversifying risks, and encouraging innovation (King and Levine, 1993; Rajan and Zingales, 1998). We focus on share pledging, a unique financing vehicle at the intersection of the banking system and the stock market, whereby shareholders obtain loans with their shares as collateral and use the funds to finance various activities.

In addition to the flexibility in fund usage, share pledging attracts shareholders due to benefits such as delayed tax payments and retained voting rights compared to direct sales of shares. As a result, share pledging has become prevalent across global financial markets; for instance, in the U.S. 10% of S&P 500 firms had at least one director/executive pledging their shares in 2022.[1] In fact, some of the most notable deals are financed by share pledging loans; Elon Musk pledged about 267 million Tesla shares (out of the 423 million shares he owned) to obtain margin loans to fund the $44 billion Twitter deal, and Alibaba co-founders—Jack Ma and Chongxin Cai—have repeatedly pledged their Alibaba shares in exchange for loans from investment banks since 2014.[2] In 2017, at the peak of share pledging in China, more than 95% of the A-share listed firms had at least one pledging shareholder.

Despite the prominence and flexibility of share pledging as a financing vehicle, the literature speaks little on the usage of funds and its relevance to economic growth. The study by Larcker and Tayan (2010) is descriptive and suggests the funds could be used for personal consumption, paying off debts, and making other investment in the U.S. market; and in China the discussion is largely restricted to finance the listed firms themselves (e.g., Shi et al., 2023). In this paper, we place share pledging within a broad perspective and explore its role in promoting entrepreneurial activities.

China, which has witnessed an upsurge in private entrepreneurship in the past several decades without too much support from its state-owned banking system (Brandt and Li, 2003; Song et al.,

[1] See https://insights.issgovernance.com/posts/share-pledges-lose-popularity-as-companies-clamp-down. This article also reports that some professional investors, including Cinven, Blackstone, and KKR also borrowed against their stock holdings to gin up cash.

[2] See https://www.barrons.com/articles/tesla-elon-musk-margin-call-twitter-loan-51672328580 and https://squadronlending.com/asia-hnwi-wealth-management/billionaires-pledge-stock-shares-for-loans-learn-how-you-can-increase-liquidity-like-them.

2011), is an ideal setting to study how the share pledging market can serve as an important financing vehicle for entrepreneurship. More specifically, we challenge the common perception that share pledging funds circle back to the listed firms in China (e.g., Pang and Wang, 2020). Instead, a significant portion of share pledging funds is used to support shareholder-entrepreneurs, for its accessibility, cost advantage,[3] and flexibility in loan term extensions which allows the financing of long-term projects with short-term loans. Since China's economic growth is largely driven by non-listed, small- and medium-sized firms rather than listed companies (Allen et al., 2005),[4] it is of first-order relevance to identify the driving forces behind China's entrepreneurship.

China established its share pledging system in the mid-1990s, with the volume of newly pledged shares growing at an annual rate of 18.6% between 2007 and 2020. In its peak year 2017, the total value of pledged shares reached 6.15 trillion RMB, which is above 10% of the total market capitalization. Before 2013, share pledging was solely organized in the over-the-counter (OTC) market, where commercial banks and trust firms were major lenders. In 2013, share pledging was introduced to the Shanghai and Shenzhen stock exchanges, with securities firms being the major lenders. This initiative, which we will use as a quasi-natural experiment, greatly expedited the development of share pledging. The annual transaction volume between 2013 and 2020 jumped to 1.1 trillion RMB, compared to only 192 billion RMB during the period of 2007–2012.

To shape further discussion, we first analyze the usage of shareholders' pledging funds, focusing on whether they have been used outside or inside the listed firms. Based on public disclosure and contrary to common belief, we find that just 7.8% of share pledging transactions funded listed firms during 2007–2019, with the remaining 92.2% financing shareholders' other activities. We further break down the specific usages outside the listed firms by taking advantage of a joint survey by the PBC School of Finance at Tsinghua University (Tsinghua PBCSF) and the China Securities Regulatory Commission (CSRC, the regulator of China's securities markets) in 2019. Given the official status of the CSRC, the response rate to our survey is close to perfect (99.5%). In the survey, among those firms who report the largest shareholders' share pledging activities, only 36.1% of shareholders support their listed firms with pledged funds while a larger fraction (67.3%) used

[3]The interest rate of share pledging loans is comparable to that of bank loans (which are typically not accessible to entrepreneurs), ranging from 5% to 15%.

[4]The Chinese stock market is relatively small compared to its US counterpart. As of the end of 2023, the ratio of stock market capitalization to GDP is about 62% in China, whereas this number is 284% in the United States.

the funds outside the listed firms. In the latter group, the largest shareholders may repay personal debts (25.3%), spend for personal consumption (13.6%), and/or make financial investment (5.2%); and, most relevant to our study, 33.0% of them take the funds to establish/invest in new firms.[5] This last point is direct evidence that share pledging is not only a financing tool to support the listed firms but also a potential source of financing for entrepreneurial activities.

Our second exercise associates shareholders' pledging transactions to their entrepreneurial activities. For listed firms' major shareholders, we infer their entrepreneurial activities each year by counting the number of firms they hold with registration data compiled by the State Administration for Industry and Commerce (SAIC).[6] We consider two types of entrepreneurial activities by shareholders: creating new firms and investing in existing firms. Throughout the paper, we term the newly created firms "new firms" and the existing firms (i.e., firms that were already established by someone else but newly invested in by shareholders in question) "existing firms"; and we call the sum "add-on firms" that shareholders newly add to their portfolios.[7] We then merge entrepreneurial activity variables with share pledging transaction information to form the research sample with shareholder-year observations. In the baseline regression, we find that shareholders who pledge that year have a larger number of add-on firms than non-pledging shareholders, and most of their new investment is in newly created firms rather than in existing firms. This supports our hypothesis of a positive relation between shareholders' pledging transactions and entrepreneurial activities.

We further utilize the launch of the exchange market in 2013 as a quasi-natural experiment and perform a difference-in-differences (DiD) analysis to address potential endogeneity concerns. We posit that the 2013 reform, which enabled securities firms to become the major lender in the

[5] As the pledging shareholders may use the funds for multiple purposes and we include a multiple-choice question in the survey, the sum of fractions of shareholders using funds within or outside the listed firms (103.4%) exceeds 100%; and the fractions of shareholders that repay debt, spend for consumption, make financial investment, and establish new firms add up to 77.1%, exceeding the fraction of firms with shareholders using funds outside (67.3%).

[6] Recently, the SAIC firm registration data have been used to study several important topics in China, including the evolution of state ownership (Allen et al., 2022; Bai et al., 2020), firm growth (Allen et al., 2019), inter-regional investment (Shi et al., 2021; Lin et al., 2023), talent and firm creation (Bai et al., 2021), serial entrepreneurship (Brandt et al., 2022), reluctant entrepreneurs (Fang et al., 2023), and VC's individual limited partners (Lerner et al., 2023).

[7] We take a stand that "entrepreneurial" activities are associated with investment that is "new" to the shareholders themselves. From this perspective, our entrepreneurial activities exclude shareholders' "follow-on" investment into firms they already own. In Section 4.4.3, we compare our paper to Guo et al. (2023), who study the latter mechanism, and show that share pledging plays a much more significant role in driving the shareholders' "entrepreneurial" activities compared to their "follow-on" investment in existing firms.

exchange market, expanded the credit supply to private shareholders in a significant way, but not much to state-owned shareholders, if at all. Unlike commercial banks in the OTC market, the lending decisions for securities firms in the exchange market are mainly based on the quality of collateral (i.e., the value of pledged shares) rather than shareholders' identities (i.e., private versus state-owned). Because private shareholders are often being discriminated against in China's state-owned banking system, following the reform they naturally turned to the exchange share pledging market. In contrast, the impact of the increased credit supply to state-owned shareholders was less significant, given their relatively weak demand for pledged loans.[8]

We assign private and state-owned shareholders to the treatment and control groups, respectively. As a standard pre-trend analysis, we show that before the 2013 reform, entrepreneurial activities by both private shareholders (the treatment group) and state-owned shareholders (the control group) grew at a similar pace. However, after the reform shock, entrepreneurial activities by private shareholders increased much faster and caught up with the level of state-owned shareholders. A formal DiD analysis suggests that after the launch of the exchange market, the increase in the add-on firms held by a private shareholder exceeds that of a state-owned shareholder by 128% of the national average. This pattern is driven by treated shareholders' creation of new firms: the growth of new firms by a treated private shareholder exceeds that of a state-owned shareholder by 109% of the national average, while the difference in existing firms is insignificant. We further show that shareholders tend to take advantage of the industrial policies and invest in industries encouraged by the government. To strengthen our identification, we show the key DiD results are robust to controlling for unobservable industry or local economic shocks, using two alternative treatment groups, and other potentially confounding policy initiatives.

We further discuss two potential risks embedded in entrepreneurial activities financed by share pledging. Regarding margin call risk, shareholders are indeed less likely to use share pledging loans to support their entrepreneurial activities if they have received margin calls; regarding rollover risk, we show pledging shareholders are able to use loan term extensions and staggered financing schemes to secure a stable financing source for their entrepreneurial activities. Finally, we run a

[8]First, state-owned shareholders have been adequately served by the Chinese banking sector. Second, for managers of these state-owned shareholders, the possibility of being accused of losing state assets (i.e., a decline in the equity value held by the state) when the market reacts negatively to the pledging transaction constitutes a major career risk.

variety of robustness checks and emphasize that our study, which highlights new firms, differs from Guo et al. (2023) whose mechanism is via existing firms.

Relation to literature

The first strand of literature is related to entrepreneurship in China. China's entrepreneurial landscape has evolved significantly since the 1980s, mainly driven by economic reforms and the gradual removal of institutional barriers (Song et al., 2011; Lu and Tao, 2010; He et al., 2019). The rise of privately owned enterprises can also be attributed to many other factors, including Township and Village Enterprises (TVEs) (Huang, 2012), alternative financing channels (Allen et al., 2005), kinship and community networks (Greif and Tabellini, 2017; Dai et al., 2020), talents (Bai et al., 2021), and the contribution of serial entrepreneurs (Brandt et al., 2022).

In particular, our work focuses on the interaction between finance and entrepreneurship. Financial constraints are among the most important impediments to entrepreneurship and the survival of start-ups (Blanchflower and Oswald, 1998; Andersen and Nielsen, 2012). However, this constraint can be relaxed with alternative financing tools. For instance, increased housing wealth can alleviate entrepreneurs' credit constraints by enabling homeowners to extract equity from their property (Harding and Rosenthal, 2017; Schmalz et al., 2017).

The second strand of literature concerns share pledging. In most studies, share pledging is believed to destroy firm value (e.g., Lu et al., 2024) (with few exceptions such as Pan and Qian, 2024), because of expropriation from large shareholders (Li et al., 2023; Yeh et al., 2003; Kao et al., 2004), increased tail risks of listed firms (Dou et al., 2019), and reduced corporate risk-taking (Dou et al., 2019; Chang et al., 2022). The negative returns are contagious among highly pledged stocks in adverse market circumstances (Li et al., 2023; Zong et al., 2023). Instead, our study suggests share pledging plays an important role in financing entrepreneurial activities.[9]

The third strand of literature is on the development of China's financial markets. China's banking system is predominantly state-owned and has undergone significant reforms to enhance competitiveness and financial innovation (Song and Xiong, 2018). Meanwhile, China's stock market,

[9]As for causes for share pledging, it can be used to finance the listed or non-listed firms held by the pledging shareholders (Shi et al., 2023; Cheng et al., 2021; Guo et al., 2023) or diversify the risk exposure of executives of the listed firms (Larcker and Tayan, 2010). As for consequences, pledging shareholders alter their decisions on share repurchases (Chan et al., 2018), earnings management (DeJong et al., 2020), corporate innovation (Pang and Wang, 2020), and mergers and acquisitions (Zhu et al., 2021).

ranking second by size in the world, has quickly gained global prominence (Hu and Wang, 2022) and has become as informative about future corporate profits as that in the United States (Carpenter et al., 2021).[10] As a unique financing vehicle, our paper studies share pledging loans, which form an important financial channel that connects both the banking system and the stock market.

2 Institutional Background and Data

After discussing the institutional background of share pledging in China, this section explains the data and variables used in this paper.

2.1 The Share Pledging Market

Share pledging is a prevalent phenomenon across the globe, partly because of the flexibility in fund usage, including making investment, paying off debts, and/or spending for other personal uses (Larcker and Tayan, 2010). In the U.S., 17.9% of insiders at S&P 1500 firms had pledged their shares by 2012 (Singh, 2018). In the Taiwanese market, 50% of insiders pledged 3.15% of their shares in listed firms from 2003 to 2013 (Dou et al., 2019).[11]

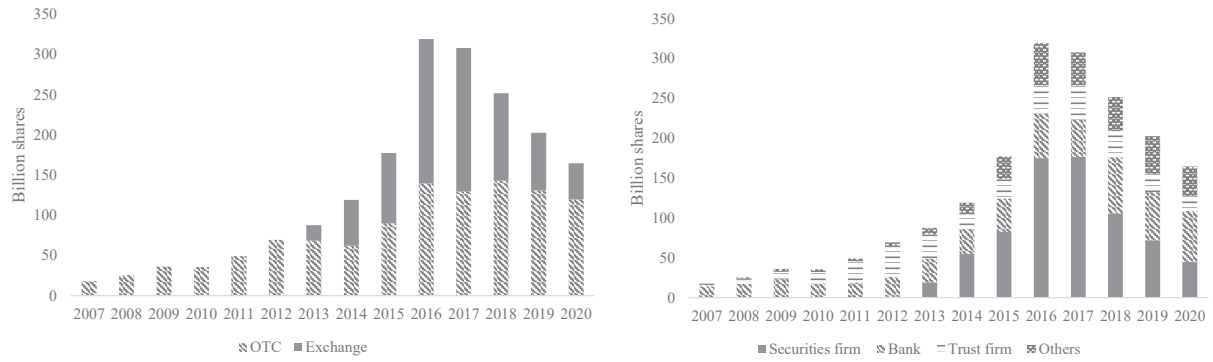
2.1.1 The Chinese Share Pledging Market

The rise of the share pledging market. China's share pledging system was officially established by the 1995 Guarantee Law. The first transaction was finished in 1997: Jiangsu Yueda Group pledged 57 million shares of Jiangsu Yueda Investment Co. LTD., its subsidiary listed on the Shanghai Stock Exchange, to Zhejiang Industrial Bank for loans. Before 2013, share pledging—including the Yueda transaction—was organized in the OTC market, and the size of the market was relatively small. We shall explain the OTC share pledging market shortly in Section 2.1.2.

In 2013, the Shanghai Stock Exchange, the Shenzhen Stock Exchange, and the China Securities

[10] Both the stock and bond markets channel household savings toward the real sector, which is relevant to China's economic growth (Amstad and He, 2020; He and Wei, 2023). China's bond market has also been growing quickly in recent years; in particular, local governments with rollover pressure resorted to non-bank financing after 2012, expediting the development of the municipal corporate bond market (Chen, He and Liu, 2020). The markets for short-term debts (e.g., commercial papers) also grew substantially (Huang et al., 2023), and the pledgeability of corporate bonds studied in Chen et al. (2023a) is tightly linked to margin calls received by pledging shareholders.

[11] In India, shares pledged in listed firms amounted to $38.08 billion by September 2020, accounting for 1.9% of the total capitalization. See https://economictimes.indiatimes.com/markets/stocks/news/share-pledging-by-promoters-rises-in-aug-on-cash-needs/articleshow/78025860.cms.



Panel A: *OTC and exchange market* ***Panel B:*** *Different types of lenders*

Figure 1: **Shares newly pledged in the Chinese market, 2007–2020.** This figure plots the number of listed firms' shares newly pledged by major shareholders who hold at least 5% of the total shares in each year from 2007 to 2020. The pledging information is disclosed by major shareholders and recorded in the China Stock Market and Accounting Research (CSMAR) database.

Depository and Clearing Corporation Limited (hereafter, CSDC) jointly launched a centralized pledging system in the two stock exchanges. As a result, the market size soared: the average annual transaction volume from 2013 to 2020 reached 204 billion shares, rising from 39 billion during the period from 2007 to 2012 (see Figure 1). The market reached its peak in terms of newly pledged shares in 2016 and in terms of total pledged shares in 2017.

Tightening regulations and recent developments. After 2015, the seemingly oversized share pledging market drew increasing attention from regulators and the market and was even believed to be a new source of systemic risk in the Chinese financial system. For instance, when the collateral value drops below a certain level, which is typically a multiple of the corresponding loan amount, pledging shareholders will receive margin calls. This margin call risk concerns not only individual shareholders but also regulators; pledging shareholders may have to sell their collateral—that is, their pledged shares—to fulfill the margin requirements, causing price drops or even panics in the market (we discuss margin call risk in detail in Section 4.3.1).[12] In late 2017, the authorities started to tighten regulations on share pledging,[13] and the Chinese share pledging market shrank gradually.

[12]See Bian et al. (2021) for an illustrative case of the 2015 A-share market crash in China. For a recent review article on margin and its regulations in an international context, see Chen et al. (2024).

[13]For instance, the new guidelines issued by the exchanges mandated the following: i) share pledging funds were only allowed to be used in the real sector, and investment in obsolete industries and the stock market was prohibited; ii) the transaction value had to be larger than 5 million RMB; iii) a single securities firm could only accept up to 30% of a listed firm's shares as collateral; and iv) for a listed firm, the total number of pledged shares could not exceed 50% of its total shares.

As shown in Figure 1, the annual growth rate of pledging volume was −18.9% between 2018 and 2020. The market size in 2020 was significantly smaller than in 2016/2017 but still much larger than other markets.

2.1.2 The OTC and Exchange Markets

Share pledging in the OTC market. As mentioned above, in China share pledging transactions only occurred in the OTC market before 2013, with major lenders being commercial banks and trust firms (Figure 1). The terms of pledging transactions are negotiated between shareholders and lenders; then both parties go to the CSDC to register the transaction and make settlements. The interest rate of pledging loans ranges from 8% to 15% in the OTC market, which is higher than that of bank loans; and the loan maturity ranges from 15 days to 7 years. The share pledging process is relatively time-consuming and may last for more than one month because i) the search for an interested lender may take a while in a decentralized market; ii) the lender has to perform necessary due diligence on collateral and borrowers; and iii) it also takes time to complete the internal approval process within the lender. Finally, in case of default that triggers forced sales, lenders have to go to the courthouse to transfer the ownership first, which could be a long, complicated, and hence costly process.

Share pledging in the exchange market. In the exchange market, securities firms are the dominant lender. Shareholders can easily approach multiple securities firms and discuss borrowing needs and loan terms. Lenders compete on interest rates, loan-to-value ratios (loan value over market value of pledged shares), and other services. Once an agreement is reached, the securities firm passes on the transaction information via an electronic system, which then collectively handles the registration and settlement at the CSDC. Under this system, a pledging transaction can be completed within one or two days. Though less flexible on borrowing terms, the launch of the exchange market significantly boosted share pledging for three reasons. First, securities firms (the lenders) are motivated to compete for the growing business because they are backed by external capital through asset management plans. Second, the sale of collateral does not need the shareholders' consent, and the procedure is easy.[14] Third, competition makes pledging loans attractive

[14]The lender's risk is lower for other two reasons: i) collaterals are restricted to securities traded on the stock exchanges (e.g., stocks, bonds, and mutual fund shares); and ii) loan maturity is restricted to less than three years.

to borrowers not only for the lower cost (1%–3% below the rate in the OTC market) but also for the simplified procedure, not to mention looser restrictions on fund usage.[15]

We conclude this section by highlighting two facts. First, despite the fast growth of the exchange market in recent years, the OTC market remains a well-functioning and active marketplace, with 58.16% of pledging transactions conducted in the OTC market during 2020. Second, this 2013 initiative in the exchange market generated larger supply shocks to private shareholders than to state-owned shareholders, by which the private shareholders are provided with more equal access to pledging loans (see Section 4.2.1 for details).

2.2 The Growth of Entrepreneurship in China

The share pledging market in China has experienced significant growth in the past two decades but perhaps pales in comparison to the tremendous upsurge of Chinese privately owned enterprises and entrepreneurs. As China's economic transition lifted constraints on the private sector and provided an increasingly open business environment, a growing number of entrepreneurs seized the opportunity to establish their own businesses (see, e.g., Brandt et al., 2022; Fang et al., 2023).[16] By far, promoting entrepreneurship has always been a key initiative in China's economic agenda (He et al., 2019), although its weight in Beijing's policy agenda has been varying over time. Recently, the government repeatedly highlighted the crucial role of the private sector and entrepreneurship in economic development, but also emphasized its goal to further consolidate and develop the state sector.

It is reasonable to conjecture that major shareholders of Chinese listed firms, thanks to their business acumen and social connections, are among the main leaders of entrepreneurship in China. We aim to link their share pledging activities to the rising enterprise creations in the economy. In fact, in our dataset these major shareholders are more likely to engage in entrepreneurial activities: an average major shareholder added 0.68 new firms between 2009 and 2018, whereas other

[15]For example, shareholders were allowed to use the funds for investment in equities (i.e., buying publicly traded stocks and equities of non-listed firms) in the exchange market before 2017, a practice that was prohibited by bank lenders in the OTC market. After 2017, the CSDC tightened its regulations and banned the usage of pledged funds for such a purpose.

[16]For example, in the 1990s, internet entrepreneurs started to emerge and created today's giants such as Alibaba, Tencent, and Baidu. Many entrepreneurs also appeared in other industries: energy, healthcare, financial service, consumer, and retail, among others. Source: https://www.forbes.com/sites/tseedward/2016/04/05/the-rise-of-entrepreneurship-in-china/.

shareholders added only 0.14 firms in the same period.

2.3 Data, Sample, and Key Variables

This paper uses three categories of data. The first two are about share pledging transactions and the usage of the funds, and the third is on shareholders' entrepreneurial activities. Detailed definitions of variables are provided in Appendix A.

2.3.1 Data on share pledging

We collect data on share pledging transactions from the CSMAR database. In China, corporate insiders (directors, supervisors, and executives), major shareholders (i.e., with at least 5% of share holdings), and ultimate controllers are required to report their share pledging information.[17] We collect the pledging information by each major shareholder, including shareholder name, transaction dates, number of shares pledged, purposes, and information on the initiation, expiration, and extension of loans. We then construct the key independent variable of interest, $PledgingDummy_{it}$, which is a dummy variable that equals one if shareholder i newly pledges shares in year t, and zero otherwise.

2.3.2 Data on fund usage

We use two methods to determine how shareholders use their share pledging funds.

Fund usages based on firm disclosure. Our first method is based on listed firms' public disclosure. In our context, we classify the usages of share pledging funds as i) guarantees to the listed firm, that is, shareholders pledge shares as collateral for loans (made by a third party) to the listed firm; ii) investment through seasoned equity offerings (SEOs) in the listed firm; iii) direct loans to the listed firm; and iv) other usages outside the listed firm. The original fund usage data from the CSMAR database suffers from significant misclassification issues. We have corrected these errors and integrated additional data from the RESSET database on related-party transactions between major shareholders and listed firms, resulting in an upgraded CSMAR dataset

[17] See https://www.gov.cn/gongbao/content/2007/content_823793.htm.

on the usage of share pledging funds.[18]

Fund usages based on a survey. Our second method takes advantage of a formal survey led by a key regulator. At the end of 2019, Tsinghua PBCSF and the CSRC jointly surveyed the Chinese listed firms on share pledging. Every listed firm in the Chinese stock market was invited by the CSRC to respond to the survey, which was designed by researchers from both the school and the CSRC, and then distributed by the regulator. Firms were asked whether the firm's largest shareholder had ever pledged her shares in the past and, if yes, the usages of the pledging funds. For the second question, respondents can pick from multiple choices a) establish/invest in new firms; b) finance the listed firm; c) purchase the firms' shares in private placements; d) purchase shares from incentive plans; e) repay personal debts; f) finance other related parties (not the listed firm); g) finance personal consumption; h) make other financial investment; and i) unknown or others.

2.3.3 Data on entrepreneurial activities

To infer the entrepreneurial activities by a major shareholder, we retrieve all firms (except the listed firm) she owns based on the SAIC firm registration data, which covers the universe of Chinese firms. We count the firms that the shareholder newly adds in each year. As we explained in the introduction, the shareholder could newly invest in some existing firms that were already registered by someone else in the past in the SAIC database. Otherwise, this is the new firm created by the shareholder in that year.

Following this procedure, we construct three measures for entrepreneurial activities. We define $\#FirmAdded_{it}$ to be the number of add-on firms that shareholder i newly adds; $\#New_{it}$ to be the number of new firms created by her; and $\#Existing_{it}$ to be the number of existing firms in which

[18] Fund usages reported by CSMAR have three categories: financing the listed firms, financing the third parties, and used by the shareholder. After confirming with CSMAR staff members, we learned that in CSMAR i) transactions whose purposes are not disclosed in the announcements are assigned to "used by the shareholder," and ii) the category of "financing the listed firms" includes loan guarantees only but not direct loans or investment made to the listed firms. Our correction consists of several steps. First, we check whether the shareholder provides direct loans and equity investment to the listed firm within a year after the pledging, with the data on direct loans to listed firms retrieved from the RESSET database and the seasoned equity offerings data retrieved from the CSMAR database. For example, if we observe a shareholder pledges shares to a securities firm, and three months later she makes loans to the listed firm, we classify the purpose of this pledging transaction as "loans to the firm." Second, we also use the RESSET guarantee data to cross-check the "financing the listed firms" usage reported by CSMAR. Finally, we combine the above two steps to upgrade the usages provided by CSMAR. Our procedure significantly supplements the CSMAR data: from 2007 to 2019, the fraction of transactions used to finance the listed firms (loan guarantees, seasoned equity offerings, and direct loans) increases by 6.0%, from 1.8% (reported by the CSMAR database) to 7.8% (our final classification).

she makes her first investment, all at year t. By definition, $\#New_{it}$ and $\#Existing_{it}$ add up to $\#FirmAdded_{it}$.

We also categorize $\#FirmAdded_{it}$ by industry characteristics. At the shareholder-year level, we count the number of i) risky industry firms (denoted by $\#Risky_{it}$), including real estate and other firms with excessive capacity according to China's Ministry of Industry and Information Technology (Chen et al., 2018); ii) high-tech industry firms ($\#HighTech_{it}$) such as pharmaceuticals and telecommunication, defined by the National Bureau of Statistics;[19] and iii) other industry firms ($\#Other_{it}$), containing firms that do not fall into the risky or high-tech categories. $\#Other_{it}$ is further decomposed into two subcategories by past performance: the number of high-growth industry firms ($\#HighGwt_{it}$), of which the growth rate of value-added in the past three years is in the top half among all industries from the "other industries" category; and low-growth industry firms ($\#LowGwt_{it}$), which contains the remaining industries in $\#Other_{it}$ (Brandt et al., 2017). The information on value-added is from the Wind database.

In addition, we retrieve the paid-in capital information for the SAIC database to measure each shareholder's dollar contribution to entrepreneurial activities. We construct $CapAdded_{it}$ to measure the shareholder's total capital contribution to firms (relative to her financial wealth), which is further decomposed into three parts: $CapFollow_{it}$, the follow-on investment in existing firms that the shareholder already holds; $CapExisting_{it}$, the capital contribution to existing firms that the shareholder had not held before; and $CapNew_{it}$, the capital contribution to firms newly created by the shareholder.

2.3.4 Other data

We collect data from multiple sources to construct control variables in our analysis. Based on the CSMAR database, we include i) the natural logarithm of a shareholder's financial wealth ($LnFinWealth$); ii) her wealth growth potential, proxied by the value-weighted average of Tobin's Q of listed firms she holds ($FinWealthGwt$); and iii) the financial constraints of firms she holds, proxied by the value-weighted average of the cash dividend-paying dummy ($DivDum$). In

[19] For detailed industry classifications, see High-tech Industry (Manufacturing) Classifications (2017) (http://www.stats.gov.cn/xxgk/tjbz/gjtjbz/202008/t20200811_1782329.html) and High-tech Industry (Service) Classifications (2018) (http://www.stats.gov.cn/xxgk/tjbz/gjtjbz/201805/t20180509_1758924.html) issued by the National Bureau of Statistics.

addition, we take the city the shareholder resides and include iv) the GDP per capita of the city ($GDPPerCapita$); v) the average salary of the city ($AvgSalary$); and vi) the natural logarithm of the number of commercial bank branches in that city ($LnBankBranch$).[20] Among them, $GDPPerCapita$ and $AvgSalary$ are constructed based on the CEIC database, and $LnBankBranch$ is constructed with data from the China Banking and Insurance Regulatory Commission.

2.3.5 Sample and summary statistics

Sample construction. To construct the research sample during the period of 2009-2018,[21] we merge the entrepreneurial activity data described in Section 2.3.3 with share pledging transaction data described in Section 2.3.1, by shareholder and year. Specifically, for each non-financial listed firm, we identify major shareholders holding at least 5% of the shares at the immediate level. These major shareholders belong to three categories: i) natural person shareholders; ii) legal entity shareholders ultimately controlled by natural persons; and iii) legal entity shareholders ultimately controlled by the state.[22] In our context, a natural person shareholder refers to an individual shareholder; a legal entity shareholder refers to a company or organization that holds a firm's shares;[23] and "the state" refers to central/local governments and their subsidiaries (including the SASAC and the Ministry of Finance), together with government-sponsored institutions. We use the SAIC firm registration data to identify the ultimate controllers of legal entity shareholders (see Appendix B for detailed procedures). Our final sample includes 23,123 shareholder-year observations, covering 1,499 natural person shareholders, 2,107 natural-person-controlled legal entity shareholders, and 903 state-controlled legal entity shareholders.

For each observation at the shareholder-year level, we construct the share pledging measure $PledgingDummy$ (see Section 2.3.1) and the entrepreneurial activity measure $\#FirmAdded$ (Sec-

[20] For a legal entity shareholder, we use the entity's registered address to determine its residence. For a natural person shareholder, we use her listed firm's registered address to infer her residence. If she owns shares in multiple listed firms, we use the information of the listed firm with the longest history. See Section 2.3.5 for detailed definitions of natural person and legal entity shareholders.

[21] The SAIC firm registration data we obtain end in 2018. We use the data starting in 2009 to minimize the impact of the 2008 global financial crisis.

[22] There are two other types of shareholders in the Chinese economy: state shareholders themselves and foreign shareholders. Because the SAIC database does not record full information about these two types of shareholders, we are not able to calculate their entrepreneurial activities or determine their ultimate controllers and have to exclude them from the sample. Considering they only participate in 0.22% and 0.20% of the pledging transactions in our sample, we believe their absence is unlikely to contaminate our analysis.

[23] Typical legal entity shareholders in the Chinese stock market include companies, financial managers (e.g., mutual funds), and non-profit organizations (e.g., university endowment funds).

tion 2.3.3). Because it is commonly seen in practice that for ii) natural-person-controlled legal entity shareholders, the pledging funds are under the control of their ultimate controllers and used to finance the latter's entrepreneurial activities (e.g., in terms of dividends paid or loans made to the ultimate controller), we combine the investments by the pledging shareholder and her ultimate controller when counting their entrepreneurial activities ($\#FirmAdded$).[24]

Summary statistics. Table 1 Panel A shows that, in each year, 34% of shareholders on average newly pledge their shares. A typical shareholder pledges 17.08% of her shares (3.97% of her listed firms' total shares) and receives 140.38 million RMB of loans. These pledging loans are short-term financing in nature, as the average (median) maturity is 1.59 (1.32) years. The shareholder also faces considerable margin call risk; among pledging shareholders, the number of shares pledged and subject to margin calls accounts for 17.94% of the total shares a shareholder owns during each year. Panel B says that she newly invests in 0.68 firms each year by creating 0.55 new firms and investing in 0.12 existing firms. The total investment amounts to 63.91 million RMB: 49.43 million as paid-in capital to create new firms, 8.13 million going to existing firms that she had not held before, and the remaining 6.35 million going to existing firms that she already holds.

To put these numbers in perspective, we calculate the average entrepreneurial activities, which is $\overline{\#FirmAdded}_t$, as "national average" in the entire SAIC database; we then scale entrepreneurial activities by listed firms' shareholders by this national average. In terms of the number of firms, the shareholders of listed firms invest about 5 times the national average; dollarwise, the difference is even more striking as they invest about 462 times the national average. This confirms that shareholders in listed firms are indeed a group of sophisticated entrepreneurs who are actively seeking and investing in new business opportunities.

[24] According to our procedures in Appendix B, the immediate shareholder of the pledging legal entity acts as the ultimate controller in 83.2% of these natural-person-controlled legal entity shareholders. The ultimate controller can be identified at the second layer along the ownership chain in another 14.1% cases. In other words, for most ultimate controllers, they have a direct and significant influence on the pledging legal entity shareholders and are able to allocate the funds for their own purposes. In unreported analysis, we exclude the entrepreneurial activities by these natural person ultimate controllers and find qualitatively unchanged results.

3 Usages of Share Pledging Funds

Due to data availability issues, the usage of funds from share pledging is an under-researched area in the literature. In China, it is commonly believed that at least a portion of the funds flows back to the listed firms via borrowings, investment, or other related-party transactions (e.g., Pang and Wang, 2020; Shi et al., 2023; Cheng et al., 2021). In this section, we attempt to open the black box and study how Chinese shareholders use their share pledging loans. We deem the basic data pattern of share pledging loan usage—though largely descriptive—to be important in shaping any informative discussion on this topic.

3.1 Evidence Based on Firm Disclosure

Following the procedure described in the first half of Section 2.3.2, we first study the usage of funds from each pledging transaction by major shareholders that hold at least 5% of shares from 2007 to 2019,[25] based on the public disclosure by listed firms.

We report the key results in Table 2. Panel A shows that, among the 62,019 pledging transactions during 2007-2019, only 7.8% were used inside the listed firms: shareholders used 1.8% for providing guarantees, 3.5% for purchasing seasoned equity offering shares, and another 2.7% for lending to the listed firms directly;[26]but the majority of pledging transactions (92.2%) have fund usage outside the listed firms. Panels B and C summarize the number of firms involved and the dollar amount of pledging funds by different usages, respectively, and confirm the same message: 14.2% of the listed firms had shareholders pledging their shares and using the proceeds to finance the listed firms; and 10.1% of the funds were used for the listed firms.[27]

[25]The sample starts in 2007 when the CSRC required mandatory disclosure of pledging by shareholders holding over 5% of shares. It ends in 2019 to align with the timing of the joint survey by Tsinghua PBCSF and the CSRC. In addition, we use the SAIC firm registration data during the period of 2009-2018 to perform the regression-based analyses in Section 4 due to data availability (see Section 2.3.5 for details).

[26]As the funds from a pledging transaction could be used for guarantees, seasoned equity offerings, and loans simultaneously, the sum of these three usages in Panels A, B, and C may exceed the subtotal of "Used within listed firms."

[27]In unreported analyses, we also compare fund usages by controlling shareholders in the listed firms to those by non-controlling shareholders following the same method. Consistent with Pan and Qian (2024), in our sample controlling shareholders direct a greater share of pledging funds to their listed firms relative to non-controlling shareholders. For example, 11% of the pledging funds are used within listed firms by controlling shareholders, whereas the number is only 4% for non-controlling shareholders. Meanwhile, it is also worth noting that controlling shareholders—despite having a smaller fraction of pledging loans used outside listed firms—in fact engage more in entrepreneurial activities in absolute dollar terms. This is because the size of controlling shareholders' pledging transactions (261.22 million RMB on average) significantly exceeds that of non-controlling shareholders (64.61 million RMB).

Our method may underestimate the amount of pledging funds used within the listed firms, as we classify missing purposes as outside (see 2.3.2 for details). In addition, the procedure only detects transactions by large shareholders disclosed by listed firms, so we will miss the funds channeled to the listed firms through third parties.[28] However, undoubtedly a significant part of the funds is used to finance shareholders' other activities outside the listed firms. We next strengthen this argument with survey evidence.

3.2 Direct Survey Evidence

The survey. At the end of 2019, Tsinghua PBCSF and the CSRC jointly surveyed the Chinese listed firms on their largest shareholders' share pledging activities, collecting information on the usages of share pledging funds (see Section 2.3.2 for the survey questions). The CSRC distributed the questionnaire to all of the 3,760 firms listed on the Shanghai and Shenzhen stock exchanges on November 25, 2019. The survey responses were provided by top executives, including chairperson of the board, director, CEO, CFO, and board secretary, who were sufficiently informed about their largest shareholder's activities and the firm's status; and by November 29 the CSRC collected responses from 3,741 firms, representing a response rate of 99.49%.[29] We are also confident that the survey responses are reliable, as it is unclear whether respondents wished to provide biased information to cater to the CSRC's (the distributor's) needs or to avoid unnecessary troubles.[30]

A breakdown of fund usages outside listed firms. According to the survey, 60.1% (2,217) out of the 3,741 responding firms reported that their largest shareholders had used share pledging by 2019. Figure 2 depicts the usages of share pledging funds. In 36.1% (801) of the above-mentioned 2,217 firms that reported pledging transactions, the largest shareholders supported their own listed

[28] For example, the shareholder can give the pledging funds to another firm, and then the firm lends to the listed firm.

[29] Two points are worth mentioning. First, the board secretary in Chinese listed firms is one of the top executives. He/she not only handles affairs about the board and shareholder meetings and communicates with the regulators, but also is responsible for functions related to the capital market, including information disclosure, investor relations, and financing. Second, the response rate was significantly higher than those in previous survey studies among corporate executives such as Graham and Harvey (2001) because share pledging was a common concern among listed firms and the regulator was quite influential in China.

[30] First, as explained in Section 2.3.2, the survey is carefully designed with straightforward and academic-oriented questions without "correct" answers. These answers were unlikely to be used to judge a firm's behavior. Second, we formally declared that the survey information was only used in policy and academic research in a large sample. In fact, we strictly complied with the same policies in the previous rounds of surveys, an approach helpful for building trust between the survey and the respondents. For more details regarding the Tsinghua PBCSF-CSRC survey, see Goldstein et al. (2024).

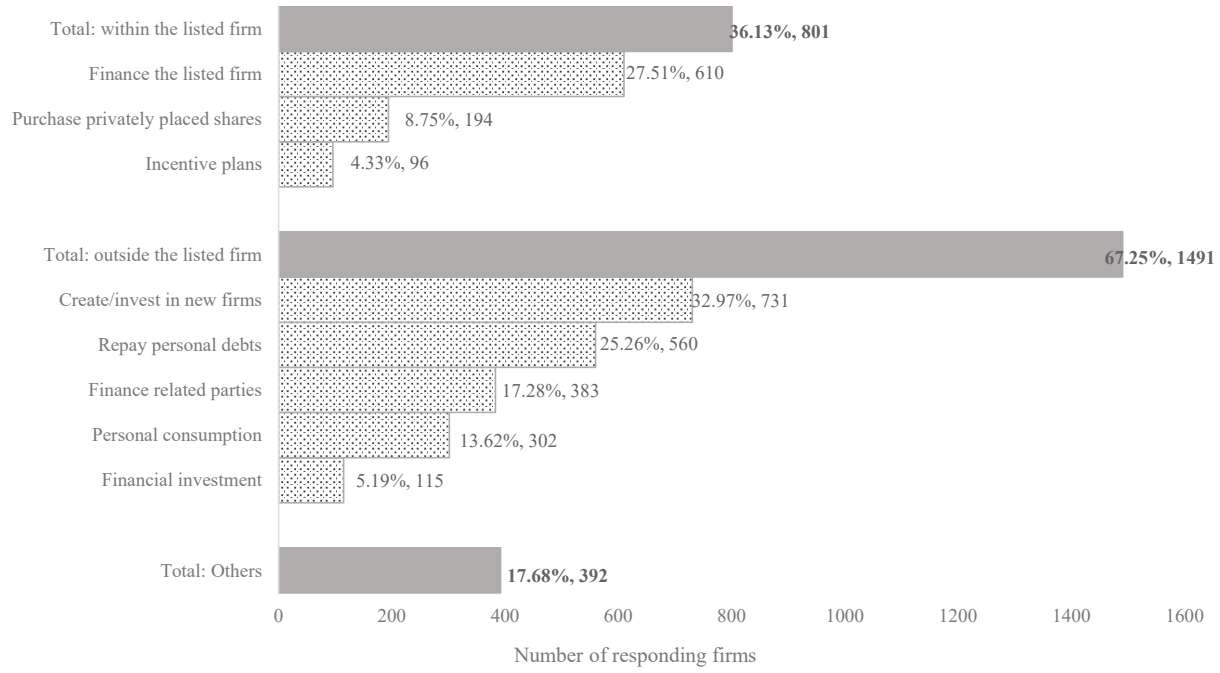


Figure 2: **Survey results on usages of share pledging funds.** This figure plots the frequencies of usages of share pledging funds based on the Tsinghua PBCSF-CSRC 2019 survey. The item "total: within the listed firm" is the union of "incentive plans," "purchase privately placed shares," and "finance the listed firm." The item "total: outside the listed firm" is the union of "financial investment," "personal consumption," "finance related parties," "repay personal debts," and "create/invest in new firms."

firms with the funds, via various means. Specifically, 8.8% (194) of them purchased privately placed shares and 4.3% (96) participated in incentive plans; the majority of them (27.5%, 610), though, used other channels such as providing loans and guarantees directly or indirectly.

In the survey, a greater fraction (67.3%, 1,491) of firms report that their pledging largest shareholders used the funds outside the listed firms:[31] 25.3% (560) of them took the funds for personal debt repayment, 13.6% (302) for personal consumption, and 5.2% (115) for financial investment. Of particular note, 33.0% (731) of the responding firms reported that their largest shareholders invested the funds in existing firms (other than the listed firm) or to create new firms.

We summarize that share pledging is not only a financing tool used by shareholders to support their listed firms but also a potential financing source for their entrepreneurial activities.[32] This

[31]This percentage is smaller than 85.8%, which is the estimate based on public disclosure in Section 3.1. This might be due to two reasons. First, the survey only covers the largest shareholders, whereas the public firm disclosure counts share pledging by major shareholders that hold at least 5% of shares. Second, the survey counts share pledging transactions from 1997 to 2019, but the disclosure method covers a sample period from 2007 to 2019.

[32]In this analysis, our sample includes state-controlled legal entity shareholders, whose behavior may not be entirely market oriented. For robustness, we also restrict the sample to pledging transactions by natural person shareholders and natural-person-controlled legal entity shareholders (see Section 2.3.5 for details on these shareholders), and repeat

conjecture is formally tested in Section 4.

4 Share Pledging and Entrepreneurship

In this section, we attempt to formally link share pledging to entrepreneurial activities with a regression framework. The data and variables used in the analysis are described in Section 2.3.

4.1 Baseline Results

We run the following regression to examine the effects of share pledging on major shareholders' entrepreneurial activities in terms of creating new firms and investing in existing firms:

$$Y_{it} = \alpha + \beta \cdot PledgingDummy_{it} + \boldsymbol{\gamma} \cdot Controls_{it} + \delta_i + \delta_t + \varepsilon_{it}, \tag{1}$$

where the dependent variable Y_{it} denotes the number of add-on ($\#FirmAdded_{it}$), new ($\#New_{it}$), and existing firms ($\#Existing_{it}$) shareholder i adds at year t (Section 2.3.3). To address the concern of a spurious relation due to the aggregate macroeconomic trends, we scale these three entrepreneurship variables by the average of $\#FirmAdded_{it}$ in the population of shareholders at year t (the "national average" $\overline{\#FirmAdded}_t$ in Section 2.3.5). The key independent variable of interest, $PledgingDummy_{it}$, is a dummy variable indicating whether shareholder i newly pledges shares in year t (Section 2.3.1). The variable $Controls_{it}$ is described in Section 2.3.4. We also include shareholder fixed effects δ_i and year fixed effects δ_t, and cluster standard errors at the shareholder level as shareholders' entrepreneurial activities are likely to be autocorrelated over time.

Table 3 Panel A reports the OLS regression results. Columns (1)-(3) show results with the scaled entrepreneurial activity variables, with all coefficients on *PledgingDummy* being positive and significant at the 1% level. Particularly, shareholders prefer creating new firms to investing in existing firms: the number of firms a pledging shareholder newly adds exceeds that of a non-pledging shareholder by 89% of the national average (column (1)); she spends most of pledging funds to create new firms (65% of the national average, column (2)) rather than invest in existing firms

the analyses in Section 3.1 and 3.2. We find qualitatively similar patterns on fund usages and report the results in Appendix C.

(22% of the national average, column (3)). Columns (4)-(6) report results with the raw numbers of add-on firms as the dependent variables; the findings are similar qualitatively. Panel B reports the estimation results when we take the independent variable in Eq. (1) to be *PledgingRatio*, which is a continuous variable defined as the percentage of shares newly pledged by a shareholder in a year out of the shares she holds. The main findings stay qualitatively unchanged with this alternative proxy. In sum, the above results are consistent with our conjecture that pledging shareholders are more likely to engage in entrepreneurial activities.

4.2 Identification: A Quasi-Natural Experiment

We have shown a positive association between shareholders' pledging and entrepreneurial activities. The standard endogeneity concern applies; for instance, shareholders with more investment opportunities may seek financing by share pledging (reverse causality), and more risk-averse shareholders are less likely to engage in share pledging and entrepreneurial activities simultaneously (omitted variables). To at least partially address the endogeneity issue, we take advantage of the launch of the exchange market as a quasi-natural experiment and perform a difference-in-differences (DiD) analysis.

4.2.1 Share pledging reform in 2013: Exchange market versus OTC

We divide the shareholders in our sample into two groups: private shareholders, including natural person shareholders and natural-person-controlled legal entity shareholders (shareholder type i and ii in Section 2.3.5); and state-owned shareholders, referring to state-controlled legal entity shareholders (shareholder type iii). We posit that the launch of the exchange market in 2013, with institutional details explained in Section 2.1, constitutes a quasi-natural experiment. Enabling securities firms to be the major lender in the exchange market, the reform expanded the credit supply to private shareholders in a significant way, but not much to state-owned shareholders, if at all.

First, unlike commercial banks in the OTC market, the lending decisions for securities firms in the exchange market are mainly based on the quality of collateral (i.e., the value of pledged shares) rather than shareholders' identities (i.e., private versus state-owned). They are enthusiastic about lending to any shareholder with sufficient collateral. Second, securities firms can use both

their own capital and external capital to support the share pledging business, making it possible to extend large loans to many borrowers.[33] Because financially constrained private shareholders in China are often discriminated against in the state-owned banking system (Brandt and Li, 2003; Song et al., 2011; Chen et al., 2023b),[34] following the 2013 reform, private shareholders naturally turned to the exchange market where cheap and convenient credit became available. In contrast, the incremental credit supply to state-owned shareholders was less significant, partly because of their limited financing demand beyond the traditional banking sector, and partly because managers of these state-owned shareholders worry about the possibility of being accused of losing state assets.[35]

In sum, the launch of the exchange market (at least partially) levels the playing field between private and state-owned shareholders, opening the door for private shareholders to tap share pledging loans (provided by securities firms) as a relatively available and convenient financing tool. Indeed, we find that only 3.2% of the share pledging transactions are from state-owned shareholders in the post-reform period from 2014 to 2018. Dollarwise, compared to the level during the three years before the launch, share pledging loans obtained by private shareholders grew by 390% during the three years after the launch, while the growth is only 158% for state-owned shareholders.

4.2.2 Empirical analysis based on DiD method

Empirical design. Based on the discussion above, we assign private shareholders to the treatment group and assign state-owned shareholders to the control group in our DiD specification. The sample from 2009 to 2018 includes 15,520 shareholder-year observations, covering 1,271 private shareholders and 548 state-owned shareholders. We estimate the following equation to perform the DiD analysis:

$$Y_{it} = \alpha + \beta \cdot Treat_i \times After_t + \boldsymbol{\gamma} \cdot Controls_{it} + \delta_i + \delta_t + \varepsilon_{it}, \tag{2}$$

[33] For example, at the market peak in 2017, 48% of the 1.62 trillion RMB pledging loans was ultimately financed by securities firms' asset management plans, according to the Securities Association of China.

[34] The capital raised by an average private firm only accounted for 12% of that raised by an average SOE during 2016 and 2018; see https://www.chinathinktanks.org.cn/content/detail/id/uspibe76.

[35] That is to say, managers of state-owned enterprises are concerned about the decline in the equity value held by the state when the market reacts negatively to the pledging transaction.

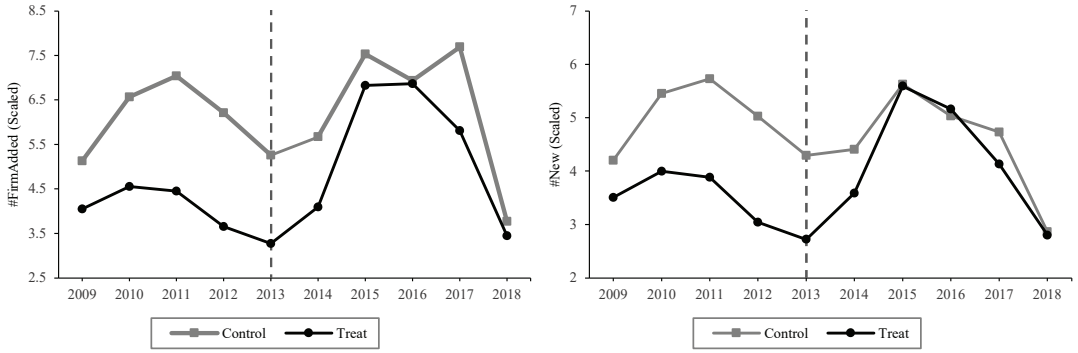
where $Treat_i$ is a dummy variable that equals one if a shareholder is a private shareholder (zero otherwise), $After_t$ is a dummy variable that equals one if the year is 2013 or after (zero otherwise); and the interaction term $Treat_i \times After_t$ is our key variable of interest. We also include the same set of controls as in Eq. (1), as well as the shareholder and year fixed effects.

Parallel trends assumption. We first provide evidence for the parallel trends assumption in Figure 3. The two plots in Panel A show the dynamics of entrepreneurial activities of the two groups around 2013, where we measure entrepreneurial activities for group $g \in G = \{\text{private, state-owned}\}$ by the average $\#FirmAdded_{gt}$ and $\#New_{gt}$ within any group g. As shown in the left panel, before 2013 the total number of add-on firms by both private (treatment) and state-owned (control) shareholders grew at a similar pace. However, after the 2013 shock, entrepreneurial activities by the treated private shareholders increased much faster and caught up with the level of state-owned shareholders. The right panel repeats the same analysis on the number of new firms ($\#New$), with qualitatively same patterns.[36] These patterns lend support to no pre-trends in shareholders' entrepreneurial activities before the 2013 shock, the key identification assumption that we will formally test in the next section (Panel B in Figure 3).

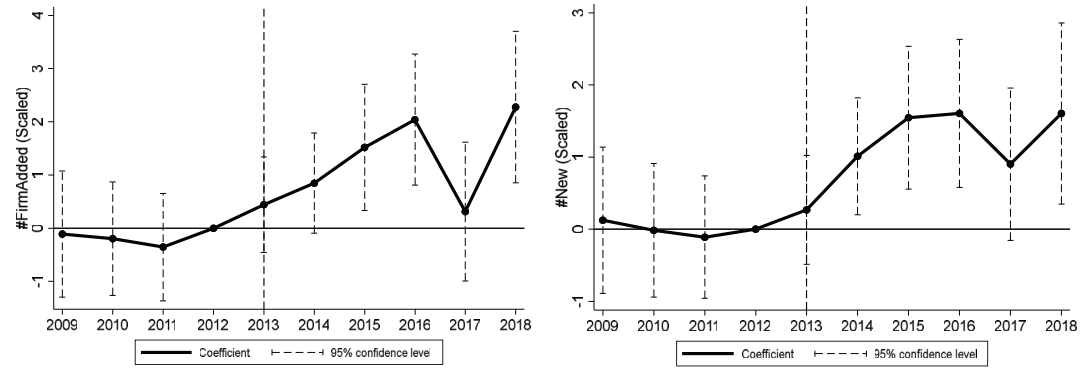
DiD estimation results. Columns (1) to (3) in Table 4 report regression results of Eq. (2) with the entrepreneurship variables scaled by the national average being the dependent variables. The coefficients of $Treat \times After$ are 1.283 and 1.094 in columns (1) and (2), which are statistically significant at the 1% level. This suggests that, after the launch of the exchange market in 2013, the increase in the number of add-on firms held (new firms created) by a private shareholder exceeds that by a state-owned shareholder at a rate of 128% (109%) of the national average. This relative increase accounts for 26.2% (26.4%) of the pre-event level of add-on firms (new firms created). The coefficient estimate in column (3) is statistically insignificant, suggesting treated private shareholders do not increase their investment in existing firms relative to the control group. Columns (4) to (6) report results with unscaled entrepreneurial activities being the dependent variables, with qualitatively similar patterns.

In addition, to formally test the dynamic impact of the reform in 2013, we replace $Treat \times After$

[36] We find the 2013 shock has no significant impact on shareholders' investment in existing firms ($\#Existing$) and omit the plots on that type of activities in Figure 3.



Panel A: The number of add-on firms around the 2013 reform, scaled by the national average



*Panel B: Coefficient estimates on Treat*Year from dynamic regressions*

Figure 3: **Tests on parallel trends assumption.** Panel A plots the average number of add-on firms and new firms (scaled by the national average) each year held by private and state-owned shareholders around the launch of the exchange market in 2013. Panel B plots the coefficient estimates for dynamic regressions of scaled entrepreneurial activities on $Treat \times Year$, following Eq. (2).

with $Treat \times Year$ in Eq. (2), with $Year$ as dummy variables indicating each year in our sample period from 2009 to 2018. Taking 2012 as the base year, we plot the coefficient estimates in Figure 3 Panel B. We find no statistically significant differences in the growth of entrepreneurial activities between the treatment and control groups before the reform shock, supporting the parallel trends assumption. Starting from 2014 after the reform took place, the coefficient estimates on $Treat \times Year$ become significantly positive,[37] suggesting private shareholders held more add-on firms in the post-reform period.

In summary, our DiD analysis results suggest a causal relation from share pledging to en-

[37] One exception is that the coefficient estimate on $Treat \times Year2017$ is positive but statistically insignificant for the $\#FirmAdded$ regression, probably due to private shareholders' larger negative exposure to the tightening regulations on share pledging in late 2017. The tightening regulations are discussed in Section 2.1.1.

trepreneurial activities, with the main channel being the creation of new firms rather than investment in existing firms.

4.2.3 Industries of entrepreneurial firms

We next examine the industry characteristics of add-on firms to reveal shareholders' preference in entrepreneurial activities. Specifically, we take the five entrepreneurial activity variables at the industry level ($\#Risky$, $\#HighTech$, $\#Other$, $\#HighGwt$, and $\#LowGwt$) defined in Section 2.3.3 as the dependent variables and re-estimate Eq. (2).

Table 5 reports the estimation results. Private shareholders exhibit a relatively stronger preference toward high-tech industries following the reform shock, compared to state-owned shareholders. The coefficient of $Treat \times After$ is positive and significant for $\#HighTech$ in column (2), but insignificant for $\#Risky$ in column (1) and smaller in magnitude for $\#Other$ in column (3). Given the risky (high-tech) industries are likely discouraged (encouraged) by Beijing, these results suggest that shareholders are able to take advantage of the government's industrial policies. Moreover, columns (4) and (5) show that, relative to their state-owned peers, private shareholders are more likely to add firms in industries with above-median past growth rates after the reform, suggesting that shareholders use a momentum-like strategy by investing in past winners (when considering other industries that are less affected by government policies).[38]

4.2.4 Further discussion on identification

We now perform a batch of additional analyses to further strengthen our identification.

Industry and local economic shocks. To further address the omitted variable issue, we add industry × year fixed effects in our DiD regressions to control for potential shocks to the industry in which add-on firms are created. Specifically, we categorize any shareholder's entrepreneurial activities into different industries and perform the analysis at the shareholder-industry-year level:

[38] In addition, shareholders have two channels for moving pledging funds into entrepreneurial activities: i) direct investment in entrepreneurial firms and ii) investing in professional asset managers (i.e., PE/VC firms), who in turn invest in entrepreneurial firms. In unreported analysis, we show that relative to investing in PE/VC firms, shareholders are more likely to make direct investment in entrepreneurial firms from the real sector. However, the contribution to entrepreneurship by investing in PE/VC firms could be more pronounced because these firms are larger in size and able to spawn many other real-sector firms.

$$Y_{ijt} = \alpha + \beta \cdot Treat_i \times After_t + \boldsymbol{\gamma} \cdot Controls_{it} + \delta_i + \delta_{jt} + \varepsilon_{ijt}, \tag{3}$$

where Y_{ijt} denotes the number of add-on, new, and existing firms in industry j added by shareholder i in year t. We include shareholder fixed effects δ_i and industry $\times$ year fixed effects δ_{jt} across regressions to absorb any effect varying with shareholder and industry $\times$ year.[39]

As shown in Table 6, the coefficient of $Treat \times After$ is still positive and significant for entrepreneurial activity variables scaled by the industry average (columns (1) and (2)) and the raw numbers of firms (columns (3) and (4)). The economic impact is also sizable albeit relatively smaller than our earlier findings. For example, the coefficient estimate in the $\#FirmAdded$ regression (0.604) in column (1) accounts for 14.0% of the pre-event level of add-on firms, whereas it is 26.2% in the baseline DiD analysis (Section 4.2.2). These results confirm our prior: within the same industry-year, private shareholders are more active in entrepreneurial activities compared to state-owned shareholders.

Second, we use the same method to control for the exposure to unobservable local economic shocks in regions where the add-on firms are created. These shocks could capture certain province-level policy shocks that affect the attractiveness of entrepreneurial activities. Specifically, we perform the DiD analysis at the shareholder-province-year level and replace industry $\times$ year fixed effects with province $\times$ year fixed effects. Our main results are robust to these province-year shocks, as shown in columns (5) to (8) in Table 6.

Alternative treatment groups. The key idea behind the quasi-experiment so far is that the launch of the exchange market in 2013 expanded the credit supply to private shareholders to a larger extent, relative to state-owned shareholders. We also note that among private shareholders, natural person shareholders (relative to legal entity shareholders) were more exposed to the positive supply shock. Before 2013, commercial banks in the OTC market used a loan system designed to collect and process information from firms and follow formal credit approval rules. These banks find it difficult to obtain enough information on natural person shareholders' financials, and grant only small credit lines to them. In contrast, in the exchange market after 2013, securities firms (the

[39] Our data exhibit a scarcity of investment in existing firms within a specific industry, resulting in a prevalence of zero values in $\#Existing$. Therefore, we only report the results for $\#FirmAdded$ and $\#New$ regressions. We also have the same case with the analysis at the shareholder-province-year level that follows.

major lender) strive to make loans to any qualified shareholder, no matter whether the borrower is a natural person or a legal entity.

We exploit the heterogeneity and use natural person and legal entity shareholders as two alternative treatment groups and perform the DiD analysis. Specifically, we decompose the treated private shareholders ($Treat$) into two subgroups: treatment group 1 ($Treat1$) includes natural person shareholders, whereas treatment group 2 ($Treat2$) contains natural-person-controlled legal entity shareholders. We keep the same control group (state-owned shareholders) and replace $Treat \times After$ in Eq. (2) with $Treat1 \times After$ and $Treat2 \times After$. Table 7 reports the estimation results, which are highly consistent with our hypothesis: the coefficient of $Treat1 \times After$ (the top row) is significantly larger than that on $Treat2 \times After$ (the bottom row), suggesting the treatment effect is more pronounced for natural person shareholders relative to legal entity shareholders.[40]

Additional tests. We further show that our results are unlikely to be contaminated by confounding events and the heterogeneity in treatment and control groups, and report the results in Appendix D. First, among potential confounding policy shocks, the most relevant one is the "Mass Entrepreneurship and Innovation" policy, which was called for by the Chinese government in September 2014 and might facilitate entrepreneurial activities. We show that the entrepreneurial activities by listed firms' private shareholders exhibit distinctive patterns (i.e., creating significantly larger firms) in comparison to those by average shareholders in the economy, and the 2014 mass entrepreneurship policy—which hits the bottom distribution in Chinese entrepreneurship—is unlikely to drive our DiD results. Second, the treatment group (private shareholders) and the control group (state-owned shareholders) may differ in other dimensions that might be correlated with the outcome variables and hence bias our estimates. We allow the impacts of shareholder characteristics to vary before and after the 2013 policy shock, and find the causal relation robust to controlling for $Control \times After$ in our DiD specification.

[40] In general, natural person shareholders are smaller in size compared to legal entity shareholders. For example, besides the listed firm, in our sample an average natural person shareholder holds 2.68 firms; in contrast, an average natural-person-controlled legal entity shareholder holds 6.15 firms. In unreported analysis, we allow shareholder characteristics to vary before and after the 2013 policy shock to control for the influence of shareholder size, and find qualitatively similar results.

4.3 Potential Financing Risks

We now discuss two potential risks embedded in entrepreneurial activities financed by share pledging. The margin call risk may impede shareholders' borrowing capacity, and the rollover risk (using short-term pledging loans to finance long-term projects) may also hinder their ability to finance entrepreneurial activities.

4.3.1 Margin call risk

As with any collateralized borrowing, share pledging loans expose shareholders to margin call risk. In pledging transactions, the collateral value (i.e., the market value of pledged shares) must remain above a certain level (typically, 160%) of the loan amount. If not, shareholders may receive margin calls from lenders, who then demand additional collateral or partial repayment of the loan. As this typically occurs exactly when shareholders themselves are experiencing financial distress, margin calls may lead to early liquidation of part of their entrepreneurial projects. In our analysis, since the information on margin call terms at the transaction level is unavailable, we use the industry standard to determine the occurrence of margin calls.[41]

We then test the conjecture that shareholders who have received margin calls are less likely to use share pledging loans to support their entrepreneurial activities at the shareholder-year level.[42] To test this hypothesis, we measure the shareholder's margin call risk experience with the following proxies: $MarginCall_{it}$, which is the number of pledged shares in all pledging transactions that are subject to margin calls during year t; $MarginCallCurrent_{it}$, the number of pledged shares in new pledging transactions initiated in year t and subject to margin calls in that year; and $MarginCallPast_{it}$, the number of pledged shares in pledging transactions initiated before year t and subject to margin calls in the past. The above measures are all scaled by the total shares the shareholder holds at the end of year t. We restrict the sample to shareholders with pledging loans

[41] Specifically, for each pledging transaction, we use the average share price in the most recent month and loan-to-value ratios of 50%, 40%, and 30% for the Mainboard, SME board, and ChiNext board to estimate the loan amount, and assume a margin call threshold of 160% (i.e., when the collateral value falls below 160% of the loan amount). We obtain these cutoffs from leading practitioners (e.g., Haitong Securities, source: https://www.htsec.com/jfimg/colimg/upload/20170531/75441496197258173.pdf). For a recent review on margin rules and margin trading, see Chen et al. (2024).

[42] Pledging shareholders with margin call experiences may engage less in entrepreneurial activities because i) they realize that they may receive margin calls in the future again, and the financing source is less stable than they thought (the learning channel); and ii) margin calls hurt their financial wealth, and they are forced to cut the investment in entrepreneurial projects (the wealth channel).

at each year end and regress the entrepreneurial activity variables on the risk experience measures, with a specification similar to that in Eq. (1).

Indeed, the results in Table 8 suggest that shareholders are less likely to use share pledging loans to finance their entrepreneurial activities if they have the experience of receiving margin calls (columns (1) and (2)). The dampening effect mainly comes from the margin call experience caused by past pledging transactions, as shown in columns (4) and (5). In unreported analysis, we also use the loan amount involving the margin call risk (scaled by the total amount of share pledging loans) to construct the risk experience measures, and find slightly weaker but consistent results. Overall, the above results indicate that margin call risk constitutes an important concern for these pledging shareholder-entrepreneurs.

4.3.2 Rollover risk

In the data, the median maturity of pledging loans is only 1.3 years, a length of time that seems too short to support long-term entrepreneurial projects. How do shareholders manage the maturity mismatch between the short loan maturity on the liability side and the long project maturity on the asset side? First, a common practice is to extend the maturity of share pledging loans upon the agreement between the borrower and the original lender. We retrieve the information on term extensions from the pledging transaction data and find the probability of an extension is 8.9% in our sample;[43] taking this into account, the median and 75^{th} percentile of pledging loan maturities reach 1.5 and 2.1 years. Given a typical project maturity of 5 to 10 years, this practice of term extension seems insufficient to resolve the rollover risk faced by shareholders who take share pledging loans.

Second, and perhaps more importantly, shareholders can use a staggered financing scheme to achieve a much longer "effective" maturity via a series of loans. Overlapping pledging transactions (i.e., the initiation date of the next new pledging transaction occurs earlier than the expiration date of the previous pledging transaction) with the same or different lenders can be arranged to maintain a stable financing source. In our sample, the median number of pledging transactions and the effective loan maturity in a staggered financing scheme are 4.0 and 2.9 years, respectively; and these two statistics at the 75^{th} percentile are 12.0 and 4.1 years.[44] As a result, this staggered

[43] In our analysis, it is not counted as a term extension if the borrower switches to a different lender. That is to say, the probability of a term extension may be underestimated.

[44] Interestingly, in our data, we find that the number of transactions in the financing scheme by a shareholder who

financing scheme provides an effective way to lengthen the maturity of share pledging loans.

4.4 Robustness and Additional Analysis

4.4.1 Evidence on paid-in capital

Our previous analyses focus on the number of firms newly held by pledging shareholders. We now consider the other side of the same coin: shareholders' capital injected into these newly held firms. Specifically, we use the four capital contribution measures ($CapAdded$, $CapFollow$, $CapExisting$, and $CapNew$) defined in Section 2.3.3 as the dependent variables and re-estimate Eq. (2).

Table 9 presents the DiD results that are consistent with our prior findings. For example, columns (1) to (4) report regression results with the capital contribution variables scaled by the national average. After the 2013 reform, the increase in the total capital contribution by a private shareholder exceeds that by a state-owned shareholder by 43.7% of the national average (column (1)). The relative increase mainly comes from newly created firms (34.4% of the national average, column (4)) and is insignificant for her existing portfolio firms (column (2)) and existing firms that she did not hold before (column (3)).[45]

4.4.2 Net entrepreneurial activities

In previous analyses, we define the main entrepreneurship variable, $\#FirmAdded$, by counting the number of add-on firms newly held by a shareholder during each year. Since we did not subtract firms that the shareholder exits during that year, $\#FirmAdded$ tends to be an overestimated measure for entrepreneurial activities. We now replace $\#FirmAdded$ by $\Delta Firm$ (i.e., the difference in the number of firms held by a shareholder between two consecutive years) to eliminate the possible contamination of exiting firms.[46]

engages in entrepreneurial activities is larger than that by a non-engaging shareholder.

[45] It is worth noting that the magnitude of our estimation may be underestimated, as we only count direct investment in the analysis. Pledging shareholders are also able to back their entrepreneurial activities with loans, guarantees, or through third parties. From Section 3.1, we know that shareholders use these methods to finance their listed firms in addition to direct investment.

[46] Shareholders exit firms because i) the firm is liquidated and de-registered with the SAIC, and/or ii) their equity in the firm is sold or transferred to others. In practice, Chinese shareholders are incentivized to de-register nonperforming firms because shareholders with nonperforming, but registered firms are not allowed to register their add-on firms with the SAIC. In our sample, in each year, a shareholder de-registers (sells) about 1.6% (1.2%) of firms that she holds. Note that in our study, we focus on major shareholders of listed firms who hold at least 5% shares, so our statistics may differ from average statistics in the entire economy.

Table 10 reports the DiD estimation results. In column (1), we use the national average of $\#FirmAdded$ to scale $\Delta Firm$. We find the coefficient estimate on $Treat \times After$ is comparable to that from the regression with $\#FirmAdded$ as the dependent variable (column (1), Table 4). We also find results consistent with our earlier results when scaling $\Delta Firm$ with its own national average (column (2)) or running the unscaled regression (column (3)). As these findings suggest, our main results still hold if we measure entrepreneurial activities in a more conservative manner.

4.4.3 Comparison to Guo et al. (2023)

A recent study by Guo et al. (2023) shows that privately owned firms' financial constraints drive their shareholders to pledge shares of listed firms they hold. Though both that study and ours point to large shareholders pledging their shares of listed firms to support activities outside their listed firms, there is an important difference. Our paper pushes a "new firm" story that shareholders finance newly created firms, whereas Guo et al. (2023) implicitly suggest an "old firm" story that shareholders finance other privately owned existing firms. We highlight this difference because it is entrepreneurial activities (i.e., "new firms") that drive economic growth.

In Section 4.4.1, we have shown that the "new firm" channel is much more pronounced in our sample. In our specification, $CapFollow$, shareholders' follow-on investment in firms they already hold, echoes the key research question in Guo et al. (2023). From Table 9, we find that the DiD estimators ($Treat \times After$) for $CapFollow$ are 0.830 in column (2) and 0.071 in column (6), which are only around 1.8%–2.4% of the estimators for $CapNew$ (34.407 in column (4) and 4.031 in column (8)). These estimates suggest that in our sample, shareholders only use a small portion of the pledging funds in firms they already hold; instead, most funds go to firm creation.[47]

[47] Empirically, we find that the "old firm" story yields relatively weak results in our context. We regress $PledgingDummy$ (a dummy variable that equals one if a shareholder has newly pledged shares in a year, and zero otherwise) and $PledgingRatio$ (the percentage of shares newly pledged by a shareholder in a year out of the shares she holds) on the measures of their privately owned firms' financial constraints: $Lag\#Firm$ (the number of firms held by the shareholder) used by Guo et al. (2023). The same set of control variables in Eq. (1) are also included in regressions, with results reported in Table A4, Appendix E. The coefficient estimates on $Lag\#Firm$ are negative and statistically significant, indicating a negative relation between existing portfolio firms' financial constraint and shareholders' pledging activities.

5 Conclusion

The growth of the Chinese share pledging market has been remarkable over the past two decades, with the common perception that Chinese shareholders directly or indirectly use the pledging funds for their listed firms. However, we witnessed an upsurge of entrepreneurship and privately owned enterprises in China during the same time, with some growing into today's business giants. We therefore conjecture that major shareholders of Chinese listed firms, with proven business acumen and strong social connections, have used the share pledging funds to finance their entrepreneurial activities outside the listed firms. To our knowledge, our paper is the first in the literature to study this question from this particular angle.

By piecing together several data sources, including those on share pledging loan transactions of shareholders of listed companies and the universe of firm registration data, we show that share pledging increases the odds that a shareholder creates new firms or invests in existing firms other than the listed firm she already holds. Utilizing the launch of the exchange market in 2013 as a quasi-natural experiment, we are able to show that this positive relation is likely causal. In addition, we find that shareholders are able to take advantage of industry policies and invest in industries encouraged by the government, and they also follow a momentum-like investment strategy that invests in industries with high past growth rates. Finally, the margin call risk hinders shareholders' supporting entrepreneurial activities with share pledging loans; and shareholders are able to use loan term extensions and staggered financing schemes to support long-term entrepreneurial projects with short-term share pledging loans. These results help us understand the real effects of the financial market in terms of facilitating economic growth through financing entrepreneurship.

References

Allen, F., Cai, J., Gu, X., Qian, J., Zhao, L., Zhu, W., 2019. Ownership networks and firm growth: What do forty million companies tell us about the Chinese economy? University of Pennsylvania, Working Paper .

Allen, F., Cai, J., Gu, X., Qian, J., Zhao, L., Zhu, W., 2022. Centralization or decentralization? The evolution of state-ownership in China. University of Pennsylvania, Working paper .

Allen, F., Qian, J., Qian, M., 2005. Law, finance, and economic growth in China. Journal of Financial Economics 77, 57–116.

Amstad, M., He, Z., 2020. Chinese Bond Markets and Interbank Market. Princeton University Press.

Andersen, S., Nielsen, K.M., 2012. Ability or finances as constraints on entrepreneurship? Evidence from survival rates in a natural experiment. The Review of Financial Studies 25, 3684–3710.

Bai, C.E., Hsieh, C.T., Song, Z.M., Wang, X., 2020. The rise of state-connected private owners in China. Tsinghua University, Working paper .

Bai, C.E., Jia, R., Li, H., Wang, X., 2021. Entrepreneurial reluctance: Talent and firm creation in China. Tsinghua University, Working Paper .

Bian, J., Da, Z., He, Z., Lou, D., Shue, K., Zhou, H., 2021. Margin trading and leverage management. University of Chicago, Working Paper .

Blanchflower, D.G., Oswald, A.J., 1998. What makes an entrepreneur? Journal of Labor Economics 16, 26–60.

Brandt, L., Dai, R., Kambourov, G., Storesletten, K., Zhang, X., 2022. Serial entrepreneurship in China. CEPR Discussion Paper No. DP17131 .

Brandt, L., Li, H., 2003. Bank discrimination in transition economies: Ideology, information, or incentives? Journal of Comparative Economics 31, 387–413.

Brandt, L., Van Biesebroeck, J., Wang, L., Zhang, Y., 2017. WTO accession and performance of Chinese manufacturing firms. American Economic Review 107, 2784–2820.

Carpenter, J.N., Lu, F., Whitelaw, R.F., 2021. The real value of China's stock market. Journal of Financial Economics 139, 679–696.

Chan, K., Chen, H.K., Hu, S., Liu, Y.J., 2018. Share pledges and margin call pressure. Journal of Corporate Finance 52, 96–117.

Chang, J.J., Meng, Q., Ni, X., 2022. A tale of riskiness: The real effects of share pledging on the Chinese stock market. Pacific-Basin Finance Journal 73, 101754.

Chen, H., Chen, Z., He, Z., Liu, J., Xie, R., 2023a. Pledgeability and asset prices: Evidence from the chinese bond markets. The Journal of Finance 78, 2563–2620.

Chen, K., Gao, H., Higgins, P., Waggoner, D.F., Zha, T., 2023b. Monetary stimulus amidst the infrastructure investment spree: Evidence from China's loan-level data. The Journal of Finance 78, 1147–1204.

Chen, K., Ren, J., Zha, T., 2018. The nexus of monetary policy and shadow banking in China. American Economic Review 108, 3891–3936.

Chen, Z., He, Z., Liu, C., 2020. The financing of local government in China: Stimulus loan wanes and shadow banking waxes. Journal of Financial Economics 137, 42–71.

Chen, Z., He, Z., Wei, W., 2024. Margin rules and margin trading: Past, present, and implications. Annual Review of Financial Economics 16.

Cheng, Z., Liu, Z., Sun, Y., 2021. Share pledging and financial constraints in China. Accounting & Finance 61, 4147–4189.

Dai, R., Mookherjee, D., Munshi, K., Zhang, X., 2020. The community origins of private enterprise in China. Boston University, Working Paper .

DeJong, D.V., Liao, K., Xie, D., 2020. Controlling shareholder's share pledging and accounting manipulations. Tsinghua University, Working Paper .

Dou, Y., Masulis, R.W., Zein, J., 2019. Shareholder wealth consequences of insider pledging of company stock as collateral for personal loans. The Review of Financial Studies 32, 4810–4854.

Fang, H., Li, M., Wu, Z., Zhang, Y., 2023. Reluctant entrepreneurs: Evidence from China's SOE reform. National Bureau of Economic Research, Working paper .

Goldstein, I., Liu, B., Yang, L., 2024. Market feedback: Evidence from the horse's mouth. University of Pennsylvania, Working Paper .

Graham, J.R., Harvey, C.R., 2001. The theory and practice of corporate finance: Evidence from the field. Journal of Financial Economics 60, 187–243.

Greif, A., Tabellini, G., 2017. The clan and the corporation: Sustaining cooperation in China and Europe. Journal of Comparative Economics 45, 1–35.

Guo, K., Ke, B., Tang, S., 2023. Private firms' financial constraints and share pledging by controlling shareholders of publicly listed firms: Evidence from China. Journal of Corporate Finance 80, 102393.

Harding, J.P., Rosenthal, S.S., 2017. Homeownership, housing capital gains and self-employment. Journal of Urban Economics 99, 120–135.

He, C., Lu, J., Qian, H., 2019. Entrepreneurship in China. Small Business Economics 52, 563–572.

He, Z., Wei, W., 2023. China's financial system and economy: A review. Annual Review of Economics 15, 451–483.

Hu, G.X., Wang, J., 2022. A review of China's financial markets. Annual Review of Financial Economics 14, 465–507.

Huang, J.Z., Liu, B., Shi, Z., 2023. Determinants of short-term corporate yield spreads: Evidence from the commercial paper market. Review of Finance 27, 539–579.

Huang, Y., 2012. How did China take off? Journal of Economic Perspectives 26, 147–170.

Kao, L., Chiou, J.R., Chen, A., 2004. The agency problems, firm performance and monitoring mechanisms: The evidence from collateralised shares in Taiwan. Corporate Governance: An International Review 12, 389–402.

King, R.G., Levine, R., 1993. Finance, entrepreneurship and growth. Journal of Monetary Economics 32, 513–542.

La Porta, R., Lopez-de Silanes, F., Shleifer, A., 1999. Corporate ownership around the world. The Journal of Finance 54, 471–517.

Larcker, D.F., Tayan, B., 2010. Pledge (and hedge) allegiance to the company. Rock Center for Corporate Governance at Stanford University Closer Look Series: Topics, Issues and Controversies in Corporate Governance No. CGRP-11 , 1–6.

Lerner, J., Li, J., Liu, T., 2023. Learning by investing: Entrepreneurial spillovers from venture capital. National Bureau of Economic Research, Working paper .

Li, F., Qian, J., Wang, H., Zhu, J.L., 2023. Stock pledged loans and market crash risk: Evidence from china. The Journal of Finance and Data Science 9, 100104.

Lin, Y., Sulaeman, J., Yan, J., Zhang, J., 2023. Expanding footprints: The impact of passenger transportation on corporate locations. Review of Finance 27, 1119–1154.

Lu, J., Tao, Z., 2010. Determinants of entrepreneurial activities in China. Journal of Business Venturing 25, 261–273.

Lu, Y., Luo, R., Zhu, F., 2024. Institutional investors' discretionary decisions, controlling shareholders' share pledging, and their corporate governance effects. Economic Research Journal (in Chinese) 60, 111–129.

Pan, X., Qian, M., 2024. Firm financing through insider stock pledges. Review of Finance 28, 621–659.

Pang, C., Wang, Y., 2020. Stock pledge, risk of losing control and corporate innovation. Journal of Corporate Finance 60, 1015–1034.

Rajan, R., Zingales, L., 1998. Financial development and growth. American Economic Review 88, 559–586.

Schmalz, M.C., Sraer, D.A., Thesmar, D., 2017. Housing collateral and entrepreneurship. The Journal of Finance 72, 99–132.

Shi, X., Xi, T., Zhang, X., Zhang, Y., 2021. "Moving umbrella": Bureaucratic transfers and the comovement of interregional investments in China. Journal of Development Economics 153, 102–717.

Shi, Y., Li, J., Liu, R., 2023. Financing constraints and share pledges: Evidence from the share pledge reform in China. Journal of Corporate Finance 78, 102337.

Singh, P.P., 2018. The inside job: Share pledges by insiders and earnings management. University of Illinois at Urbana-Champaign, Working paper .

Song, Z., Storesletten, K., Zilibotti, F., 2011. Growing like China. American Economic Review 101, 196–233.

Song, Z., Xiong, W., 2018. Risks in China's financial system. Annual review of financial economics 10, 261–286.

Yeh, Y.H., Ko, C., Su, Y.H., 2003. Ultimate control and expropriation of minority shareholders: New evidence from Taiwan. Academia Economic Papers 31, 263–299.

Zhu, B., Xia, X., Zheng, X., 2021. One way out of the share pledging quagmire: Evidence from mergers and acquisitions. Journal of Corporate Finance 71, 102–120.

Zong, J., Zhuang, Y., Li, X., 2023. Pledgee's dilemma: Stock fire sales and peer risk contagion. Management World (in Chinese) 39, 77–99.

Table 1: Summary statistics

This table reports the summary statistics on share pledging transactions, entrepreneurial activities, and shareholders. The sample consists of 23,123 shareholder-year observations between 2009 and 2018, which covers 1,499 natural person shareholders, 2,107 natural-person-controlled legal entity shareholders, and 903 state-controlled legal entity shareholders.

	Mean	STD	P5	P25	Median	P75	P95
Panel A: Share pledging transactions							
Pledging dummy	0.34	0.47	0.00	0.00	0.00	1.00	1.00
Shares newly pledged out of shares held (%)	17.08	30.5	0.00	0.00	0.00	24.1	93.65
Shares newly pledged out of total shares (%)	3.97	7.97	0.00	0.00	0.00	4.43	22.37
Loans from pledging (million RMB)	140.38	351.75	0.00	0.00	0.00	95.08	816.61
Maturity (years)	1.59	0.88	0.65	1.00	1.32	2.00	3.00
Margin call (%)	17.94	29.3	0.00	0.00	0.00	27.28	94.75
Panel B: Entrepreneurial activities by shareholders							
No. of add-on firms	0.68	1.30	0.00	0.00	0.00	1.00	3.00
- New firms	0.55	1.09	0.00	0.00	0.00	1.00	3.00
- Existing firms	0.12	0.40	0.00	0.00	0.00	0.00	1.00
No. of add-on firms scaled by the national average	5.06	9.74	0.00	0.00	0.00	7.61	24.56
Amount of new paid-in capital (million RMB)	63.91	233.48	0.00	0.00	0.00	10.00	363.6
- Follow-on investment in existing firms	6.35	40.21	0.00	0.00	0.00	0.00	4.90
- New investment in existing firms	8.13	45.77	0.00	0.00	0.00	0.00	20.00
- Investment in new firms	49.43	205.42	0.00	0.00	0.00	3.00	227.70
Amount scaled by the national average	462.06	1698.50	0.00	0.00	0.00	71.46	2504.06
Panel C: Shareholders and their listed firms							
Shareholder financial wealth (billion RMB)	2.94	5.93	0.13	0.41	1.00	2.55	12.54
Shareholder financial wealth growth potential	2.11	1.31	1.04	1.31	1.68	2.4	4.65
Firm market capitalization (billion RMB)	10.57	16.78	1.26	2.65	5.09	10.7	38.51
Firm shares outstanding (million shares)	529.89	851.18	25	91	263.74	591.49	1887.73
Firm dividend dummy	0.75	0.43	0.00	1.00	1.00	1.00	1.00

Table 2: Usages of share pledging funds disclosed by listed firms

This table summarizes different usages of share pledging funds from 2007 to 2019, according to listed firms' public disclosure. Panels A, B, and C summarize the number of transactions, the number of firms involved, and the dollar amount (in billion RMB) by different usages. For each year and each category, the percentage fractions of total observations are given in parentheses.

Year	No. Obs/Amount	Used by listed firms				Other purposes (%)
		Subtotal (%)	Guarantee (%)	SEO (%)	Loan (%)	
Panel A: No. of transactions						
2007	502	76 (15.1)	49 (9.8)	18 (3.6)	13 (2.6)	426 (84.9)
2008	703	106 (15.1)	81 (11.5)	14 (2.0)	19 (2.7)	597 (84.9)
2009	877	104 (11.9)	71 (8.1)	9 (1.0)	28 (3.2)	773 (88.1)
2010	969	126 (13.0)	64 (6.6)	30 (3.1)	39 (4.0)	843 (87.0)
2011	1495	129 (8.6)	62 (4.1)	22 (1.5)	50 (3.3)	1366 (91.4)
2012	1901	172 (9.0)	84 (4.4)	53 (2.8)	42 (2.2)	1729 (91.0)
2013	2596	257 (9.9)	69 (2.7)	115 (4.4)	88 (3.4)	2339 (90.1)
2014	3951	500 (12.7)	48 (1.2)	298 (7.5)	166 (4.2)	3451 (87.3)
2015	6403	816 (12.7)	55 (0.9)	600 (9.4)	184 (2.9)	5587 (87.3)
2016	9839	915 (9.3)	119 (1.2)	572 (5.8)	263 (2.7)	8924 (90.7)
2017	12331	781 (6.3)	125 (1.0)	351 (2.8)	322 (2.6)	11550 (93.7)
2018	13646	605 (4.4)	171 (1.3)	73 0.5)	369 (2.7)	13041 (95.6)
2019	6806	238 (3.5)	136 (2.0)	39 (0.6)	67 (1.0)	6568 (96.5)
Avg. Percent	100%	7.8%	1.8%	3.5%	2.7%	92.2%
Panel B: No. of firms						
2007	239	41 (17.2)	28 (11.7)	9 (3.8)	8 (3.3)	198 (82.8)
2008	315	56 (17.8)	41 (13.0)	9 (2.9)	12 (3.8)	259 (82.2)
2009	361	56 (15.5)	36 (10.0)	6 (1.7)	18 (5.0)	305 (84.5)
2010	401	64 (16.0)	36 (9.0)	15 (3.7)	19 (4.7)	337 (84.0)
2011	570	69 (12.1)	36 (6.3)	15 (2.6)	21 (3.7)	501 (87.9)
2012	698	82 (11.7)	46 (6.6)	23 (3.3)	21 (3.0)	616 (88.3)
2013	897	107 (11.9)	36 (4.0)	45 (5.0)	34 (3.8)	790 (88.1)
2014	1050	193 (18.4)	31 (3.0)	115 (11.0)	56 (5.3)	857 (81.6)
2015	1400	284 (20.3)	36 (2.6)	202 (14.4)	63 (4.5)	1116 (79.7)
2016	1642	285 (17.4)	57 (3.5)	174 (10.6)	79 (4.8)	1357 (82.6)
2017	1991	227 (11.4)	68 (3.4)	94 (4.7)	78 (3.9)	1764 (88.6)
2018	1973	153 (7.8)	70 (3.5)	27 (1.4)	61 (3.1)	1820 (92.2)
2019	1676	118 (7.0)	76 (4.5)	18 (1.1)	25 (1.5)	1558 (93.0)
Avg. Percent	100%	14.2%	6.2%	5.1%	3.9%	85.8%
Panel C: Pledging funds (in billion RMB)						
2007	123.28	19.20 (15.6)	10.42 (8.5)	6.74 (5.5)	2.49 (2.0)	104.08 (84.4)
2008	107.10	15.79 (14.7)	11.71 (10.9)	2.47 (2.3)	2.56 (2.4)	91.30 (85.3)
2009	177.81	20.23 (11.4)	11.57 (6.5)	1.17 (0.7)	8.44 (4.7)	157.58 (88.6)
2010	202.84	27.46 (13.5)	10.24 (5.0)	10.06 (5.0)	7.82 (3.9)	175.38 (86.5)
2011	261.18	24.64 (9.4)	9.28 (3.6)	5.82 (2.2)	10.13 (3.9)	236.54 (90.6)
2012	269.07	23.31 (8.7)	9.45 (3.5)	7.54 (2.8)	7.19 (2.7)	245.76 (91.3)
2013	351.10	33.59 (9.6)	7.65 (2.2)	16.53 (4.7)	11.58 (3.3)	317.52 (90.4)
2014	555.97	73.33 (13.2)	6.59 (1.2)	42.73 (7.7)	26.77 (4.8)	482.64 (86.8)
2015	1352.97	181.42 (13.4)	12.02 (0.9)	141.26 (10.4)	33.01 (2.4)	1171.56 (86.6)
2016	1792.75	195.66 (10.9)	26.34 (1.5)	110.78 (6.2)	64.89 (3.6)	1597.09 (89.1)
2017	1606.78	133.45 (8.3)	30.18 (1.9)	51.35 (3.2)	55.85 (3.5)	1473.33 (91.7)
2018	1005.19	78.91 (7.9)	19.02 (1.9)	11.75 (1.2)	54.24 (5.4)	926.28 (92.1)
2019	772.40	37.50 (4.9)	18.67 (2.4)	6.71 (0.9)	12.30 (1.6)	734.90 (95.1)
Avg. Percent	100%	10.1%	2.1%	4.84%	3.5%	89.9%

Table 3: Share pledging and entrepreneurial activities

This table reports results of the OLS regression of a shareholder's entrepreneurial activities on pledging variables at the shareholder-year level. The sample period is 2009 to 2018. Columns (1) to (3) report results with entrepreneurial activities variables scaled by the national average as the dependent variables. Columns (4) to (6) report results with unscaled entrepreneurial activities variables as the dependent variables. See Appendix A for variable definitions. t-statistics reported in parentheses are adjusted for heteroscedasticity and clustering at the shareholder level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Using PledgingDummy to measure share pledging

	Scaled			*Unscaled*		
	(1)	(2)	(3)	(4)	(5)	(6)
	#FirmAdded	*#New*	*#Existing*	*#FirmAdded*	*#New*	*#Existing*
PledgingDummy	0.885***	0.653***	0.216***	0.135***	0.099***	0.031***
	(4.96)	(4.32)	(3.36)	(5.53)	(4.69)	(3.87)
LnFinWealth	0.812***	0.760***	0.031	0.105***	0.100***	0.006
	(4.02)	(4.57)	(0.41)	(3.82)	(4.30)	(0.65)
FinWealthGwt	0.142*	0.125*	0.016	0.025**	0.023***	0.002
	(1.79)	(1.85)	(0.52)	(2.47)	(2.61)	(0.64)
DivDum	0.070	0.030	0.011	0.007	0.001	-0.000
	(0.36)	(0.19)	(0.16)	(0.25)	(0.06)	(-0.05)
GDPPerCapita	0.154	0.186**	-0.020	0.018	0.022*	-0.002
	(1.42)	(1.96)	(-0.50)	(1.19)	(1.65)	(-0.34)
AvgSalary	0.360**	0.263*	0.084	0.025	0.024	0.002
	(2.09)	(1.82)	(1.38)	(1.12)	(1.19)	(0.22)
LnBankBranch	-0.325	-0.662	0.113	-0.112	-0.120	-0.032
	(-0.28)	(-0.68)	(0.28)	(-0.67)	(-0.82)	(-0.61)
Constant	-13.888	-10.938	-0.988	-1.097	-1.090	0.223
	(-1.56)	(-1.46)	(-0.31)	(-0.86)	(-0.98)	(0.54)
Shareholder FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	20379	20379	20379	20379	20379	20379
Adj. R^2	0.450	0.409	0.234	0.440	0.403	0.216

Panel B: Using PledgingRatio to measure share pledging

	Scaled			*Unscaled*		
	(1)	(2)	(3)	(4)	(5)	(6)
	#FirmAdded	*#New*	*#Existing*	*#FirmAdded*	*#New*	*#Existing*
PledgingRatio	0.012***	0.008***	0.004***	0.002***	0.001***	0.001***
	(4.86)	(3.95)	(3.61)	(5.13)	(4.06)	(3.97)
LnFinWealth	0.867***	0.804***	0.041	0.114***	0.107***	0.008
	(4.29)	(4.84)	(0.56)	(4.16)	(4.61)	(0.85)
FinWealthGwt	0.143*	0.126*	0.016	0.025**	0.023***	0.002
	(1.80)	(1.86)	(0.54)	(2.48)	(2.61)	(0.66)
DivDum	0.062	0.023	0.010	0.005	0.000	-0.001
	(0.32)	(0.15)	(0.14)	(0.20)	(0.01)	(-0.07)
GDPPerCapita	0.159	0.191**	-0.018	0.019	0.023*	-0.001
	(1.47)	(2.01)	(-0.47)	(1.25)	(1.70)	(-0.30)
AvgSalary	0.345**	0.251*	0.081	0.023	0.022	0.001
	(2.01)	(1.74)	(1.33)	(1.02)	(1.10)	(0.15)
LnBankBranch	-0.302	-0.649	0.122	-0.110	-0.119	-0.030
	(-0.26)	(-0.66)	(0.31)	(-0.65)	(-0.81)	(-0.59)
Constant	-15.063*	-11.830	-1.253	-1.280	-1.228	0.183
	(-1.70)	(-1.58)	(-0.39)	(-1.01)	(-1.11)	(0.45)
Shareholder FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	20379	20379	20379	20379	20379	20379
Adj. R^2	0.450	0.409	0.234	0.440	0.402	0.216

Table 4: DiD testing results

This table reports DiD testing results based on the 2013 policy shock. The sample period is 2009-2018. Columns (1) to (3) report results of regressions with entrepreneurial activities variables scaled by the national average as the dependent variables. Columns (4) to (6) report results with unscaled entrepreneurial activities variables as the dependent variables. Control variables are as those in Table 3. See Appendix A for variable definitions. t-statistics reported in parentheses are adjusted for heteroscedasticity and clustering at the shareholder level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Scaled			*Unscaled*		
	(1)	(2)	(3)	(4)	(5)	(6)
	#FirmAdded	*#New*	*#Existing*	*#FirmAdded*	*#New*	*#Existing*
$Treat \times After$	1.283***	1.094***	0.101	0.189***	0.159***	0.017
	(3.55)	(3.54)	(0.78)	(3.74)	(3.57)	(1.02)
Controls	Y	Y	Y	Y	Y	Y
Shareholder FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	14717	14717	14717	14717	14717	14717
Adj. R^2	0.429	0.393	0.213	0.429	0.395	0.204

Table 5: Investing in risky, high-tech, and fast-growing industries

This table reports DiD testing results on shareholders' entrepreneurial activities in risky, high-tech, and fast-growing industries. The sample period is from 2009 to 2018. In columns (1) to (5), the dependent variables are scaled by the national average of each corresponding industry category. Columns (6) to (10) report unscaled results. Control variables are as those in Table 3. See Appendix A for variable definitions. t-statistics reported in parentheses are adjusted for heteroscedasticity and clustering at the shareholder level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Scaled					*Unscaled*				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	#Risky	*#HighTech*	*#Other*	*#HighGwt*	*#LowGwt*	*#Risky*	*#HighTech*	*#Other*	*#HighGwt*	*#LowGwt*
$Treat * After$	2.510	2.452*	1.149***	1.102***	0.116	0.011	0.024*	0.153***	0.132***	0.022
	(1.46)	(1.81)	(3.39)	(4.02)	(0.92)	(1.23)	(1.89)	(3.59)	(3.78)	(1.44)
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Shareholder FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	14717	14717	14717	14717	14717	14717	14717	14717	14717	14717
Adj. R^2	0.150	0.193	0.382	0.332	0.234	0.144	0.192	0.385	0.334	0.219

Table 6: DiD testing results with more fixed effects

This table reports DiD testing results with more fixed effects included in Eq. (2). The sample period is 2009 to 2018. Panel A reports results of regressions at the shareholder-industry-year level with entrepreneurial activities in an industry in one specific year as the dependent variables. Panel B reports results of regressions at the shareholder-province-year level with entrepreneurial activities in a province in one specific year as the dependent variables. In columns (1) and (2), the dependent variables are scaled by the industry average; in columns (5) and (6), the dependent variables are scaled by the provincial average. Control variables are as those in Table 3. See Appendix A for variable definitions. t-statistics reported in parentheses are adjusted for heteroscedasticity and clustering at the shareholder level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Panel A: Industry × year fixed effects				*Panel B: Province × year fixed effects*			
	Scaled		*Unscaled*		*Scaled*		*Unscaled*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	#FirmAdded	*#New*	*#FirmAdded*	*#New*	*#FirmAdded*	*#New*	*#FirmAdded*	*#New*
$Treat \times After$	0.604**	0.471**	0.007***	0.006***	0.425***	0.302***	0.003***	0.003***
	(2.06)	(2.28)	(3.67)	(3.44)	(3.17)	(3.14)	(3.33)	(2.96)
Controls	Y	Y	Y	Y	Y	Y	Y	Y
Shareholder FE	Y	Y	Y	Y	Y	Y	Y	Y
Ind./Prv. × Year FE	Y	Y	Y	Y	Y	Y	Y	Y
N	279623	279623	279623	279623	456227	456227	456227	456227
Adj. R^2	0.071	0.069	0.102	0.092	0.051	0.043	0.054	0.044

Table 7: DiD testing results with alternative treatment groups

This table reports DiD testing results based on the 2013 policy shock. The sample period is 2009-2018. Columns (1) to (3) report results of regressions with entrepreneurial activities variables scaled by the national average as the dependent variables. Columns (4) to (6) report results with unscaled entrepreneurial activities variables as the dependent variables. Two treatment groups are included in the regression simultaneously. Control variables are as those in Table 3. See Appendix A for variable definitions. t-statistics reported in parentheses are adjusted for heteroscedasticity and clustering at the shareholder level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Scaled			*Unscaled*		
	(1)	(2)	(3)	(4)	(5)	(6)
	#FirmAdded	*#New*	*#Existing*	*#FirmAdded*	*#New*	*#Existing*
$Treat1 \times After$	1.690***	1.726***	-0.049	0.290***	0.276***	0.006
	(4.57)	(5.44)	(-0.38)	(5.70)	(6.15)	(0.36)
$Treat2 \times After$	1.048**	0.731**	0.188	0.131**	0.092*	0.023
	(2.58)	(2.11)	(1.28)	(2.30)	(1.83)	(1.25)
Controls	Y	Y	Y	Y	Y	Y
Shareholder FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	14717	14717	14717	14717	14717	14717
Adj. R^2	0.430	0.394	0.213	0.429	0.396	0.204
Diff. in Coef.	0.642**	0.995***	-0.237**	0.159***	0.184***	-0.017

Table 8: Margin call risk in financing entrepreneurial activities by share pledging

This table reports results of regressions of shareholders' entrepreneurial activities on the margin call risk of share pledging financing. The sample includes shareholders with existing share pledging at each year-end during 2009 to 2018. Control variables are as those in Table 3. See Appendix A for variable definitions. t-statistics reported in parentheses are adjusted for heteroscedasticity. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	#FirmAdded	*#New*	*#Existing*	*#FirmAdded*	*#New*	*#Existing*
MarginCall	-0.009*	-0.008**	-0.001			
	(-1.93)	(-2.13)	(-0.60)			
MarginCallPast				-0.013**	-0.010**	-0.002
				(-2.21)	(-2.21)	(-1.00)
MarginCallCurrent				-0.003	-0.004	0.000
				(-0.52)	(-0.81)	(0.01)
Controls	Y	Y	Y	Y	Y	Y
Shareholder FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	7909	7909	7909	7909	7909	7909
Adj. R^2	0.374	0.341	0.188	0.374	0.341	0.188

Table 9: Evidence on capital allocation

This table reports DiD regression results on paid-in capital contributed by shareholders. The sample period is from 2009 to 2018. Columns (1) to (4) report results of regressions with entrepreneurial activities variables scaled by the national average as the dependent variables. Columns (5) to (8) report results with unscaled entrepreneurial activities variables as the dependent variables. Control variables are as those in Table 3. See Appendix A for variable definitions. t-statistics reported in parentheses are adjusted for heteroscedasticity and clustering at the shareholder level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Scaled				*Unscaled*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	CapAdded	*CapFollow*	*CapExisting*	*CapNew*	*CapAdded*	*CapFollow*	*CapExisting*	*CapNew*
$Treat \times After$	43.659***	0.830	2.843	34.407**	4.420**	0.071	0.318	4.031**
	(2.61)	(0.60)	(1.27)	(2.29)	(2.23)	(0.36)	(1.12)	(2.17)
Controls	Y	Y	Y	Y	Y	Y	Y	Y
Shareholder FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
N	14717	14717	14717	14717	14717	14717	14717	14717
Adj. R^2	0.185	0.162	0.094	0.164	0.202	0.159	0.098	0.167

Table 10: The influences of exiting firms

This table reports DiD testing results using the change in the number of firms held by a shareholder as the dependent variable. The sample period is 2009 to 2018. Column (1) to (3) report results of regressions with the entrepreneurial activities variables scaled by the national average of $\#FirmAdded$ or by the national average of $\Delta Firm$, and the unscaled variable being the dependent variables, respectively. Control variables are as those in Table 3. See Appendix A for variable definitions. t-statistics reported in parentheses are adjusted for heteroscedasticity and clustering at the shareholder level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Scaled by $\overline{\#FirmAdded}$	*Scaled by* $\overline{\Delta Firm}$	*Unscaled*
$Y = \Delta Firm$	(1)	(2)	(3)
$Treat \times After$	1.693***	1.317***	0.161***
	(3.39)	(3.18)	(2.72)
Controls	Y	Y	Y
Shareholder FE	Y	Y	Y
Year FE	Y	Y	Y
N	13700	13700	13700
Adj. R^2	0.172	0.205	0.213

Appendix

A Variable Definitions

Table A1: Variable definitions

This table provides definitions of variables.

Variable	Definition
#FirmAdded	The number of add-on firms a shareholder newly adds in a year, including *#New* and *#Existing*.
#New	The number of firms newly created by a shareholder in a year.
#Existing	The number of existing firms in which a shareholder makes her first investment. The existing firms refer to firms that were already established by someone else but newly invested in by the shareholder.
#Risky	The number of add-on firms a shareholder newly adds in a year in risky industries. Risky industries are defined following Chen et al. (2018).
#HighTech	The number of add-on firms a shareholder newly adds in a year in high-tech industries. High-tech industries are defined by the National Bureau of Statistics of China.
#Other	The number of add-on firms a shareholder newly adds in a year in non-risky and non-high-tech industries.
#HighGwt	The number of add-on firms a shareholder newly adds in industries with above-median growth rates of value-added in the past three years, restricted to other industries.
#LowGwt	The number of add-on firms a shareholder newly adds in industries with below-median growth rates of value-added in the past three years, restricted to other industries.
CapAdded	The ratio of new paid-in capital that a shareholder invested in firms other than the listed firm to her total financial wealth, including *CapFollow*, *CapExisting*, and *CapNew*.
CapFollow	The ratio of new paid-in capital that a shareholder invests in firms in which she is already a shareholder, to total her financial wealth.
CapExisting	The ratio of new paid-in capital that a shareholder invests in existing firms in which she was not previously a shareholder, to her total financial wealth.
CapNew	The amount of new paid-in capital that a shareholder invests in newly created firms, to her total financial wealth.

Table A1: Variable definitions (Cont.)

Variable	Definition
$\Delta Firm$	The difference in the number of firms held by a shareholder between two consecutive years.
PledgingDummy	A dummy variable that equals one if a shareholder has newly pledged shares in a year, and zero otherwise.
PledgingRatio	The percentage of shares newly pledged by a shareholder in a year out of the shares she holds.
Treat	A dummy variable that equals one if a shareholder is a private shareholder, and zero otherwise.
Treat1	A dummy variable that equals one if a shareholder is a natural person, and zero otherwise.
Treat2	A dummy variable that equals one if a shareholder is a legal entity that is ultimately controlled by a natural person, and zero otherwise.
After	A dummy variable that equals one for year 2013 or later, and zero otherwise.
LnFinWealth	The natural logarithm of the market value of shares of all listed firms held by a shareholder at the end of each year.
FinWealthGwt	The weighted average of all listed firms' Tobin's Q held by a shareholder. The weight is the market value of shares in each firm held by the shareholder to total market value of shares she held.
DivDum	The value-weighted average of the cash dividend-paying dummy of listed firms held by a shareholder.
GDPPerCapita	GDP per capita in the city where a shareholder resides. For the legal entity shareholder, we use the entity's registered address to infer its residence. For the natural person shareholder, we use the listed firm's registered address to infer her residence. If a natural person shareholder owns shares in multiple listed firms, we use information from the listed firm with the longest history.
AvgSalary	The average salary in the city where a shareholder resides (unit: 10,000 RMB).
LnBankBranch	The natural logarithm of the number of commercial bank branches in the city where a shareholder resides.
MarginCall	The proportion of pledged shares subject to a margin call during a year relative to the total shares held by the shareholder at the end of that year.
MarginCallCurrent	The proportion of pledged shares initiated in a year and subject to margin call risk during that year relative to the total shares held by the shareholder at the end of that year.
MarginCallPast	The proportion of pledged shares initiated before a year and subject to margin call risk during that year relative to the total shares held by the shareholder at the end of that year.
Lag#Firm	The number of firms financed by a shareholder in the previous year.

B Procedure for Determining the Ultimate Controller

We explain how we use the firm registration data discussed in Section 2.3.3 to identify the ultimate controller of any legal entity shareholder (of a listed firm). Take any legal entity shareholder denoted by E_0^l. From the firm registration data, we find the shareholders of E_0^l, who could be three types: a legal entity shareholder E_1^l, a natural person shareholder E_1^n, and a state shareholder E_1^s (for exhibition purposes, we assume each agent for each type). We are interested in identifying whether the legal entity shareholder E_0^l is controlled by the state or a natural person. The procedure, shown in Figure A1, is as follows:

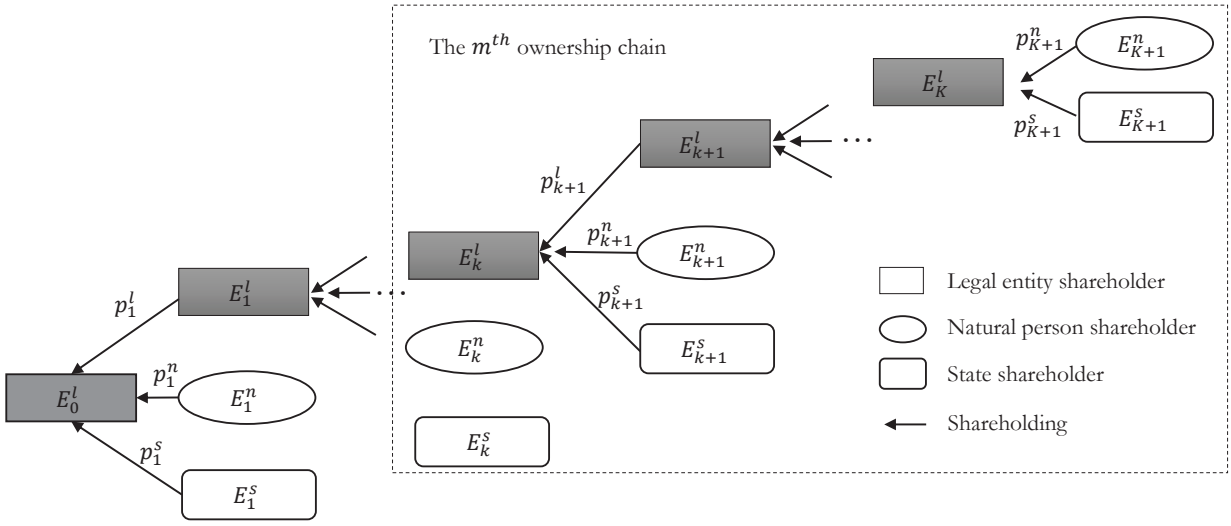


Figure A1: **Procedure for determining the ultimate controller.**

1. The percentage of shares held by these shareholders is p_1^l, p_1^n, and p_1^s, respectively.

   (a) The ownership of natural person (n) and state (s) is ultimate; and

   (b) we continue to search for the ultimate controller of the legal entity E_1^l (who could be either listed or unlisted).

2. We fix an ownership chain indexed by $m \in M$, with a total of $K^{(m)}+1$ layers with layer $k^{(m)} \in \left\{2, \cdots, K^{(m)}+1\right\}$. For simplicity, we subsume the index m in the following steps:

   (a) In any layer k, we repeat step 1 for the legal entity shareholder E_k^l and find her three shareholders in the next layer: a legal entity shareholder E_{k+1}^l, a natural person share-

holder E^n_{k+1}, and a state shareholder E^s_{k+1}. Their shareholdings are p^l_{k+1}, p^n_{k+1}, p^s_{k+1}, respectively; again, the ownership of natural person (n) and state (s) is ultimate.

(b) This algorithm stops until we find the legal entity shareholder E^l_K, who only has a natural person shareholder E^n_{K+1} and/or a state shareholder E^s_{K+1} with shares p^n_{K+1} and/or p^s_{K+1}.

(c) We now calculate the ownership structure of E^l_0. As shown in Figure A1, for any layer $k \in \{1, \cdots, K+1\}$, we compute the controlling ownership of c^n_k and c^s_k. The effective share of the k^{th}-layer natural person shareholder is $c^n_k \equiv p^n_k \cdot \prod_{i=1}^{k-1} p^l_i$; similarly, the effective share of the k^{th}-layer state shareholder is $c^s_k \equiv p^s_k \cdot \prod_{i=1}^{k-1} p^l_i$.

(d) If there are identical shareholders (natural person or state) in different steps, their shares will be combined in calculation.

3. We repeat the same exercise for all other chains indexed by m. If there are identical shareholders (natural person or state) in different chains, their shares will be combined further in calculation.

4. From steps 1-3 we obtain a collection of $\{c^n_k, c^s_k\}$ for $k \in \left\{1, \cdots, K^{(m)}+1\right\}$, $\forall m \in M$. This gives the percentage shares of various natural person and state shareholders along the ownership network associated with E^l_0.

5. We search the maximum of $c^* = \max_{m \in M, k \in \left\{1, \cdots, K^{(m)}+1\right\}} \{c^n_k, c^s_k\}$ to identify the largest ultimate controller of E^l_0. Following La Porta et al. (1999), if the largest ultimate shareholder is a natural person *and* the maximum share c^* is no less than 10%, then we classify E^l_0 as being ultimately controlled by a natural person and hence included in the sample. Otherwise, we remove E^l_0 from the sample. (Our result is robust to including E^l_0 whose largest ultimate shareholder is a natural person and $c^* < 10\%$.)

C Fund Usages by Natural Person Shareholders

C.1 Evidence Based on Firm Disclosure

Table A2: Usages of share pledging funds by natural person shareholders and natural-person-controlled legal entity shareholders, disclosed by listed firms

This table summarizes different usages of share pledging funds by listed firms' natural person major shareholders and legal entity shareholders controlled by natural persons from 2007 to 2019, according to listed firms' public disclosure. Panels A, B, and C summarize the number of transactions, the number of firms involved, and the dollar amount (in billion RMB) by different usages. For each year and each category, the percentage fractions out of total observations are shown in parentheses.

Year	No. Obs/Amount	Used by listed firms				Other purposes (%)
		Subtotal (%)	Guarantee (%)	SEO (%)	Loan (%)	
Panel A: No. of transactions						
2007	220	46 (20.9)	28 (12.7)	12 (5.5)	10 (4.5)	174 (79.1)
2008	345	75 (21.7)	59 (17.1)	7 (2.0)	13 (3.8)	270 (78.3)
2009	456	60 (13.2)	45 (9.9)	6 (1.3)	12 (2.6)	396 (86.8)
2010	594	93 (15.7)	48 (8.1)	26 (4.4)	25 (4.2)	501 (84.3)
2011	958	89 (9.3)	47 (4.9)	14 (1.5)	29 (3.0)	869 (90.7)
2012	1288	117 (9.1)	61 (4.7)	25 (1.9)	34 (2.6)	1171 (90.9)
2013	1897	203 (10.7)	49 (2.6)	99 (5.2)	75 (4.0)	1694 (89.3)
2014	3036	387 (12.7)	39 (1.3)	235 (7.7)	119 (3.9)	2649 (87.3)
2015	5047	685 (13.6)	31 (0.6)	502 (9.9)	172 (3.4)	4362 (86.4)
2016	7764	850 (10.9)	75 (1.0)	514 (6.6)	286 (3.7)	6914 (89.1)
2017	9893	755 (7.6)	84 (0.8)	308 (3.1)	385 (3.9)	9138 (92.4)
2018	11149	622 (5.6)	106 (1.0)	62 (0.6)	465 (4.2)	10527 (94.4)
2019	5426	273 (5.0)	96 (1.8)	42 (0.8)	146 (2.7)	5153 (95.0)
Avg. Percent	100%	8.9%	1.6%	3.9%	3.7%	91.1%

Table A2: Usages of share pledging funds by natural person shareholders and natural-person-controlled legal entity shareholders, disclosed by listed firms (Cont.)

Year	No. Obs/Amount	Used by listed firms				Other purposes (%)
		Subtotal (%)	Guarantee (%)	SEO (%)	Loan (%)	
Panel B: No. of firms						
2007	100	21 (21.0)	14 (14.0)	5 (5.0)	5 (5.0)	79 (79.0)
2008	147	35 (23.8)	26 (17.7)	6 (4.1)	7 (4.8)	112 (76.2)
2009	191	29 (15.2)	21 (11.0)	3 (1.6)	8 (4.2)	162 (84.8)
2010	231	45 (19.5)	27 (11.7)	12 (5.2)	11 (4.8)	186 (80.5)
2011	355	48 (13.5)	28 (7.9)	10 (2.8)	11 (3.1)	307 (86.5)
2012	477	59 (12.4)	35 (7.3)	13 (2.7)	15 (3.1)	418 (87.6)
2013	649	76 (11.7)	25 (3.9)	34 (5.2)	24 (3.7)	573 (88.3)
2014	818	159 (19.4)	26 (3.2)	96 (11.7)	45 (5.5)	659 (80.6)
2015	1098	240 (21.9)	26 (2.4)	168 (15.3)	59 (5.4)	858 (78.1)
2016	1306	244 (18.7)	41 (3.1)	147 (11.3)	75 (5.7)	1062 (81.3)
2017	1624	207 (12.7)	49 (3.0)	74 (4.6)	96 (5.9)	1417 (87.3)
2018	1606	132 (8.2)	51 (3.2)	21 (1.3)	72 (4.5)	1474 (91.8)
2019	1322	123 (9.3)	59 (4.5)	19 (1.4)	51 (3.9)	1199 (90.7)
Avg. Percent	100%	24.9%	8.8%	14.2%	8.0%	75.1%
Panel C: Pledging funds (in billion RMB)						
2007	39.65	8.53 (21.5)	4.6 (11.6)	2.25 (5.7)	1.99 (5.0)	31.12 (78.5)
2008	47.89	13.73 (28.7)	10.25 (21.4)	1.97 (4.1)	1.95 (4.1)	34.16 (71.3)
2009	69.47	11.3 (16.3)	6.61 (9.5)	0.94 (1.4)	4.59 (6.6)	58.17 (83.7)
2010	110.39	22.21 (20.1)	9.41 (8.5)	9.15 (8.3)	4.15 (3.8)	88.18 (79.9)
2011	151.94	16.83 (11.1)	7.97 (5.2)	3.34 (2.2)	5.67 (3.7)	135.11 (88.9)
2012	166.45	14.43 (8.7)	7.07 (4.2)	4.14 (2.5)	3.41 (2.0)	152.02 (91.3)
2013	216.12	24.17 (11.2)	5.16 (2.4)	13.41 (6.2)	7.47 (3.5)	191.95 (88.8)
2014	368.63	52.24 (14.2)	6.25 (1.7)	29.3 (7.9)	17.99 (4.9)	316.39 (85.8)
2015	897.28	123.36 (13.7)	5.55 (0.6)	92.4 (10.3)	30.18 (3.4)	773.92 (86.3)
2016	1225.01	150.68 (12.3)	13.92 (1.1)	89.97 (7.3)	50.71 (4.1)	1074.33 (87.7)
2017	1033.73	108.66 (10.5)	10.91 (1.1)	40.28 (3.9)	60.84 (5.9)	925.07 (89.5)
2018	632.34	54.79 (8.7)	10.01 (1.6)	10.38(1.6)	37.44 (5.9)	577.56 (91.3)
2019	454.24	31.2 (6.9)	11.46 (2.5)	6.22 (1.4)	14.04 (3.1)	423.04 (93.1)
Avg. Percent	100%	11.7%	2.0%	5.6%	4.4%	88.3%

C.2 Direct Survey Evidence

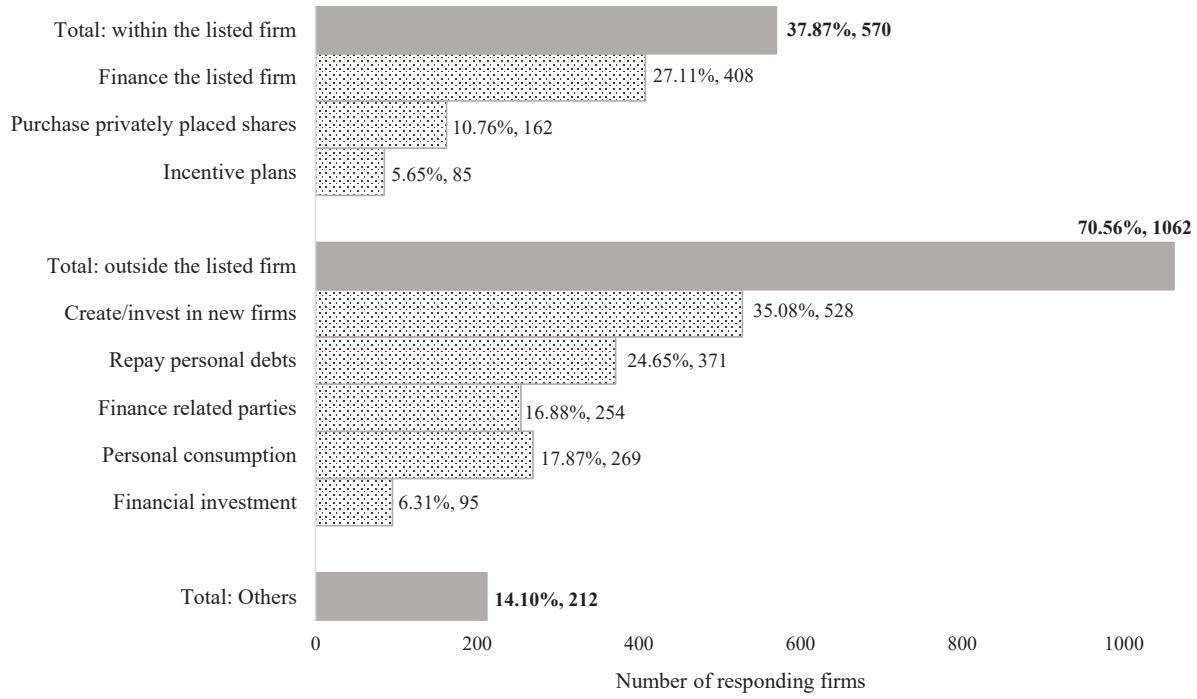


Figure A2: **Survey results on usages of share pledging funds by natural person shareholders and natural-person-controlled legal entity shareholders.**

This figure plots the frequencies of usages of share pledging funds by natural person major shareholders and legal entity shareholders controlled by natural persons, based on the Tsinghua PBCSF-CSRC 2019 survey. The item "total: within the listed firm" is the union of "incentive plans," "purchase privately placed shares," and "finance the listed firm." The item "total: outside the listed firm" is the union of "financial investment," "personal consumption," "finance related parties," "repay personal debts," and "create/invest in new firms."

D Additional Identification Tests

In this section, we discuss the influences of confounding policies and the heterogeneity in treatment and control groups on our identification.

D.1 Confounding Policies

The "Mass Entrepreneurship and Innovation" policy was proposed by the Chinese government in September 2014 and followed by many other initiatives in the broad business environment with various financial and fiscal supports,[A1] and therefore it is possible that this policy facilitates entrepreneurial activities in the economy, especially from the side of natural persons, which constitutes 40% of our treated private shareholders.

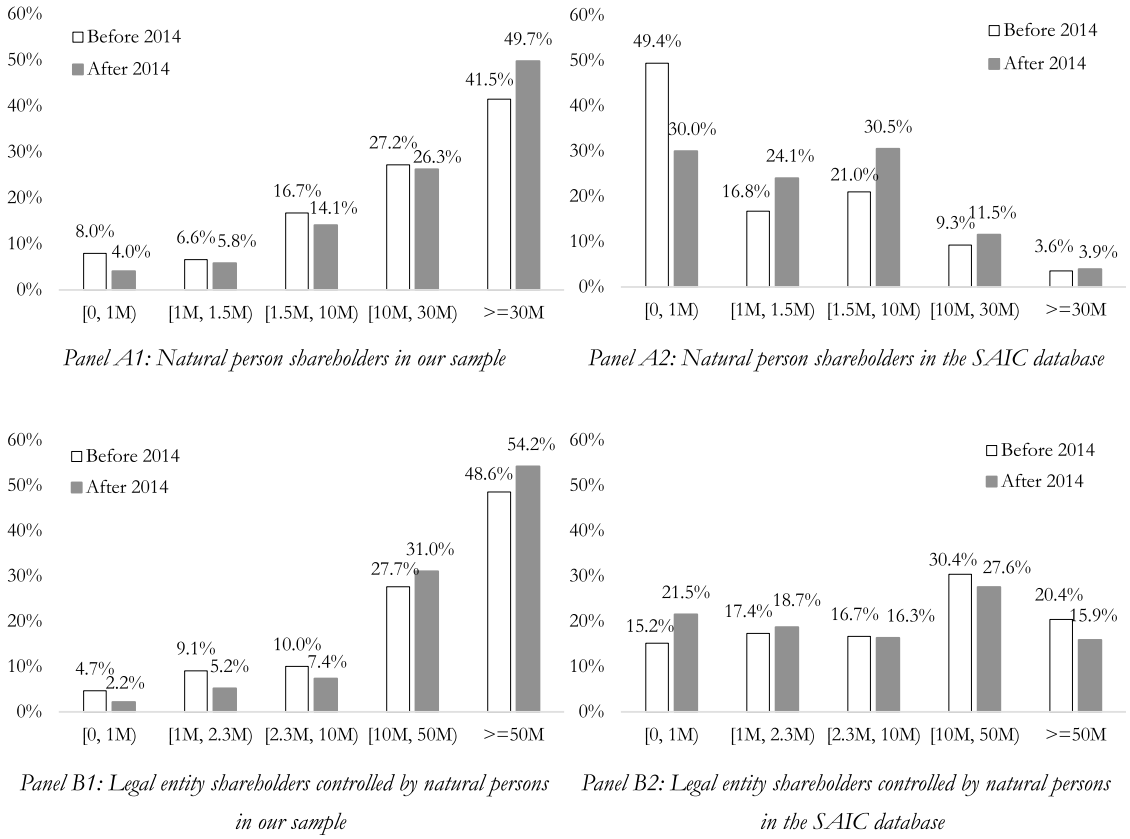
We argue that this policy has a quite limited impact on our DiD results. Importantly, the mass entrepreneurship policy aims at boosting employment and targets grassroots entrepreneurs, including researchers, college graduates, laborers from rural areas, veterans, the handicapped, the unemployed, the low-income group, and talents returning from abroad. Apparently, this target group does not overlap with those well-established major shareholders of listed firms we consider. For example, the treated private shareholders in our sample create significantly larger entrepreneurial firms: the median registered capital is about 30 million RMB for firms created by listed firms' natural person shareholders, which is 30 times the median registered capital size of all firms in the SAIC database. The figure is even larger (50 million RMB) for firms created by natural-person-controlled legal entity shareholders.

To formally illustrate this point, Figure A3 presents the size distribution of firms created by shareholders before and after the 2014 policy shock. We pick the size cutoffs based on the 5^{th}, 10^{th}, 25^{th}, and 50^{th} percentiles for firm sizes (measured by registered capital) created by listed firms' private shareholders in our sample. Panel A1 shows that, listed firms' natural person shareholders create more larger firms, as the fraction of firms with more than 30M RMB registered capital increases from 41.5% to 49.7% around the 2014 shock. In contrast, Panel A2 shows that in the SAIC sample, the 2014 shock mainly facilitated the creation of small firms with less than 10M registered capital, for which the fraction increases by 16.8%. We also compare the sizes of firms created by natural-person-controlled legal entity shareholders in Panels B1 and B2 and find similar patterns.

Another possible confounding policy shock is the enactment of the new corporate law in March 2014, which lifted the minimum requirement on registered and paid-in capital in firm registration. Similarly,

[A1] The general guidelines about relevant initiatives, Opinions of the State Council on Several Policies and Measures for Vigorously Promoting Mass Entrepreneurship and Innovation, were issued in June 2015. Source: http://www.gov.cn/zhengce/content/2015-06/16/content_9855.htm.

the amendment favors natural person shareholders and may drive our DiD results. However, this policy also targets grassroots entrepreneurs and facilitates their creation of micro- and small-sized firms, and our conclusion on the "Mass Entrepreneurship and Innovation" policy still holds in this case.



Panel A1: Natural person shareholders in our sample

Panel A2: Natural person shareholders in the SAIC database

Panel B1: Legal entity shareholders controlled by natural persons in our sample

Panel B2: Legal entity shareholders controlled by natural persons in the SAIC database

Figure A3: **The "Mass Entrepreneurship and Innovation" policy and shareholders' entrepreneurial activities.**

This figure shows the distribution of registered capital of firms created by shareholders before the announcement of the "Mass Entrepreneurship and Innovation" policy (2009-2013) and after that year (2014-2018). The frequency for each interval is calculated by year and then averaged over years. The cutoff points $1M$, $1.5M$, $10M$, and $30M$ in Panel A1 and A2 correspond to the 5^{th}, 10^{th}, 25^{th}, and 50^{th} percentile for the sizes of firms created by listed firms' natural person shareholders in our sample. The cutoff points $1M$, $2.3M$, $10M$, and $50M$ in Panel B1 and B2 correspond to the 5^{th}, 10^{th}, 25^{th}, and 50^{th} percentile for the sizes of firms created by listed firms' legal person shareholders controlled by natural persons in our sample.

D.2 Heterogeneity in Treatment and Control Groups

We note that in our DiD analysis, the treatment group (private shareholders) and the control group (state-

owned shareholders) may differ in other dimensions that might be correlated with the outcome variables and hence bias our estimates. To address this issue, we allow the impacts of shareholder characterisitics to vary before and after the 2013 policy shock by including $Control \times After$ in our specification:

$$Y_{ijt} = \alpha + \beta \cdot Treat_i \times After_t + \boldsymbol{\gamma} \cdot Controls_i \times After_t + \delta_i + \delta_t + \varepsilon_{it}, \tag{A4.1}$$

where $Controls_i$ denotes shareholders' initial characteristics measured in or at the end of year 2009, and other variables are defined as in Eq. (2).

Table A3 Panel A shows that the coefficient estimates on $Treat \times After$ stay significant and positive in $\#FirmAdded$ and $\#New$ regressions, suggesting the causal relation still holds if we correct for biases due to heterogeneous distributions of shareholder characteristics, such as financial wealth and the economic conditions of cities in which shareholders reside. In Panel B, we find our results are robust to controlling for $Controls \times Year$ instead of $Controls \times After$, in which $Year$ is dummy variable indicating each year in the post-reform period from 2013 to 2018.

Table A3: Controlling for heterogeneity in treatment and control groups

This table reports DiD testing results after controlling for the time-varying impacts of shareholder characteristics. The sample period is 2009-2018. Columns (1) to (3) report results of regressions with entrepreneurial activities variables scaled by the national average as the dependent variables. Columns (4) to (6) report results with unscaled entrepreneurial activities variables as the dependent variables. Control variables are as those in Table 3 and measured in their initial values or at the end of year 2009. See Appendix A for variable definitions. t-statistics reported in parentheses are adjusted for heteroscedasticity and clustering at the shareholder level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Control for Initial Controls × After

	Scaled			*Unscaled*		
	(1)	(2)	(3)	(4)	(5)	(6)
	#FirmAdded	*#New*	*#Existing*	*#FirmAdded*	*#New*	*#Existing*
$Treat \times After$	1.291***	0.950***	0.235	0.169***	0.122**	0.031*
	(3.19)	(2.64)	(1.64)	(2.96)	(2.35)	(1.70)
Initial Controls × After	Y	Y	Y	Y	Y	Y
Shareholder FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	14947	14947	14947	14947	14947	14947
Adj. R^2	0.424	0.387	0.211	0.426	0.392	0.204

Panel B: Control for Initial Controls × Year

	Scaled			*Unscaled*		
	(1)	(2)	(3)	(4)	(5)	(6)
	#FirmAdded	*#New*	*#Existing*	*#FirmAdded*	*#New*	*#Existing*
$Treat \times After$	1.317***	0.959***	0.247*	0.171***	0.122**	0.032*
	(3.25)	(2.66)	(1.73)	(2.99)	(2.34)	(1.76)
Initial Controls × Year	Y	Y	Y	Y	Y	Y
Shareholder FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	14947	14947	14947	14947	14947	14947
Adj. R^2	0.425	0.389	0.212	0.428	0.394	0.205

E Comparison to Guo et al. (2023)

Table A4: Privately owned firms' financial constraints and share pledging decisions

This table reports results of the regressions of shareholders' pledging decisions on the financial constraints of firms privately owned by them. The sample period is from 2009 to 2018. *Lag#Firm* denotes the number of firms held by a shareholder in the previous year, which proxies for the financial constraints of the shareholder. See Appendix A for variable definitions. *t*-statistics reported in parentheses are adjusted for heteroscedasticity and clustering at the shareholder level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
	PledgingDummy		*PledgingRatio*	
Lag#Firm	-0.003**	-0.005***	-0.198**	-0.253**
	(-2.28)	(-3.26)	(-2.27)	(-2.50)
LagLnFinWealth		0.087***		3.281***
		(9.73)		(5.48)
LagFinWealthGwt		-0.000		0.121
		(-0.10)		(0.40)
LagDivDum		-0.026***		-2.794***
		(-2.71)		(-3.91)
LagGDPPerCapita		0.008		0.608
		(1.22)		(1.59)
LagAvgSalary		-0.014		-0.462
		(-1.50)		(-0.85)
LagLnBankBranch		-0.060		-5.163
		(-0.89)		(-1.29)
Constant	0.372***	-0.929*	18.746***	-10.801
	(32.53)	(-1.78)	(27.70)	(-0.34)
Shareholder FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
N	21827	17151	21827	17151
Adj.R^2	0.482	0.524	0.370	0.404