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Does strengthening large shareholders' cash flow rights reduce their expropriation motivation? Evidence from China's dividend tax reforms

Hang Liu

School of Accountancy, Dongbei University of Finance and Economics, China

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ABSTRACT

According to classic corporate governance theory, strengthening large shareholders' cash flow rights without changing their control rights should reduce expropriation incentives by better aligning their interests with those of minority shareholders. However, due to the weaker investor protections and low dividend payouts of listed firms in China, large shareholders typically extract private benefits instead of seeking shared benefits through dividends. They therefore care more about control rights than cash flow rights. An empirical study using the exogenous changes of two rounds of dividend tax reductions reveals that strengthening the largest shareholders' cash flow rights leaves their expropriation activities unchanged and firm value does not increase. However, when other shareholders supervise the largest shareholder, expropriation activities ease significantly.

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1. Introduction

In August 2020, the Shede Spirits Co. (Stock code: 600702) reported that its controlling shareholder and related parties had misappropriated a cumulative total of more than RMB 4.0 billion in company funds, and close to RMB 500 million could not be recovered. This incident caused the company's stock price to fall more than 20% in a single month, representing a loss of over RMB 2.0 billion in market value, and minority shareholders suffered substantial losses as a result. It is true that China's capital market has made considerable progress during the past three decades or more, thanks to efforts to improve corporate governance and investor protections. Nevertheless, as the Shede Spirits Co. incident suggests, the diversion of minority shareholder-

E-mail address: liuhang@dufe.edu.cn

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ers' benefits by large shareholders is still a common occurrence. Identifying methods for curbing the expropriation of minority shareholders' benefits by large shareholders is therefore still a major concern for academic researchers and regulators.

Studies have consistently proposed that large shareholders' method of controlling enterprises is an important factor in their motive for expropriation (Grossman and Hart, 1988; Shleifer and Vishny, 1997; La Porta et al., 1999). In particular, after controlling for large shareholders' control rights, the greater their cash flow rights, the more their interests will be aligned with those of minority shareholders, and the weaker their motive for expropriation (Grossman and Hart, 1988; Shleifer and Vishny, 1997; Claessens et al., 2002). Although these research findings have inspired many subsequent studies (e.g., Lemmon and Lins, 2003; Zhang et al., 2004; Wang and Zhou, 2006), the theory has largely been developed in the context of well-developed capital markets in the United States and elsewhere, which may not be applicable to China (as is discussed below). Another problem is that most empirical research has been based on cross-sectional tests, and the conclusions are biased due to endogeneity issues. For example, Almeida and Wolfenzon (2006) and Almeida et al. (2011) find that enterprises with poor performance (which may be a sign of expropriation by large shareholders) are typically marginalized in their business groups by large shareholders, which naturally ensures that large shareholders' cash flow rights in these enterprises are relatively low. The findings in the literature thus may be tainted by reverse causality. However, because large shareholders' control is largely endogenous to the characteristics of the capital markets in which they are embedded (such as legal and cultural characteristics), when there are no major changes in the institutional environment, large shareholders are unlikely to systematically change their control method (La Porta et al., 1998; Masulis et al., 2011). This implies that the causal identification of large shareholders' influence is not easy.

If we limit our research focus to large natural person shareholders, however, we may observe that dividend tax reforms influence large shareholders' cash flow rights but do not change their control rights. When a company distributes profits as dividends, natural person shareholders must pay individual income tax on the dividend, i.e., a dividend tax. When the dividend tax is reduced, natural person shareholders' cash flow rights to corporate profits will be strengthened, but their control rights will not change. This provides us with an ideal setting to observe the effect of changes in cash flow rights on shareholder behavior. According to classic corporate governance theory, when insiders' cash flow rights are enhanced, their expropriation of outsiders' benefits will decrease. As revealed by the empirical investigations by Li et al. (2018) and Ma (2018), when the United States reduced its dividend tax in 2003, which strengthened managers' cash flow rights, managers put more effort into improving firm value.

This paper examines whether the strengthening of large natural person shareholders' cash flow rights, the results of China's two rounds of dividend tax reductions, has reduced these shareholders' motive for expropriation. Although research on the U.S. capital market has investigated whether the strengthening of management's cash flow rights caused by reductions in the dividend tax affects the agency conflict between management and shareholders (Li et al., 2018; Ma, 2018), it is still necessary to examine this effect in China's institutional setting. This is motivated by the following considerations. (1) In China's capital market, the agency conflict between large shareholders and minority shareholders is one of the most important corporate governance issues. The conclusions of previous research on agency conflict between shareholders and management cannot be directly generalized to China (Hope, 2013; Jiang and Kim, 2020). (2) If large shareholders chiefly rely on methods such as inter-corporate loans and related-party transactions to obtain private benefits of control and do not seek common benefits in the form of dividends, they will pay greater attention to their control rights than to cash flow rights. The reason is that control rights influence control over corporate resources, but cash flow rights only affect income through the distribution of net income (i.e., dividends). One consequence is that strengthening cash flow rights may not necessarily inhibit the expropriation incentive of large shareholders. This is the objective reality in China's capital market: expropriation of the benefits of minority shareholders is a low-cost activity for large shareholders, and corporate cash dividend payouts are low. Consequently, the relationship between large shareholders' cash flow rights and their expropriation incentive in China is likely to be different from that in other countries.

The tax reform issued by the China Securities Regulatory Commission (CSRC) at the end of 2012 announced that starting 1 January 2013, the dividend tax rate borne by natural person shareholders would be coupled with the holding period. When natural person shareholders held stock for more than one year,

the dividend tax rate would be 5%; when the holding period exceeded one month but was less than or equal to one year, the dividend tax rate would be 10%; and when the holding period was less than or equal to one month, the dividend tax rate would be 20%. Prior to this reform, the dividend tax rate for natural person shareholders had been a uniform 10%. Three years later, the CSRC further announced that starting 8 September 2015, natural person shareholders' dividend income would be exempt from taxes when the holding period exceeded one year (Fig. 1). Thus, the dividend tax rate for natural person shareholders who are long-term investors (i.e., investors holding stock for more than one year) first decreased from 10% to 5% and then to 0. More importantly, according to my statistics, during the 2008–2017 period, fewer than 2% of companies in which the largest shareholder was a natural person had changes in their largest shareholder. Therefore, almost all of the largest natural person shareholders of listed firms in China are long-term investors whose dividend tax rate gradually decreased starting in 2013. This makes it possible to investigate whether changes in large shareholders' cash flow rights have any effect on their motive for expropriating benefits from minority shareholders.

Taking A-share listed firms in China during the 5-year periods before and after dividend tax reforms as a research sample, I take firms whose largest shareholder is a natural person as the treated group and other firms as the control group. I then use a propensity score matching + difference-in-differences (PSM + DID) identification strategy to investigate the change in the largest shareholders' expropriation behavior around the dividend tax reforms (i.e., before and after the largest shareholders' cash flow rights strengthened). I construct the following three measures of the expropriation of minority shareholders' benefits by the largest shareholder: (1) inter-corporate loans to the largest shareholder; (2) related-party transactions between the largest shareholder and listed firms; and (3) Tobin's Q, i.e., the measure of firm value. The results indicate that after controlling for firm fixed effects, year fixed effects and some firm characteristics that change with time, the strengthening of the largest natural person shareholders' cash flow rights by reducing the dividend tax does not significantly reduce their expropriation behavior. These results are at odds with previous researchers' findings for the US capital market (Li et al., 2018; Ma, 2018).

I next investigate why strengthened cash flow rights have such a weak effect on the expropriation activities of the largest shareholders in China. As noted above, in China's relatively weak investor protection environment, rather than obtaining benefits in the form of dividends, large shareholders typically prefer to obtain private benefits from control. As a result, reductions in the dividend tax do little to reduce large shareholders' motive to seek private benefits. Taking this logic further, I infer that if a listed firm has other large natural person shareholders, these shareholders' cash flow rights are also affected by reductions in the dividend tax (giving them greater motive to engage in supervision) and they have sufficient voting rights to supervise the largest shareholder (namely, supervisory ability). In such circumstances, the decreased dividend tax should influence the largest shareholder's expropriation behavior. I thus create a variable consisting of the shareholding ratio of other shareholders with major interests. After assembling the percentage of shares held by natural person shareholders among the 2nd to the 10th largest shareholders for each listed firm, because the dividend tax policy for securities investment funds is the same as that for natural person investors, I calculate the shareholding ratio for the securities investment fund of each listed firm. I then use the sum of the shareholding ratios of these two types of shareholders to assess the shareholding ratios of other shareholders with major interests. The results reveal that when the shareholding ratios of other shareholders with major interests

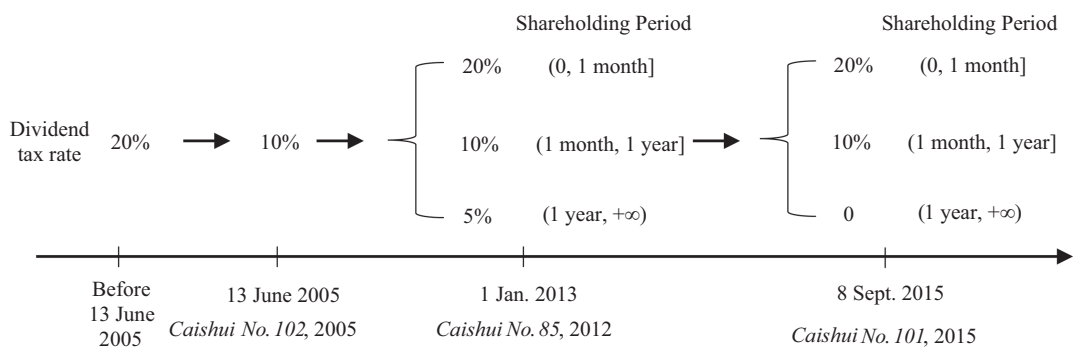

Fig. 1. The timeline of China's dividend tax policies.

are large, strengthening cash flow rights has a significant inhibiting effect on the expropriation activities of the largest shareholder. This suggests that the low cost of expropriation for large shareholders due to poor investor protections is indeed an important influence on large shareholders' cash flow rights.

I further provide supporting evidence for my argument from the angle of corporate dividend policies. The results show that strengthening the largest natural person shareholders' cash flow rights through reductions in the dividend tax does not significantly increase the firm's cash dividends. However, when an enterprise has other shareholders with major interests, the firm's cash dividends tend to increase significantly. This implies that when the largest shareholder is effectively restrained, the strengthening of cash flow rights will cause these shareholders to shift from obtaining the private benefits of control, such as via inter-corporate loans or related-party transactions, to the pursuit of common benefits in the form of dividends.

In summary, strengthening large shareholders' cash flow rights through a decreased dividend tax rate will typically not reduce their motive for expropriation. Only when large shareholders' self-benefiting behavior can be effectively restrained will the strengthening of large shareholders' cash flow rights improve corporate governance. This study makes the following contributions to the literature. (1) Taking advantage of the quasi-natural experiments provided by two rounds of dividend tax reforms and considering China's institutional context, this paper re-assesses a classic issue in the field of corporate governance: the effect of large shareholders' cash flow rights on their expropriation incentive. However, while its conclusions are inconsistent with the literature, they are consistent with the prevailing characteristics of China's capital market. My conclusions effectively constrain the applicability of classic corporate governance theory with regard to large shareholders in China and, consequently, make a significant theoretical contribution. (2) My findings also broaden the literature concerning dividend taxes. Most research on dividend taxes has been based on asset pricing and corporate finance theory and has examined the effect of dividend taxes on cost of capital, dividend policies, capital structure and investment (such as Yagan, 2015; Li et al., 2017). Very little research on this subject has addressed the economic consequences of dividend tax reforms from the perspective of corporate governance theory. (3) This study reveals that when an enterprise has other shareholders with major interests, the self-benefiting behavior of its largest shareholder can be effectively curbed. This finding is consistent with the conclusions of recent related studies concerning multiple large shareholders (such as Jiang et al., 2017, 2018). (4) The conclusions of this paper also have important policy implications. Strengthened cash flow rights through dividend tax reductions tend to inhibit large shareholders' expropriation activities when the large shareholders can be effectively curbed. This implies that strengthening the supervision of and restraints on large shareholders is important for easing the agency conflict between large shareholders and minority shareholders.

2. Institutional background, theoretical analysis and research hypotheses

2.1. Institutional background: China's dividend tax reforms

China began implementing its new Individual Income Tax Law in 1994, which prescribed that individuals must pay individual income tax on interest and dividends at a 20% rate. Dividends obtained from listed firms by natural person investors in the capital market fell into the category of interest and dividends according to this law. Investors consequently encountered a tax rate of 20% on dividends during the initial period after the establishment of China's capital market. In 2005, to promote the development of the capital market, the Notice of the Ministry of Finance and the State Administration of Taxation on the Policy Relating to the Individual Income Tax on Dividends (*Caishui No. 102*, 2005) stated that the dividends obtained from listed firms by natural person investors would be included within personal taxable income at a 50% rate starting from 13 June 2005. The calculation of taxes on dividends distributed to securities investment funds by listed firms would also comply with this regulation.[1] This implies that the dividend tax rate for both natural person investors and securities investment funds decreased to 10% after this reform.

On 16 November 2012, the Notice of the Ministry of Finance, the State Administration of Taxation and the China Securities Regulatory Commission on Issues Concerning Differentiated Individual Income Tax Policies

[1] As almost all securities investment fund investors are natural persons, according to tax regulations, the dividends received by securities investment funds were subject to the same tax policies as those for natural persons.

on Dividends of Listed Firms (*Caishui No. 85*, 2012) stated that starting 1 January 2013, individual income tax policies for dividends would be differentiated based on the length of the holding period. When the share holding period was less than or equal to one month, the tax rate on dividends would be 20%; when the share holding period was greater than one month but less than or equal to one year, the rate would be 10%; and when the share holding period was greater than one year, the rate would be 5%. As a continuation of this reform, the Notice of the Ministry of Finance, the State Administration of Taxation and the China Securities Regulatory Commission on Issues Concerning Differentiated Individual Income Tax Policies on Dividends of Listed Firms (*Caishui No. 101*, 2015) stated that starting 8 September 2015, the dividends of natural persons who held stock for more than one year would be exempt from individual income tax. These regulations were also applicable to securities investment funds.

These three changes to the dividend tax system are shown in Fig. 1. The dividend tax rate for long-term investors decreased from 20% to 10%, 5% and then to 0 (Fig. 1). This implies that long-term investors' after-tax income on every pre-tax RMB 1 from a listed firm would be RMB 0.8, RMB 0.9, RMB 0.95 and RMB 1 during each of these successive stages. As mentioned previously, the largest natural person shareholders of listed firms in China are typically long-term investors. As such, China's dividend tax reforms had major impacts on the cash flow rights of the largest natural person shareholders but did not influence their control rights. These circumstances give us an opportunity to examine how large shareholders' cash flow rights affect their expropriation motivation. Note that the analysis in this study does not include the reduction in the dividend tax rate from 20% to 10% under the 2005 dividend tax reform (i.e., *Caishui No. 102*, 2005) for the following reason: the largest shareholders of very few listed firms were natural persons around 2005. In 2004, 2005 and 2006, there were 31, 32 and 48 listed firms with natural persons as their largest shareholders, and these accounted for 2.25%, 2.33% and 3.3% of all listed firms during the same years. This prevents us from obtaining a sufficient research sample. However, by 2012, the number of listed firms with natural persons as their largest shareholders had increased to 569, accounting for 22.83% of all listed firms. Consequently, the 2012 and 2015 dividend tax reforms are chosen as the research domain.

Furthermore, China's Individual Income Tax Law calls for the independent calculation of tax on dividend income, i.e., not lumped together with other taxable income. This implies that investors' marginal dividend tax rate is not affected by other income apart from dividends. In contrast, under the consolidated income tax system established in the United States, investors' marginal dividend tax rate is affected by other non-dividend income. As a result, China's dividend tax reforms allow the more precise determination of investors' marginal dividend tax rate and its economic consequences.

2.2. Theoretical analysis and research hypothesis

Based on the two dividend tax reforms in 2012 and 2015, this paper examines how the strengthening of large shareholders' cash flow rights through the reduction in the dividend tax affected these shareholders' expropriation motivation. In particular, I look at the largest shareholders of listed firms. In addition, because the dividend tax is part of the individual income tax and, therefore, only affects natural person shareholders, I focus specifically on listed firms' largest natural person shareholders. This research focus is motivated by the following considerations.

First, China is a typical emerging capital market and is characterized by a high degree of ownership concentration, poor investor protections and frequent expropriation of minority shareholders by large shareholders. Agency conflict between large shareholders and minority shareholders is consequently the chief corporate governance issue in China. I therefore hope that ensuring that large shareholders' behavior is more consistent with practice in China's capital market will lead to more meaningful research conclusions.

Second, the dividend tax reforms linked the holding period to the dividend tax rate. Because the dividend tax rate might increase or decrease, whether the dividend tax rate for natural person shareholders decreased after 2012 remains uncertain (Fig. 1). As a consequence, an empirical investigation of the effect of the dividend tax rate on natural person shareholders is impossible. However, if we focus solely on the largest natural person shareholders, the situation changes, because the largest shareholders at listed firms in China seldom change; this is especially the case for natural person shareholders. One reason for this is that initial public offering (IPO) qualifications are scarce resources in China, and once a firm has been listed, the largest shareholder will

seldom relinquish control rights. After dividend tax reforms, during the 2013–2017 period, the largest shareholder changed at only 42 firms where the largest shareholder was a natural person, accounting for less than 2% of all such firms. Before the dividend tax reforms, during the 2007–2012 period, the largest shareholder changed at only 18 firms, accounting for less than 1.5% of all such firms. This indicates that nearly all largest natural person shareholders are long-term investors. In the wake of the two dividend tax reforms, the dividend tax applicable to these shareholders decreased from 10% to 5% and then to 0. For non-natural person largest shareholders, dividends are a part of corporate profits and are subject to corporate income tax; thus, these shareholders were not affected by the dividend tax reforms. I am therefore able to use the *difference-in-differences* method to assign the largest natural person shareholders to a treated group and assign non-natural person largest shareholders to a control group. By comparing differences in the behavior of these two types of shareholders before and after dividend tax reforms, I can determine how the strengthening of cash flow rights caused by the dividend tax changes affected the behavior of the largest shareholders.

In theory, the strengthening of cash flow rights due to changes in the dividend tax should influence the expropriation behavior of large shareholders via its effects on the relative cost to these shareholders in after-tax income (i.e., after-tax dividends) versus that of private benefits. Specifically, when the dividend tax rate is high, the largest natural person shareholders must pay more individual income tax on dividends, reducing their net dividend income. In this case, the marginal cost to large shareholders of expropriating profits that should be distributed to shareholders as private benefit will be relatively low. Conversely, when the dividend tax rate is low, because the largest natural person shareholders will receive greater net dividend income, the distribution of profit in the form of dividends will be a more attractive option for large shareholders. From this perspective, the likelihood that firms' largest natural person shareholders will engage in expropriation activities will decrease after their cash flow rights are strengthened through dividend tax reforms.

However, although the foregoing logic is intuitive, in view of the characteristics of China's capital market, it remains to be seen whether cash flow rights actually influenced large shareholders' expropriation motivation. In particular, China's capital market has two notable characteristics. (1) Despite repeated attempts, it has been impossible to stamp out large shareholders' expropriation activities. (2) Listed firms typically distribute only low levels of cash dividends, and this situation has not improved despite the presence of various regulatory policies. These characteristics reflect a basic reality: dividends are not the main means by which large shareholders extract benefits. This reality has weakened the influence of cash flow rights on large shareholders' expropriation motivation.

We first look at the problem of large shareholders' private benefit of control. China's capital market has long been plagued by agency conflicts involving large shareholders, and the diversion of minority shareholders' benefits by large shareholders is a common occurrence. In particular, the issues of greatest concern are the direct expropriation of funds through inter-corporate loans from listed firms and related-party transactions between large shareholders and listed firms (Chen and Wang, 2005; Lyu and Xiao, 2006; Jiang et al., 2010; Liao et al., 2014). Although the regulatory authorities have issued many regulations to rein in the expropriation behavior of large shareholders, data from official sources indicate that the misappropriation of minority shareholders' gains by large shareholders remains a severe problem.

The enforcement bureau, the CSRC, has disclosed on its website that it investigated 20 typical violation cases each year during the four-year period from 2016 to 2019.[2] After examining these 80 typical cases, I discovered that at least one case each year involved the expropriation of minority shareholders' benefits by a large shareholder. Such cases had a value of RMB 129 million in 2016, RMB 120 million in 2017, RMB 1.33 billion in 2018 and RMB 2.09 billion in 2019. The CSRC described one of these cases in 2019 as follows:

> *During the first seven months of 2018, Deng Qinghua, the controller of Chengdu Techcent, employed methods including signing false procurement contracts and loans to achieve the non-operating occupation of RMB 2.09 billion in Techcent's funds without performing disclosure in accordance with law. This case should make it clear that attempts by large shareholders and controllers of listed firms to ignore the rights of minority shareholders and employ methods such as the expropriation of funds and illegal guarantees to harm the interests of these listed firms shall be punished severely.*

[2] http://www.csrc.gov.cn/pub/newsite/jcj/aqfb/.

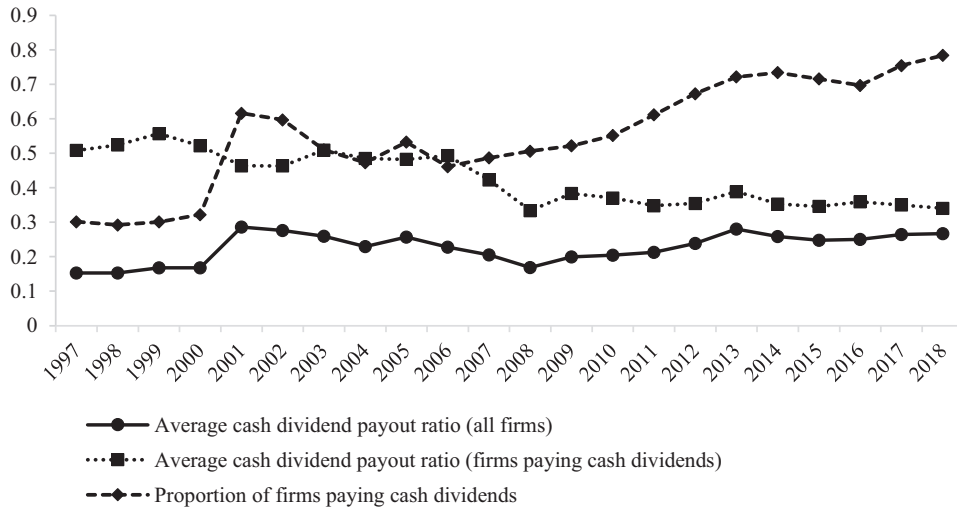

Fig. 2. Cash dividend payout trends among listed firms in China Note: The dividend payout ratio is equal to cash dividend/net income.

Furthermore, according to statistics from Chen et al. (2019), among the 731 financial statement inquiry letters sent to listed firms by the stock exchange, 15.7% involved questions concerning related-party transactions. It is evident that the diversion of minority shareholders' benefits by large shareholders is still commonplace in China's capital market, indicating that large shareholders' expropriation is a low-cost activity. Under these circumstances, large shareholders are primarily concerned about their control rights because these directly affect their right of control over corporate resources and thereby their ability to obtain private benefits. Because cash flow rights only affect large shareholders' share of net profits, they tend to be less concerned about cash flow rights.

We next examine the state of dividend payouts at listed enterprises in China. Because dividend policies are endogenous to corporate governance, the payout of dividends reflects the agency problem involving large shareholders. Fig. 2 displays the dividend payout ratio of listed firms during the period 1997–2018.[3] It can be seen that 2001 was a significant watershed year: Starting in 2001, both the number of firms issuing cash dividends and the average cash dividend payout ratio (for all firms) increased significantly. The *Measures for the Administration of the Listed Company Issuing New Shares* issued by the CSRC in March 2001 linked the dividend payout to Seasoned Equity Offerings (SEOs). The CSRC steadily strengthened the relationship between dividend payouts and SEOs in 2004, 2006 and 2008 (Li et al., 2010; Wei et al., 2014). In addition, the 2013 *Shanghai Stock Exchange Guidelines on the Distribution of Cash Dividends by Listed Companies* specified that when the total cash dividends issued by a company on the Shanghai Stock Exchange accounted for less than 30% of the net profit, it must provide a detailed explanation in its annual report. Similarly, *Listed Companies Regulatory Guidance No. 3—Cash Dividends Distribution of Listed Companies,* issued by the CSRC in 2013, recommends that listed companies establish differentiated cash dividend policies that reflect their industry characteristics and their own stage of development. These regulations are commonly referred to as semi-mandatory dividend policies (Li et al., 2010; Wei et al., 2014).

Returning to Fig. 2, although the regulatory authorities have made a number of attempts to increase dividend payouts over the past 20 years, listed firms' average cash dividend payout ratio was almost the same in 2018 as it had been in 2001. Because the number of listed firms paying cash dividends increased steadily throughout this period, if we only consider those firms that paid cash dividends, the average dividend payout ratio decreased. Looking at the average dividend payout ratio trend (for firms that paid cash dividends) in Fig. 2, we see that, as expected, the average dividend payout ratio for firms paying cash dividends decreased from 51% to 34% during the 1997–2018 period. This suggests that semi-mandatory dividend policies have not

[3] The fact that there were few listed firms during the early period of China's capital market makes dividend payout ratio statistics for this period easily affected by outlies. The statistics used here therefore consist of dividend information for 1997 and later years.

shown any sustained effectiveness and, in fact, have encouraged listed firms to pay small dividends in response to supervision. All in all, the willingness to pay out cash dividends among listed firms in China has remained consistently low (Wei et al., 2014).

To summarize, the large shareholders of listed firms in China chiefly rely on methods such as inter-corporate loans and related-party transactions to extract private benefit of control; dividends are not their primary means of obtaining benefits. Although strengthening large shareholders' cash flow rights will boost their after-tax dividend income, because dividends have only a small weight in large shareholders' utility function, boosting their cash flow rights should have little influence on their expropriation motivation. This paper therefore develops the following null hypothesis:

All else remaining equal, in comparison with firms where the largest shareholder is not a natural person, at firms where the largest shareholder is a natural person, the largest shareholder's expropriation activity does not change significantly after dividend tax reforms strengthens their cash flow rights.

3. Research design and descriptive statistics

3.1. Empirical model and variable definitions

To investigate the effect of large shareholders' strengthened cash flow rights following dividend tax decreases on their expropriation behavior, I use the following *difference-in-differences* model (Li et al., 2018; Ma, 2018):

$$y = \alpha_i + \alpha_t + \alpha_0 + \alpha_1 Post\_Treat + \alpha_2 Ln(Assets) + \alpha_3 Lev + \alpha_4 Roa + \alpha_5 Growth + \alpha_6 Ln(Age) + \alpha_7 Indep + \alpha_8 Dual + \varepsilon \quad (1)$$

In Model (1), y is the expropriation behavior of large shareholders, and I use the following three measures. (1) *Tunnel*: inter-corporate loans to the largest shareholders, calculated as the amount of receivables of listed firms from the largest shareholders and their affiliates divided by total assets at the end of the year and multiplied by 100 (Jiang et al., 2010). (2) *RPT*: related-party transactions between the largest shareholders and listed firms, calculated as the value of related products transactions, assets transactions and labor services between listed firms and the largest shareholders and their affiliates divided by total assets at the end of the year and multiplied by 100 (Jian and Wong, 2010). (3) *TQ*: Tobin's Q, the measure of firm value, calculated as the sum of the market value of equity and the book value of total leverage divided by the book value of total assets at the end of the year. Inter-corporate loans and related-party transactions are commonly used indicators of the private benefits of control in China (Jiang et al., 2010; Liao et al., 2014). However, in addition to these approaches, large shareholders may use other methods to extract private benefits, and these methods are difficult to observe and quantify. I consequently use Tobin's Q as another indicator, following Li et al. (2018) and Ma (2018).

On the right-hand side of Model (1), α_i indicates firm fixed effects, α_t indicates year fixed effects and *Post_Treat* is the interaction between *Post* and *Treat*. Here, *Post* is a dummy variable that equals 1 if the sample period is 2013–2017 (post-dividend tax reform), and 0 if the sample period is 2008–2012 (pre-dividend tax reform). *Treat* is a variable that expresses the degree to which the largest shareholders' cash flow rights are affected by the dividend tax reforms and is assessed using two methods. First, I define the dummy variable $Treat^{dum}$. When the largest shareholder of a firm is a natural person prior to dividend tax reforms, $Treat^{dum}$ is equal to 1, and otherwise is equal to 0.[4] I further calculate the shareholding ratio of the largest natural person shareholder of listed firms prior to the dividend tax reforms and call this variable $Treat^{share}$. The larger the value of $Treat^{share}$, the greater the impact of the dividend tax reforms on the cash flow rights of the largest shareholders. The coefficient on the interaction between *Post* and *Treat* (i.e., *Post_Treat*) captures the relative change in expropriation incentive of large shareholders for firms whose largest shareholders are natural persons compared to those of firms

[4] There are no firms where the largest shareholder was a securities investment fund in 2011 or 2012. When defining $Treat^{dum}$, to ensure that the largest shareholder has considerable influence over the listed firm, we require that the largest shareholder has shareholdings greater than or equal to 20%.

whose largest shareholders are not natural persons. I also include a number of control variables: *Ln*(*Assets*), firm size, which is the natural logarithm of total assets at the end of the year; *Lev*, firm leverage, which is total leverage divided by total assets at the end of the year; *Roa*, return on assets, which is net income divided by total assets at the end of the year; *Growth*, sales growth rate, which is the difference between the revenues of the current year and last year, divided by the total revenue at the last fiscal year end; *Ln*(*Age*), the natural logarithm of the firm age; *Indep*, independent directors as a percentage of all directors; and *Dual*, whether the CEO and chairman are the same person, which is equal to 1 when true and 0 when false.

3.2. Sample and data

I use A-share non-financial listed firms during the 5-year periods before and after the 2012 dividend tax reforms as the initial sample. I then eliminate state-owned enterprises (SOEs) from the sample because of the following considerations. (1) The largest shareholder of SOEs cannot be a natural person. (2) SOEs have been subject to other influences such as SOE reform, which are distinct from the regulatory policies applicable to non-SOEs. These considerations imply that SOEs are not an ideal control group. Furthermore, for non-SOEs, differences are still likely to exist between firms where the largest shareholder is a natural person and firms where the largest shareholder is a non-natural person (for example, firms where the largest shareholder is a natural person are more likely to be family firms). Because propensity score matching (PSM) can ensure the greatest degree of comparability between treated and control groups, I use it to create the main research sample.

Specifically, I first construct a probability model taking $Treat^{dum}$ as an dependent variable and taking *Ln*(*Assets*), *Lev*, *Roa*, *Growth*, *Ln*(*Age*), *Indep*, *Dual* and industry fixed effects as independent variables. Using data for the year prior to the enactment of the dividend tax reforms (i.e., 2012), I perform logit regression on this model to estimate the probability that any one firm should be a treated firm. Then, nearest neighbor matching with replacement is used to match each firm in the treated group with one firm from the control group. The empirical results of PSM are provided in Table 1. Panel A reveals that *Ln*(*Assets*), *Ln*(*Age*), *Indep* and *Dual* affect whether a firm should be assigned to the treated group. Panel B indicates that apart from the sales growth rate, there are significant differences in other characteristics of the treated and control groups prior to PSM. After PSM, only firm size is significantly different between the treated group and control group, at the 10% level, which implies that the PSM was effective.

I obtain 4,452 observations via PSM, with 85, 110, 200, 441, 630, 607, 591, 589, 602 and 597 observations for each year from 2008 to 2017.

3.3. Descriptive statistics

The descriptive statistics for the variables are provided in Table 2. To eliminate the impact of outliers, I winsorize all of the continuous variables at the 1% level. *Tunnel* and *RPT* have mean values of 0.083 and 0.305. Because the average total assets of the firms in the sample are RMB 4.0 billion, the average levels of intercorporate loans and related-party transactions are RMB 3.32 million and RMB 12.20 million, respectively.

4. Empirical results

4.1. Does the strengthening of the largest shareholders' cash flow rights reduce their private benefit?

The regression results for Model (1) are displayed in Table 3.[5] These results show that when the dependent variable is *Tunnel* or *TQ*, the sign for *Post_Treat* is consistent with expectations; however, the coefficient is not

[5] Truncation occurs when the values for the *Tunnel* and *RPT* indicators used to assess the expropriation behavior of large shareholders are 0. This implies that when these two indicators are dependent variables, Tobit regression is appropriate. However, the econometrics literature suggests that controlling for firm fixed effects while using Tobit regression will cause large estimation errors (Greene, 2004) and that the same problem exists in probit regression. As a consequence, some finance studies use OLS regression to deal with this issue (such as Doidge and Dyck, 2015). This paper therefore also uses OLS regression. Furthermore, when we convert *Tunnel* and *RPT* to dummy variables and apply OLS regression, the results do not change.

Table 1
Results of PSM.

Variable	Coefficient	*z* values
Panel A: Results of the first stage		
Ln(*Assets*)	−0.272***	(−3.03)
Lev	0.031	(0.06)
Roa	0.554	(0.33)
Growth	0.059	(0.38)
Ln(*Age*)	−1.931***	(−11.80)
Indep	3.244**	(2.45)
Dual	0.373**	(2.56)
Constant	6.037***	(2.69)
Industry effects		Yes
N		1,297
Pseudo R^2		0.242

	Before PSM				After PSM			
Variable	Treated	Control	Differences	*t* value	Treated	Control	Differences	*t* value
Panel B: Differences tests of the variables before and after PSM								
Ln(*Assets*)	21.109	21.532	−0.423***	−6.53	21.109	21.205	−0.096*	−1.73
Lev	0.276	0.423	−0.147***	−11.34	0.276	0.289	−0.013	−1.05
Roa	0.051	0.039	0.012***	3.69	0.051	0.049	0.002	0.56
Growth	0.159	0.206	−0.047	−1.24	0.159	0.149	0.010	0.40
Ln(*Age*)	1.391	2.123	−0.732***	−19.84	1.391	1.370	0.021	0.82
Indep	0.379	0.370	0.009***	3.03	0.379	0.376	0.003	0.74
Dual	0.470	0.301	0.169***	6.01	0.470	0.485	−0.015	−0.42

*, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. *Z*-statistics reported in parentheses are computed based on standard errors adjusted for firm-level clustering. *Ln* (*Assets*), firm size, is the natural logarithm of total assets at the end of the year; *Lev*, firm leverage, is total leverage divided by total assets at the end of the year; *Roa*, return on assets, is net income divided by total assets at the end of the year; *Growth*, sales growth rate, is the difference between revenues of the current year and last year, divided by the total revenue at the last fiscal year end; *Ln*(*Age*) is the natural logarithm of the firm age; *Indep*, independent directors as a percentage of all directors; and *Dual*, whether the CEO and chairman are the same person, 1 when true and 0 when false.

significant. When the dependent variable is *RPT*, the sign for *Post_Treat* is not consistent with expectations, and the coefficient is not significant. This implies that the strengthening of large shareholders' cash flow rights due to the reduction in the dividend tax does not significantly influence large shareholders' private benefits of control. Notably, when the dependent variable is *Tunnel* or *RPT*, most of the control variables are not significant, because controlling for firm fixed effects in the model only enables control variables to convey time series variations, not cross-sectional variations. Unreported results indicate that when I do not control for firm fixed effects, the indicators of *ROA*, *Growth* and *Indep* are all significantly different from zero.

4.2. Effect of other shareholders with major interests

As noted above, overall, the strengthening of large shareholders' cash flow rights due to the reduction in the dividend tax has an insignificant effect on their expropriation activities. This can be explained as stemming from the reality that large shareholders in China's capital market routinely extract private benefits of control; the cost of this behavior is relatively low. Pursuing this logic further, we would expect that when large shareholders' expropriation behavior can be effectively restrained and the cost of diverting private benefits is therefore high, strengthening these shareholders' cash flow rights will cause them to shift their benefit-seeking behavior from the extraction of private benefit to enjoying the shared benefits (e.g., dividends). I therefore further investigate whether the influence of large shareholders' strengthened cash flow rights due to the dividend tax reforms varies between different firms. China's dividend tax reforms affect not only the cash flow rights of the largest natural person shareholders but also the cash flow rights of other natural person shareholders. In theory, when a firm has a large number of other natural person shareholders, because these shareholders will

Table 2
Summary statistics of the variables.

Variable	N	Mean	Median	Std. Dev.
Tunnel (%)	4,452	0.083	0.000	0.437
RPT (%)	4,452	0.305	0.000	1.281
TQ	4,452	3.102	2.474	1.977
$Post\_Treat^{dum}$	4,452	0.426	0.000	0.495
$Post\_Treat^{share}$	4,452	0.157	0.000	0.186
Ln(*Assets*)	4,452	21.529	21.466	0.944
Lev	4,452	0.339	0.316	0.190
Roa	4,452	0.044	0.043	0.050
Growth	4,452	0.234	0.161	0.407
Ln(*Age*)	4,452	1.761	1.792	0.444
Indep	4,452	0.378	0.364	0.056
Dual	4,452	0.437	0.000	0.496

Tunnel, inter-corporate loans to the largest shareholders, is calculated as the amount of receivables of listed firms from the largest shareholders and their affiliates divided by total assets at the end of the year and multiplied by 100; *RPT*, related-party transactions between the largest shareholders and listed firms, is calculated as the value of related products transactions, assets transactions and labor services between listed firms and the largest shareholders and their affiliates divided by total assets at the end of the year and multiplied by 100; *TQ*, Tobin's Q, the measure of firm value, is calculated as the sum of the market value of equity and the book value of total leverage divided by the book value of total assets at the end of the year; *Post* is a dummy variable that equals 1 if the sample period is 2013–2017 (post-dividend tax reform), and 0 if the sample period is 2008–2012 (pre-dividend tax reform); $Treat^{dum}$ is a dummy variable that equals 1 when the largest shareholder of a firm is a natural person prior to dividend tax reforms, and 0 otherwise; $Treat^{share}$ is calculated as the shareholding ratio of the largest natural person shareholder of listed firms prior to the dividend tax reforms. $Post\_Treat^{dum}$ ($Post\_Treat^{share}$) is the interaction between *Post* and $Treat^{dum}$ ($Treat^{share}$). *Ln*(*Assets*), firm size, is the natural logarithm of total assets at the end of the year; *Lev*, firm leverage, is total leverage divided by total assets at the end of the year; *Roa*, return on assets, is net income divided by total assets at the end of the year; *Growth*, sales growth rate, is the difference between revenues of the current year and last year, divided by the total revenue at the last fiscal year end; *Ln*(*Age*) is the natural logarithm of the firm age; *Indep*, independent directors as a percentage of all directors; and *Dual*, whether the CEO and chairman are the same person, 1 when true and 0 when false.

Table 3
Effect of strengthening the largest shareholders' cash flow rights on their expropriation activities.

	$Treat = Treat^{dum}$			$Treat = Treat^{share}$		
	(1)	(2)	(3)	(4)	(5)	(6)
Variable	*Tunnel*	*RPT*	*TQ*	*Tunnel*	*RPT*	*TQ*
Post_Treat	−0.043	0.031	0.066	−0.136	0.163	0.232
	(−1.18)	(0.30)	(0.59)	(−1.57)	(0.62)	(0.81)
Ln(*Assets*)	0.012	−0.093	−1.324***	0.013	−0.094	−1.325***
	(0.32)	(−0.98)	(−11.22)	(0.34)	(−1.00)	(−11.27)
Lev	−0.056	0.270	0.851**	−0.051	0.265	0.843**
	(−0.49)	(0.72)	(2.35)	(−0.45)	(0.71)	(2.32)
Roa	−0.420	−0.158	8.018***	−0.417	−0.159	8.013***
	(−1.47)	(−0.19)	(6.69)	(−1.46)	(−0.19)	(6.70)
Growth	0.033	0.161	0.282***	0.033	0.161	0.282***
	(1.07)	(1.56)	(3.72)	(1.07)	(1.56)	(3.73)
Ln(*Age*)	0.060	0.141	0.851***	0.065	0.133	0.842***
	(0.58)	(0.42)	(3.06)	(0.62)	(0.40)	(3.04)
Indep	0.043	−1.101*	−1.033	0.046	−1.105*	−1.039
	(0.17)	(−1.86)	(−1.49)	(0.19)	(−1.86)	(−1.50)
Dual	0.049	−0.082	0.037	0.049	−0.082	0.036
	(1.54)	(−0.96)	(0.41)	(1.56)	(−0.97)	(0.40)
Constant	−0.271	2.259	28.407***	−0.286	2.295	28.439***
	(-0.34)	(1.08)	(11.90)	(−0.36)	(1.10)	(11.95)
Firm effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
N	4,452	4,452	4,452	4,452	4,452	4,452
Adjusted R^2	0.227	0.373	0.664	0.228	0.373	0.664

*, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively; *T*-statistics reported in parentheses are computed based on standard errors adjusted for firm-level clustering. All of the variables are defined in Table 2.

also be affected by the dividend tax, they will be more likely to supervise and restrain the largest shareholder. This may amplify the effect of the dividend tax reforms. It is not possible to observe all natural person shareholders and not all natural person shareholders would have the motive or ability to restrain the largest shareholders. I therefore expect that only those natural person shareholders with large shareholding ratios would have little motive to be free riders, would possess strong supervisory ability and might therefore be able to restrain the largest shareholders.

Pursuing this line of thinking, I create a variable representing other shareholders with major interests (*Others*). I take the second to the tenth largest shareholders, including both natural person shareholders and securities investment fund shareholders, as other shareholders with major interests. These two types of shareholders are chosen because they are both affected by the dividend tax reforms and are consequently motived to supervise the largest shareholders. In addition, because the shareholders possess relatively centralized and large voting rights, they also have the ability to supervise the largest shareholders. I obtain *Others* by gathering and adding the shareholding ratios of these shareholders at each listed firm. I then multiply *Others* by *Post_Treat* and put the new variable into Model (1). The results are shown in Table 4. When the dependent variable is *Tunnel* or *RPT*, the coefficient on *Others*Post_Treat* is significantly negative in all cases. When the dependent variable is *TQ*, the coefficient on *Others*Post_Treat* is significantly positive. This suggests that the greater the shareholding ratio of other shareholders with major interests, the more likely it is that large shareholders' expropriation behavior will be affected by the strengthening of their cash flow rights. The implication is that when large shareholders are effectively supervised and restrained, because the diversion of minority shareholders' benefits will have a greater marginal cost, the strengthening of large shareholders' cash flow rights will have a significant restraining effect on their expropriation behavior.

4.3. Robustness tests

The following robustness tests are conducted to ensure the reliability of the main results.

(1) Excluding the effect of potential coincident events

It is possible that other events that influenced the behavior of large shareholders occurred in China's capital market during the sample period. I therefore assess whether the main conclusions may be the result of other coincident events. Any coincident events having this effect must satisfy two conditions. First, they must influence large shareholders' expropriation motivation. Second, they must have different effects on the treated and

Table 4
Effect of other shareholders with major interests.

	$Treat = Treat^{dum}$			$Treat = Treat^{share}$		
	(1)	(2)	(3)	(4)	(5)	(6)
Variable	*Tunnel*	*RPT*	*TQ*	*Tunnel*	*RPT*	*TQ*
*Others*Post_Treat*	−0.338**	−1.026**	1.422**	−0.975***	−2.383**	5.290***
	(−2.35)	(−2.44)	(2.36)	(−2.60)	(−2.21)	(3.04)
Post_Treat	0.021	0.229	−0.145	0.006	0.516	−0.450
	(0.41)	(1.38)	(−0.91)	(0.06)	(1.48)	(−1.15)
Others	0.059	0.299	1.339**	0.063	0.226	1.196*
	(0.38)	(0.57)	(2.20)	(0.39)	(0.46)	(1.92)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
N	4,452	4,452	4,452	4,452	4,452	4,452
Adjusted R^2	0.228	0.374	0.667	0.229	0.374	0.668

*, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively; *T*-statistics reported in parentheses are computed based on standard errors adjusted for firm-level clustering. *Others*, the shareholding ratio by other shareholders with major interests, is calculated as the shareholding ratios of natural person shareholders in the second to the tenth largest shareholders and securities investment fund shareholders. Other variables are defined in Table 2.

Table 5
Separate effects of the two rounds of dividend tax reforms.

	$Treat = Treat^{dum}$			$Treat = Treat^{share}$		
	(1)	(2)	(3)	(4)	(5)	(6)
Variable	*Tunnel*	*RPT*	*TQ*	*Tunnel*	*RPT*	*TQ*
Panel A: Effect of the first round of dividend tax reforms						
*Others*Post1_Treat*	−0.112	−0.323	0.945*	−0.641*	−1.401	4.029**
	(−0.92)	(−0.83)	(1.63)	(−1.69)	(−1.36)	(2.46)
Post1_Treat	−0.067	−0.082	−0.100	−0.142*	−0.099	−0.528
	(−1.49)	(−0.52)	(−0.68)	(−1.71)	(−0.34)	(−1.64)
Others	0.005	0.299	2.066***	0.027	0.346	2.020**
	(0.03)	(0.48)	(2.61)	(0.14)	(0.58)	(2.57)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
N	2,664	2,664	2,664	2,664	2,664	2,664
Adjusted R^2	0.232	0.440	0.730	0.232	0.440	0.731
Panel B: Effect of the second round of dividend tax reforms						
*Others*Post2_Treat*	−0.300**	−0.817*	2.066***	−0.607	−1.320	6.346***
	(−1.98)	(−1.88)	(2.65)	(−1.41)	(−1.06)	(2.75)
Post2_Treat	0.112*	0.386**	−0.251	0.231*	0.861**	−0.390
	(1.96)	(2.47)	(−1.42)	(1.78)	(2.39)	(−0.84)
Others	−0.014	−0.100	2.398***	−0.054	−0.263	2.319***
	(−0.07)	(−0.16)	(3.55)	(−0.29)	(−0.42)	(3.39)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
N	2,986	2,986	2,986	2,986	2,986	2,986
Adjusted R^2	0.329	0.445	0.698	0.329	0.445	0.699

*, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively; *T*-statistics reported in parentheses are computed based on standard errors adjusted for firm-level clustering. *Post1* is a dummy variable that equals to 1 if the sample period is 2013–2014, and 0 if the sample period is 2008–2012; *Post2* is a dummy variable that equals to 1 if the sample period is 2015–2017, and 0 if the sample period is 2013–2014. Other variables are defined in Table 2.

control groups, and the direction and timing of their effects must be generally aligned with those of the dividend tax reforms. In theory, coincident events that meet these conditions are unlikely to exist. To exclude the effect of such events as much as possible, I perform the following tests.

As shown in Fig. 1, two rounds of dividend tax reforms occurred during the sample period. The first round cut long-term investors' dividend tax rate from 10% to 5%, while the second further reduced it to 0. If the results of this study are in fact a consequence of the dividend tax reforms, we would expect to see consistent results during each round of reforms. For the test, I first establish two dummy variables: *Post1* and *Post2*. When the sample period is 2008–2012, *Post1* is equal to 0, and when the sample period is 2013–2014, *Post1* is equal to 1. When the sample period is 2013–2014, *Post2* is equal to 0, and when the sample period is 2015–2017, *Post2* is equal to 1. I then separately multiply *Post1* and *Post2* by *Treat*, creating two new variables, i.e., *Post1_Treat* and *Post2_Treat*. Therefore, *Post1_Treat* captures the effect of the first round of dividend tax reforms, while *Post2_Treat* captures the effect of the second round. The results shown in Table 5 reveal that the coefficients on *Others*Post1_Treat* and *Others*Post2_Treat* are both consistent with expectations and are significant most of the time,[6] indicating that my conclusions are unlikely to result from events other than the dividend tax reforms.

[6] The reason the regression coefficients are not all significant is that when the two rounds of dividend tax reforms are considered separately, each round had only a 5% impact on the dividend tax rate applicable to long-term investors (the rate decreased from 10% to 5% during the first round and from 5% to 0 during the second).

I also change the sample period to the 4-year periods before and after the dividend tax reforms (2009–2016) and the 3-year periods before and after the dividend tax reforms (2010–2015). Shortening the sample period enables a more thorough exclusion of interference from other events. Unreported results reveal no changes in the conclusions of this study.

(2) Test of the parallel trends hypothesis

I also construct a dynamic effects model to test the parallel trends hypothesis of the difference-in-differences model. As shown in Table 3, the effect of the dividend tax reforms on large shareholders' expropriation behavior is insignificant; therefore, testing these results is essentially unnecessary.[7] I therefore mainly investigate the dynamic effects on the results in Table 4 (i.e., the effect of other shareholders with major interests). I construct the following empirical model:

$$\begin{aligned} y = {} & \alpha_i + \alpha_t + \alpha_0 + \alpha_1 Before^2\_Treat + \alpha_2 Before^1\_Treat + \alpha_3 After^0\_Treat + \alpha_4 After^1\_Treat \\ & + \alpha_5 After^{2+}\_Treat + \alpha_6 Others + \alpha_7 Others * Before^2\_Treat + \alpha_8 Others * Before^1\_Treat + \alpha_9 Others \\ & * After^0\_Treat + \alpha_{10} Others * After^1\_Treat + \alpha_{11} Others * After^{2+}\_Treat + Controls + \varepsilon \end{aligned} \quad (2)$$

In Model (2), $Before^2\_Treat$, $Before^1\_Treat$, $After^0\_Treat$, $After^1\_Treat$ and $After^{2+}\_Treat$ are the products of $Before^2$, $Before^1$, $After^0$, $After^1$ and $After^{2+}$ with *Treat*, respectively. $Before^2$ ($Before^1$) is a dummy variable that equals 1 for the second (first) year before the dividend tax reform (i.e., 2011 and 2012, respectively), and 0 otherwise. $After^0$ is a dummy variable that equals 1 for the year the dividend tax reform took effect (i.e., 2013), and 0 otherwise. $After^1$ is a dummy variable that equals 1 for the first year after the dividend tax reform (i.e., 2014), and 0 otherwise. $After^{2+}$ is a dummy variable that equals 1 for the second year and subsequent years after the dividend tax reform (i.e., 2015–2017), and 0 otherwise. The regression results for Model (2) are shown in Table 6. The coefficients on $Others*Before^2\_Treat$ and $Others*Before^1\_Treat$ are insignificant, which implies that there are no significant differences between companies with high and low *Others* before the implementation of the dividend tax reforms, satisfying the parallel trends hypothesis. In addition, the coefficient on $Others*After^0\_Treat$ is uniformly insignificant and the sign of the coefficient is not consistent with predictions, indicating that the effect of the dividend tax reforms is not immediate. However, the coefficient on $Others*After^1\_Treat$ is uniformly as expected and is significant in some instances, and the coefficient on $Others*After^{2+}\_Treat$ is significant in all columns, demonstrating the effect of other shareholders with major interests.

(3) Adjustment of the research sample and key variable definitions

In the PSM process, I also use matching with no replacement to reconstruct the control group sample; include SOEs among the control group firms and reconstruct the control group sample; exclude firms at which the largest shareholders changed; and consider the influence of persons acting in concert. Unreported results indicate that the conclusions of this study remain unchanged.

(4) Effect of restricted shares

According to the regulations *Caishui No. 85*, 2012 and *Caishui No. 101*, 2015, when individuals hold restricted shares in listed firms, they must pay dividend tax at a rate of 10% before the expiration of lockup but, depending on the holding period, enjoy different dividend tax rates on dividends obtained after the expiration of lockup. In China, restricted shares chiefly consist of split share structure reform (SSSR) restricted shares and new stock restricted shares. Here, SSSR restricted shares refer to previously non-tradable shares that may not be traded or transferred during the 12-month period from the day that a firm's SSSR plan is implemented; this requirement has been imposed by the regulatory authorities during the SSSR period to prevent the mass listing of non-tradable shares for trading from impacting the stock price. However, because the sample

[7] Unreported results indicate that when we do not include *Others* and its interactions with other variables in Model (2), the coefficients on $After^0\_Treat$, $After^1\_Treat$ and $After^{2+}\_Treat$ are either insignificant or are significant but have a sign not consistent with expectations.

Table 6
Dynamic effects.

	$Treat = Treat^{dum}$			$Treat = Treat^{share}$		
	(1)	(2)	(3)	(4)	(5)	(6)
Variable	*Tunnel*	*RPT*	*TQ*	*Tunnel*	*RPT*	*TQ*
*Others*Before*^{2}*_Treat*	−0.426	−0.972	−0.253	−0.852	−2.738	−1.945
	(−1.19)	(−0.91)	(−0.34)	(−1.01)	(−1.01)	(−0.88)
*Others*Before*^{1}*_Treat*	−0.011	−0.091	−0.871	0.190	−0.762	−3.544
	(−0.06)	(−0.14)	(−1.15)	(0.34)	(−0.36)	(−1.57)
*Others*After*^{0}*_Treat*	−0.087	−0.177	−0.090	−0.439	−1.319	−0.043
	(−0.50)	(−0.28)	(−0.11)	(−0.86)	(−0.66)	(−0.02)
*Others*After*^{1}*_Treat*	−0.416	−1.313	0.530	−1.049	−3.609*	2.075
	(−1.38)	(−1.54)	(0.62)	(−1.23)	(−1.66)	(0.77)
*Others*After*$^{2+}$*_Treat*	−0.589**	−1.681*	1.974**	−1.428**	−4.039*	6.252**
	(−2.07)	(−1.94)	(2.04)	(−1.98)	(−1.70)	(2.21)
Before^2*_Treat*	0.139	0.152	−0.283	0.192	0.345	−0.863
	(1.06)	(0.42)	(−1.18)	(0.77)	(0.47)	(−1.41)
Before^1*_Treat*	0.052	−0.124	−0.176	0.068	−0.142	−0.665
	(0.74)	(−0.57)	(−0.71)	(0.42)	(−0.29)	(−1.09)
After^0*_Treat*	−0.020	−0.216	−0.160	−0.066	−0.291	−0.934
	(−0.27)	(−0.97)	(−0.66)	(−0.41)	(−0.59)	(−1.58)
After^1*_Treat*	0.039	0.113	−0.370	−0.012	0.248	−1.307**
	(0.35)	(0.35)	(−1.46)	(−0.05)	(0.37)	(−2.19)
After^{2+}*_Treat*	0.122	0.346	−0.457*	0.181	0.842	−1.326**
	(1.19)	(1.19)	(−1.75)	(0.80)	(1.30)	(−2.07)
Others	0.142	0.499	1.528**	0.101	0.459	1.594**
	(0.76)	(0.74)	(2.24)	(0.50)	(0.66)	(2.18)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm effects	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
N	4,452	4,452	4,452	4,452	4,452	4,452
Adjusted R^2	0.229	0.376	0.669	0.229	0.375	0.670

*, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively; *T*-statistics reported in parentheses are computed based on standard errors adjusted for firm-level clustering. *Before*^{2} (*Before*^{1}) is a dummy variable that equals 1 for the second (first) year before the dividend tax reform (i.e., 2011 and 2012, respectively), and 0 otherwise. *After*^{0} is a dummy variable that equals 1 for the year the dividend tax reform takes effect (i.e., 2013), and 0 otherwise. *After*^{1} is a dummy variable that equals 1 for the first year after the dividend tax reform (i.e., 2014), and 0 otherwise. *After*$^{2+}$ is a dummy variable that equals 1 for the second year and the subsequent years after the dividend tax reform (i.e., 2015–2017), and 0 otherwise. Other variables are defined in Table 2.

period in this study begins with 2008 and the vast majority of listed firms completed SSSR in 2006, SSSR restricted shares could not affect the conclusions of this study. New stock restricted shares refer to restricted shares created in an IPO, which generally have a lockup period of three years after listing. The shares held by large natural person shareholders during the first three years after an IPO generally consist of restricted shares. As a consequence, the dividend tax rate applicable to large natural person shareholders would not be affected by dividend tax reforms during the first three years after an IPO. However, I would argue that the dividend tax policy for restricted shares should not have any effect on the conclusions of this study, because large natural person shareholders do not only consider the current dividend tax rate when making decisions but also the future dividend tax rate. In particular, under the circumstances discussed in this paper, restricted share shareholders can be sure of the dividend tax rate after the expiration of lockup. Hence, whenever shareholders anticipate a change in the tax rate, their behavior should change correspondingly. Nonetheless, for the sake of robustness, I exclude firms with less than one year since IPO, less than two years since IPO and less than three years since IPO. Unreported results indicate that the conclusions of this study remain unchanged.

(5) Possible alternative explanations

While the results of this study indicate that other shareholders with major interests will significantly restrain large shareholders' expropriation behavior, there may possibly be alternative explanations. In particular, a

natural negative correlation may exist between the shareholding ratio of other shareholders and that of the largest natural person shareholder. I find that in such cases, a significantly negative coefficient on *Others_Post_Treat* may occur because the largest natural person shareholder has a relatively low shareholding ratio and, consequently, lacks the ability to expropriate. To rule out this alternative explanation, I divide the sample into two groups based on the median shareholding ratio of the largest shareholder and then performed regressions. Unreported results indicate that the influence of other shareholders with major interests is not concentrated in the group with a relatively low largest shareholder shareholding ratio, which is inconsistent with the alternative explanation. The conclusions of this study can thus not be explained by this alternative explanation.

4.4. Further analysis: Effect of strengthened large shareholder's cash flow rights on dividend policy

To provide further support for the logic of this study, I perform analyses from the perspective of firms' dividend payout policies. According to theory, large shareholders' strengthened cash flow rights in the wake of dividend tax reforms should encourage firms to pay out more cash dividends. The logic is straightforward: the after-tax return of large shareholders for each unit cash dividend will increase. However, when the extraction

Table 7
Evidence from dividend payout policies.

	$Treat = Treat^{dum}$				$Treat = Treat^{share}$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	*Payer*	*Ratio*	*Payer*	*Ratio*	*Payer*	*Ratio*	*Payer*	*Ratio*
Post_Treat	0.034	0.006	−0.001	−0.011	0.154*	0.051	0.052	−0.042
	(1.16)	(0.24)	(−0.03)	(−0.27)	(1.86)	(0.64)	(0.52)	(−0.47)
*Others*Post_Treat*			0.198*	0.127			0.723**	0.714**
			(1.64)	(0.94)			(2.05)	(1.99)
Others			0.014	0.176			−0.000	0.138
			(0.11)	(1.07)			(−0.00)	(0.93)
Ln(Assets)	0.072***	−0.044*	0.073***	−0.042*	0.071***	−0.045**	0.072***	−0.043*
	(2.90)	(−1.94)	(2.93)	(−1.83)	(2.86)	(−1.97)	(2.89)	(−1.87)
Lev	−0.172*	−0.195**	−0.166*	−0.192**	−0.178**	−0.197**	−0.170*	−0.190**
	(−1.92)	(−2.46)	(−1.85)	(−2.46)	(−1.99)	(−2.52)	(−1.91)	(−2.46)
Roa	2.568***	−0.072	2.567***	−0.074	2.565***	−0.073	2.570***	−0.070
	(11.09)	(−0.44)	(11.08)	(−0.45)	(11.12)	(−0.44)	(11.14)	(−0.43)
Growth	−0.014***	−0.012***	−0.014***	−0.012***	−0.014***	−0.012***	−0.014***	−0.012***
	(−4.30)	(−4.91)	(−4.29)	(−4.86)	(−4.32)	(−4.92)	(−4.32)	(−4.88)
Ln(Age)	−0.184***	−0.059	−0.190***	−0.058	−0.189***	−0.061	−0.196***	−0.064
	(−3.02)	(−1.03)	(−3.10)	(−1.02)	(−3.13)	(−1.05)	(−3.24)	(−1.12)
Indep	−0.080	−0.237	−0.076	−0.228	−0.088	−0.240	−0.083	−0.231
	(−0.42)	(−1.58)	(−0.39)	(−1.52)	(−0.46)	(−1.60)	(−0.44)	(−1.54)
Dual	0.030	−0.002	0.030	−0.001	0.030	−0.002	0.030	−0.001
	(1.52)	(−0.09)	(1.53)	(−0.05)	(1.52)	(−0.09)	(1.55)	(−0.03)
Vola	−0.387	−0.363	−0.408	−0.386	−0.389	−0.363	−0.414	−0.397
	(−1.11)	(−1.06)	(−1.17)	(−1.13)	(−1.11)	(−1.06)	(−1.19)	(−1.16)
Cash	0.016	0.185***	0.019	0.187***	0.015	0.186***	0.021	0.190***
	(0.25)	(2.89)	(0.30)	(2.92)	(0.25)	(2.91)	(0.34)	(2.99)
Constant	−0.491	1.428***	−0.519	1.330***	−0.461	1.442***	−0.485	1.352***
	(−0.96)	(3.03)	(−1.00)	(2.77)	(−0.91)	(3.06)	(−0.94)	(2.84)
Firm effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	4,283	4,262	4,283	4,262	4,283	4,262	4,283	4,262
Adjusted R^2	0.395	0.244	0.396	0.245	0.396	0.244	0.397	0.246

*, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively; *T*-statistics reported in parentheses are computed based on standard errors adjusted for firm-level clustering. *Payer* is a dummy variable that equals 1 when a firm pays out cash dividends during the year, and 0 otherwise; *Ratio* equals the firm's amount of cash dividend payout divided by net income; *Vola* is calculated as the standard deviation of monthly returns during the year; *Cash* is calculated as cash divided by total assets at the end of the year. Other variables are defined in Table 2.

of private benefit by large shareholders has a low cost, because the dividend must be shared with minority shareholders, large shareholders' motive to increase cash dividends will decrease. As a consequence, strengthening large shareholders' cash flow rights will not necessarily increase firms' dividend payouts. To investigate changes in firms' dividend policy, I construct two indicators of firms' cash dividend payouts: *Payer* and *Ratio*. Here, *Payer* is a dummy variable that equals 1 when a firm pays out cash dividends during the year, and 0 otherwise. *Ratio* equals the firm's amount of cash dividend payouts divided by net income. I then investigate the effect of large shareholders' cash flow rights on corporate dividend policies and further incorporate the additional effect of other shareholders with major interests. The regression results are shown in Table 7.

The results in columns (1)–(2) and (5)–(6) of Table 7 show the effect of large shareholders' cash flow rights on dividend payouts. Empirical results indicate that although the sign of the coefficient on *Post_Treat* is consistent with expectations in all cases, the coefficient is significantly positive only in the case of column (5). This indicates that, on the whole, there is little likelihood that enterprises increased cash dividend payouts following the strengthening of large shareholders' cash flow rights. Other results in Table 7 reflect the additional effect of other shareholders with major interests. In these results, the coefficient on *Others*Post_Treat* is uniformly positive and is significant in most cases. This further suggests that the enhancement of large shareholders' cash flow rights will reduce their expropriation motivation only when other shareholders have effective supervisory and restraining ability, a finding that is consistent with the main conclusions of the study.

5. Conclusions

According to classic corporate governance theory, when the control rights of large shareholders remain unchanged, strengthening their cash flow rights should increase the alignment of their interests with those of minority shareholders and, thereby, reduce large shareholders' motive for the expropriation of minority shareholders' interests. Taking advantage of the changes in the largest natural person shareholders' cash flow rights that were part of China's two rounds of dividend tax reforms, I reassess this topic. I find, however, that the enhanced cash flow rights of the largest natural person shareholders attributable to dividend tax reductions do not reduce large shareholders' attempts to expropriate the benefits of minority shareholders. However, when a firm has other shareholders with the ability and the motive to curb large shareholders' expropriation behavior, the strengthening of large shareholders' cash flow rights will significantly decrease their expropriation motivation. I also find that the strengthening of large shareholders' cash flow rights due to the dividend tax cuts does not cause enterprises' cash dividend payouts to increase; only when there are other shareholders with major interests do dividend payments increase significantly.

Although the conclusions of this study are at odds with the expectations of classic corporate governance theory, they are consistent with the actual conditions in China's capital market: China's protection of the interests of minority shareholders is relatively weak, and the dividend payments of listed firms are relatively low. As a consequence, large shareholders commonly seek to extract private benefits and do not increase shared benefits in the form of dividends. Hence, strengthening large shareholders' cash flow rights will not necessarily affect their behavior. Of course, one reason this study does not find a significant association between enhanced cash flow rights and large shareholder behavior may have been because large shareholders' cash flow rights were not strengthened sufficiently by dividend tax cuts. Nevertheless, the 10% increase in after-tax cash flow rights is sufficient to show that large shareholders' behavior is not especially sensitive to changes in their cash flow rights.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Is pledge risk matched between pledgees and pledgers in China's share pledge market?

Deren Xie, Mengyu Zhang *

Tsinghua University, Beijing, China

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ABSTRACT

Based on a sample of share pledging by the controlling shareholders of A-share listed firms, we investigate whether pledge risk is matched between pledgees and pledgers in China's share pledge market. The results show that, compared with broker pledgees, commercial bank pledgees accept pledged stocks with lower market risk and the corresponding listed firms are at lower risk, have higher levels of information transparency and are more likely to be state-owned enterprises (SOEs). We also find that commercial bank pledgees do not ease the risk requirement of pledged stocks for pledgers of SOEs. Further, we document that commercial bank pledgees face lower margin call risks than broker pledgees. After securities companies were authorized to compete in the share pledge market in 2013, the pledge risk faced by commercial bank pledgees further reduced. Our results support that China's share pledge financing market generally achieves an efficient equilibrium in terms of pledge risk matching between pledgees and pledgers. We recommend that the macro control of share pledge risk be focused on broker pledgees.
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1. Introduction

China actively promotes the construction of a multi-layer capital market for sustainable and healthy economic development. A key aspect of such construction is to enable financing parties with different risk levels and capital providers with different levels of risk tolerance and risk appetite to quickly match with each other, i.e., to find risk-matched counterparties and efficiently complete transactions. The share pledge market is a part of the multi-layer capital market, which was dominated by commercial banks (with a market share of

* Corresponding author.
E-mail addresses: xiedr@sem.tsinghua.edu.cn (D. Xie), zhangmy.17@sem.tsinghua.edu.cn (M. Zhang).

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80% in 2007) before 2013. However, since the Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE) issued the *Measures on Stock Pledge and Repo Transactions and Registration and Clearing (for Trial Implementation)* in May 2013, securities companies have gradually become the main players in this market (with a market share of 70% in 2018). They largely drive the development of this market due to the higher convenience of their stock pledge transactions compared with commercial banks. Although listed company shares are much more liquid as pledge targets than, for example, fixed assets, the shares of many listed companies are riskier than fixed assets. Recently, substantial capital market volatility has led to more frequent blow-ups of share pledging. This causes many pledgees to suffer losses and set aside large impairment provisions for share pledge loans.[1] Therefore, in this share pledge market, we examine the existing status of pledge risk matching between the main pledgees, i.e., commercial banks and brokerage firms, and the main pledgers, i.e., the controlling shareholders of listed companies. The question of whether pledge risk matching represents an equilibrium in China's share pledge market is especially relevant as a significant risk mismatch between pledgees and pledgers can harm the sustainability and stability of the market and result in systematic financial risk.

This paper examines the above questions by using quarterly data on share pledging by the controlling shareholders of A-share listed companies in China from 2013 to 2018. As discussed in our subsequent arguments, in general, commercial banks are more risk averse, are willing to accept relatively low-risk stocks for pledge loans and require lower interest rates. In comparison, securities firms are less risk averse, can accept pledge loans with riskier stocks and ask for higher interest rates. Accordingly, we find that compared with brokerage firm pledgees (hereafter referred to as broker pledgees), commercial bank pledgees (hereafter referred to as bank pledgees) accept pledged stocks with lower stock price crash risk and lower stock return volatility before the pledge transactions; their pledged stock issuers (hereafter referred to as pledger firms) are larger, have lower operating income volatility, higher quality of cash flow from operating activities and higher total asset turnover before the pledge transactions; moreover, the pledger firms have higher levels of information transparency and are more likely to be state-owned. Our results show that bank pledgees in general do not relax the risk requirements for pledged shares by SOE pledgers. Furthermore, compared with broker pledgees, share pledge transactions with bank pledgees have a lower risk of closing out during the pledge period and are less likely to actually incur additional pledges or require extensions. Interestingly, after brokerage firms were authorized to join the share pledge market in 2013, the market risk of pledged stocks and the risk of pledger firms facing bank pledgees has decreased rather than increased. In addition, from the perspective of the industry distribution of pledger firms, the ratio of real estate industry pledger firms accepted by bank pledgees to their total pledges is significantly higher than that of broker pledgees. However, the proportion of information technology (IT) industry pledger firms accepted by broker pledgees is higher than that accepted by bank pledgees. In terms of market segment, bank pledgees accept fewer share pledges of companies from the Growth Enterprise Board (hereafter referred to as GEB) and broker pledgees accept fewer share pledges of companies from the Main Board. These findings suggest that there is some level of risk matching between pledgees and pledgers in China's share pledge financing market, with banks that are more risk averse choosing stocks with lower risk as pledges and facing lower closeout risk during the pledge period. Banks do not appear to increase their own risk tolerance when faced with competition from brokerage firms in the share pledge market.

This paper makes the following contributions. First, the findings of this paper can help regulators and academics determine the presence of a risk matching equilibrium in China's share pledge market. The results encourage regulators and academics to study how China's multi-layer capital market relies on market and regulatory forces to achieve a risk matching equilibrium and thereby reduce systematic financial risk. Since the introduction of stock pledged repo agreements, i.e., on-exchange pledges, in 2013, it has been generally accepted to view on-exchange pledges as standardized businesses that are subject to more regulation and have

[1] In 2019, 32 of the 37 A-share listed securities companies incurred credit impairment losses of 19.461 billion yuan, with credit impairment losses on redemptory monetary capital for sale (mainly formed by equity pledges) accounting for a major portion of the losses. For example, Everbright Securities incurred an impairment loss of 848 million yuan on redemptory monetary capital for sale, mainly on stock pledges by shareholders of companies such as Silver Age Sci and Tech, Qingshan Paper Industry and New Sea Union Technology Group. As another example, CITIC Securities disclosed nine lawsuits for stock pledged repo disputes in 2019, involving a total amount of 6.130 billion yuan.

more stringent requirements for pledged stocks than over-the-counter pledges. Over-the-counter pledges are usually considered only for shares that cannot be pledged on an exchange. In other words, the quality of the underlying stocks of on-exchange pledges is perceived to be higher than that of the underlying stocks of over-the-counter pledges. In such cases, given that banks are the main holders of over-the-counter pledges and brokerage firms are the holders of on-exchange pledges, there would exist a mismatch between the risk tolerance of pledgees and the risk level of underlying pledges that is likely to bring about systematic financial risk. However, the empirical results of this paper show that the overall risk level of the underlying pledged stocks faced by bank pledgees is lower than that faced by broker pledgees. Risk matching between pledgees and pledgers is thus achieved, falsifying initial perceptions of the practice. Moreover, commercial banks accept stocks with lower risk as pledges when facing competition from brokerage firms, which is unexpected but also validates the positive outcome and the practice importance of the strengthening of the regulation of the banking sector in China in recent years.

Second, this paper enriches the literature on the share pledges of listed companies. Related studies conducted in China mainly focus on the shareholders of listed companies, who are the pledgers, and discuss the impact of controlling or major shareholders' equity pledges on the relevant behaviors of pledger firms (e.g., Hao and Liang, 2009; Xie et al., 2016; Zhang et al., 2016; Li et al., 2018; Liao et al., 2018; Xie and Liao, 2018). The pledgee, the other trading party in share pledging, is less often studied (e.g., Tan and Wu, 2013; Li et al., 2019; Xie et al., 2019). Therefore, this paper explores how risk matching is achieved between pledgees and pledgers from the new perspective of different pledgees and their risk aversion characteristics.

Third, the findings of this study are instructive for regulators who wish to macro regulate share pledge risk in a targeted manner. The results support regulators' efforts to primarily urge brokerage firms to moderate the risk of on-exchange equity pledges. Specifically, although the comparison of pledge risk between pledgers of commercial banks and those of brokerage firms shows the presence of risk matching between pledgees and pledgers, this does not necessarily mean that the risk level of pledged stocks is suited to the risk-taking capacity of brokerage firms. When a brokerage firm's stock pledging activity increases dramatically and is important to its profit, the firm's risk tolerance for stock pledging may be set to an unrealistically high value. Overall, our finding that broker pledgees accept pledged stocks with higher risk echoes the recent and frequent occurrence of equity pledge blow-ups by broker pledgees. However, the pledge risk faced by bank pledgees declined rather than increased after brokerage firms joined the share pledge market in 2013, implying that some of the riskier clients who originally had equity pledges with banks may have shifted to brokerage firms. As a result, brokerage firms may have undertaken excessive risks to seize market share and gain profits from equity pledge financing. In this context, our findings imply that the share pledging activity of brokerage firms and the related risks should be the focus of macro share pledge monitoring in China's capital market. The China Securities Regulatory Commission's (CSRC) new regulations on equity pledging rolled out in 2018 are therefore necessary but can still be improved (e.g., imposing constraints on the operating and financial characteristics of pledger firms).

One of the aims of this paper is to start a discussion, with the hope that academics will conduct more in-depth research on the risk matching conditions between financing parties and capital providers in the multilayer capital market and on the underlying mechanisms and possible improvements.

The remainder of this paper is organized as follows. Section 2 introduces the institutional background of China's share pledge system. Section 3 reviews the related literature and develops the hypothesis. Section 4 describes the research design. Section 5 reports the main empirical results and analyses. Further analyses and robustness tests are presented in Section 6. Finally, Section 7 concludes the paper.

2. Institutional background

The essence of a share pledge is a pledge of right to secure the underlying loan, wherein the subject of the pledge is the shares held by the pledger, who is also generally the borrower. Share pledging is not a new product of the capital market. The pledge guarantee system in China can be traced back to the *Guarantee Law of the People's Republic of China*, which came into effect on 1 October 1995. Article 75 of the *Guarantee Law* specifies that shares and share certificates that are transferable in accordance with the law are rights that can be pledged. Article 223 of the *Property Law of the People's Republic of China*, which took effect on 1 Octo-

ber 2007, also specifies that transferable shares that the debtor or a third party has the right to dispose of can be pledged.[2] The *Guarantee Law* and *Property Law* are the basic laws that need to be followed when conducting share pledging.

Share pledge contracts in China's capital market generally contain four important indicators: (1) reference market value, which is the secondary market trading price of the stock before it is pledged; (2) pledge ratio, which is the loan principal divided by the reference market value of the pledged stocks; in practice, the pledge ratio can be as high as 60% and as low as 20%; (3) warning line, which is generally not less than 135%; if the ratio of the actual market value of the pledged stocks to the loan principal drops to the warning line, the lender can require the borrower to immediately make up for the shortfall in the value of the pledge due to the fall in the share price; (4) closeout line, which is generally set to a minimum of 120%; if the ratio of the actual market value of the pledged stocks to the loan principal falls to the closeout line, the lender has the right to sell the pledged stocks and use the proceeds to repay the principal and interest, with the balance returned to the borrower and the shortfall settled by the borrower. After the pledgee and pledger sign a written pledge contract, it is necessary to register the pledge with the China Securities Depository and Clearing Corporation Limited (CSDC) before the contract can officially take effect. If the shares of a limited liability company are pledged, the relevant provisions of the *Company Law of the People's Republic of China* on share transfer apply. It is worth noting that unlike a mortgage, a pledge does not require the transfer of possession of the property. In other words, even if a shareholder pledges his or her shares, he or she retains the right to attend shareholders' meetings, make proposals or vote, based on the identity as a shareholder. Consequently, share pledge financing enables the controlling shareholders of listed companies to raise capital while maintaining the controlling rights of listed companies. This makes share pledging a very convenient financing tool.

The specific practice of equity pledging in China shows that regulators are gradually relaxing the constraints on equity pledging so that the practice can better serve the development of the capital market. Before 2013, share pledging in China was mainly handled through intermediaries such as commercial banks and trusts. As share pledges are non-standard businesses, the contract terms are set quite flexibly and decided upon based on mutual consensus between the pledgee and pledger. The requirements are more detailed for securities companies that pledge the shares or certificates of securities investment funds they hold. In 2000, the *Measures for the Administration of Securities Company Stock Pledge Loans*, issued by the People's Bank of China and the CSRC, required that "the maximum term of a stock pledge loan is six months, and the loan contract shall not be extended after its expiration," "the shares of a listed company used by a securities company for pledging shall not be more than 10% of the total outstanding shares of that listed company" and "the shares of a listed company being pledged shall not be more than 20% of the total outstanding shares of that listed company." In 2004, the *Measures* were amended, with the maximum term of a stock pledge loan extended to one year and the warning line raised from 130% to 135%.

On 24 May 2013, the launch of the *Measures on Stock Pledge and Repo Transactions and Registration and Clearing (for Trial Implementation)* officially started a new chapter of the stock pledge market in China. Stock pledged repo refers to a transaction in which an eligible financing party pledges its stock holdings to an eligible capital lender to raise funds and agrees to return the funds and release the pledge in the future. The lenders include securities companies, pooled asset management plans or targeted asset management clients managed by securities companies and pooled asset management plans or targeted asset management clients managed by asset management subsidiaries of securities companies (hereafter referred to as securities companies). Clearly, the essence of stock pledged repo is still stock pledge financing. The main difference between stock pledged repo and traditional stock pledge lending is that when a fund raiser defaults on a contract, the former can directly make a default disposal declaration and sell the pledged stocks in the secondary market, but the latter cannot directly sell the stocks in the market and the disposal process is more cumbersome; correspondingly, the former is referred to as an "on-exchange pledge" and the latter is referred to as an "over-the-counter pledge." Hence, stock pledged repo allows pledgees to more conveniently control the risk of stock pledging. Besides, stock pledged repo is a highly standardized business that is efficiently processed, allowing borrowers

[2] The *Civil Code of the People's Republic of China* was adopted by the National People's Congress on 28 May 2020 and came into force on 1 January 2021. The *Property Law* was also repealed at the same time. Article 440 of the *Civil Code* clarifies that transferable shares that the debtor or a third party has the right to dispose of can be pledged.

to raise funds more quickly. The convenience of stock pledged repo has contributed to the sharp increase in the volume of stock pledges and has led to the subsequent rise of securities companies as dominant players in the stock pledge market. On 16 March 2015, the Securities Association of China (SAC) issued the *Guidelines for the Risk Management of Securities Firms Regarding Stock Pledged Repo Trading (for Trial Implementation)*, which provides more specific regulations for the risk management of securities firms when conducting on-exchange pledges. For example, one of the guidelines is that "the cumulative financing balance of a single pledgee (securities company) shall not exceed 10% of the net capital of the securities company." The SAC also issued the *Measures for the Pilot Project of Securities Firms' Conduct of Over-the-Counter Stock Pledged Repo Trading* on 24 July 2015 to promote the adoption of over-the-counter stock pledged repo agreements by securities companies. However, as the range of stocks involved in over-the-counter pledges may be broader than that involved in on-exchange pledges and as there are no clear regulations on pledge terms and restricted stocks, securities companies are exposed to higher business and default disposal risks. Therefore, in practice, securities companies engage in less over-the-counter equity pledges, with most of their over-the-counter pledges representing the ancillary business of on-exchange equity pledges. As stated by Guotai Junan Securities, based on the reference market value of equity pledges, as of 1 June 2018, the ratio of over-the-counter equity pledges by securities companies to their total equity pledges was approximately 5%; over-the-counter equity pledging was estimated to contribute only 0.52% of the overall revenue of securities firms.[3]

When the capital market was generally buoyant, on-exchange share pledging, a convenient financing tool, was widely favored by brokerage firms and shareholders of listed companies. The size of the share pledge market also ballooned during this time. However, in recent years, as the capital market has undergone substantial volatility and experienced frequent equity pledge blow-ups, more pledge risks have come to light and regulators have been forced to focus on controlling the risk of on-exchange pledges. On 8 September 2017, the SSE and SZSE, in conjunction with the CSDC, issued the *Measures on Stock Pledge and Repo Transactions and Registration and Clearing (a Trial Version Revised in 2017)* to request public opinions on the amendments. The SAC also issued the *Guidelines for the Risk Management of Securities Firms Regarding Stock Pledged Repo Trading (Draft for Comment)* on the same day. On 12 March 2018, both the amended versions of the aforementioned *Measures* and *Guidelines* were officially implemented. These new regulations impose stricter and more detailed requirements on the risk control of on-exchange pledges. For example, some of the guidelines are that "the number of stocks of a single A-share company accepted by a single securities company as pledges shall not exceed 30% of the A-share share capital of that stock," "the number of stocks of a single A-share company accepted by a single pooled asset management plan or directed asset management client as pledges shall not exceed 15% of the A-share share capital of that stock," "the ratio of the number of pledged stocks of a single A-share company to its A-share share capital shall not exceed 50%" and "the maximum stock pledge ratio shall not exceed 60%." The new regulations also impose more restrictions on the fund raiser, the capital provider and the use of funds. In early June 2018, the SAC issued the *Notice on Matters Relating to Securities Firms' Conduct of Over-the-Counter Stock Pledged Repo Trading* to suspend this type of business. Under the rigorous regulations implemented by the authorities, the stock pledge market has gradually "cooled down."

To better understand the practice of controlling shareholders' equity pledges in China's capital market, we provide statistics on the overall situation of controlling shareholders' equity pledges among A-share non-financial listed companies from 2003 to 2018, excluding all observations under special treatment (ST). As shown in Fig. 1, controlling shareholders' equity pledges have become increasingly common. In March 2003, 184 out of 1,169 (15.7%) companies had controlling shareholders' equity pledges. By December 2018, this percentage increased to 53.4%, with the controlling shareholders of 1,786 out of 3,342 companies pledging their shares. Moreover, the percentage of companies with controlling shareholders' equity pledges increased at a significantly faster rate after the start of on-exchange pledges in May 2013, from an average increase rate of 0.4% per quarter to 1.0% per quarter. Furthermore, to determine the extent of the impact of controlling shareholders' equity pledges, we calculate the ratio of the number of shares pledged by a controlling shareholder to the number of shares he or she holds (hereafter referred to as the controlling shareholder's pledge ratio) and the ratio of the number of shares pledged by a controlling shareholder to the number of shares issued by the

[3] Source: http://www.xinhuanet.com//fortune/2018–06/06/c_1122942821.htm

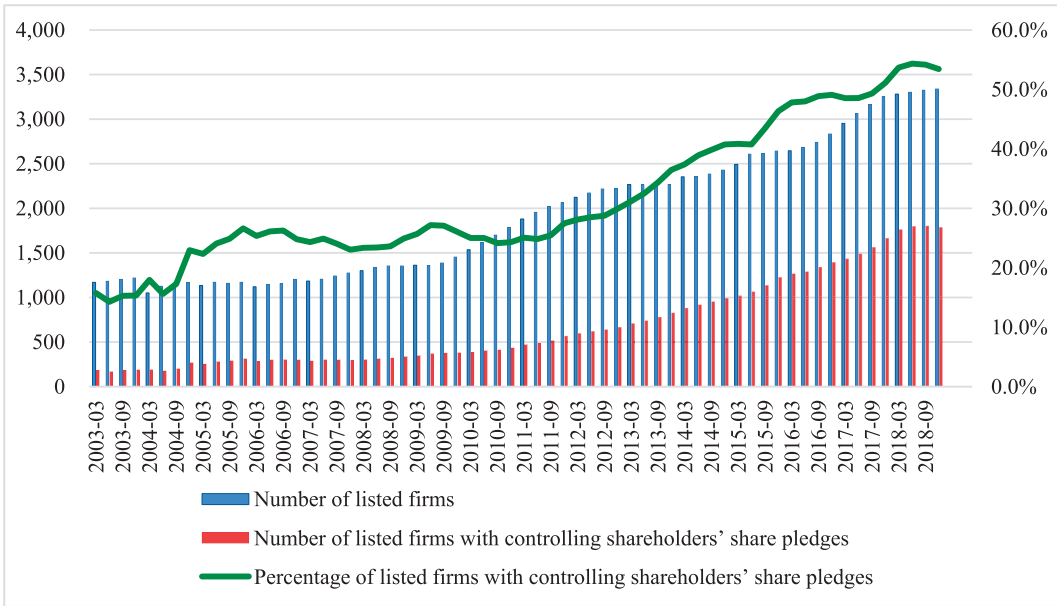

Fig. 1. Share pledges made by the controlling shareholders of listed firms.

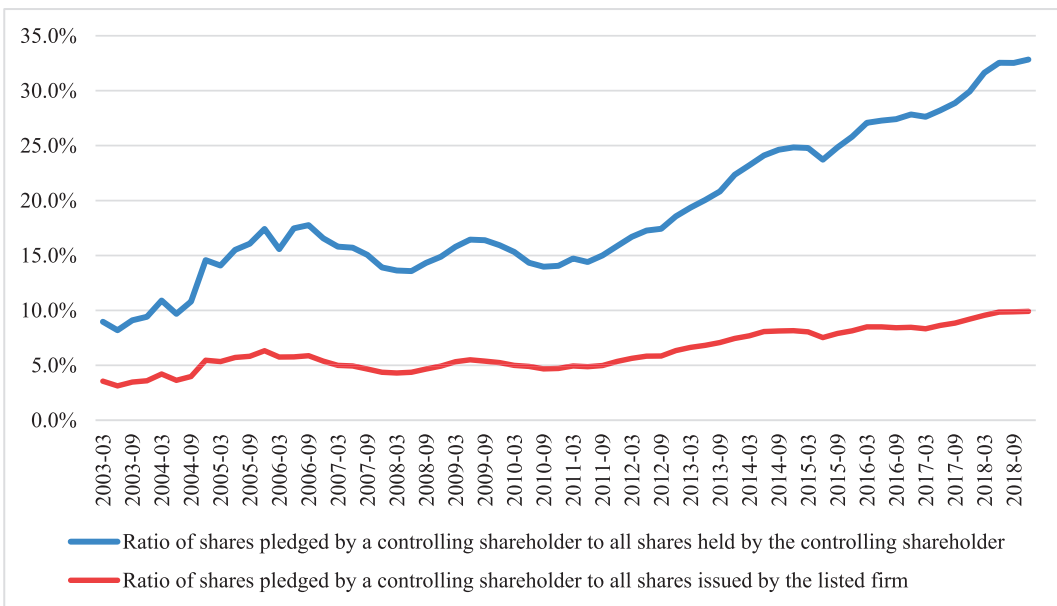

Fig. 2. Two ratios of controlling shareholders' share pledges.

listed firm (hereafter referred to as the firm's pledge ratio). In Fig. 2, we show the sample means of these two ratios in each quarter. There is a clear general upward trend in the average controlling shareholder's pledge ratio. The controlling shareholder's pledge ratio increased from 9.0% in March 2003 to 32.8% in December 2018. Simultaneously, the firm's pledge ratio increased from 3.5% to 9.9%. In addition, the controlling shareholder's pledge ratio of the sample companies with controlling shareholders' equity pledges was no less than 55% and the firm's pledge ratio was more than 17% between 2003 and 2018. This indicates that the closeout risk of controlling shareholders' equity pledges poses a significant threat to the control rights of many listed

companies, with increased pledges possibly giving rise to systematic risk in the capital market. Therefore, there is a need to study the risk management of share pledges in China's market from different perspectives.

3. Literature review and research hypothesis

3.1. Literature review

Although share pledging provides controlling shareholders with financing facilities by taking advantage of the liquidity and valuation convenience of the shares of listed companies, it is difficult for pledgees to effectively monitor the real purpose of the funds obtained by controlling shareholders' equity pledges. As argued in the literature, the real purpose of equity pledges by controlling shareholders can be to alleviate their own financial distress (Zheng et al., 2014), to cash out (Li and Li, 2007) or to increase the leverage of control rights (Hao and Liang, 2009). Xu et al. (2016) find that the willingness of large shareholders to pledge equity is significantly and positively correlated with the firm's stock mispricing and credit policy, suggesting the presence of timing behavior in large shareholders' equity pledges. This implies that controlling shareholders' equity pledges may not serve the purpose of developing industry because if that were the case, the shares would have been pledged in the event of capital need and not when the stock was mispriced. When pledging shares, to reduce the risk of transfer of control rights, the controlling shareholder can use various methods to maintain or defend the share price, either by himself or herself or by asking the listed company to do so. The methods may include reducing their expropriation (Li and Zheng, 2015), pushing listed companies to capitalize the development cost (Xie et al., 2017) or conduct real earnings management (Xie and Liao, 2018) to boost profits, exploiting the dividend policies of listed companies for market capitalization management (He et al., 2018; Liao et al., 2018), requiring listed companies to withhold bad news (Qian and Zhang, 2018), pushing listed companies to engage in tax avoidance (Wang et al., 2018), inhibiting investment by listed companies in innovation (Li et al., 2018) and increasing strategic charitable giving by listed companies (Hu et al., 2020). These behaviors of market capitalization management promoted by controlling shareholders may indeed reduce their companies' stock price crash risk during the pledge period (Xie et al., 2016), but may also increase share price crash risk due to investor speculation and panic over the controlling shareholders' equity pledges stemming from information asymmetry between investors and companies (Xia and Jia, 2019). In contrast, Jing et al. (2019) find that equity pledges do not affect stock price crash risk per se, but only because controlling shareholders are more likely to pledge shares when the deposit and loan interest rates are high. The high interest rates increase the cost of investing in stocks, which in turn reduces the supply of market capital and makes share prices more likely to fall. In addition, the risk that arises from pledging shares affects the behavior of external stakeholders of the firm. For example, external auditors adjust their audit fees after considering the risk of share pledging and are also more likely to issue modified audit opinions (Zhang et al., 2016; Zhai et al., 2017; Zhang et al. 2017), but deregulation of short selling can reduce the audit fees for firms with share pledges (Wang et al., 2019). Accordingly, share pledging can reinforce changes in companies' auditors for audit opinion shopping (Cao and Li, 2019) and make companies more inclined to choose low-quality auditors to reduce external monitoring (Xu et al., 2019).

To date, relatively few studies have examined share pledging from the pledgee's point of view. Using a sample of share pledge announcements from 2001 to 2010, Tan and Wu (2013) find less earnings management and tunneling in firms with controlling shareholders' share pledges than in firms without. They argue that share pledges by bank pledgees have a governance effect on controlling shareholders and pledger firms. However, when the design of their study is taken into account, the findings appear to be an outcome of ex-ante screening by banks rather than in-process governance. Li et al. (2019) use the *Measures on Stock Pledge and Repo Transactions and Registration and Clearing (for Trial Implementation)* released in 2013 as an exogenous event and find that increased pledge competition leads pledgees to tolerate greater management of the tone of annual reports by pledger firms. This is accompanied by lower quality corporate disclosure and higher stock price

crash risk.[4] As the sharp increase in equity pledges after 2013 arose mainly from on-exchange pledges made by brokerage firms, some scholars study analysts at brokerage firms. From a conflict of interest perspective, pledgee analysts make more optimistic earnings forecasts (Hua and Sun, 2017) and stock recommendations (Xie et al., 2019) for pledger firms than non-pledgee analysts. However, from the perspective of information transfer, pledgee analysts make more accurate earnings forecasts for pledger firms (He et al., 2021). Using our search strategy, we find no studies on share pledges that closely link pledgees and pledgers. Therefore, this paper is innovative in its study of share pledges from the viewpoint of risk matching between pledgees and pledgers.

3.2. Research hypothesis

As mentioned above, brokerage firms have been authorized to enter the share pledge market for shareholders of listed companies from May 2013 onward. Since then, China's share pledge market has grown rapidly and brokerage firms have replaced commercial banks as dominant pledgees in this market, although banks remain important market participants. Banks and brokerage firms are the main pledgees in China's share pledge market, with the former only being able to conduct over-the-counter pledges and the latter mainly making on-exchange pledges. Over-the-counter pledges and on-exchange pledges refer to pledgers raising funds from pledgees in the over-the-counter and on-exchange markets, respectively, with their holdings of shares of listed companies being pledged. In the following paragraphs, we elaborate the basic characteristics of pledgees and pledgers and analyze the share pledge game played between banks and brokerage firms as pledgees and the controlling shareholders of listed companies as pledgers. Finally, we propose a research hypothesis based on the described characteristics.

First, the expectation or utility function of the pledgee in share pledge financing is to control pledge risk and obtain a high return on the share pledge loan within a tolerable risk range. On the one hand, risk control depends on the low risk of the underlying stock (note that share pledge financing itself is a type of non-credit loan with strong credit enhancement); on the other hand, risk control depends on the ability to understand the financial situation of the pledger and monitor the use of the share pledge financing funds.[5] It is usually difficult for commercial banks to monitor the real use of funds once they enter the pledger's bank account and it is even more difficult for brokerage firms to do so. Although the specific use of the pledge funds can be agreed upon in the share pledge contract, its authenticity depends on the integrity of the pledger. As a result, the pledgee's risk control on share pledge loans mainly relies on the risk assessment of the pledged shares and the pledgee's risk tolerance.

As pledgees, commercial banks and brokerage firms naturally have different levels of risk tolerance for share pledge loans. Generally, brokerage firms have a higher tolerance for risk than banks, because banks mainly grant loans by taking deposits and are responsible for the safety of the depositors' funds. Moreover, their lending market is an indirect financing market, they uphold a conservative creditor mindset, they are more responsible for the stability of the financial system and they are subject to more stringent financial prudential regulations in the long term. Unlike banks, brokerage firms are usually active in the direct financing market, with most of their profits being related to high risk equity financing, brokerage business and investment business. This also instills a more aggressive investment banking mindset. The risk orientation and the atmosphere of brokerage firms' direct financing business are higher than those of banks' indirect financing business, with brokerage firms being less responsible for the stability of the financial system and subject to fewer stringent financial prudential regulations. When it comes to share pledge financing, banks cannot

[4] As the study does not require pledger firms to have made equity pledges both before and after 2013 and as brokerage firms could not participate in the share pledge market prior to 2013, the findings can be explained as brokerage firms accepting share pledges from pledgers with higher risk and lower disclosure quality.

[5] For on-exchange pledges, the *Guidelines for the Risk Management of Securities Firms Regarding Stock Pledged Repo Trading* state that risk management mainly includes due diligence on the financing party, evaluation and screening of the pledged stocks and mark-to-market mechanisms during the pledging process. For over-the-counter pledges, there are no such specific regulations. Share pledges are only pledge loans with shares being the subject of pledges for banks, i.e., loans granted by lenders with movable assets or rights of borrowers or third parties as pledges in accordance with the pledges stipulated in the *Guarantee Law*, which are part of the traditional business of banks. Therefore, pre-loan due diligence and valuation of the subject of pledges are regular processes for banks.

directly dispose of the pledged shares on the stock market in a timely manner as the over-the-counter pledges that they use are non-standardized. Whereas for brokerage firms, the on-exchange pledges that they use are standardized transactions governed by the rules of the CSRC. As stated by the *Measures on Stock Pledge and Repo Transactions and Registration and Clearing*, brokerage firms implement a mark-to-market arrangement after setting warning and closeout lines so that they can promptly request pledgers to replenish collateral or repay loans ahead of schedule. Alternatively, they can promptly sell the underlying stocks directly in the secondary market.[6] Therefore, brokerage firms can issue stop-loss orders in a more timely manner than banks. In addition, equity pledge loans and their proceeds are not important for banks compared with traditional loans, whereas for brokerage firms, the proceeds from equity pledges have become an important and even main source of revenue from 2013 onward.[7] Hence, in terms of their business risk management culture, the timeliness of stop-loss and the importance of pledging, brokerage firms are likely to have a higher tolerance for risk than banks regarding equity pledge financing.

We also need to analyze the differences in the efficiency with which banks and brokerage firms handle share pledges. As traditional lenders, banks have a relatively rigorous set of loan approval procedures. For banks, share pledges are nothing more than loans with the shares of listed companies as the underlying pledges, implying that the pledges are naturally handled in accordance with loan approval procedures. The share pledges handled by banks are non-standardized over-the-counter pledges. The liquidity of listed companies' stocks is also discounted for banks as they cannot directly dispose of the pledged stocks when the pledger defaults. The disposal procedures are cumbersome, with judicial procedures often required to dispose of the pledged stocks. This increases the probability of loss on share pledge loans for banks. This also implies that banks are unlikely to relax their approval requirements even if the liquidity of listed companies' stocks is higher. As mentioned above, banks uphold a conservative creditor mindset with lower risk tolerance and are more accustomed to physical assets such as fixed assets as collateral. As the *Commercial Bank Law of the People's Republic of China* has long prohibited banks from directly making equity investments, banks have difficulty effectively assessing the value of equity instruments such as stocks and spend more time on pre-loan review. Moreover, banks generally pay more attention to the use of loan funds and the source and likelihood of repayment by the pledger, which increases both the document preparation time required by the pledgers and the pre-loan due diligence and review time required by the banks. In contrast, brokerage firms have an aggressive investment banking mindset with higher risk tolerance and their equity pledges are standardized on-exchange pledges that use standardized contracts prescribed by the CSRC. As noted earlier, they can also issue stop-loss orders in a more timely manner for equity pledges and are better at valuing equity instruments. Although brokerage firms are also concerned about the use of loan funds, they are less capable of handling the issue and are less likely to sufficiently research it for reasons such as a lack of means to track and monitor the use of funds, making them efficient in handling equity pledges. Consequently, banks are generally less efficient in handling equity pledges than brokerage firms.

In terms of the cost of capital for equity pledge loans that banks and brokerage firms can provide, banks can provide pledgers with lower financing costs than brokerage firms because banks can directly absorb low-cost deposits, which brokerage firms are not authorized to do. Whether brokerage firms raise funds through bank loans, issuance of bonds or other financing instruments, the cost of capital on the liability side of brokerage firms is undoubtedly higher than that of banks. Therefore, although the controlling shareholders of listed companies who pledge their shares do not pose a high risk and brokerage firms have higher risk tolerance, the brokerage firms cannot provide funds with lower financing costs to the pledgers.

Second, the pledger's expectations include ensuring low financing costs of the share pledge, efficient business processing and flexible use of the funds. The price fluctuation risk and liquidity of the shares of different listed companies are also different. For simplicity, we distinguish potential share pledgers (the controlling shareholders of listed companies who intend to satisfy their own capital needs by pledging shares) into two categories: high-risk and low-risk pledgers, based on the risk of the underlying shares (the level of risk referred to in this paper is mainly the relative level of risk).

[6] If a stock has a high pledge ratio, the brokerage firm actually faces liquidity difficulties in selling the underlying stock.

[7] The SAC states that the scale of interest income from securities firms' equity pledges reached 46.39 billion yuan in 2018, far exceeding the scale of income from their traditional underwriting and sponsorship activities (25.56 billion yuan).

Given the basic characteristics of pledgees and pledgers, we can briefly analyze the theoretical equilibrium of competition in the share pledge market. We assume the presence of information asymmetry between the pledgee and pledger with respect to the risk of the pledged stocks and the true use of the funds provided to the pledger. We also assume that the pledger is in a position of information advantage. However, as the underlying stocks are those of a listed company, the pledgee can obtain public financial and valuation data and even private information about the company through due diligence and communication with the pledger. Therefore, the information asymmetry between the pledgee and pledger regarding the risk of the pledged stocks is weaker than the information asymmetry between them regarding the pledger's own financial position and true use of the funds. At a micro level, the risk of the underlying stocks depends on two main factors: the quality of the pledger firm and the valuation. In other words, banks and brokerage firms as pledgees can make basic judgments on the risk of the underlying stocks. Although the controlling shareholder, i.e., the pledger, is the underlying debtor in share pledging, the pledgee can treat the pledger firm as the debtor to conduct due diligence (partly in lieu of due diligence on the pledger, especially when the pledger is a natural person) with the purpose of controlling the risk of pledging shares by controlling the risk of the underlying stocks. Specifically, for high-risk pledgers, because they have low risk tolerance and perceive themselves to have a relatively low ability to value equity instruments, banks will demand higher interest rates for share pledge loans, conduct longer due diligence and pre-loan reviews, offer lower pledge ratios for stocks of the same market capitalization size and have more incentives to draft and adopt restrictive measures to constrain the true use of loan funds by high-risk pledgers than brokerage firms. Banks may even turn away pledgers whose risk exceeds the traditionally borne levels. Therefore, in terms of loan interest rates, time costs, the scale of pledge financing available for stocks of the same market capitalization size and constraints on the use of funds, high-risk pledgers are likely to prefer to apply for equity pledge loans from brokerage firms. Naturally, information asymmetry plays a role in this transaction. Due to the information asymmetry between the pledgee and pledger regarding the pledger firm, a conservative bank is more likely to overestimate the risk of the high-risk pledger firm than an aggressive brokerage firm, thus requiring financing costs that exceed the pledger's expectations. This will in turn make high-risk pledgers more inclined to seek equity pledge loans from brokerage firms. Low-risk pledgers will also prioritize equity pledge loans from brokerage firms given the time cost of business processing and the constraints on the use of funds. For normal share pledge loans, the most important factor considered by the pledger is the financing cost. Although the risk tolerance of brokerage firms is higher than that of commercial banks, their cost of capital is higher than that of banks because the funds used by brokerage firms for loans are either their own funds, sourced from the brokerage firms' debt and equity financing, or bank funds that use the brokerage firms' asset management channels for loans. Additionally, it is impossible for brokerage firms to set the interest rate for equity pledge loans below the cost of these funds, which, together with the operating costs of brokerage firms' equity pledges and a certain degree of risk premium, implies that the interest rate required by brokerage firms for low-risk pledgers will be higher than that required by commercial banks.[8] For low-risk pledgers, the efficiency of business processing and the pledge ratios are likely to be appropriately increased and the use of loan funds appropriately relaxed by banks due to the low risk of the underlying stocks and low pledge risk. Therefore, after weighing factors such as the interest rates of equity pledge loans, business processing efficiency, the scale of financing available for stocks of the same market capitalization size and constraints on the use of funds, low-risk pledgers are likely to be more inclined to apply for equity pledge loans from banks. Although information asymmetry exists between low-risk pledgers and pledgees regarding the pledger firms, the difference in overestimation of the risk of low-risk pledger firms between banks and brokerage firms will be less than the difference in overestimation of the risk of high-risk pledger firms. In our opinion, due to the difference in the cost of capital between brokerage firms and commercial banks, the fact that pledger firms are listed companies and the small difference in the level of information asymmetry between pledgees and different types of pledgers, the adverse selection problem that may arise from information asymmetry, if it exists, is not serious.

[8] Based on our survey of brokerage firms and commercial banks, the interest rate of brokerage firms' equity pledge loans is more than 100 basis points higher than that of commercial banks on average.

In summary, we argue that the competitive equilibrium in the share pledge market is that high-risk pledgers are more likely to apply for and obtain equity pledge loans from brokerage firms whose risk tolerance is relatively high, whereas low-risk pledgers are more inclined to apply for and obtain equity pledge loans from commercial banks whose risk tolerance is relatively low. Therefore, pledge risk matching between pledgees and pledgers is achieved. Based on the discussion above, we propose the following hypothesis:

All else being equal, the underlying shares of pledges conducted by bank pledgees are less risky than the underlying shares of pledges conducted by broker pledgees.

4. Research design

4.1. Model and variables

Referring to Hu and Jin (2007) and Krishnan and Mani (2020), we establish the following logit model to test the hypothesis above:

$$\begin{aligned} BANK_{i,t} = {} & \beta_0 + \beta_1 NCSKEW_{i,t-1} + \beta_2 VOLATILITY_{i,t-1} + \beta_3 HIGHPE_{i,t-1} + \beta_4 SIZE_{i,t-1} + \beta_5 FIX_{i,t-1} \\ & + \beta_6 REVVOL_{i,t-1} + \beta_7 CFO_{i,t-1} + \beta_8 HQCFO_{i,t-1} + \beta_9 ROE_{i,t-1} + \beta_{10} TURNOVER_{i,t-1} \\ & + \beta_{11} ABSDA_{i,t-1} + \beta_{12} SOE_{i,t} + \sum QUARTER + \sum IND + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where i denotes the firm and t denotes the quarter (we use quarterly panel data to better reflect the risk information of the underlying shares available to the pledgee at the time of signing the share pledge contract). *BANK* is the dependent variable that indicates whether the controlling shareholder of firm i pledges new shares to a bank in quarter t. If the controlling shareholder of firm i pledges new shares to a bank in quarter t (including cases where the controlling shareholder pledges new shares to a brokerage firm in the same quarter), *BANK* equals one; if the controlling shareholder pledges new shares only to brokerage firms in quarter t, *BANK* equals zero. [9]

In share pledging, the pledged stocks are the subject of the pledge and in the event of default of the pledge loans, the pledgees cover the losses mainly by selling the pledged stocks. The pledger firms are not directly involved in the pledge loans. This implies that the market risk of the pledged stocks exerts a more direct influence on the pledgee's share pledge decision, whereas the quality and risk of the pledger firm have a more indirect impact on the decision. Therefore, with respect to the independent variables, we first consider and control for variables related to the valuation and risk of the pledged stocks. The first independent variable is a firm's stock price crash risk. In share pledging, the pledgee determines the loan amount based on a certain discount to the market value of the pledged stocks, making the pledgee more focused on downside risk (i.e., that the stock price will fall). Moreover, obtaining a larger loan amount when pledging shares gives the controlling shareholder an incentive to hide bad news about the firm and defend the inflated value of the pledged stocks. This behavior gives rise to the adverse selection problem. The accumulation of bad news also increases stock price crash risk. To account for this, we follow Chen et al. (2001) and Xie et al. (2016) to calculate the negative return skewness coefficient (*NCSKEW*) for the year prior to the pledge, which measures the pledger firm's stock price crash risk. We also calculate the upward and downward stock return volatility ratio (*DUVOL*) as an alternative indicator for *NCSKEW* to show the robustness of the results. The higher these two variables, the greater the stock price crash risk. In accordance with the hypothesis stated in this paper, we expect β_1 to be negative, implying that bank pledgees face lower stock price crash risk for the pledged shares. The second independent variable is stock return volatility (*VOLATILITY*), which is a proxy variable for stock market risk commonly used in the literature (Chandra and Ro, 1997; Hu and Jin, 2007; Zhang and Huang, 2009). *VOLATILITY* is measured as the standard deviation of weekly individual stock returns after accounting for the reinvestment of cash dividends in the four quarters prior to the pledge. The higher the stock return volatility, the more difficult it is for the pledgee to determine the loan amount directly based on the stock price in the period

[9] The sample in this paper consists of 10,112 firm-quarter observations. Of these, 2,742 observations pledge new shares to banks only and 39 pledge new shares to both banks and brokerage firms, with *BANK* taking a value of one for both types of observations. The remaining 7,331 observations pledge new shares to brokerage firms only, with *BANK* taking a value of zero.

prior to the pledge and the higher the risk of stock price volatility in the future. Banks are more likely to be reluctant to approve applications for such share pledge loans and, consequently, we expect β_2 to be negative. The third independent variable is based on the stock's price-to-earnings (P/E) ratio, which is an indicator widely used in the market to reflect valuation. For example, the CSRC constrains the P/E ratio for initial public offering (IPO) pricing and analysts usually forecast the P/E ratios of listed companies in their research reports. The higher the P/E ratio, the higher the likelihood that the stock price is in a bubble (Dai, 2001) and therefore the higher the likelihood that the stock price will collapse in the near future. Based on historical statistics from the SSE and SZSE, the average P/E ratio of the GEB is always the highest, followed by that of the Small and Medium Enterprise Board (hereafter referred to as the SME) and finally that of the Main Board. This also indicates that the P/E ratio indeed reflects the valuation risk of stocks to a certain extent. In share pledging, the P/E ratio is even more important because the loan amount is generally obtained by estimating the value of the pledged shares based on the stock price in the period before the pledge and then multiplying it by the pledge ratio. The higher the P/E ratio, the higher the valuation risk of the stocks and the lower the likelihood that a commercial bank will become the pledgee. To account for this, we construct the dummy variable *HIGHPE* to reflect the relative level of the company's P/E ratio in the market. *HIGHPE* equals one when the company's quarterly P/E ratio is above the median quarterly P/E ratio of all A-share non-financial listed companies and zero otherwise. We use the company's market value at the end of the most recent quarter before the pledge divided by the rolling net income attributable to shareholders of the parent company for the previous four quarters. We expect β_3 to be negative.

To assess the quality and risk of the pledger firm, we measure and control for them from several perspectives. First, the size of the company (*SIZE*) is a comprehensive reflection of the company's risk. Large companies tend to be in a mature stage with stable operating and financial conditions, which puts the company at relatively low risk. The fixed asset ratio (*FIX*) reflects one aspect of the company's asset composition. A company with more physical assets available for collateral is more likely to obtain loans or dispose of assets to replenish its capital. The volatility of operating income (*REVVOL*) directly depicts the stability of a firm's day-to-day operations and is an important indicator of the firm's risk. The operating cash flow ratio (*CFO*) is another important signal of a firm's operational risk, with a small ratio meaning that a company might be under immense pressure to repay its short-term debt. We also consider the quality of cash flow from operating activities. High quality implies that the actual net cash flow from operating activities is not less than "interest + operating income after tax (i.e., net income – change in fair value – investment income) + depreciation and amortization (including asset impairment loss) + cost of equity incentive," as described in Xie et al. (2020). We construct the dummy variable *HQCFO* to indicate cash flow quality, which takes a value of one if the actual net cash flow from operating activities is of high quality and zero otherwise. We also include the firm's return on equity (*ROE*) to reflect the profitability of the firm and the total asset turnover ratio (*TURNOVER*) to reflect the operating capability of the firm. For these variables, we expect β_4, β_5, β_7, β_8, β_9 and β_{10} to be positive and β_6 to be negative.

Given that the information transparency of the pledger firm can affect the accuracy of both market and financial data to reflect risk, we further account for information transparency to reflect risk from another perspective when analyzing the risk of the pledged stocks. Specifically, before a controlling shareholder begins an equity pledge, he has an incentive to manipulate the company's earnings to increase the company's share price and thus obtain more loans when the shares are pledged (Tan and Wu, 2013). This behavior reduces the transparency of company information (Li and Kong, 2013), which not only reduces the favorability of the pledgee's evaluation of the pledger firm's quality but also reflects the pledger's dishonesty. Based on these two aspects, in addition to the aforementioned share price risk, we use earnings quality (*ABSDA*) to measure the information transparency of the pledger firm. We calculate discretionary accruals for the year prior to the pledge using the modified Jones model (Dechow et al., 1995) and then take its absolute value. The higher the value, the worse the firm's earnings quality and the lower its information transparency. Finally, we consider the nature of the firm's property rights (*SOE*). State-owned enterprises (SOEs) in China have a "soft budget constraint" (Lin and Li, 2004; Xie and Chen, 2009), enjoy many resources and are subject to more regulations. Hence, they tend to be low risk (Xu and Zhou, 2016). We expect β_{11} to be negative and β_{12} to be positive. In addition, we control for quarter and industry fixed effects, with the regressions clustered at the firm level. Table 1 presents the definitions of all variables.

Table 1
Variable definitions.

Variable	Definition
$BANK_{i,t}$	Indicator variable equal to one if the controlling shareholder pledges new equity to a bank in quarter *t* and zero otherwise.
$NCSKEW_{i,t-1}$	Negative return skewness coefficient for the year prior to the pledge, calculated with reference to Chen et al. (2001) and Xie et al. (2016). The higher the value, the higher the risk of a stock price crash.
$VOLATILITY_{i,t-1}$	Stock return volatility for the four quarters prior to the pledge, equal to the standard deviation of weekly individual stock returns after accounting for cash dividends reinvested.
$HIGHPE_{i,t-1}$	Indicator variable equal to one if the P/E ratio is higher than the median P/E ratio of all A-share non-financial listed firms in quarter *t–1* and zero otherwise. The P/E ratio in quarter *t–1* is equal to the market value of the firm at the end of quarter *t–1* divided by the rolling net income attributable to shareholders of the parent company for the previous four quarters.
$SIZE_{i,t-1}$	Firm size at the end of quarter *t–1*, equal to the natural logarithm of total assets at the end of the quarter.
$FIX_{i,t-1}$	Fixed asset ratio at the end of quarter *t–1*, equal to net fixed assets divided by total assets at the end of the quarter.
$REVVOL_{i,t-1}$	Operating income volatility for the three years prior to the pledge, equal to the standard deviation of the natural logarithm of operating income each year.
$CFO_{i,t-1}$	Operating cash flow ratio for the year prior to the pledge, equal to net cash flow from operating activities during the year divided by current liabilities at the end of the year.
$HQCFO_{i,t-1}$	Quality of cash flow from operating activities for the year prior to the pledge. Indicator variable equal to one if the actual net cash flow from operating activities is not less than "interest + operating income after tax (i.e., net income – change in fair value – investment income) + depreciation and amortization (including asset impairment loss) + cost of equity incentive," as described in Xie et al. (2020), and zero otherwise.
$ROE_{i,t-1}$	Return on equity for the year prior to the pledge, equal to net income attributable to shareholders of the parent company during the year divided by equity attributable to shareholders of the parent company at the end of the year.
$TURNOVER_{i,t-1}$	Total asset turnover ratio for the year prior to the pledge, equal to sales revenue during the year divided by total assets at the end of the year.
$ABSDA_{i,t-1}$	Absolute value of discretionary accruals for the year prior to the pledge, estimated by year and industry using the modified Jones model (Dechow et al., 1995). The higher the value, the worse the earnings quality and information transparency.
$SOE_{i,t}$	Indicator variable equal to one if the firm is state-owned and zero otherwise.
$DUVOL_{i,t-1}$	Upward and downward stock return volatility ratio for the year prior to the pledge, as described in Chen et al. (2001) and Xie et al. (2016). The higher the values, the higher the risk of a stock price crash.

4.2. Data and sample

We obtain all share pledge records of A-share listed companies in China from the China Stock Market and Accounting Research (CSMAR) database and consider one share pledge to represent one event. We only retain share pledges made by controlling shareholders to banks or brokerage firms and exclude financial and ST companies. As this paper focuses on the difference in risk appetite between the bank and broker pledgees and on-exchange pledges by brokerage firms officially began after the release of the *Measures on Stock Pledge and Repo Transactions and Registration and Clearing (for Trial Implementation)* in May 2013, we retain all share pledge events made between July 2013 and December 2018. In other words, the time window of the sample is from the third quarter of 2013 to the fourth quarter of 2018. Based on these pledge events, we collate new pledges in each quarter. For controlling shareholders who start multiple pledges in a quarter, we retain only the first pledge event in the quarter. We also exclude observations with missing data or data exceptions and finally obtain 10,112 firm-quarter observations. For all continuous variables, we winsorize them at the 1% and 99% levels.

5. Empirical results and analyses

5.1. Descriptive statistics

The market risk, earnings predictability and composition and quality in terms of firm value of companies in different industries vary, implying that the expected risk of controlling shareholders' equity pledges of listed

Table 2
Sample distribution.

Panel A: Industry distribution

	Bank pledgee		Broker pledgee	
Industry name and code	N	Percentage	N	Percentage
Agriculture, forestry, livestock farming and fishery (A)	54	1.94%	127	1.72%
Mining (B)	75	2.70%	122	1.66%
Manufacturing (C1)	197	7.08%	410	5.56%
Manufacturing (C2)	598	21.50%	1,525	20.69%
Manufacturing (C3)	1,014	36.46%	2,781	37.73%
Manufacturing (C4)	33	1.19%	161	2.18%
Electricity, heat, gas and water (D)	35	1.26%	69	0.94%
Construction (E)	67	2.41%	171	2.32%
Wholesale and retail (F)	148	5.32%	236	3.20%
Transportation (G)	34	1.22%	55	0.75%
Hotel and catering (H)	9	0.32%	4	0.05%
Information transmission, software and IT services (I)	147	5.29%	808	10.96%
Real estate (K)	169	6.08%	294	3.99%
Leasing and commerce services (L)	47	1.69%	164	2.23%
Scientific research and technical services (M)	16	0.58%	83	1.13%
Water conservancy, environment and public facilities (N)	54	1.94%	137	1.86%
Health and social work (Q)	14	0.50%	68	0.92%
Culture, sports and entertainment (R)	40	1.44%	134	1.82%
Comprehensive (S)	30	1.08%	21	0.29%
Total	2,781	100%	7,370	100%

Panel B: Board distribution

	Bank pledgee		Broker pledgee	
Board	N	Percentage	N	Percentage
Main Board	1,450	52.14%	1,872	25.40%
Small and Medium Enterprise Board (SME)	965	34.70%	3,176	43.09%
Growth Enterprise Board (GEB)	366	13.16%	2,322	31.51%
Total	2,781	100%	7,370	100%

companies in different industries may also vary. This may lead different types of pledgees to prefer different industries to which the pledged stocks belong. Therefore, we divide the sample into categories based on the industries to which they belong according to the 2012 CSRC industry classification standard. Except for the manufacturing industry, which has 2-digit codes, all of the other industries have 1-digit codes. Panel A of Table 2 shows the industry distribution of the sample.[10] Both types of pledgees have shares pledges in all industries in the sample. The proportion of observations in the real estate industry (K) for bank pledgees (6.08%) exceeds the proportion of observations in this industry for broker pledgees (3.99%) by 2.09%, whereas the proportion of observations in the information transmission, software and IT services industry (I) for broker pledgees (10.96%) is 5.67% higher than the proportion of observations in this industry for bank pledgees (5.29%). A possible explanation for this difference is that during the sample period, the real estate industry had more stable business and relatively high-quality collateralizable assets such as land use rights and buildings. It is relatively easy to value companies in this industry, which also has large loan amounts for share pledges. In contrast, companies in the software and information industry are often in the growth stage with large investments in R&D, high risk and intangible assets that account for a large proportion of their total assets. It is therefore relatively difficult to evaluate such companies.

In addition to its industry, the board on which a company is listed can reflect its risk. For example, Main Board companies are larger, generally in the mature stage and have greater resistance to share price pressure and lower P/E ratios. However, companies listed on the SME and GEB are generally in the growth stage and have more volatile share prices. In particular, the average P/E ratio of GEB companies is significantly higher than that of Main Board companies. The share prices of GEB companies also tend to be frothier. Therefore, in

Table 3
Descriptive statistics.

Variable	N	Mean	SD	Min.	P25	P50	P75	Max.
BANK	10,112	0.275	0.447	0	0	0	1	1
NCSKEW	10,112	−0.121	0.726	−2.466	−0.515	−0.091	0.302	1.962
VOLATILITY	10,112	0.071	0.033	0.026	0.047	0.061	0.087	0.267
HIGHPE	10,112	0.554	0.497	0	0	1	1	1
SIZE	10,112	22.157	1.086	17.319	21.420	22.050	22.765	27.530
FIX	10,112	0.187	0.137	0	0.080	0.163	0.265	0.783
REVVOL	10,112	0.274	0.259	0.018	0.114	0.205	0.337	1.630
CFO	10,112	0.156	0.331	−0.628	−0.006	0.098	0.256	1.967
HQCFO	10,112	0.217	0.412	0	0	0	0	1
ROE	10,112	0.069	0.080	−0.253	0.029	0.064	0.106	0.315
TURNOVER	10,112	0.547	0.362	0.091	0.312	0.466	0.660	2.296
ABSDA	10,112	0.059	0.059	0.001	0.019	0.040	0.078	0.308
SOE	10,112	0.064	0.245	0	0	0	0	1
DUVOL	10,109	0.114	0.487	−1.163	−0.206	0.108	0.419	1.498

accordance with our hypothesis, we expect bank pledgees to prefer Main Board companies and controlling shareholders of GEB companies to mainly pledge their shares to brokerage firms. Panel B of Table 2 presents the board distribution of the sample. It shows that among the pledger firms accepted by banks, the majority are Main Board companies (52.14%), followed by SME (34.70%) and GEB companies (13.16%). However, among the pledger firms accepted by brokerage firms, the majority are SME companies (43.09%), followed by GEB (31.51%) and Main Board companies (25.40%). Thus, the board distribution of the sample is largely consistent with our expectation that shares pledged to bank pledgees have lower risk than those pledged to broker pledgees.

Table 3 presents the descriptive statistics of the key variables in the study. The results show that 27.5% of the observations are cases in which controlling shareholders pledge new shares to banks in a given quarter (*BANK*) and 72.5% are cases in which controlling shareholders pledge new shares only to brokerage firms in a given quarter. This is consistent with the actual surge in business by broker pledgees after the launch of on-exchange pledges, with bank pledgees still holding some market share. Additionally, 55.4% of the observations have a P/E ratio above the median P/E ratio of the overall market for that quarter (*HIGHPE*), 21.7% have high-quality cash flow from operating activities (*HQCFO*) and only 6.4% are SOEs.

In Table 4, we test the differences between groups based on whether a controlling shareholder pledges new shares to a bank for that quarter. We find that all variables, except *CFO* and *ROE*, are statistically significantly different between the two groups at the 1% level, both in terms of mean and median. Compared with firms whose controlling shareholders pledge new shares to brokerage firms only for that quarter, firms whose controlling shareholders pledge new shares to banks have smaller *NCSKEW*, *DUVOL*, *VOLATILITY*, *HIGHPE, REVVOL* and *ABSDA* and higher *SIZE*, *FIX*, *HQCFO*, *TURNOVER* and *SOE*. Thus, overall, shares pledged to bank pledgees are less risky than those pledged to broker pledgees, supporting our hypothesis to a certain degree.

5.2. Empirical results and analysis

The regression results of model (1) for the research hypothesis are shown in Table 5. In column (1), after controlling for quarter and industry fixed effects, the coefficients of *NCSKEW* and *VOLATILITY* are significantly negative at the 1% and 5% levels, respectively, indicating that the market risk of stocks pledged to bank pledgees is lower. The coefficients of *SIZE* and *HQCFO* are significantly positive at the 1% and 5% levels, respectively, and the coefficient of *REVVOL* is significantly negative at the 1% level. *ABSDA* is significantly

[10] The sum of all observations for both types of pledgees is greater than the number of observations in the sample because some controlling shareholders pledged new shares to both banks and brokerage firms in one quarter.

Table 4
Difference test.

Variable	*BANK* = 0			*BANK* = 1			*t*-test	Wilcoxon test
	N	Mean	Median	N	Mean	Median		
NCSKEW	7,331	−0.095	−0.066	2,781	−0.190	−0.165	5.900***	6.589***
VOLATILITY	7,331	0.072	0.062	2,781	0.069	0.059	3.450***	3.928***
HIGHPE	7,331	0.574	1	2,781	0.505	1	6.250***	6.230***
SIZE	7,331	22.088	21.986	2,781	22.341	22.231	−10.500***	−10.896***
FIX	7,331	0.181	0.157	2,781	0.203	0.18	−7.150***	−6.913***
REVVOL	7,331	0.285	0.216	2,781	0.246	0.172	6.750***	11.013***
CFO	7,331	0.154	0.092	2,781	0.162	0.109	−1.100	−2.671***
HQCFO	7,331	0.206	0	2,781	0.248	0	−4.550***	−4.556***
ROE	7,331	0.068	0.064	2,781	0.070	0.066	−0.950	−1.516
TURNOVER	7,331	0.532	0.452	2,781	0.584	0.506	−6.400***	−8.302***
ABSDA	7,331	0.060	0.042	2,781	0.055	0.037	4.250***	4.490***
SOE	7,331	0.039	0	2,781	0.130	0	−16.900***	−16.659***
DUVOL	7,329	0.133	0.126	2,780	0.062	0.058	6.630***	6.812***

Note: *** indicates statistical significance at the 1% level.

negatively correlated with *BANK* at the 10% level and *SOE* is significantly positively correlated with *BANK* at the 1% level. These imply that the pledger firms of bank pledgees are also less risky. In column (2), we run the regression again using another indicator of stock price crash risk, *DUVOL*, to replace *NCSKEW* and the results remain essentially unchanged. Thus, the overall results are consistent with our hypothesis that shares pledged to bank pledgees are less risky than those pledged to broker pledgees.

6. Further analyses and robustness tests

6.1. Impact of the nature of the property rights of pledger firms

Studies find that the nature of a listed company's property rights can significantly affect the share pledge behavior of the controlling shareholder. Controlling shareholders of non-state-owned listed companies (NSOEs) engage in various manipulative behaviors during the pledge to avoid the transfer of control rights (e.g., Xie et al., 2016; Xie et al., 2018). Independent auditors also strengthen the risk response measures for NSOEs whose controlling shareholders pledge their shares (Zhai et al., 2017). However, these behaviors are significantly weaker in SOEs. In light of this, we examine whether the nature of the pledger firm's property rights affects risk matching between the pledgee and pledger. As SOEs are inherently politically connected with soft budget constraints (Lin and Li, 2004; Xie and Chen, 2009) and because they can obtain bank loans at a lower cost, banks are less concerned about the downside risk of SOEs (Chen et al., 2010). Once an SOE goes into financial distress, the government usually provides it with resources, either directly or indirectly, to help repay its debts. In contrast, NSOEs tend to face more severe financing constraints, which are further enhanced when firms are in financial distress. This can lead to greater downside risk for the shares of NSOEs and greater closeout risk for the share pledges of controlling shareholders of NSOEs. As a result, pledgees may relax their risk assessment for SOEs. To examine the above, we conduct the following tests.

First, we regress model (1) using a subsample of SOEs, and the results are shown in column (1) of Table 6. We find that in SOEs, the shares pledged to bank pledgees still have less stock price crash risk (*NCSKEW*), higher cash flow quality (*HQCFO*) at the 10% level, less operating income volatility (*REVVOL*) and higher *ROE* at the 1% level. These preliminary results imply that risk matching between pledgees and pledgers holds to some extent even in SOEs. Next, we construct interaction terms for *SOE* and other variables and regress model (1) again with these interaction terms to assess the possible impact of the nature of property rights on the variables. The results are presented in column (2). The results show that none of the interaction terms are significant, except for the coefficients of $REVVOL \times SOE$ and $CFO \times SOE$, which are both statistically

Table 5
Hypothesis testing.

	BANK	
	(1)	(2)
NCSKEW	−0.133***	
	(-3.20)	
DUVOL		−0.240***
		(-3.66)
VOLATILITY	−4.432**	−4.360**
	(−2.39)	(−2.34)
HIGHPE	−0.067	−0.062
	(−0.88)	(−0.81)
SIZE	0.166***	0.164***
	(3.14)	(3.08)
FIX	0.378	0.383
	(0.93)	(0.94)
REVVOL	−0.512***	−0.510***
	(−2.92)	(−2.91)
CFO	0.061	0.058
	(0.39)	(0.37)
HQCFO	0.185**	0.186**
	(2.01)	(2.01)
ROE	0.373	0.335
	(0.73)	(0.65)
TURNOVER	0.233*	0.228
	(1.67)	(1.64)
ABSDA	−1.243*	−1.240*
	(−1.94)	(−1.94)
SOE	0.963***	0.963***
	(5.58)	(5.58)
CONSTANT	−3.378**	−3.281**
	(−2.47)	(−2.39)
QUARTER	YES	YES
INDUSTRY	YES	YES
N	10,112	10,109
Pseudo R^2	0.067	0.068

Note: The values in brackets are Z values. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

significant at the 10% level. Thus, in general, bank pledgees do not relax their risk control for share pledging by SOE pledgers.

6.2. Share pledge risk

The tests above show that in the screening stage of share pledges, bank pledgees with low risk tolerance accept low risk stocks as pledges, whereas broker pledgees with high risk tolerance accept high risk stocks. We wonder whether the low (high) risk stocks identified before the pledge indeed cause low (high) risk during the pledge. First, we measure the actual share pledge risk from two perspectives. One is the estimated closeout risk commonly used in the literature. As described in Liao et al. (2018), we first estimate the outstanding balance of the controlling shareholder's share pledge loans based on the stock price in the pledge month and a pledge ratio of 30%, then calculate the ratio of the outstanding loan balance to the market value of the controlling shareholder's holdings per month. We finally obtain the maximum ratio (*MAXRISK*) and average ratio (*MEANRISK*) for the entire pledge period. The higher these two ratios, the greater the potential closeout risk of the pledge throughout the course of the pledge. We also set a dummy variable for share pledge risk (*HIGHRISK*), equal to one if the ratio of the market value of the controlling shareholder's holdings to the outstanding balance of equity pledge loans has ever fallen below 200% during the pledge period and zero

Table 6
Impact of the nature of the property rights of pledger firms.

	BANK	
	(1)	(2)
NCSKEW	−0.259*	−0.119***
	(−1.75)	(−2.75)
VOLATILITY	−1.860	−4.588**
	(−0.27)	(−2.43)
HIGHPE	0.064	−0.079
	(0.27)	(−0.98)
SIZE	−0.171	0.192***
	(−1.13)	(3.40)
FIX	1.217	0.419
	(1.13)	(0.97)
REVVOL	−1.873***	−0.432**
	(−2.75)	(−2.42)
CFO	−0.932	0.128
	(−1.37)	(0.82)
HQCFO	0.563*	0.173*
	(1.94)	(1.77)
ROE	3.200***	0.090
	(2.68)	(0.16)
TURNOVER	−0.474	0.293**
	(−1.11)	(2.01)
ABSDA	−2.448	−1.218*
	(−1.00)	(−1.82)
SOE		6.326*
		(1.80)
NCSKEW × *SOE*		−0.141
		(−0.97)
VOLATILITY × *SOE*		6.021
		(1.62)
HIGHPE × *SOE*		0.176
		(0.68)
SIZE × *SOE*		−0.232
		(−1.54)
FIX × *SOE*		0.376
		(0.36)
REVVOL × *SOE*		−1.419*
		(−1.93)
CFO × *SOE*		−1.482*
		(−1.69)
HQCFO × *SOE*		0.320
		(1.08)
ROE × *SOE*		2.041
		(1.52)
TURNOVER × *SOE*		−0.592
		(−1.44)
ABSDA × *SOE*		−0.292
		(−0.11)
CONSTANT	1.391	−3.994***
	(0.39)	(−2.76)
QUARTER	YES	YES
INDUSTRY	YES	YES
N	631	10,112
Pseudo R^2	0.142	0.071

Note: The values in brackets are Z values. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 7
Actual share pledge risk.

Panel A: Share pledge events in the sample

Variable	Broker pledgee			Bank pledgee			*t*-test	Wilcoxon test
	N	Mean	Median	N	Mean	Median		
MAXRISK	5,224	0.322	0.298	2,042	0.309	0.296	2.150**	0.576
MEANRISK	5,224	0.210	0.205	2,042	0.205	0.201	1.850*	0.493
HIGHRISK	5,224	0.113	0	2,042	0.085	0	3.400***	3.420***
REALRISK	5,224	0.060	0	2,042	0.003	0	10.700***	10.635***

Panel B: Share pledge events including observations with missing data for variables in model (1)

Variable	Broker pledgee			Bank pledgee			*t*-test	Wilcoxon test
	N	Mean	Median	N	Mean	Median		
MAXRISK	13,465	0.339	0.315	4,022	0.315	0.301	6.400***	5.547***
MEANRISK	13,465	0.227	0.222	4,022	0.215	0.211	5.450***	4.432***
HIGHRISK	13,465	0.141	0	4,022	0.083	0	9.750***	9.733***
REALRISK	13,465	0.052	0	4,022	0.004	0	13.700***	13.616***

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

otherwise. We further set a dummy variable for whether additional pledges or extensions have occurred during the pledge period (*REALRISK*), which are usually required by the pledgee when the market value of the pledged stocks falls to the warning or closeout line. Hence, this indicator better reflects the actual risk of equity pledging. Based on the specific share pledge events corresponding to the 10,112 observations in the sample,[11] we further exclude events with end dates after 2018, whose pledge period cannot be observed during the sample period. For events with missing data on equity pledge end dates, we assume a pledge term of one year. We consider each event to be an observation and divide all events into bank pledgee and broker pledgee groups based on the type of pledgee. We conduct t-tests and Wilcoxon rank sum tests to determine the mean and median values of the variables for the actual share pledge risk of the bank and broker pledgee groups, respectively. The results are shown in Panel A of Table 7. The business risk faced by bank pledgees (*HIGHRISK*) and the probability of actually incurring additional pledges or extensions (*REALRISK*) are significantly smaller at the 1% level for both the mean and median tests. *MAXRISK* and *MEANRISK* are also significantly lower for bank pledgees at the 5% and 10% levels, respectively, in the mean test compared with broker pledgees. To reduce sample loss caused by sample selection and enable a comparison of the business risks faced by the two types of pledgees in a broader context, we use all of the share pledge events of the controlling shareholders of A-share companies whose pledgees are either banks or brokerage firms from the third quarter of 2013 to the fourth quarter of 2018. We exclude financial companies, ST companies and pledges with end dates after 2018. We then conduct the group tests again for the bank pledgee and broker pledgee groups. The results are presented in Panel B of Table 7. They are similar to those reported in Panel A, except that bank pledgees have significantly smaller *MAXRISK* and *MEANRISK* at the 1% level in both the mean and median tests in Panel B. These results imply that bank pledgees' risk screening of pledged stocks helps reduce the actual risk of share pledging.

6.3. Impact of competition in the share pledge market

Prior to the launch of on-exchange pledges in May 2013, share pledges in China were conducted over-the-counter with banks being the main pledgees. After brokerage firms were authorized to engage in on-exchange pledges, the volume of their share pledges grew rapidly. Banks became the second-largest pledgees, with a steadily declining market share of equity pledges based on observations. If this was indeed the case, then in practice, was risk matching between the bank pledgees and pledgers affected by the competition brought about by the entry of brokerage firms into the share pledge market? And if so, what was the nature of the impact?

One intuitive speculation is that the entry of brokerage firms into the share pledge market intensified business competition between the two types of pledgees, banks and brokerage firms. In such a scenario, one

method used by banks to gain market share in response to competition from brokerage firms might have been to increase their own risk tolerance and take advantage of their low cost of capital to offer pledge clients lower loan rates than brokerage firms. Li et al. (2019) find that after 2013, listed companies whose controlling shareholders have equity pledges engage in greater management of the tone of annual reports, which implies lower disclosure quality. They argue that this is the result of pledgees reducing their oversight of pledgers to seize market share. However, an alternative explanation for this finding is that more controlling shareholders of low-quality listed companies now have the opportunity to pledge shares to brokerage firms with higher risk tolerance since 2013. Thus, the overall quality of pledger firms deteriorates even if bank pledgees do not relax their share pledge standards.

The alternative speculation we offer is that the entry of brokerage firms into the share pledge market may not have exacerbated the competition faced by banks and the risk level of the stocks pledged to bank pledgees may not have changed significantly. In fact, it may even have decreased. Specifically, we classify controlling shareholders of listed companies with share pledge needs into three categories: low-risk, medium-risk and high-risk, based on the risk of the pledged stocks. To simplify the analysis, we assume that before 2013, both low-risk and medium-risk controlling shareholders could apply for equity pledge loans from banks, but not high-risk controlling shareholders. It should be noted that although share pledges from medium-risk controlling shareholders were accepted by banks, banks may have required high-risk compensation for such pledgers, making the interest rate on equity pledge loans higher than expected by the pledgers. Since 2013, high-risk pledgers have been able to seek on-exchange pledges from brokerage firms with higher risk tolerance than that of banks, and these pledgers were not originally among the banks' target customers. Thus, high-risk pledgers may not affect banks' equity pledging activity. However, brokerage firms may also seize market share by offering more favorable interest rates than banks to medium-risk pledgers; in this case, a portion of the banks' riskier customers move to brokerage firms. The risk-conservative characteristics of banks may thus prevent them from rushing to increase their risk tolerance and accepting pledgers with higher risk to gain market share. The profits from share pledges are also not significant compared with those from traditional bank loans. Thus, even if brokerage firms attract a portion of banks' clients, banks will maintain their original level of risk control, which ultimately manifests as a decrease rather than an increase in their share pledge risk. Based on data on share pledges of controlling shareholders of listed companies obtained from the CSMAR database, 64% of the controlling shareholders of the 2,379 companies in the sample pledged their shares for the first time after May 2013, of which 86% chose broker pledgees. Share pledging from these new clients accounts for 66% of all pledges of brokerage firms, which is much higher than the percentage for banks (22%). The remaining 34% of share pledges of broker pledgees are transferred from bank pledgees. Moreover, the share pledge volume of brokerage firms rose from 1,764 in 2014 to 6,539 in 2018, but that of banks does not increase significantly after

Table 8
Impact of competition in the share pledge market.

Variable	$POST = 0$			$POST = 1$			*t*-test	Wilcoxon test
	N	Mean	Median	N	Mean	Median		
NCSKEW	1,456	0.085	0.115	2,583	0.135	0.159	−2.250**	−2.573**
VOLATILITY	1,456	0.011	0.009	2,583	0.002	−0.002	14.700***	20.141***
HIGHPE	1,456	0.536	1	2,583	0.501	1	2.150**	2.163**
SIZE	1,456	−2.219	−2.265	2,583	−1.297	−1.413	−26.750***	−24.292***
FIX	1,456	−0.047	−0.071	2,583	−0.016	−0.038	−6.600***	−7.271***
REVVOL	1,456	0.080	0.003	2,583	0.028	−0.039	6.300***	8.390***
CFO	1,456	−0.228	−0.259	2,583	−0.121	−0.173	−10.850***	−14.212***
HQCFO	1,456	0.258	0	2,583	0.240	0	1.300	1.289
ROE	1,456	−0.042	−0.047	2,583	−0.028	−0.030	−4.700***	−6.970***
TURNOVER	1,456	−0.131	−0.216	2,583	−0.053	−0.127	−6.250***	−9.438***
ABSDA	1,456	0.014	−0.008	2,583	0.004	−0.014	4.950***	1.930*
SOE	1,456	0.218	0	2,583	0.128	0	7.500***	7.447***
DUVOL	1,456	0.021	0.021	2,582	0.104	0.111	−5.550***	−5.548***

Note: ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

2013 and remains at around 1,200 per year, despite some growth over the previous period. Therefore, this simple data analysis partially supports our speculation that banks do not relax their risk control standards for share pledges.

To examine the impact of brokerage firms' stock pledged repo on bank pledgees' risk screening, we first consider 2008–2012 as the ex-ante period ($POST = 0$) and 2014–2018 as the ex-post period ($POST = 1$). We then select bank pledgees' share pledges by controlling shareholders of A-share listed companies that begin during the sample period, exclude all observations for financial and ST companies, retain the first pledge event for each company in a quarter and exclude all observations with missing data or data exceptions. Finally, we obtain 4,039 firm-quarter observations of bank pledgees' share pledges. Given that all of the variables in model (1), except *HIGHPE*, *HQCFO* and *SOE*, are affected by the time trend of the market, we calculate the weighted average market value of all A-share non-financial listed companies for each quarter for each of these variables and then subtract the weighted average market value from each variable to obtain the market-adjusted value. This reflects the level relative to the contemporaneous market and can partially mitigate the effect of time trends. Table 8 presents the results of the difference tests for *HIGHPE*, *HQCFO*, *SOE* and the other market-adjusted variables. The results show that compared with the 2008–2012 period, *VOLA-*

Table 9
Robustness tests.

	BANK (1)	*TYPE* (2)	*BANK* (3)
NCSKEW	−0.121***	−0.120***	−0.164***
	(−2.99)	(−3.04)	(−3.46)
VOLATILITY	−2.691	−3.563**	−4.466**
	(−1.52)	(−2.05)	(−2.07)
HIGHPE	−0.046	−0.056	−0.059
	(−0.63)	(−0.77)	(−0.60)
SIZE	0.212***	0.190***	0.182***
	(4.06)	(3.62)	(2.86)
FIX	0.068	0.180	0.534
	(0.17)	(0.46)	(1.09)
REVVOL	−0.441***	−0.472***	−0.715***
	(−2.75)	(−2.87)	(−3.15)
CFO	−0.005	0.022	0.001
	(−0.03)	(0.15)	(0.00)
HQCFO	0.182**	0.187**	0.230**
	(2.11)	(2.13)	(2.09)
ROE	0.515	0.436	1.309
	(1.00)	(0.87)	(1.44)
TURNOVER	0.227	0.236*	0.198
	(1.62)	(1.73)	(1.25)
ABSDA	−1.223**	−1.323**	−1.812**
	(−2.03)	(−2.18)	(−2.27)
SOE	0.745***	0.952***	0.912***
	(4.34)	(5.15)	(4.71)
CONSTANT	−4.331***		−3.578**
	(−3.27)		(−2.17)
CUT1		3.476**	
		(2.56)	
CUT2		4.043***	
		(2.97)	
QUARTER	YES	YES	YES
INDUSTRY	YES	YES	YES
N	10,112	10,112	8,031
Pseudo R^2	0.055	0.050	0.072

Note: The values in brackets are Z values. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

TILITY and *HIGHPE* are smaller in the 2014–2018 period for the subject of the pledges of bank pledgees with statistical significance levels of 1% and 5%, respectively; *SIZE*, *FIX*, *CFO*, *ROE* and *TURNOVER* are significantly larger at the 1% level for pledger firms; *REVVOL* is significantly smaller at the 1% level and *ABSDA* is significantly higher, with pledger firms more likely to be SOEs (*SOE*) but at increased risk of a stock price crash (*NCSKEW*). Thus, overall, the risk of stocks pledged to bank pledgees decreases rather than increases after brokerage firms begin to engage in on-exchange share pledges. The quality of pledger firms especially improves. This result essentially supports our speculation that banks do not relax their risk control standards for share pledging.

6.4. Robustness tests

In the above tests, for controlling shareholders with multiple new share pledges in a given quarter, we only retain the first pledge event in the quarter. This implies that most quarter observations correspond to only one type of pledgee. Given that controlling shareholders may pledge shares to both banks and brokerage firms in a given quarter, we adjust *BANK* in a robustness test to equal one if the controlling shareholder pledges new shares to a bank at least once in a given quarter and zero otherwise. This adjusted *BANK* variable includes cases in which the controlling shareholder's first equity pledge in the quarter is traded with a bank pledgee. The mean of the adjusted *BANK* variable increases from 0.275 to 0.329. We rerun the regression of model (1) using this adjusted *BANK* variable and the results are presented in column (1) of Table 9. Although the coefficients for some variables are no longer statistically significant, the overall conclusion is consistent with our main finding that shares pledged to bank pledgees are less risky. We also set the variable *TYPE*, whose value is zero and represents 67.08% of the sample when the controlling shareholders pledge new shares only to brokerage firms in a given quarter; its value is one and it represents 10.41% of the sample when they pledge new shares to both banks and brokerage firms in a given quarter; its value is two and it represents 22.51% of the sample when they pledge new shares only to banks in a given quarter. In accordance with our hypothesis, if the controlling shareholder can pledge new shares to both banks and brokerage firms, it implies that the risk of this lender is moderate; the higher the value of *TYPE*, the lower the risk of the lender. We replace *BANK* in model (1) with *TYPE* and run the ordered logit regression. The results are presented in column (2) of Table 9. When *TYPE* is higher, *NCSKEW*, *VOLATILITY* and *REVVOL* are smaller, *SIZE*, *HQCFO* and *TURNOVER* are higher, *ABSDA* is higher and the pledger firm is more likely to be an SOE. The overall result is consistent with our expectations, further supporting our research hypothesis.

Additionally, given the objective supervision requirements, the *Guidelines for the Risk Management of Securities Firms Regarding Stock Pledged Repo Trading* only emphasize that brokerage firms should prudently assess the risk of underlying stocks if the number of single pledged stocks exceeds 50% of the total share capital, if the pledger firm suffered a loss in the previous year and it is still uncertain whether the loss can be reversed in the current year or if the pledger firm risks delisting. In practice, stocks that have received special treatment or suffered losses in the previous year generally cannot be pledged as part of an on-exchange transaction. The new regulations on equity pledges released in 2018 also specify that the pledge ratio accepted by a single brokerage firm (a pooled asset management plan) for a single stock shall not be higher than 30% (15%) and the overall pledge ratio for a single stock shall not be higher than 50%. These screening conditions for the underlying stocks of pledges do not accurately reflect the subjective choices of pledgees. Therefore, in addition to the exclusion of ST companies, we further exclude companies with an overall pledge ratio greater than 50% in the previous quarter or with a net profit loss in the previous year and then conduct the regression test of model (1). As shown in column (3) of Table 9, the results still support the main conclusion of this paper, which states that bank pledgees accept less risky share pledges than broker pledgees.

7. Conclusion

In recent years, the substantial growth of the share pledging business has attracted the attention of all parties involved in the capital market. However, the systematic risk of share pledges has accumulated, with share pledge blow-ups occurring frequently given the volatility of the capital market. Therefore, it is necessary to study whether the two types of pledgees, commercial banks and brokerage firms, match with their own pled-

gers in terms of the risk of the underlying stocks to examine the possibility of systematic risk in the share pledge market. Based on the share pledges made by the controlling shareholders of A-share listed companies from 2013 to 2018, we find that in general, compared with brokerage firms, banks accept pledged stocks with lower market risk and pledges from pledger firms with lower risk and higher information transparency. The pledger firms of banks are also more likely to be SOEs. Bank pledgees in general have not relaxed their risk control standards for share pledging for SOE pledgers. Further tests show that during the equity pledge period, broker pledgees with higher risk tolerance face higher closeout risk, whereas bank pledgees with lower risk tolerance face lower closeout risk. Since brokerage firms were authorized to enter the equity pledge financing market in 2013, bank pledgees have not lowered their risk control standards for share pledging and the risk of pledged stocks has decreased rather than increased.

The findings of this paper imply that risk matching between pledgees and pledgers in China's share pledge market is generally achieved. However, these findings are more general and may not be applicable to specific equity pledge cases. That is to say, commercial banks as pledgees do not always face lower risk in the underlying stocks than broker pledgees; the risks of the underlying stocks for broker pledgees may not well suited to their risk-taking capacity. It should be noted that our paper finds that broker pledgees face higher share pledge risk, which corresponds to the frequent equity pledge blow-ups by brokerage firms observed in recent years. We also find that the overall risk of stocks pledged to banks declined after brokerage firms were allowed to compete in the share pledge market, implying that some of the riskier clients who originally pledged shares to banks have shifted to brokerage firms. In this context, the findings of this paper imply that the strengthening of the regulation of the banking sector in China in recent years has yielded some positive results and that the share pledging activity of brokerage firms and their risks should be the focus of share pledge risk monitoring in China's capital market. In addition, the new share pledge regulations issued in 2018, while necessary, can still be improved (e.g., imposing constraints on the operating and financial characteristics of pledger firms).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Does preventive regulation reduce stock price synchronicity? Evidence from Chinese annual report comment letters

Xiaomin Hao *, Yonghai Wang

Economics and Management School, Wuhan University, China

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ABSTRACT

Based on a sample of Chinese A-share listed firms from 2015 to 2018, this paper studies the impact of annual report comment letters (ARCLs) on firm stock price synchronicity. We find that after firms receive ARCLs, their stock price synchronicity decreases. Moreover, the longer the ARCLs and the more negative the ARCLs' tone, the lower the resulting stock price synchronicity. The mechanism test shows that after firms receive ARCLs, the firms' information disclosure increases in quantity and quality, external media attention increases, and the firms' governance improves, reducing their stock price synchronicity. Further research shows that this negative association is more significant in firms with higher information asymmetry. This paper shows that the ARCL, an innovative application of the capital market supervision philosophy, is conducive to improving the quality of listed firms and to the healthy development of the capital market.
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1. Introduction

As an essential means toward China's goal of comprehensively deepening its administrative reform, the directive to "streamline the government, delegate power, and improve government services" has been in effect since the 18th CPC National Congress. The sentiment dates back as early as the third session of the 13th National People's Congress, when Premier Li Keqiang stressed the need to deepen administrative reform. One of the core elements of this reform is "innovation in regulation" The annual report comment letters (ARCLs) system introduced by the Chinese stock exchanges in 2013 is an important institutional innovation

* Corresponding author.
E-mail address: 18086519529@163.com (X. Hao).

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to implement new regulation philosophy based on foreign experience. The ARCL system is a departure from the previous "administrative penalty regulation," which included penalties for past violations. In contrast, the ARCL system is a "non-administrative penalty regulation" (Chen et al., 2018b) that entails issuing inquiry letters or concern letters for inaccurate or imperfect information disclosures that have not yet crossed the threshold of breaking laws or regulations. Testing the effectiveness of regulatory policies has been a topic of interest in economics, finance, and accounting research (Stigler, 1971; La Porta et al., 2006; Leuz and Wysocki, 2016). The primary focus of this paper is how the ex-ante preventive regulation of ARCLs affect a firm's stock price synchronicity compared to ex-post administrative punitive regulation.

Although the U.S. Securities and Exchange Commission implemented the comment letters system in 2002, research on the effectiveness of regulation policies based on comment letters in China has emerged only in recent years (Chen et al., 2019). Compared to the close attention that regulators, the media, and investors pay to ARCLs, academic research on China's ARCLs has lagged. However, such studies have improved with the maturity of the ARCL system and the accumulation of relevant data. Studies have explored the quality of financial reports' disclosure (Chen et al., 2019) and of forward-looking information disclosure (Li et al., 2019), market reaction (Chen et al., 2018c), audit quality (Chen et al., 2018b), and stock price crash risk (Zhang et al., 2018). Stock price synchronicity is an effective indicator of capital market information efficiency. However, there are two opposing views on the relationship between stock price synchronicity and capital market information efficiency (Chen and Yao, 2018). One is that stock price synchronicity is negatively correlated to information efficiency (Morck et al., 2000), and the other is that stock price synchronicity positively correlates to information efficiency (West, 1988). Studies in the Chinese context are more supportive of the first view. For example, Zhong and Lu (2018) argue that the Chinese stock market has long been subject to the phenomenon of "the same rise and fall" and that higher stock price synchronicity is not conducive to the efficiency of stock prices in guiding resource allocation. Therefore, the question remains of whether the stock price synchronicity of listed firms decreases after receiving ARCLs.

Information asymmetry between firms and investors is a notable cause of higher stock price synchronicity (Jin and Myers, 2006; Hutton et al., 2009). Therefore, when firms increase information disclosure (Shi and Zhang, 2014) and increase restraint and oversight of their managers (Bushman et al., 2004), this reduces information asymmetry as well as stock price synchronicity. It has been shown that ARCLs not only inhibit firms' earnings management (Chen et al., 2019) but also improve the quality of forward-looking disclosure (Li et al., 2019), which directly reduces information asymmetry and contributes to lower stock price synchronicity. Furthermore, firms receive more attention from the media and investors after receiving ARCLs, which triggers negative market reactions (Chen et al., 2018c). Depending on a firm's response to ARCLs, it may face further investigation by the regulator (Deng et al., 2020). To alleviate external regulatory pressure and reverse the adverse effects, the ARCL-targeted (hereafter, targeted) firm may take the initiative to improve its corporate governance, which indirectly reduces information asymmetry and stock price synchronicity. However, firms' annual reports and information disclosure strategies are often the product of a cost-benefit trade-off. The ARCL system provides preventive supervision, with the letters serving as a warning signal, as firms receiving them have not yet violated relevant statutes or regulations. As such, ARCLs may not have an incremental deterrent effect and may not attract sufficient attention from firms. Furthermore, firms subject to ARCLs may incur additional costs in making more detailed disclosures under the previous level of information to disclose after cost-benefit trade-off. They may therefore limit their response to the letter to increasing specified disclosures within acceptable costs without reducing stock price synchronicity.

Therefore, it is unclear ex-ante whether and how ARCLs may affect stock price synchronicity. Our main empirical finding is consistent with a decrease in stock price synchronicity after firms receive ARCLs. Moreover, the longer the text of ARCLs and the more negative the tone of ARCLs, the lower the stock price synchronicity. The mechanism test shows that after a firm receives an ARCL, the firm's information disclosure increases in quantity and quality, external media attention increases and its governance improves, reducing its stock price synchronicity. Further research shows that this negative association is more significant in firms with higher information asymmetry.

Our study makes several contributions to the literature. First, this study is closely related to the growing literature on the role of ARCLs in capital market information efficiency (environment), such as short-term market reaction (Chen et al., 2018c), stock price crash risk (Zhang et al., 2018), and earnings response coef-

ficients (Chen et al., 2019). We add to this literature by showing that ARCLs also affect stock price synchronicity. Furthermore, we provide evidence on the channels through which ARCLs affect stock price synchronicity. Second, this study also broadens the line of research that examines the determinants of stock price synchronicity. From the perspective of securities regulatory policies, prior studies have explored the effect of regulatory penalties for firms in violation of laws on stock price synchronicity (Gu et al., 2016). However, there is no evidence on the effect of preventive regulation on stock price synchronicity in the literature. We complement the relevant research using a sample of ARCLs. Finally, this study provides additional evidence on the effectiveness of regulatory reforms and innovations. Our results indicate that ARCLs can reduce stock price synchronicity and thereby improve capital market information efficiency.

2. Literature review and hypothesis development

2.1. Literature review

Based on information economics theory, capital market information efficiency indicates that stock prices accurately reflect firms' private information and market value. Fama (1970) argues that in a perfectly efficient capital market, stock prices incorporate all relevant information about firms and achieve optimal capital market information efficiency. However, in reality, capital markets are not perfectly efficient because of information asymmetry. For example, Hutton et al. (2009) find that when a firm's information transparency is low, investors cannot access all of a firm's relevant information, and therefore, they are unable to influence the stock price through trading, which reduces stock price volatility. Furthermore, firms' complex operating characteristics (Zhang and Wang, 2014) and management's strategic disclosure behavior (Kim et al., 2019) prevent timely reflection of firm-specific information in stock prices, thereby reducing capital market efficiency (Piotroski and Roulstone, 2004).

Stock price synchronicity is an effective indicator of capital market efficiency. A large body of literature has shown that stock price synchronicity negatively reflects information efficiency in the Chinese capital market. It has also been shown that as information disclosure increases and information asymmetry decreases, stock price synchronicity decreases and information efficiency increases. Huang and Guo (2014) indicate that an increase in media coverage reduces stock price synchronicity. Shi and Zhang (2014) find that XBRL adoption reduces stock price synchronicity. Jiang et al. (2019) show that the greater the number of analysts, the lower the stock price synchronicity. There is a negative correlation between the firm-specific information of analysts' reports and stock price synchronicity (Yin et al., 2019). In addition, events in institutional environments, such as industrial policies (Chen and Yao, 2018), the Shanghai–Hong Kong Stock Connect (Zhong and Lu, 2018), and the Belt and Road Initiative (Zhu, 2019), increase the idiosyncratic information in stock price and reduce stock price synchronicity.

The Chinese ARCL system aims to induce listed firms to improve disclosure quality and protect investor interest. Studies have shown that comment letters have a profound impact on firms' disclosure. When firms receive comment letters, they correct irregularities in a targeted manner based on the regulator's concerns; for example, as Bens et al. (2016) note, after receiving a comment letter on fair value valuation, a firm will reduce uncertainty in its fair value valuation. Furthermore, comment letters improve the quality of financial reports and disclosures. Studies based on the U.S. capital market suggest that after receiving comment letters, firms' earnings response coefficients increase, information asymmetry decreases, and information transparency increases (Johnston and Petacchi, 2017; Bozanic et al., 2017; Duro et al., 2019). Similarly, in a study based on Chinese ARCLs, Chen et al. (2019) find that ARCLs restrain earnings management behavior and improve financial report quality. Li et al. (2019) further explore the effect of ARCLs on firms' management earnings forecasts and find that firms are more likely to issue earnings forecasts, forecast more precisely, and disclose more detailed and readable explanations after receiving ARCLs. Moreover, ARCLs affect intermediaries' decisions. Wang (2016) finds that analysts' forecast errors, forecast divergence, and optimism bias are significantly lower in targeted firms. In addition, targeted firms' audit fees increase (Gietzmann and Pettinicchio, 2014) and audit quality improves (Chen et al., 2018b). However, it is not yet clear how ARCLs affect firms' stock price synchronicity.

2.2. Hypothesis development

ARCLs may directly or indirectly reduce information asymmetry, thereby reducing stock price synchronicity. First, firms receiving ARCLs may improve the quality and quantity of their information disclosure, thereby directly reducing information asymmetry and thus stock price synchronicity. In practice, targeted firms provide additional explanation or more complete disclosure in response to the regulator's concerns, which directly improves the accuracy of the information. It has also been shown that ARCLs restrain earnings management behavior and improve financial report quality (Chen et al., 2019) and that the improvement in disclosure quality reduces stock price synchronicity (Yang et al., 2018). The issuance of ARCLs also conveys bad news to investors about the targeted firms (Chen et al., 2018c) and increases the costs of hiding information and litigation risk. Thus, targeted firms must proactively reverse negative market expectations, such as by increasing voluntary information disclosure to reduce information asymmetry. Furthermore, a higher frequency of voluntary disclosure can reduce stock price synchronicity and improve the information environment (Chen et al., 2018a).

Second, targeted firms receive external attention, which motivates them to improve disclosure. Such firms may take the initiative to improve governance, which indirectly reduces information asymmetry and consequently reduces stock price synchronicity. A firm receiving ARCLs receives added attention from the media, investors, and intermediaries as well as continuous attention from regulators. To alleviate the pressures of external monitoring and reduce the possibility of further investigation, the best option for a targeted firm is to improve information disclosure quality (Fang et al., 2017), which indirectly reduces information asymmetry. A firm's corporate governance affects its disclosure strategy and quality. Targeted firms may thus also reduce information asymmetry by improving corporate governance. Studies have shown that ARCLs improve targeted firms' internal control (Anantharaman and He, 2016) and decrease tunneling behaviors (Nie and Pan, 2019). Improved corporate governance not only improves the monitoring of management, reduces insiders' expropriation, and allows investors to gain more from informed transactions (Fishman and Hagerty, 1992) but also improves the quality of private information disclosure and reduces the cost of accessing firm-specific information for outside investors (Karamanou and Vafeas, 2005). Furthermore, firms' private information can be reflected in the stock price (Grossman and Stiglitz, 1980).

However, it is also possible that ARCLs have no impact on stock price synchronicity. The quality of firms' financial reports is influenced by their disclosure capabilities but is more likely to be a product of a cost-benefit trade-off (Kim et al., 2021). Because listed firms are relatively high-quality firms and often have more qualified teams to issue financial reports, the effect of such disclosure capability is negligible. Listed firms' disclosure of flawed information is a sign of opportunistic behavior, as firms are aware that the disclosed information is subject to regulatory oversight. Most firms should have known in advance of receiving a comment letter that their disclosed information was flawed. Because of limited resources, regulators cannot examine every firm in detail, which makes some firms opt to disclose incomplete information. However, this is not a risk that they are willing to take once under the scrutiny of regulators; under such attention, firms reevaluate the costs and benefits of disclosure. Firms must make corrections or provide clarifications on the issues covered in their ARCLs or in the requested professional opinions of intermediaries. This takes time, resources, and other costs beyond those of normal operations (Cassell et al., 2019; Ballestero and Schmidt, 2019). More importantly, the requested additional disclosure may concern firm-specific information that the firms wish to hide and may incur new private information costs. As a result, inquired firms may choose to respond to ARCLs by disclosing limited information as a temporary means to avoid non-compliance, relieving the pressure of regulation while compensating to some extent for their previous disclosure deficiencies. However, such improvements may not be sufficient to reduce stock price synchronicity overall.

Based on the above discussion, we propose the following hypotheses:

H1a: *Ceteris paribus*, ARCLs reduce stock price synchronicity.
H1b: *Ceteris paribus*, ARCLs are not associated with stock price synchronicity.

3. Research design

3.1. Data and sample selection

Our sample consists of listed firms on the Chinese A-share market during the 2014–2018 period. We retain non-special treatment firms, exclude financial firms, and eliminate firms with missing data. To measure stock price synchronicity, we remove the firms with fewer than 30 trading weeks in the given time frame. Our final sample includes 7,687 firm-year observations. The data for ARCLs are retrieved from the Chinese Research Data Services Database (CNRDS). Other data are obtained from the China Stock Market and Accounting Research Database (CSMAR). To mitigate the effect of outliers, we also winsorize all of the continuous variables at the 1% and 99% percentiles.

3.2. Variable definitions

Our dependent variable is stock price synchronicity (*Synch*). We follow the literature (Piotroski and Roulstone, 2004; Gul et al., 2010; Xu et al., 2013; Yin et al., 2019) to measure stock price synchronicity. For each firm in each year, we regress the weekly firm stock returns on the current and lagged markets and industry value-weighted returns as follows:

$$R_{i,t,w} = \alpha_0 + \alpha_1 R_{m,t,w} + \alpha_2 R_{m,t,w-1} + \alpha_3 R_{l,t,w} + \alpha_4 R_{l,t,w-1} + \varepsilon_{i,t,m} \tag{1}$$

where $R_{i,t,w}$ is the weekly return of stock i in year t, $R_{m,t,w}$ is the weekly market return calculated on a value-weighted basis, and $R_{i,t,w}$ is the weekly industry return calculated on a value-weighted basis. We also include lagged market and industry returns to control for the possibility of non-contemporaneous relation. *Synch* is computed as the logged transformed $R^2_{i,t}$ from estimating regression Eq. (2):

$$Synch_{i,t} = \ln\left(R^2_{i,t}/(1 - R^2_{i,t})\right) \tag{2}$$

where $Synch_{i,t}$ is annual stock price synchronicity for firm i. $R^2_{i,t}$ represents the portion of stock price changes that can be explained by market and industry returns. A larger value of $Synch_{i,t}$ implies a higher degree of stock price synchronicity and a lower degree of firm-specific information incorporated in the stock prices.

3.3. Specifications

To examine whether ARCLs affect firms' stock price synchronicity, we use the following specification:

$$\begin{aligned} Synch = {} & \beta_0 + \beta_1 CL + \beta_2 Size + \beta_3 CFO + \beta_4 LEV + \beta_5 Growth + \beta_6 ROA + \beta_7 MTB \\ & + \beta_8 Share1 + \beta_9 Independ + \beta_{10} Board + \beta_{11} Dual + \beta_{12} Owmer + \beta_{13} Big4 \\ & + \beta_{14} Beta + \beta_{15} DA + \beta_{16} FR + \sum IND + \sum Year + \varepsilon \end{aligned} \tag{3}$$

where *CL* is the main explanatory variable, which equals 1 if the targeted firms receive ARCLs for year t-1 in year t, and 0 otherwise, and *Synch* is stock price synchronicity, computed as described above.

We include control variables reported in the literature (Chen et al., 2018a) that potentially affect firms' stock price synchronicity. Specifically, we control for firm size (*Size*), cash flow from operations (*CFO*), leverage (*LEV*), percentage change in sales (*Growth*), return on assets (*ROA*), market-to-book ratio (*MTB*), largest shareholder's ownership (*Share1*), proportion of independent directors (*Independ*), number of board members (*Board*), whether the CEO also serves as board chairman (*Dual*), whether the firm is owned by the state (*Owner*), whether the firm is audited by an international Big Four auditor (*Big4*), systematic risk (*Beta*), earnings quality (*DA*), and whether the firm is punished because of fraud (*FR*). We control for industry and year fixed effects. ε is the residual. We cluster standard errors at the firm level. Detailed variable definitions are reported in Table 1.

Table 1
Definitions of the variables.

Variable Name	Definition
Synch	Stock price synchronicity, defined as $\ln(R^2/(1-R^2))$, where R^2 is obtained from Eq. (1).
CL	An indicator equaling 1 if the firms receive ARCLs for year *t*-1 in year *t*, and 0 otherwise.
Size	Natural logarithm of the total assets.
CFO	Cash flow from operations divided by total assets.
LEV	Total debts divided by total assets.
Growth	The percentage change in sales over the previous year.
ROA	Net income divided by total assets.
MTB	Total assets divided by the total market value of equity.
Share1	The proportion of the firm's shares held by the largest shareholder.
Independ	The number of independent directors divided by the number of board members.
Board	The natural logarithm of the number of board members.
Dual	An indicator equaling 1 if the CEO also serves as board chairman, and 0 otherwise.
Owner	An indicator equaling 1 if the firm is stated-owned, and 0 otherwise.
Big4	An indicator equaling 1 if the firm is audited by a Big 4 auditor, and 0 otherwise.
Beta	Beta estimated from the market model (CAPM), using yearly returns.
DA	The absolute value of the firm's discretionary accruals estimated by the modified Jones model.
FR	An indicator equaling 1 if the firm is punished because of fraud, and 0 otherwise.
IND	Dummy variable for industry.
Year	Dummy variable for year.
Smooth	The standard deviation of cash flow from operations divided by the standard deviation of net income, where cash flow from operations and net income are divided by lagged total assets. The standard deviation is calculated over the years *t*-3 to *t*.
Forecast	Total number of management's voluntary forecasts.
Media	Total number of media stories about the firm.
GOV	Corporate governance index. We use the principal component analyses to extract the top three principal components based on eight items: the number of board members; the number of independent directors; the number of discipline commission members; shareholding ratio of the largest shareholder; shareholding ratio of the second to tenth largest shareholders; the number of shareholder meetings; the number of board meetings; an indicator that equals 1 if there is an internal weakness disclosure, and 0 otherwise.
FERROR	The absolute value of the difference between the mean of actual earnings per share and the earnings per share forecast divided by the absolute value of the mean of actual earnings per share.
FDISP	The standard deviation of the mean of earnings per share forecast divided by the absolute value of the mean of actual earnings per share.

4. Empirical results

4.1. Descriptive statistics

Table 2 reports the descriptive statistics for the main variables. The mean value of *Synch* is −0.0889, which is consistent with the value (−0.09) reported in Jiang et al. (2019). The standard deviation of *Synch* is 0.8650, which implies a great variation in stock price synchronicity among Chinese firms. The mean value of *CL* is 0.0731, indicating that 7.31% of sample firms receive ARCLs.

4.2. Univariate analyses

Table 3 shows the differences in stock price synchronicity between targeted firms ($CL = 1$) and un-targeted firms ($CL = 0$). The mean value of stock price synchronicity for the targeted firms is −0.422, which is significantly lower than that for the un-targeted firms (−0.063). The median value of stock price synchronicity for the targeted firms is −0.387, which is also significantly lower than that for the un-targeted firms (0.027). Thus,

Table 2
Descriptive statistics.

Variable	Obs.	Mean	Median	Std. Dev.	Min.	Max.
Synch	7,687	−0.0889	−0.0028	0.8650	−2.4415	1.5429
CL	7,687	0.0731	0.0000	0.2603	0.0000	1.0000
Size	7,687	22.5169	22.3588	1.2772	19.5657	26.1677
CFO	7,687	0.0474	0.0462	0.0685	−0.1803	0.2489
LEV	7,687	0.4436	0.4345	0.2021	0.0623	0.9803
Growth	7,687	0.4609	0.1540	1.4138	−0.7136	12.4550
ROA	7,687	0.0544	0.0489	0.0567	−0.1958	0.2361
MTB	7,687	0.6186	0.6155	0.2513	0.1046	1.1215
Share1	7,687	35.6967	33.8400	14.8764	9.0900	76.0000
Independ	7,687	0.3742	0.3333	0.0531	0.3125	0.5714
Board	7,687	2.1398	2.1972	0.1966	1.6094	2.7081
Dual	7,687	0.2413	0.0000	0.4279	0.0000	1.0000
Owner	7,687	0.4314	0.0000	0.4953	0.0000	1.0000
Big4	7,687	0.0687	0.0000	0.2529	0.0000	1.0000
Beta	7,687	1.1439	1.1462	0.2768	0.4435	1.8691
DA	7,687	0.0598	0.0397	0.0692	0.0008	0.4472
FR	7,687	0.1503	0.0000	0.3573	0.0000	1.0000

Table 3
Univariate analyses.

Item	*Synch*		*t*-Statistic for mean	*z*-Statistic for median
	Mean	Median		
$CL = 1$	−0.422	−0.387	$t = 9.54$***	$z = 9.55$***
$CL = 0$	−0.063	0.027		

Note: *** denotes significance at 1%.

the results show that the stock price synchronicity of targeted firms decreases after their receiving ARCLs, as compared to that of the un-targeted firms. The results are consistent with our hypothesis H1a.

4.3. Correlation analyses

Table 4 provides the Pearson correlation matrix for our main variables in Eq. (3). As shown in the table, *CL* is significantly and negatively correlated with *Synch*, which suggests that firms' stock price synchronicity decreases after receiving ARCLs, as compared to the un-targeted firms' stock price synchronicity. These results are consistent with H1a. We further find that the variance inflation factors are lower than the conventional critical value of 10 for all of the variables, which indicates that multicollinearity is not a concern in the estimation of our models.

4.4. Empirical analyses

4.4.1. Main results

Table 5 presents the main regression results of the effect of ARCLs on firms' stock price synchronicity. Column (1) reports the results of a simple regression without any covariate. The coefficient of *CL* is −0.3594, which is significant at the 1% level. Column (2) reports the results controlling for firm characteristics. The coefficient of *CL* is −0.3407, which is significant at the 1% level. Columns (3) and (4) report the results controlling for firm characteristics together with industry and year fixed effects, respectively. In both columns, the coefficients of *CL* are negative and significant (−0.3576 in Column (3) and −0.1502 in Column (4)). In Column (5), we include all of the control variables and the fixed effect controls. The coefficient of *CL* (−0.1568) remains significantly negative at the 1% level. The results verify H1a, that the stock price synchronicity of the targeted

Table 4
Correlation matrix.

Variable	*Synch*	*CL*	*Size*	*CFO*	*LEV*	*Growth*	*ROA*	*MTB*	*Share1*	*Independ*	*Board*	*Dual*	*Owner*	*Big4*	*Beta*	*DA*	*FR*
Synch	1.000																
CL	**−0.108**	1.000															
Size	**0.098**	**−0.043**	1.000														
CFO	0.010	**−0.092**	**0.036**	1.000													
LEV	**0.041**	**0.072**	**0.524**	**−0.169**	1.000												
Growth	−0.014	**0.062**	**0.033**	**−0.075**	**0.098**	1.000											
ROA	**−0.086**	**−0.112**	0.025	**0.437**	**−0.286**	**−0.024**	1.000										
MTB	**0.049**	0.007	**0.617**	**−0.077**	**0.399**	0.017	**−0.117**	1.000									
Share1	−0.015	**−0.063**	**0.213**	**0.131**	**0.055**	0.005	**0.124**	**0.126**	1.000								
Independ	−0.022	0.019	0.029	−0.013	0.013	0.005	−0.029	0.002	**0.052**	1.000							
Board	**0.082**	**−0.045**	**0.233**	**0.041**	**0.130**	−0.007	0.012	**0.139**	0.012	**−0.533**	1.000						
Dual	**−0.059**	0.010	**−0.158**	−0.013	**−0.114**	−0.007	**0.053**	**−0.110**	**−0.049**	**0.114**	**−0.183**	1.000					
Owner	**0.139**	−0.026	**0.317**	0.002	**0.247**	**0.040**	**−0.115**	**0.214**	**0.205**	**−0.030**	**0.231**	**−0.294**	1.000				
Big4	0.015	**−0.037**	**0.352**	**0.083**	**0.106**	−0.028	**0.052**	**0.152**	**0.152**	**0.042**	**0.066**	**−0.058**	**0.118**	1.000			
Beta	**0.147**	−0.027	**−0.148**	**−0.067**	−0.005	−0.007	**−0.065**	**−0.058**	−0.008	0.006	−0.024	0.008	**0.056**	**−0.080**	1.000		
DA	−0.013	**0.051**	**−0.047**	**−0.125**	**0.060**	**0.123**	**−0.054**	**−0.070**	−0.011	**0.036**	**−0.067**	0.021	**−0.041**	**−0.030**	0.013	1.000	
FR	0.006	**0.122**	**−0.030**	**−0.054**	**0.065**	0.005	**−0.094**	**−0.049**	**−0.067**	0.003	−0.008	0.010	**−0.036**	**−0.042**	−0.007	0.026	1.000

Note: Coefficients in bold are significant at the 1% level.

Table 5
ARCLs and stock price synchronicity.

Variable	(1) *Synch*	(2) *Synch*	(3) *Synch*	(4) *Synch*	(5) *Synch*
CL	−0.3594***	−0.3407***	−0.3576***	−0.1502***	−0.1568***
	(−9.54)	(−9.13)	(−9.71)	(−4.57)	(−4.85)
Size		0.1048***	0.0510***	0.0667***	0.0195
		(8.85)	(3.54)	(5.23)	(1.36)
CFO		0.6335***	0.7218***	−0.1365	−0.0448
		(4.02)	(4.37)	(−0.97)	(−0.32)
LEV		−0.2843***	−0.2463***	−0.4250***	−0.3744***
		(−4.71)	(−3.83)	(−7.44)	(−6.29)
Growth		−0.0052	−0.0153**	−0.0137**	−0.0245***
		(−0.76)	(−2.13)	(−2.33)	(−3.98)
ROA		−1.7686***	−1.4058***	−0.2621	0.0762
		(−8.88)	(−6.58)	(−1.46)	(0.41)
MTB		−0.1210**	0.0946*	0.4829***	0.7337***
		(−2.45)	(1.76)	(7.98)	(11.29)
Share1		−0.0031***	−0.0008	−0.0037***	−0.0017**
		(−4.53)	(−1.14)	(−5.47)	(−2.42)
Independ		0.0059	0.1331	−0.0207	0.0646
		(0.03)	(0.60)	(−0.10)	(0.32)
Board		0.1663***	0.1711***	0.1235**	0.1200**
		(2.72)	(2.70)	(2.08)	(2.04)
Dual		−0.0192	−0.0030	−0.0079	0.0017
		(−0.81)	(−0.13)	(−0.37)	(0.08)
Owner		0.1616***	0.0884***	0.1228***	0.0581**
		(7.38)	(3.62)	(5.77)	(2.53)
Big4		−0.0751*	−0.0734	−0.0600	−0.0641
		(−1.84)	(−1.54)	(−1.36)	(−1.42)
Beta		0.4813***	0.5409***	0.7107***	0.7766***
		(13.68)	(12.33)	(19.70)	(21.93)
DA		0.0558	0.0614	−0.3720***	−0.3485***
		(0.40)	(0.43)	(−3.08)	(−2.87)
FR		0.0432	0.0313	−0.0309	−0.0414*
		(1.59)	(1.16)	(−1.43)	(−1.89)
Constant	−0.0626***	−3.0244***	−2.0188***	−2.0246***	−1.1182***
	(−6.15)	(−10.76)	(−6.13)	(−6.87)	(−3.51)
IND	No	No	Yes	No	Yes
Year	No	No	No	Yes	Yes
N	7,687	7,687	7,687	7,687	7,687
Adj_R²	0.0116	0.0702	0.1044	0.3708	0.4087

Note: ***, **, and * denote significance at 1%, 5%, and 10%, respectively. The *t*-statistics are shown in brackets.

firms decreases after they receive ARCLs. Economically, the estimated coefficient of *CL* in Column (5) suggests that *ceteris paribus*, a one-standard-deviation increase in *CL* is associated with a 4.08% decrease in the average stock price synchronicity, which is economically meaningful.[1]

The results suggest that the ARCL system has not only improved the disclosure quality of listed firms but has also had an incremental effect on the capital markets. Not only may targeted firms be limited to changes in disclosure in response to inquiries, but more firm-specific information may be incorporated into the stock price, reducing overall stock price synchronicity.

[1] Given that the coefficient of CL is −0.157 and CL has a standard deviation of 0.260 (shown in Table 2), a one-standard-deviation increase in CL would decrease the stock price synchronicity by 4.08% (0.0408 = −0.1568 × 0.2603).

Table 6
Balancing test.

Variable	Unmatched(U)	Mean		%bias	*t*-Test	
	Matched (M)	Treated	Control		t	p > |t|
Size	U	22.379	22.518	−11.3	−2.29	0.022
	M	22.379	22.362	1.5	0.22	0.826
CFO	U	0.026	0.046	−29.1	−6.00	0.000
	M	0.026	0.022	5.7	0.82	0.410
LEV	U	0.513	0.453	27.7	6.00	0.000
	M	0.513	0.530	−7.6	−1.14	0.256
Growth	U	0.820	0.472	17.9	4.72	0.000
	M	0.820	0.768	2.7	0.34	0.732
ROA	U	0.025	0.056	−52.7	−11.73	0.000
	M	0.025	0.026	−1.4	−0.19	0.849
MTB	U	0.556	0.570	−5.9	−1.24	0.217
	M	0.556	0.561	−2.3	−0.33	0.739
Share1	U	33.895	35.937	−13.6	−2.80	0.005
	M	33.895	34.057	−1.1	−0.16	0.871
Independ	U	0.376	0.372	5.6	1.14	0.252
	M	0.376	0.374	2.8	0.43	0.668
Board	U	2.116	2.145	−17.0	−3.61	0.000
	M	2.116	2.117	−0.5	−0.08	0.939
Dual	U	0.247	0.230	4.1	0.84	0.398
	M	0.247	0.249	−0.5	−0.08	0.939
Owner	U	0.427	0.473	−9.4	−1.93	0.054
	M	0.427	0.422	0.9	0.13	0.894
Big4	U	0.037	0.068	−13.7	−2.54	0.011
	M	0.037	0.053	−6.9	−1.12	0.264
Beta	U	1.155	1.122	11.2	2.36	0.018
	M	1.155	1.172	−5.7	−0.86	0.393
DA	U	0.072	0.058	18.7	4.16	0.000
	M	0.072	0.076	−5.1	−0.67	0.502
FR	U	0.295	0.150	35.4	8.13	0.000
	M	0.295	0.322	−6.4	−0.86	0.391

4.4.2. Propensity score matching

A potential concern is that our results may be confounded by functional form misspecification. To address this concern, we follow the literature (Cassell et al., 2013) in using a propensity score matching approach (one-to-one nearest neighbor matching without replacement) to match targeted firms (treatment group) with untargeted firms (control group) based on the lagged control variables in Eq. (3). Using this approach, we have a sample of 914 firm-year observations. Table 6 reports the results of the balancing test, which show no significant differences in variable means between the treatment and control groups, indicating that the matching yields acceptable covariate balance. Thus, we compare treatment and control groups that have otherwise similar fundamentals but differ in that the treatment group receives ARCLs and the control group does not. We then re-estimate the Eq. (3) using the matched sample. As shown in Column (1) of Table 7, we continue to find a significant negative coefficient on *CL* (−0.0873). These results further verify hypothesis H1a.

4.4.3. Difference-in-differences approach with propensity score matching

To strengthen the causal inference, we use a generalized difference-in-differences design with propensity score matching (PSM-DID) by estimating the following regression:

$$\begin{aligned} Synch = {} & \beta_0 + \beta_1 Treat \times Post + \beta_2 Size + \beta_3 CFO + \beta_4 LEV + \beta_5 Growth \\ & + \beta_6 ROA + \beta_7 MTB + \beta_8 Share1 + \beta_9 Indirector + \beta_{10} Board \\ & + \beta_{11} Daul + \beta_{12} Owmer + \beta_{13} Big4 + \beta_{14} Beta + \beta_{15} DA + \beta_{16} FR + \varphi + \sigma + \varepsilon \end{aligned} \tag{4}$$

Table 7
ARCLs and stock price synchronicity: The PSM and PSM-DID approaches.

Variable	(1) *Synch*	(2) *Synch*
CL	−0.0873*	
	(−1.87)	
Treat × *Post*		−0.1408***
		(−2.73)
Size	−0.0301	−0.0698
	(−0.82)	(−0.96)
CFO	−0.0486	0.1372
	(−0.12)	(0.62)
LEV	−0.1651	−0.1428
	(−1.19)	(−0.43)
Growth	−0.0467***	−0.0297**
	(−3.75)	(−2.54)
ROA	0.0320	−0.0133
	(0.07)	(−0.04)
MTB	0.7326***	1.5234***
	(4.11)	(7.46)
Share1	0.0005	−0.0000
	(0.24)	(−0.01)
Independ	0.4550	1.0727
	(0.80)	(1.55)
Board	0.3192**	0.7923***
	(2.07)	(3.32)
Dual	0.0123	−0.1107
	(0.18)	(−0.37)
Owner	0.0126	0.0329
	(0.20)	(0.58)
Big4	−0.0535	−0.2387*
	(−0.51)	(−1.91)
Beta	0.7258***	0.9894***
	(8.22)	(11.53)
DA	−0.3098	−0.2025
	(−0.94)	(−0.79)
FR	−0.1215**	0.0122
	(−2.05)	(0.30)
Constant	1.5505**	−2.5377
	(2.00)	(−1.52)
IND	Yes	No
Year	Yes	Yes
Firm	No	Yes
N	914	2,445
Adj_R^2	0.3614	0.5013

Note: ***, **, and * denote significance at 1%, 5%, and 10%, respectively. The *t*-statistics are shown in brackets. The sample size (*N*) in Column (2) is 2,445 rather than 2,534, as singleton observations were excluded from the sample when controlling for firm fixed effects using the REGHDFE in Stata.

Table 8
Univariate analyses based on the PSM-DID sample.

Items	Mean of *Synch*		Median of *Synch*	
	(1) *Post* = 1	(2) *Post* = 0	(3) *Post* = 1	(4) *Post* = 0
Treat = 1	−0.347	0.118	−0.298	0.278
Treat = 0	−0.157	0.161	−0.098	0.235
Differences	*t* = 4.10***	*t* = 0.86	*z* = 4.14***	*z* = 0.529

Note: *** denotes significance at 1%.

Table 9
Descriptive statistics of pseudo coefficients and *t*-values.

Variable	Mean	P5	P25	P50	P75	P95	Std. Dev.	N
Pseudo coefficients	−0.0016	−0.0782	−0.0342	0.0006	0.0316	0.0719	0.0467	1,000
t-Values	−0.0357	−1.7201	−0.7476	0.0141	0.6963	1.5829	1.0277	1,000

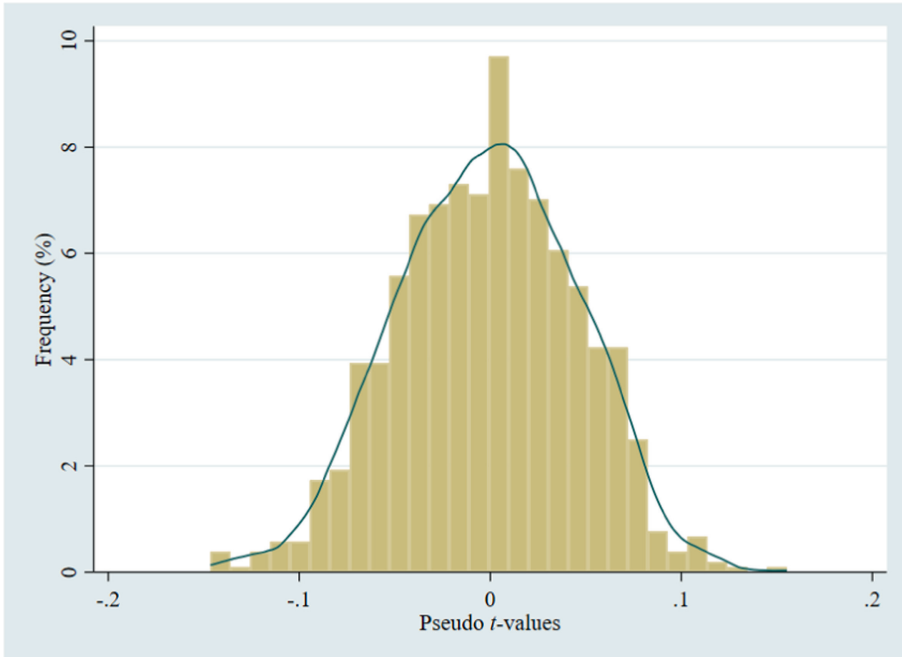

Fig. 1. Probability density of the pseudo *t*-values.

where *Synch* is stock price synchronicity, computed as described above. Following previous studies (Bourveau et al., 2018; Meng et al., 2019; Chen et al., 2019), we use a propensity score matching approach (one-to-one nearest neighbor matching) to match targeted firms (treatment group) with un-targeted firms (control group) based on the lagged control variables in Eq. (3) by year. The matched sample includes 2,534 firm-year observations. The independent variable of interest, *Treat* × *Post*, is an indicator variable that equals 1 if targeted firms receive ARCLs by year *t*, and 0 otherwise.[2] Specifically, *Treat* is an indicator variable that equals 1 for the treatment group and 0 for the control group. *Post* is an indicator variable for the treatment group that equals 1 in the years after receiving ARCLs and 0 for the years before receiving ARCLs. The control group assumes the value of the *Post* from the corresponding value of the treatment group to which it is matched. Furthermore, φ is the firm fixed effect and σ is the year fixed effect. The other control variables are defined as in Eq. (3). Detailed variable definitions are provided in Table 1. The coefficient β_1 is a DID estimator that captures the average effect of ARCLs for the treatment group relative to the control group. The results of estimating our PSM-DID analyses to examine the effect of the ARCLs on stock price synchronicity are reported in Column (2) of Table 7. The coefficient of *Treat* × *Post* (−0.1408) remains significantly negative, which further confirms that firms' stock price synchronicity decreases after they receive ARCLs.

For the DID method, the key identification assumption is the parallel trends assumption; that is, before the treatment firms receive ARCLs, the treatment and control firms' stock price synchronicity should have parallel trends. To test the parallel trends assumption, we follow the literature (Guo et al., 2018) in testing the treat-

[2] If a firm receives ARCLs more than once during the sample period, the year in which the firm first receives an ARCL is defined as year *t*.

ment and control firms' differences in the mean (median) of the stock price synchronicity in the "$Post = 1$" and "$Post = 0$" period. Table 8 presents the results of the differences test. We find that before firms receive ARCLs (i.e., $Post = 0$), the mean and median of stock price synchronicity are not statistically different between the treatment and control groups, which provides support for the parallel trend assumption. In contrast, after firms receive ARCLs (i.e., $Post = 1$), the mean and median of stock price synchronicity are statistically different between the two groups.

4.4.4. Placebo test

To ensure that the results are not driven by chance, we conduct a placebo test based on the PSM-DID sample (Li et al., 2018; Sun et al., 2019). We randomly select a pseudo-*Post* for the treatment and control groups and construct an indicator variable, *Placebo Post*. We then re-estimate Eq. (4), replacing *Post* with *Placebo Post*. We repeat this simulation process 1,000 times. Table 9 presents the descriptive statistics of the pseudo coefficients and *t*-value. We find that a smaller proportion of the pseudo coefficients are significantly positive or negative. We also plot the probability density of the pseudo *t*-values in Fig. 1, which shows that the pseudo *t*-values largely follow a normal distribution centered at zero. These findings indicate that our results are not driven by chance.

4.5. Mechanism analyses

The aforementioned theoretical analyses suggest that targeted firms receiving ARCLs may improve the quality and quantity of the disclosure, directly reducing information asymmetry and thus stock price synchronicity. In addition, they may indirectly reduce information asymmetry and thus stock price synchronicity because of external attention and improved governance. We investigate the possible direct and indirect effects described above. Following the literature (Wen and Ye, 2014), we examine the mediating effects by the following three-step method.

Step 1: Regress stock price synchronicity (*Synch*) on ARCLs (*CL*) using the following equation:

$$\begin{aligned} Synch = {} & \beta_0 + \beta_1 CL + \beta_2 Size + \beta_3 CFO + \beta_4 LEV + \beta_5 Growth + \beta_6 ROA + \beta_7 MTB \\ & + \beta_8 Share1 + \beta_9 Indirector + \beta_{10} Board + \beta_{11} Daul + \beta_{12} Owmer + \beta_{13} Big4 \\ & + \beta_{14} Beta + \beta_{15} DA + \beta_{16} FR + \sum IND + \sum Year + \varepsilon \end{aligned} \tag{5}$$

Step 2: Regress mediator variables (*Mediator*) on ARCLs (*CL*) using the following equation:

$$\begin{aligned} Mediator = {} & \gamma_0 + \gamma_1 CL + \gamma_2 Size + \gamma_3 CFO + \gamma_4 LEV + \gamma_5 Growth + \gamma_6 ROA + \gamma_7 MTB \\ & + \gamma_8 Share1 + \gamma_9 Indirector + \gamma_{10} Board + \gamma_{11} Daul + \gamma_{12} Owmer + \gamma_{13} Big4 \\ & + \gamma_{14} Beta + \gamma_{15} DA + \gamma_{16} FR + \sum IND + \sum Year + \varepsilon \end{aligned} \tag{6}$$

Step 3: Regress the stock price synchronicity (*Synch*) on both the ARCLs (*CL*) and the mediator variables (*Mediator*) using the following equation:

$$\begin{aligned} Synch = {} & \delta_0 + \delta_1 Mediator + \delta_2 CL + \delta_3 Size + \delta_4 CFO + \delta_5 LEV + \delta_6 Growth + \delta_7 ROA \\ & + \delta_8 MTB + \delta_9 Share1 + \delta_{10} Indirector + \delta_{11} Board + \delta_{12} Daul + \delta_{13} Owmer \\ & + \delta_{14} Big4 + \delta_{15} Beta + \delta_{16} DA + \delta_{17} FR + \sum IND + \sum Year + \varepsilon \end{aligned} \tag{7}$$

In Eqs. (5)–(7), *CL* equals 1 if the targeted firms receive ARCLs for year *t*-1 in year *t*, and 0 otherwise, and *Synch* is stock price synchronicity. The other control variables are defined as in Eq. (3). Detailed variable definitions are provided in Table 1. The mediator variable, *Mediator*, is a proxy for four variables: *Smooth* (earnings smoothing; referring to disclosure quality, a higher *Smooth* value implies lower disclosure quality [Zhong, 2018]), *Forecast* (total number of management voluntary forecasts; referring to disclosure quantity, a higher *Forecast* implies higher disclosure quantity [Chen et al., 2018a]), *Media* (total number of media stories of the firm; referring to external attention, a higher *Media* implies higher external attention [Yan and Zeng, 2018]), and *GOV* (corporate governance index; referring to corporate governance, a higher *GOV* implies stronger corporate governance [Deng et al., 2020]). Detailed definitions of the mediator variables are given in Table 1. The coefficient β_1 is the magnitude of the direct path from ARCLs to stock price synchronicity in these models.

Table 10
Results of the mechanism analyses.

Panel A: Test of the direct mechanism

Variable	(1) *Synch*	(2) *Smooth*	(3) *Synch*	(4) *Forecast*	(5) *Synch*
		Mediator = Smooth		*Mediator = Forecast*	
CL	−0.1367***	−1.4782***	−0.1283***	0.3644***	−0.1274***
	(−3.24)	(−4.05)	(−3.04)	(3.27)	(−3.02)
Mediator			0.0057***		−0.0257***
			(3.31)		(−3.83)
Size	0.0001	0.2115	−0.0011	−0.3600***	−0.0091
	(0.01)	(0.91)	(−0.06)	(−6.71)	(−0.54)
CFO	−0.1004	1.3341	−0.1080	0.4043	−0.0900
	(−0.53)	(0.51)	(−0.57)	(0.79)	(−0.47)
LEV	−0.4504***	4.0791***	−0.4736***	0.3582	−0.4412***
	(−6.03)	(4.51)	(−6.33)	(1.54)	(−5.89)
Growth	−0.0156**	0.2525**	−0.0170**	0.0101	−0.0153**
	(−2.07)	(2.49)	(−2.27)	(0.50)	(−2.03)
ROA	−0.1857	0.9503	−0.1911	−2.4370***	−0.2484
	(−0.76)	(0.42)	(−0.79)	(−3.68)	(−1.02)
MTB	0.8329***	0.7954	0.8284***	0.5183**	0.8462***
	(10.05)	(0.86)	(10.03)	(2.11)	(10.32)
Share1	−0.0017*	−0.0128	−0.0017*	0.0037	−0.0016*
	(−1.83)	(−1.23)	(−1.77)	(1.25)	(−1.74)
Independ	0.1675	2.7685	0.1518	0.6716	0.1847
	(0.65)	(0.80)	(0.60)	(0.88)	(0.73)
Board	0.1106	−0.9429	0.1160	0.3677	0.1201
	(1.49)	(−0.91)	(1.57)	(1.61)	(1.62)
Dual	0.0103	0.1958	0.0092	0.2618***	0.0170
	(0.36)	(0.56)	(0.32)	(2.88)	(0.59)
Owner	0.0446	0.5977*	0.0412	−0.8916***	0.0217
	(1.54)	(1.79)	(1.43)	(−9.28)	(0.74)
Big4	−0.0454	−0.9564	−0.0399	−0.2013	−0.0505
	(−0.81)	(−1.62)	(−0.73)	(−1.28)	(−0.91)
Beta	0.8014***	−0.1438	0.8022***	−0.4612***	0.7895***
	(15.86)	(−0.29)	(15.87)	(−3.43)	(15.55)
DA	−0.3471**	8.2629***	−0.3940**	0.5861	−0.3320**
	(−2.17)	(3.76)	(−2.45)	(1.47)	(−2.07)
FR	−0.0494*	−0.2583	−0.0479*	−0.0508	−0.0507*
	(−1.84)	(−0.96)	(−1.79)	(−0.71)	(−1.89)
Constant	−0.5704	−3.0761	−0.5529	8.8925***	−0.3418
	(−1.51)	(−0.54)	(−1.47)	(7.75)	(−0.90)
IND	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
N	4,291	4,291	4,291	4,291	4,291
Adj_R²	0.4055	0.1361	0.4074	0.2281	0.4079
Sobel test		$z = -2.595$, $p = 0.009$		$z = -2.724$, $p = 0.006$	

Panel B: Test of the indirect mechanism

Variable	(1)	(2)	(3)	(4)	(5)
	Synch	*Smooth*	*Synch*	*Forecast*	*Synch*
		Mediator = Smooth		*Mediator = Forecast*	
CL	−0.1367***	4.5155***	−0.1242***	0.0415**	−0.1332***
	(−3.24)	(4.47)	(−2.93)	(2.38)	(−3.16)
Mediator			−0.0028***		−0.0854*
			(−2.84)		(−1.89)
Size	0.0001	7.6160***	0.0212	0.0693***	0.0060
	(0.01)	(13.31)	(1.18)	(7.48)	(0.34)

CFO	−0.1004	0.1233	−0.1001	−0.3566***	−0.1309
	(−0.53)	(0.03)	(−0.53)	(−4.63)	(−0.69)
LEV	−0.4504***	−0.2606	−0.4511***	0.3247***	−0.4227***
	(−6.03)	(−0.16)	(−6.06)	(9.66)	(−5.53)
Growth	−0.0156**	0.0461	−0.0155**	0.0040	−0.0152**
	(−2.07)	(0.30)	(−2.05)	(1.07)	(−2.04)
ROA	−0.1857	−14.4623***	−0.2258	−0.1185	−0.1958
	(−0.76)	(−2.63)	(−0.93)	(−1.35)	(−0.80)
MTB	0.8329***	–23.2575***	0.7684***	−0.0224	0.8310***
	(10.05)	(−10.75)	(9.19)	(−0.62)	(10.04)
Share1	−0.0017*	−0.0691***	−0.0019**	0.0024***	−0.0015
	(−1.83)	(−3.40)	(−2.04)	(5.46)	(−1.62)
Independ	0.1675	5.8362	0.1836	1.9193***	0.3313
	(0.65)	(0.88)	(0.71)	(14.03)	(1.21)
Board	0.1106	−0.9566	0.1080	1.2970***	0.2213**
	(1.49)	(−0.48)	(1.45)	(33.57)	(2.46)
Dual	0.0103	0.6055	0.0120	0.0058	0.0108
	(0.36)	(0.90)	(0.42)	(0.42)	(0.37)
Owner	0.0446	−3.8584***	0.0339	−0.0364***	0.0415
	(1.54)	(−6.13)	(1.16)	(−2.64)	(1.44)
Big4	−0.0454	5.5439***	−0.0300	−0.0764***	−0.0519
	(−0.81)	(2.98)	(−0.54)	(−2.82)	(−0.93)
Beta	0.8014***	−0.7298	0.7994***	0.0519**	0.8058***
	(15.86)	(−0.66)	(15.83)	(2.55)	(15.96)
DA	−0.3471**	12.6678***	−0.3120*	0.1489**	−0.3344**
	(−2.17)	(4.09)	(−1.94)	(2.51)	(−2.09)
FR	−0.0494*	1.9072***	−0.0441*	0.0588***	−0.0444*
	(−1.84)	(3.50)	(−1.65)	(5.58)	(−1.66)
Constant	−0.5704	−84.6106***	−0.8049**	−5.1558***	−1.0106**
	(−1.51)	(−7.17)	(−2.13)	(–23.97)	(−2.20)
IND	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
N	4,291	4,291	4,291	4,291	4,291
Adj_R²	0.4055	0.7701	0.4071	0.5735	0.4060
Sobel test		$Z = -2.989$, $p = 0.003$		$Z = -1.654$, $p = 0.098$	

Note: ***, **, and * denote significance at 1%, 5%, and 10%, respectively. The *t*-statistics are shown in brackets.

The coefficient $\gamma_1 \times \delta_1$ is the magnitude of the indirect path from ARCLs to stock price synchronicity through the proxy of the mediator variables. We then conduct a Sobel test (i.e., the statistical significance of $\gamma_1 \times \delta_1$) to judge whether mediation occurs.

The results of the mechanism analyses are reported in Table 10. Panels A and B show the results of the direct and indirect mechanism tests, respectively. Column (1) in Panels A and B reports the effect of ARCLs on stock price synchronicity. Consistent with previously reported results, the coefficient of *CL* (−0.1367) is significantly negative. In Panel A of Table 10, Columns (2) and (3) show the effect of ARCLs on stock price synchronicity mediated through disclosure quality-based proxy. Specifically, there is a significant and negative relationship between *CL* and *Smooth* in Column (2), indicating that firms' earnings smoothing decreases and disclosure quality improves after receiving ARCLs. *Smooth* is positively related to the stock price synchronicity with the presence of *CL*, and the coefficient of *CL* (−0.1283) is significantly negative, as reported in Column (3). The *z*-statistic of the Sobel test is significant at the 1% level, suggesting that disclosure quality has a mediating effect. The results concerning ARCLs' effect on stock price synchronicity mediated through the disclosure quantity–based proxy are reported in Columns (4) and (5). There is a significant and positive relationship between *CL* and *Forecast* in Column (4), indicating that firm management's voluntary forecasts increase

Table 11
Results of the alternative dependent variables.

Variable	(1) *Synch*1	(2) *Idio*	(3) *Turn*
CL	−0.1971***	0.0279***	0.7702***
	(−5.25)	(7.18)	(3.74)
Size	0.0326**	−0.0065***	−1.4038***
	(2.00)	(−4.28)	(−16.30)
CFO	0.0143	−0.0183	−0.7713
	(0.09)	(−1.10)	(−0.85)
LEV	−0.4568***	0.0649***	0.9881***
	(−6.76)	(9.28)	(2.76)
Growth	−0.0250***	0.0036***	0.0345
	(−3.56)	(4.39)	(0.87)
ROA	0.1416	−0.0474**	0.6661
	(0.67)	(−2.20)	(0.58)
MTB	0.8182***	−0.1253***	4.2592***
	(11.29)	(−17.98)	(11.36)
Share1	−0.0016**	0.0002***	−0.0241***
	(−2.03)	(3.06)	(−5.11)
Independ	0.0275	−0.0248	0.3469
	(0.12)	(−1.13)	(0.30)
Board	0.1295**	−0.0215***	−0.3765
	(1.97)	(−3.40)	(−1.15)
Dual	0.0175	0.0013	0.2809*
	(0.74)	(0.51)	(1.81)
Owner	0.1108***	−0.0141***	−0.3095**
	(4.29)	(−5.48)	(−2.26)
Big4	−0.0815	0.0023	−0.1095
	(−1.59)	(0.52)	(−0.57)
Beta	0.9564***	0.0747***	4.9524***
	(22.65)	(17.34)	(21.44)
DA	−0.5163***	0.0669***	1.0057
	(−3.72)	(4.77)	(1.41)
FR	−0.0406*	0.0016	−0.1493
	(−1.66)	(0.63)	(−1.09)
Constant	−1.8310***	0.5819***	33.7255***
	(−5.06)	(17.22)	(17.84)
IND	Yes	Yes	Yes
Year	Yes	Yes	Yes
N	7,687	7,687	7,687
Adj_R^2	0.3883	0.5084	0.3953

Note: ***, **, and * denote significance at 1%, 5%, and 10%, respectively. The *t*-statistics are shown in brackets.

and disclosure quantity increases after receiving ARCLs. *Forecast* is negatively related to stock price synchronicity in the presence of *CL*, and the coefficient of *CL* (−0.1274) is significantly negative, as reported in Column (5). The *z*-statistic of the Sobel test is significant at the 1% level, suggesting that disclosure quantity has a mediating effect.

In Panel B of Table 10, Columns (2) and (3) show the results regarding ARCLs' effect on stock price synchronicity mediated through external attention based proxy. Specifically, there is a significant and positive relationship between *CL* and *Media* shown in Column (2), indicating that firms' media coverage and external attention increase after their receiving ARCLs. *Media* is negatively related to stock price synchronicity with the presence of *CL*, and the coefficient of *CL* (−0.1242) is significantly negative, as reported in Column (3). The *z*-statistic of the Sobel test is significant at the 1% level, suggesting that external attention has a mediating

Table 12
Results of retaining the sample with special treatment.

Variable	(1) *Synch*	(2) *Synch*	(3) *Synch*	(4) *Synch*	(5) *Synch*
CL	−0.3736***	−0.3387***	−0.3537***	−0.1437***	−0.1494***
	(−10.64)	(−9.67)	(−10.14)	(−4.70)	(−4.93)
Size		0.1059***	0.0511***	0.0611***	0.0132
		(9.22)	(3.68)	(4.93)	(0.95)
CFO		0.5873***	0.6899***	−0.0844	0.0176
		(3.93)	(4.41)	(−0.64)	(0.13)
LEV		−0.3059***	−0.2558***	−0.4154***	−0.3500***
		(−5.37)	(−4.29)	(−7.88)	(−6.39)
Growth		−0.0035	−0.0142**	−0.0136**	−0.0245***
		(−0.54)	(−2.13)	(−2.49)	(−4.35)
ROA		−1.4382***	−1.0633***	−0.2055	0.1252
		(−7.76)	(−5.41)	(−1.25)	(0.75)
MTB		−0.1132**	0.0973*	0.4961***	0.7355***
		(−2.34)	(1.84)	(8.47)	(11.65)
Share1		−0.0031***	−0.0008	−0.0038***	−0.0018***
		(−4.62)	(−1.17)	(−5.71)	(−2.63)
Independ		−0.0174	0.1093	0.0241	0.1183
		(−0.08)	(0.51)	(0.12)	(0.60)
Board		0.1637***	0.1633***	0.1318**	0.1276**
		(2.72)	(2.64)	(2.28)	(2.25)
Dual		−0.0143	−0.0023	−0.0097	−0.0036
		(−0.63)	(−0.10)	(−0.47)	(−0.18)
Owner		0.1713***	0.1003***	0.1279***	0.0644***
		(7.98)	(4.22)	(6.16)	(2.88)
Big4		−0.0726*	−0.0735	−0.0504	−0.0560
		(−1.80)	(−1.56)	(−1.16)	(−1.26)
Beta		0.5089***	0.5668***	0.7258***	0.7881***
		(14.98)	(13.38)	(21.04)	(23.24)
DA		−0.1066	−0.1167	−0.4056***	−0.3949***
		(−0.80)	(−0.85)	(−3.60)	(−3.48)
FR		0.0395	0.0313	−0.0315	−0.0382*
		(1.53)	(1.22)	(−1.52)	(−1.83)
Constant	−0.0698***	−3.0779***	−2.0326***	−1.9703***	−1.0486***
	(−6.97)	(−11.26)	(−6.42)	(−6.88)	(−3.39)
IND	No	No	Yes	No	Yes
Year	No	No	No	Yes	Yes
N	8,062	8,062	8,062	8,062	8,062
Adj_R²	0.0137	0.0745	0.1082	0.3769	0.4134

Note: ***, **, and * denote significance at 1%, 5%, and 10%, respectively. The *t*-statistics are shown in brackets.

effect. The effect of ARCLs on stock price synchronicity mediated through corporate governance based proxy is reported in Columns (4) and (5). Specifically, there is a significant and positive relationship between *CL and GOV* in Column (4), indicating that firms' corporate governance index increases and corporate governance level improves after receiving ARCLs. *GOV* is negatively related to stock price synchronicity in the presence of *CL*, and the coefficient of *CL* (−0.1332) is significantly negative, as reported in Column (5). The *z*-statistic of the Sobel test is significant at the 10% level, suggesting that corporate governance has a mediating effect.

It is worth noting that the mediating effect of corporate governance is less than that of the other three mediating mechanisms (i.e., disclosure quality, disclosure quality, and external attention). One possible explanation for this is that in our model, we mainly consider the regulatory effect in the current period, while the improvement of corporate governance is a gradual process and is unlikely to change significantly in the short term as compared to changes in disclosure strategies.

Table 13
Results of controlling for omitted variables.

Variable	(1) *Synch*	(2) *Synch*	(3) *Synch*
CL	−0.1304***	−0.1626***	−0.1155***
	(−3.90)	(−4.24)	(−2.92)
Size	0.0193	−0.0827**	−0.1293***
	(1.32)	(−2.07)	(−3.17)
CFO	−0.0681	−0.0026	−0.0279
	(−0.46)	(−0.02)	(−0.16)
LEV	−0.3714***	−0.1492	−0.0738
	(−6.07)	(−1.12)	(−0.53)
Growth	−0.0235***	−0.0252***	−0.0237***
	(−3.72)	(−3.04)	(−2.74)
ROA	0.1989	−0.2020	0.0944
	(1.03)	(−0.90)	(0.41)
MTB	0.7318***	1.1745***	1.3540***
	(10.87)	(11.63)	(12.82)
Share1	−0.0019**	0.0025	0.0019
	(−2.57)	(1.05)	(0.81)
Independ	0.0660	0.2798	0.3398
	(0.32)	(0.70)	(0.87)
Board	0.1147*	0.3910***	0.4129***
	(1.90)	(2.97)	(3.16)
Dual	0.0002	0.0403	0.0237
	(0.01)	(1.06)	(0.61)
Owner	0.0594**	−0.0061	−0.0075
	(2.53)	(−0.06)	(−0.07)
Big4	−0.0587	0.1345	0.1537
	(−1.26)	(1.18)	(1.21)
Beta	0.7867***	0.8535***	0.8969***
	(21.25)	(19.51)	(19.17)
DA	−0.3515***	−0.1565	−0.1331
	(−2.74)	(−1.12)	(−0.91)
FR	−0.0398*	0.0105	0.0128
	(−1.74)	(0.43)	(0.50)
Constant	−1.8978***	−0.8468	−0.0557
	(−6.07)	(−0.90)	(−0.06)
IND	Yes	No	No
Year	Yes	Yes	Yes
Industry × year	Yes	No	Yes
Firm	No	Yes	Yes
N	7,519	7,359	7,199
Adj_R²	0.4197	0.5002	0.5137

Note: ***, **, and * denote significance at 1%, 5%, and 10%, respectively. The *t*-statistics are shown in brackets. The singleton observations were excluded from the sample when controlling for industry × year and firm fixed effects using the REGHDFE in Stata.

5. Robustness tests

5.1. Alternative dependent variables

Following the literature (Zhu, 2019), we change the measurement of stock price synchronicity by excluding $R_{m,t,w\text{-}1}$ and $R_{l,t,w\text{-}1}$ in Eq. (1). We obtain another measurement of stock price synchronicity, *Synch*1, through Eq. (2). We re-estimate Eq. (3) by replacing *Synch* with *Synch*1. Li et al. (2014) argue that lower levels of stock price synchronicity and higher idiosyncratic risk indicate more firm-specific information incorporated in the stock price.

Thus, we use idiosyncratic volatility (*Idio*), estimated by the variance of the residuals of the Fama-French 3-factor model, to measure idiosyncratic risk and re-estimate Eq. (3) by replacing *Synch* with *Idio.* We expect that firms' idiosyncratic risk increases after receiving ARCLs. Li et al. (2014) also note that the measurement of R^2 and idiosyncratic risk may contain noise and therefore suggest that more robust evidence could be provided through additional information environment metrics such as stock liquidity. Thus, following the literature (Chen et al., 2018a), we use turnover rate (*Turn*), defined as the sum of monthly trading volume divided by total shares outstanding, to measure stock liquidity and re-estimate Eq. (3) by replacing *Synch* with *Turn*. We also expect firms' stock liquidity to increase after their receiving ARCLs.

We present the results of the alternative dependent variable in Table 11. Columns (1)–(3) report the results with *Synch*1, *Idio*, and *Turn* as the dependent variable, respectively. In Column (1), the coefficient of *CL* is significantly negative, and the coefficients of *CL* in Columns (2) and (3) are both significantly positive. These results are consistent with expectations and support our main conclusion.

5.2. Retaining the sample with special treatment

In baseline regression, we exclude samples with special treatment. However, in practice, these firms are more likely to receive ARCLs. Therefore, we retain the sample with special treatment and re-estimate Eq. (3). The results are reported in Table 12. The differences in results according to control variables and fixed effects of Columns (1)–(5) are in line with Table 5 (see Section 4.4.1). The coefficients of *CL* in Columns (1)–(5) are all significantly negative at the 1% level, which further validates our main conclusion.

5.3. Controlling for omitted variables, industry × year and firm fixed effects

To address the concern that unobservable variables might drive the results, we include *industry* × *year* fixed effects in Eq. (3) to control for time-varying industry-level macroeconomic shocks that may affect stock price synchronicity. The results are reported in Column (1) of Table 13. We then replace industry fixed effects with firm fixed effects in Eq. (3) to control for time-invariant, cross-firm heterogeneity that could potentially affect stock price synchronicity. The results are reported in Column (2) of Table 13. Finally, we include both *industry* × *year* and firm fixed effects together with firm characteristics and year fixed effects and present the results in Column (3) of Table 13. Our results remain robust and consistent across all specifications, indicating that our results are unlikely to be driven by unobservable variables, such as industry-level macroeconomic shocks and time-invariant cross-firm heterogeneity.

5.4. Heckman two-stage model

In theory, disclosure deficiency is not solely a product of management's opportunistic behavior but may also be influenced by a firm's disclosure capability. Considering the potential sample self-selection bias due to differences in firms' disclosure capabilities, we follow the literature (Chen et al., 2019), using the Heckman (1979) procedure to mitigate the endogeneity due to self-selection. In the first-stage probit regression, the dependent variable is *CL* and the independent variables are the potential determinants of the likelihood that a firm receives ARCLs, including all of the lagged control variables in Eq. (3) and the age of the firm (*Age*) and whether the firm's CFO is also the secretary of the board (*Finance*). Column (1) of Table 14 presents the results. We then compute the inverse Mills ratio (*Mills*) and estimate Eq. (3) with *Mills* included as an additional control variable in the second-stage regressions. The results are reported in Column (2) of Table 14. We find that *CL* still has a significantly negative effect on stock price synchronicity when controlling for *Mills*, which is consistent with our main conclusion.

Table 14
Results for the Heckman two-stage model.

Variable	(1) *CL*	(2) *Synch*
CL		−0.1341***
		(−3.88)
Size	−0.0666	−0.0169
	(−1.56)	(−0.99)
CFO	0.7487***	−0.2308***
	(4.46)	(−3.18)
LEV	−0.3478	−0.1029
	(−0.81)	(−0.61)
Growth	0.0581***	−0.0185**
	(3.43)	(−2.15)
ROA	−4.9600***	−0.1589
	(−8.27)	(−0.71)
MTB	−0.2081	0.7672***
	(−1.04)	(10.47)
Share1	0.0007	−0.0026***
	(0.34)	(−3.19)
Independ	−0.5417	0.2265
	(−0.89)	(1.01)
Board	−0.3844**	0.0611
	(−2.24)	(0.93)
Dual	0.0309	0.0075
	(0.46)	(0.31)
Owner	−0.1786	−0.0793
	(−1.27)	(−1.49)
Big4	−0.2869***	0.0280
	(−4.31)	(1.11)
Beta	−0.1694*	0.7857***
	(−1.75)	(18.62)
DA	0.3942	−0.5441***
	(0.87)	(−3.17)
FR	0.3829***	−0.0453*
	(6.02)	(−1.89)
Finance	0.2318	
	(1.52)	
Age	0.0294***	
	(5.35)	
Mills		0.1585***
		(4.74)
Constant	0.2610	2.1746***
	(0.28)	(6.22)
IND	Yes	Yes
Year	Yes	Yes
N	5,915	5,850
Pseudo R^2/*Adj_*R^2	0.1577	0.4143

Note: ***, **, and * denote significance at 1%, 5%, and 10%, respectively. The *t*-statistics are shown in brackets.

6. Additional tests

6.1. Cross-sectional analyses based on information asymmetry

The above findings suggest that ARCLs can directly or indirectly reduce information asymmetry and thus stock price synchronicity. However, for firms with lower information asymmetry, although ARCLs may lead to a further reduction in information asymmetry, the incremental effect may be weaker than in firms with

Table 15
Results of cross-sectional analyses.

Variable	(1) *Synch* *High FERROR*	(2) *Synch* *Low FERRO*	(3) *Synch* *High FDISP*	(40 *Synch* *Low FDISP*
CL	−0.1959***	−0.1388**	−0.1918***	−0.1700***
	(−4.21)	(−2.07)	(−3.97)	(−2.79)
Coefficient Differences	*p value* = 0.000		*p value* = 0.000	
Size	−0.0090	0.0036	−0.0036	0.0068
	(−0.45)	(0.15)	(−0.18)	(0.30)
CFO	0.1032	−0.0134	0.4241**	−0.3958
	(0.47)	(−0.05)	(1.97)	(−1.50)
LEV	−0.4158***	−0.4520***	−0.4018***	−0.4676***
	(−4.85)	(−4.18)	(−4.55)	(−4.39)
Growth	−0.0209*	−0.0315***	−0.0255**	−0.0281***
	(−1.82)	(−3.08)	(−2.29)	(−2.65)
ROA	0.1133	−0.6651*	−0.1704	−0.2827
	(0.42)	(−1.72)	(−0.63)	(−0.77)
MTB	0.8204***	0.6727***	0.7558***	0.7075***
	(9.23)	(6.12)	(8.39)	(6.53)
Share1	−0.0023**	−0.0013	−0.0026**	−0.0009
	(−2.12)	(−1.21)	(−2.50)	(−0.82)
Independ	0.1216	0.1613	0.1169	0.1370
	(0.41)	(0.54)	(0.40)	(0.46)
Board	0.1093	0.1004	0.1741**	0.0538
	(1.28)	(1.12)	(2.03)	(0.60)
Dual	0.0150	−0.0002	0.0268	0.0011
	(0.50)	(−0.01)	(0.90)	(0.04)
Owner	0.0272	0.0673*	0.0353	0.0650*
	(0.83)	(1.84)	(1.08)	(1.77)
Big4	−0.1451**	−0.0058	−0.0710	−0.0375
	(−2.28)	(−0.10)	(−1.06)	(−0.64)
Beta	0.7882***	0.8129***	0.8185***	0.7657***
	(14.81)	(13.79)	(15.48)	(12.61)
DA	−0.0989	−0.4882**	−0.4323**	−0.1810
	(−0.51)	(−2.25)	(−2.26)	(−0.84)
FR	−0.0417	−0.0302	−0.0412	−0.0314
	(−1.26)	(−0.77)	(−1.23)	(−0.83)
Constant	−0.3581	−0.7933	−0.7166	−0.6425
	(−0.75)	(−1.52)	(−1.49)	(−1.25)
IND	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
N	3,266	2,895	3,269	2,892
Adj_R^2	0.4347	0.4032	0.4330	0.4020

Note: ***, **, and * denote significance at 1%, 5%, and 10%, respectively. The *t*-statistics are shown in brackets. We use Fisher's permutation test to test the coefficient difference between the two subsamples 1,000 times with bootstrapping.

higher information asymmetry because in firms with lower information asymmetry, more information is incorporated into stock prices. For example, Zhong and Lu (2018) find that Chinese market liberalization can decrease stock price synchronicity through the information and corporate governance channel; this relationship is stronger for firms with lower information transparency and poorer corporate governance. Similarly, Zhang et al. (2018) note that the dampening effect of ARCLs on stock crash risk is more pronounced in firms with lower information transparency. Therefore, we expect that the negative effect between ARCLs and stock price synchronicity is more pronounced in firms with higher information asymmetry.

Following prior studies (Krishnaswami and Subramaniam, 1999; Wang and Wang, 2012), we use a lagged analyst forecast error (*FERROR*) and lagged analyst forecast dispersion (*FDISP*) to measure ex-ante information asymmetry. Higher *FERROR* and *FDISP* indicate higher information asymmetry. We then separate the

Table 16
Effect of ARCL length and tone on stock price synchronicity.

Variable	(1) *Synch*	(2) *Synch*
CL_Length	−0.0913***	
	(−3.91)	
CL_Tone		−0.0941***
		(−4.60)
Size	0.0205	0.0201
	(1.43)	(1.40)
CFO	−0.0489	−0.0461
	(−0.34)	(−0.32)
LEV	−0.3780***	−0.3774***
	(−(−6.33)	(−6.32)
Growth	−0.0259***	−0.0256***
	(−4.16)	(−4.11)
ROA	0.0810	0.0749
	(0.44)	(0.40)
MTB	0.7318***	0.7326***
	(11.23)	(11.25)
Share1	−0.0017**	−0.0017**
	(−2.42)	(−2.39)
Independ	0.0751	0.0764
	(0.37)	(0.38)
Board	0.1220**	0.1218**
	(2.07)	(2.07)
Dual	0.0016	0.0022
	(0.08)	(0.10)
Owner	0.0568**	0.0576**
	(2.47)	(2.50)
Big4	−0.0644	−0.0645
	(−1.42)	(−1.43)
Beta	0.7778***	0.7769***
	(21.97)	(21.97)
DA	−0.3469***	−0.3463***
	(−2.83)	(−2.83)
FR	−0.0435**	−0.0424*
	(−1.98)	(−1.93)
Constant	−1.1429***	−1.1355***
	(−3.58)	(−3.56)
IND	Yes	Yes
Year	Yes	Yes
N	7,667	7,667
Adj_R²	0.4082	0.4086

Note: ***, **, and * denote significance at 1%, 5%, and 10%, respectively. The *t*-statistics are shown in brackets.

sample into two subsamples based on the industry-year median of each of *FERROR* and *FDISP*: firms with high *FERROR* and *FDISP* (i.e., above median values for each) and firms with low *FERROR* and *FDISP* (i.e., above-median values for each). We then re-estimate Eq. (5) for each of the subsamples. The estimation results are reported in Table 15. The coefficients on *CL* are negative and significant for both the high information asymmetry subsample (i.e., high *FERROR* and *FDISP* subsamples in Columns (1) and (3)) and the low information asymmetry subsample (i.e., low *FERROR* and *FDISP* subsamples in Columns (2) and (4)). The test of the coefficient difference between the two subsamples shows that the coefficients are significantly higher in the high information asymmetry subsample, which implies that the negative effect of ARCLs on stock price synchronicity is more pronounced in firms with higher information asymmetry.

6.2. Effects of ARCL length and tone on stock price synchronicity

We follow Li et al. (2019) to further test the effect of the length and tone of ARCLs on stock price synchronicity.[3] First, the length of an ARCL (*CL_Length)* is measured by the number of words in the ARCL. For un-targeted firms, *CL_Length* equals 2 if the number of words is above the median value in year *t*, and 1 otherwise. For targeted firms, *CL_Length* equals 0. ARCL tone (*CL_Tone*) is an indicator of the negative tone of the ARCL. For un-targeted firms, if the value of *CL_Tone* is below the median value in year *t*, then *CL_Tone* equals 2, and 1 otherwise. For targeted firms, *CL_Tone* equals 0. We follow Huang et al. (2014) to construct the tone of ARCLs (i.e., (positive words – negative words)/the length of ARCLs) using the Chinese Financial Sentiment Dictionary developed by Bian et al. (2019). The results regarding the impact of the length and tone of ARCLs on stock price synchronicity are provided in Table 16. In Column (1), the coefficient of *CL_Length* is significantly negative at the 1% level, indicating that the longer the ARCL, the lower the stock price synchronicity. In Column (2), the coefficient of *CL_Tone* is also significantly negative at the 1% level, suggesting that the more negative the ARCL's tone, the lower the stock price synchronicity.

7. Conclusion

Adopting the perspective of stock price synchronicity, this paper tests the effect of ARCLs on the information efficiency of the Chinese capital market. We find that after firms receive ARCLs, their stock price synchronicity decreases. Moreover, the longer the ARCLs and the more negative the ARCLs' tone, the lower the stock price synchronicity. The mechanism test shows that after the firms receive ARCLs, the firms' information disclosure increases in quantity and quality, external media attention increases, and their governance improves, reducing stock price synchronicity. Further research shows that this negative association is more significant in firms with higher information asymmetry.

Our findings provide important policy implications. First, we provide new evidence on the effectiveness of the ARCL system. Regulatory innovation is one of the key initiatives used in transforming government functions since the 18th CPC National Congress. Our results highlight that the ARCL system, an innovative change in the philosophy governing capital market regulation, is vital for the healthy development of the capital market. Improving the quality of listed firms is a vital goal for the new era's capital market and a fundamental safeguard against financial risk. Therefore, regulators should continue to implement and improve the ARCL system, expand its scope, increase its intensity, and improve the efficiency of supervision. Second, the mechanism test shows that firm changes in disclosure strategy following ARCLs are more likely to reduce stock price synchronicity than corporate governance improvement, suggesting that regulators should keep an eye out for any targeted firms' short-term changes in information disclosure policies. Regulators should also urge targeted firms to promote their corporate governance, thereby improving capital market efficiency. Finally, ARCLs' effect of reducing firms' stock price synchronicity is more pronounced in firms with higher information asymmetry. This suggests to investors that deficiencies in listed firms' accounting may be related to lower transparency and poorer governance. It is essential to take into account the incremental warnings of the ARCL system when making investment decisions.

There remain many underexplored questions related to this topic that are worthy of research. First, whereas we examine the effect of ARCLs, a form of precautionary regulation, on stock price synchronicity, other types of comment letters may be further explored in the future. Second, we explore the effect of the length and tone of ARCLs on stock price synchronicity. However, other features of the ARCLs merit examination, such as whether opinions from intermediaries or independent directors are required, the number of questions raised in the ARCLs, the content of the questions, the severity of the questions, and other related elements. Finally, we have not yet explored the characteristics of targeted firms' response letters, such as whether the response letter was extended and the level of detail of the response letter. These topics could be explored in the future.

[3] In this section, we exclude the sample of firms that receive more than one ARCL in one year.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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The pricing and performance of IPOs in China's poor counties

Chao Yan *, Jiaxin Wang

School of Accounting, Zhongnan University of Economics and Law, China

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ABSTRACT

In the context of China's drive to alleviate poverty, we focus on the initial public offering (IPO) firms located in China's poor counties and investigate their IPO pricing and post-IPO performance. Contrary to the findings reported for the U.S., we find that the problem of information asymmetry between Chinese firms located in rural areas and their investors is so severe that these IPO firms are associated with significantly higher underpricing. This effect is more pronounced for firms located in rural areas with poor traffic systems. We do not find significant market performance differences between rural and urban firms after their IPOs, but the operating performance of rural firms improves in the short term. Our additional analyses indicate that rural IPO firms have significantly lower investor attention and higher agency costs than urban firms. Overall, we enrich the literature on IPO pricing and the economic effects of geographic location.

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1. Introduction

Tackling poverty is a long-term challenge throughout the world, and the Chinese government has made a commitment to take measures to address this problem. Since the 18th Party Congress, the Communist Party of China (CPC) has prioritized poverty alleviation and launched a comprehensive war against poverty, achieving

* Corresponding author at: School of Accounting, Zhongnan University of Economics and Law, 182# Nanhu Avenue, East Lake High-tech Development Zone, Wuhan 430073, China.
E-mail address: yanchao420@163.com (C. Yan).

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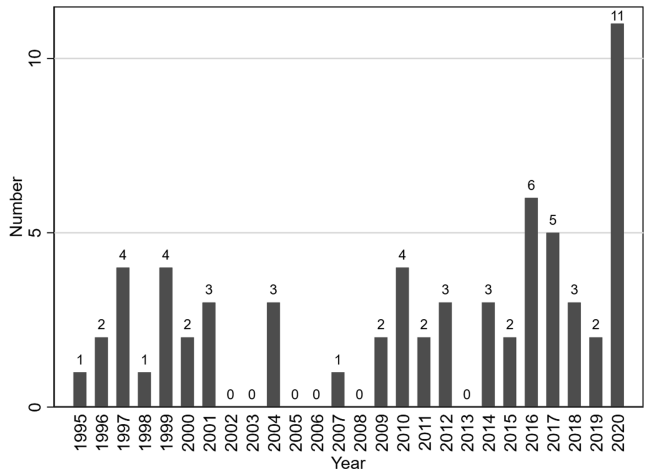

Fig. 1. Distribution of rural IPO firms in China.

results that have gained global attention. As part of this process, the regulator of the Chinese securities market, the China Securities Regulatory Commission (CSRC), has explored ways to actively tackle poverty through the capital market. Listed firms represent the main drivers of economic development, so the CSRC has introduced a series of policies to encourage firms to go public in poor areas. Although most listed firms are located in the economically developed urban areas of China, some are located in poorer areas and are the focus of this paper.

Initial public offerings (IPOs) play a critical role in capital markets. They not only represent an important financial decision for firms, but they also reflect the resource allocation efficiency of the market. A closing price that is significantly higher than the offer price for an IPO on its first day of trading indicates information asymmetry between the listed firm and outside investors. The firm may then provide a discount to investors by lowering the offer price, which is known as IPO underpricing. Accounting and finance research extensively explores and debates IPO underpricing (Ritter and Welch, 2002), and particularly the influencing factors (Rock, 1986; Heng and Kam, 2008; Chambers and Dimson, 2009; Ozmel et al., 2018; Zhang and Zhang, 2018; Huang et al., 2021).

Based on information asymmetry, the impact of a firm's geographic location on IPO underpricing has been investigated in the Western literature. For example, Nielsson and Wójcik (2016) draw on U.S. data and find that issuers headquartered in rural areas are associated with lower underpricing compared to urban firms. However, as their study is limited to the U.S., they do not indicate whether the rural areas of other countries are also affected by local bias and superior local information. The influence of the geographic location of a firm on IPO underpricing in other countries is therefore unclear. China is the world's largest emerging economy and its capital market is still in a period of development. Chinese listed firms have been found to have serious agency problems (Aharony et al., 2000), and those located in rural areas may face greater information asymmetry, and are thus more likely to provide their investors with higher IPO underpricing. Geographic location may therefore have an opposite effect on IPO underpricing in China to that in the U.S. We therefore examine the pricing and performance of IPOs in Chinese rural areas.

We first construct a sample of Chinese A-share IPO firms from the period of 1995 to 2020. We then identify rural and urban IPO firms using the list of China's 832 counties deemed to be poor by the National Administration for Rural Revitalization[1]. Figs. 1 and 2 show the distribution of rural IPO firms and a comparison of rural and urban IPO firms, respectively. The number of rural IPO firms grew more rapidly after the 18th Party Congress due to policy incentives, but it still remains far below the number of urban IPO firms. Our empirical

[1] The National Administration for Rural Revitalization was reorganized from the State Council Leading Group Office of Poverty Alleviation and Development, which is directly under the control of the State Council. On 25 February 2021, the National Administration for Rural Revitalization was officially launched.

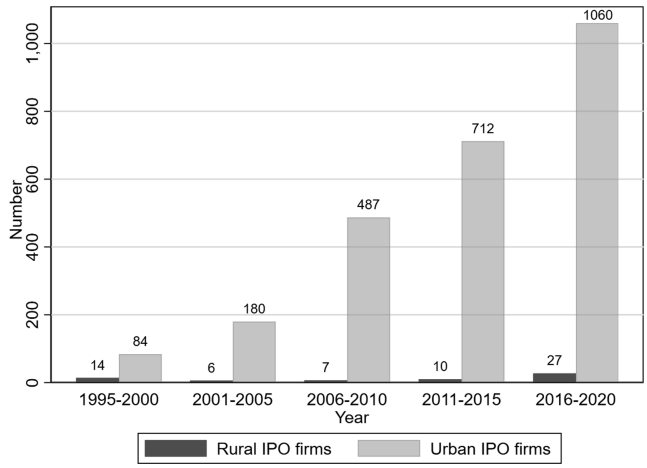

Fig. 2. Distribution of rural versus urban IPO firms in China.

tests indicate that IPO firms in poor counties are associated with significantly higher underpricing, which is contrary to the findings from the Western (in particular the U.S.) literature. This indicates that assumptions of local bias and superior local information do not apply in rural areas of China, where information asymmetry is a major problem. We do not find significant market performance differences between rural and urban firms after IPOs, but we find that the fundamentals of rural firms improve only in the short term.

We test the mechanism by examining (i) information asymmetry in rural areas in terms of traffic systems and (ii) local bias in urban areas in terms of the ratio of shares held by local institutional investors. We first divide the listed firms in poor counties into the two categories of more and less developed traffic systems, and we find that the impact of geographic location on IPO underpricing is significant for listed firms located in poor counties with less developed traffic systems. This indicates that information asymmetry in poor counties is more severe, thus resulting in higher levels of IPO underpricing. The ratio of shares in local firms held by local institutional investors is also higher in urban areas, which suggests that these investors demonstrate more local bias and that information asymmetry is lower.

We also consider the effects of different regions and sample periods, investor attention and agency costs in further analyses. We find that the impact of geographic location gradually weakens as the regional scope of the poor area metric is extended, whereas the baseline results remain unchanged. The impact of geographic location does not change significantly across the three sample periods based on the Chinese IPO system reforms. These findings all support our baseline results. In addition, we find that the rural IPO firms have significantly lower investor attention after listing and higher agency costs than the urban IPO firms.

We make two main contributions to the literature. First, we challenge the hypotheses of local bias and superior local information offered in the U.S. IPO underpricing literature. Previous studies suggest that factors such as information asymmetry (Rock, 1986; Heng and Kam, 2008; Zhang and Zhang, 2018), regulatory systems (Song and Tang, 2017; Wei et al., 2019), investor sentiment (Derrien, 2005; Ljungqvist et al., 2006), ownership structure (Zhang and Zhang, 2016; Ozmel et al., 2018) and firm behavior (Huang et al., 2021) can explain IPO underpricing. Based on information asymmetry theory, we also find that Chinese IPO firms in poor counties are associated with significantly higher underpricing. We therefore contribute to this literature by considering whether the notions of local bias and superior local information can be broadly applied to IPO underpricing in different countries.

Second, we enrich the literature on the economic impacts of geographic location (Loughran and Schultz, 2005; John et al., 2011; Nielsson and Wójcik, 2016). Most studies measure geographic location using relative distance, denoting rural and urban firms based on their proximity to larger cities. We identify rural and urban firms from the list of China's 832 poor counties published by the National Administration for Rural Revitalization, and we then examine the economic impacts of geographic location on IPO underpricing.

The remainder of this paper is organized as follows. Section 2 describes the institutional background of poor counties and IPOs in China. Section 3 develops the research hypotheses. Section 4 describes the data, sample and model. Section 5 reports the key results and robustness checks. Section 6 presents the results of our mechanism analysis. Sections 7 and 8 provide further analyses, and Section 9 concludes the paper.

2. Institutional background

2.1. Poor counties and poverty alleviation in China

Poverty presents a long-term challenge, and it can affect individuals, societies and regions. The Chinese government has a commitment to developing measures to address the problem, which has affected China for thousands of years. Different approaches are required at different times, and currently identifying poor counties is important, as through economic development poverty can be alleviated in China.

Poverty alleviation has been identified as an important action item on the CPC's agenda since the 18th Party Congress, and on 23 December 2014, the National Administration for Rural Revitalization released a list of counties in China deemed as being poor. Fig. 3 presents the distribution of these counties on a map, illustrating that they are mainly concentrated in the midwest, southwest and parts of the northeast of China. Appendix A presents the detailed distribution of these counties and the industrial distribution of the listed firms located in them. Most of these poor counties are remote, and so they have few listed firms located in them. Based on the list, the Political Bureau of the CPC Central Committee adopted *The Decision on Winning the Battle Against Poverty* on 23 November 2015. At the end of 2020, the Chinese government officially signaled its victory.

The strong leadership of the CPC combined with social initiatives have enabled poverty alleviation efforts to be successful and recognized internationally. The CSRC, as the regulator of the Chinese securities market, has explored methods of actively tackling poverty through the capital market. The CSRC issued *The Opinion of the CSRC on Playing the Role of Capital Market to Serve the National Poverty Alleviation Efforts* (hereafter, the *Opinion*) in September 2016 as a method of implementing the decisions of the CPC Central Committee and

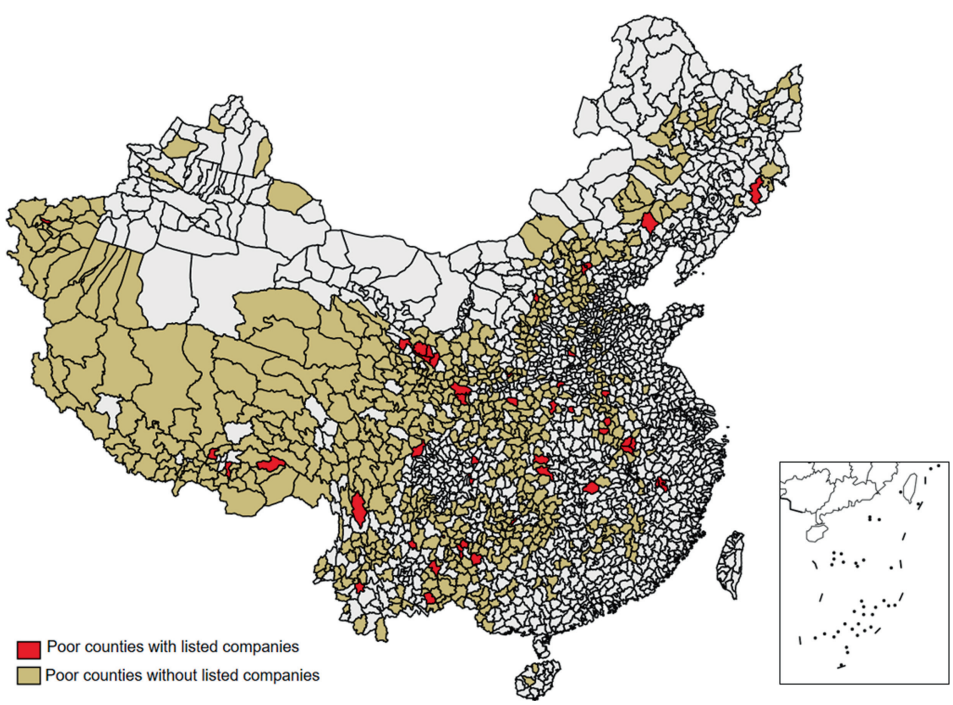

Fig. 3. Distribution of poor counties in China.

the State Council. The *Opinion* focuses on the real economy and supports firms in poor areas by enabling access to the capital market with lower financing costs, thus helping to alleviate poverty. It also initiates the fast tracking of firms in poor areas in terms of considering their IPOs, the issuance of bonds, and mergers and acquisitions.

2.2. IPO systems in China

China is the world's largest emerging market, and regulators are committed to improving its effectiveness in capital markets through IPO system reforms, mainly in terms of issuing and pricing systems.

The capital market mainly consists of listed firms, and their quality determines whether the market is healthy and sustainable. The issuing system is therefore central to IPO systems. The CSRC released *The Stock Issuance Approval Procedures* on 16 March 2000 and implemented the issuance approval system on 17 March 2001. Previously, new shares that were to be issued in a given year were determined by the central government and part of a planning method known as the issuance quota system. Quotas were allocated to provinces and municipalities. The implementation of an approval system is therefore an important step in the market-oriented reform of share issuance, as it completely eliminates the quota system. If a firm's issuance application is approved by the CSRC, it will be listed in the stock exchange. However, the strict approval system initially led to a shortage of IPO resources in China, creating fierce competition among IPO firms. The next initiative after the approval system was the registration system, officially implemented on 1 March 2016 by the State Council. This was subsequently piloted by the Sci-tech Innovation Board and the ChiNext Board on 5 November 2018 and 27 April 2020, respectively. The State Council then issued its *Opinions on Further Improving the Quality of Listed Firms* document on 9 October 2020 and proposed the gradual implementation of the registration system, thus supporting high-quality firms to go public. Unlike the strict approval process, under the registration system the CSRC only reviews the registration documents and does not necessarily make substantive judgments, thus lowering the threshold for IPOs.

In terms of pricing systems, the book-building system was introduced into the primary market on 1 January 2005 for China's IPOs, replacing the previous controlled P/E ratio pricing scheme. This new system was intended to reduce information asymmetry among issuers, underwriters and investors and to improve the efficiency of resource allocation in the new shares issuance market. Under this book-building pricing system, the issuing firm and underwriter together decide the initial offer price range. However, the supply of IPOs was limited by the strict approval system and investors' enthusiasm for IPOs and thus exceeded demand, which in turn led to IPO speculation and market instability. Regulators therefore attempted to impose controls on the first-day trading price of IPOs, to maintain market stability and protect investors' interests. In December 2013, both the Shanghai and Shenzhen Stock Exchanges imposed restrictions for the first time on the opening price of IPOs, requiring (i) the effective declared price in the pool bidding phase to not be higher than 120% or lower than 80% of the issue price and (ii) the effective declared price in the continuous bidding phase to not be higher than 144% or lower than 64% of the issue price. This policy thus effectively limits the first-day trading price of new shares.

3. Hypothesis development

Information asymmetry means that the information held by participants in IPOs (including issuers, underwriters and investors) about the value of a firm, its growth prospects and its potential market demand differs, resulting in adverse selection and moral hazard problems (Baron, 1982). Many studies document information asymmetry as the main cause of IPO underpricing (Beatty and Ritter, 1986; Ang and Brau, 2002; Cook et al., 2006).

The geographic location of the listed firms affects the communication of information among the participants in the capital market. Thus, the *Opinion* has a significant impact on information asymmetry (Garmaise and Moskowitz, 2004; Nielsson and Wójcik, 2016). Su (2004) and Chan et al. (2004) suggest that information asymmetry is worse in China than in the capital markets of developed countries, and IPO underpricing is higher. Huang et al. (2016) also find that uneven development in China creates information gaps across regions.

However, the definitions and measurements of geographic location in the literature vary. Loughran and Schultz (2005) and John et al. (2011) use the distance to population centers to distinguish between rural and urban firms, whereas Nielsson and Wójcik (2016) adopt the proximity to finance professionals and density of financial expertise. Huang et al. (2016) define central and remote areas according to the distance between them and China's three main cities (i.e., Beijing, Shanghai and Shenzhen). The list of 832 poor counties in 22 provinces issued by the National Administration for Rural Revitalization on 23 December 2014 is based on a series of conditions approved by the government. Thus, we can examine the economic impact of geographic location relatively accurately using this list. We analyze IPO underpricing in poor counties in terms of the following two aspects.

First, local bias and superior local information (Nielsson and Wójcik, 2016) in poor counties may result in greater IPO underpricing. Many studies illustrate that investors in poor areas exhibit a stronger local bias (Coval and Moskowitz, 1999; Grinblatt and Keloharju, 2001; Huberman, 2001; Massa and Simonov, 2006; Bernile et al., 2015) by allocating a large proportion of their portfolios to local firms. Thus, investors in poor counties may have more incentives to access information about local IPO firms. Such investors may also have better access to superior local information (Coval and Moskowitz, 2001; Ivkovic and Weisbenner, 2005; Gaspar and Massa, 2007; Bodnaruk, 2009). Coval and Moskowitz (2001) and Ivkovic and Weisbenner (2005) document that local investors in rural areas have access to implicit, non-standardized information about IPO firms and can earn higher returns. Bodnaruk (2009) focuses on Sweden and finds that investors who move out of the countryside and leave behind their close community ties experience a greater loss in local information than those who move away from metropolitan areas. Local bias and the superior local information held by investors in rural areas may therefore reduce the uncertainty of IPO valuation, and investors of rural firms may then demand smaller discounts.

Second, information about listed firms in developed areas is likely to be more easily disseminated than in poor areas. Thus, levels of information asymmetry are higher in poor areas. The information communication channels in developed areas are more convenient and efficient (Zhang and Wang, 2015; Huang et al., 2016), so listed firms can effectively transmit information about their operations and development prospects to outside investors. The local bias of investors in developed areas may therefore be stronger, thus reducing information asymmetry. The residents of poor areas in China do not typically make large-scale financial investments, and institutional and retail investors are mostly concentrated in developed areas (Song et al., 2012; Zhao et al., 2018). In addition, investors in developed areas can easily visit a firm's headquarters and communicate with the management, which helps increase their understanding of such a firm, again reducing information asymmetry. Thus, compared with urban firms, the information transmission efficiency of rural firms is lower, the degree of information asymmetry is greater and accordingly IPO underpricing is higher.

Based on these two aspects of IPO underpricing for rural firms, we propose the following competing hypotheses:

H1a: Rural firms underprice their IPO shares less often than urban firms.
H1b: Rural firms underprice their IPO shares more often than urban firms.

4. Research design

4.1. Data and sample

The data used in our study are collected from multiple resources. The data of China's poor counties are hand collected from the website of the National Administration for Rural Revitalization[2]. The data of firms' locations are from the WIND database, and we obtain GDP data at the municipal and provincial levels from the EPSDATA database. We further obtain the financial data of IPO firms from the CSMAR database. Our

[2] Before 2014, the list of poor counties was adjusted in 1994, 2001 and 2012. We use the latest version of list released in 2014 as it is more comprehensive. However, we also conducted a robustness test using the total list of poor counties over the years, and our baseline results still hold.

initial sample includes all Chinese A-share IPO firms between 1995 and 2020. We then eliminate firms based on the following criteria: (i) those that belong to banking, insurance or other financial industries; (ii) those with special treatment, such as ST and *ST firms; (iii) those listed on the Sci-tech Innovation Board; and (iv) those with missing values. Our final sample then consists of 2,587 IPO firms, including 64 rural and 2,523 urban IPO firms. Figs. 1, 2 and 3 and Appendix A show the distributions from various dimensions. Rural IPO firms are mainly concentrated in the manufacturing industry. To alleviate the effects of extreme observations, the top and bottom 1% of each continuous variable is winsorized.

4.2. Model and variables

We test our hypothesis using the following baseline multiple regression model:

$$FDR_i = \alpha_0 + \alpha_1 RuralFirm + Controls + Industry + Year + \varepsilon_i \quad (1)$$

where *FDR* is the return on the first day of trading relative to the offering price, and the higher the value, the higher the IPO underpricing. For comparison, we also use the market-adjusted first-day returns (*AdjFDR*) to measure IPO underpricing (Huang et al., 2021). *RuralFirm* is a dummy variable that equals 1 if the firm is located in a poor county and 0 otherwise[3]. We include the following set of control variables: offer size (*OfferSize*); the delay between the IPO offer and the listing day (*TimeLag*); firm age (*Age*); issuance costs (*Cost*); audit quality (*Big4*); firm size (*Size*); profitability (*ROE*); cash holding (*Cash*); the nature of ownership (*SOE*); and the duality of the CEO and board chairman (*Duality*). The detailed variable definitions are presented in Appendix B. We also include industry and year effects in Eq. (1). If H1a (H1b) holds, α_1 should be negative (positive) in Eq. (1).

5. Empirical results

5.1. Univariate analysis

We present our univariate analysis of the means and medians of the key variables in Table 1. For *FDR*, the mean (median) of rural firms and urban firms are 0.884 (0.440) and 0.545 (0.440), respectively. The *t*-test for the difference between the means (medians) suggests that the rural firms experience more IPO underpricing. Following Chan et al. (2004), we calculate the market-adjusted first-day returns, *AdjFDR*, and obtain consistent results.

In addition to the differences in IPO underpricing, we examine the differences between rural and urban firms in other dimensions. Table 1 shows that rural IPO firms typically have smaller offers, complete the IPO process more slowly and are younger than urban IPO firms. In addition, the state has more shares in rural IPO firms.

5.2. Baseline results

Table 2 reports the results for Eq. (1). The dependent variables in Columns (1) and (2) are *FDR* and *AdjFDR*, respectively. In Column (1), the coefficient of *RuralFirm* is 0.169, significant at the 5% level. The size of the effect is also economically significant. The average rural IPO firm's *FDR* is 16.9% higher than its urban IPO counterpart. The results in Column (2) are also statistically and economically significant and yield similar results. Overall, the results in Table 2 support H1b.

The coefficients of the control variables, if significant, carry the expected signs, as shown in Table 2. For example, those of *OfferSize*, *Cost* and *ROE* are mostly negative and significant in Columns (1) and (2), suggesting that an IPO firm characterized by a large offer size, higher issuance costs and good returns on equity exhibits a lower first-day underpricing. The coefficients of *OfferSize*, *TimeLag* and *ROE* are consistent with the

[3] The registered address and headquarters address may be different, so we also use headquarters address as the definition criterion for *RuralFirm*. The unreported results indicate that the conclusions of our study still hold, implying that this metric difference has limited impact on our findings.

Table 1
Univariate analysis.

Variable	(1) *RuralFirm*	(2) *UrbanFirm*	(3) Mean and median differences
FDR	0.884	0.545	0.338***
	[0.440]	[0.440]	[0.000***]
AdjFDR	0.882	0.545	0.337***
	[0.459]	[0.437]	[0.022***]
OfferSize	12.946	13.197	−0.251***
	[12.779]	[13.101]	[−0.323***]
TimeLag	3.201	3.092	0.108***
	[3.091]	[3.045]	[0.047**]
Age	2.097	2.494	−0.397***
	[2.350]	[2.565]	[−0.215***]
Cost	8.051	8.341	−0.290***
	[8.266]	[8.347]	[−0.081**]
Big4	0.047	0.044	0.002
	[0.000]	[0.000]	[0.000]
Size	20.299	20.468	−0.169
	[20.136]	[20.296]	[−0.159]
ROE	0.211	0.229	−0.017
	[0.203]	[0.214]	[−0.011]
Cash	0.182	0.199	−0.017
	[0.146]	[0.167]	[−0.021*]
SOE	0.344	0.162	0.182***
	[0.000]	[0.000]	[0.000***]
Duality	0.250	0.209	0.041
	[0.000]	[0.000]	[0.000]

Notes: This table presents and compares the mean and median (in brackets) values of the *RuralFirm* and *UrbanFirm* for *FDR*, *AdjFDR* and the control variables. ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

intuition that the future uncertainty of these IPO firm will be lower, and thus their investors will not demand a large discount. The coefficient of *Cost* indicates that when an IPO firm has high issuance costs, it will compensate by reducing IPO underpricing. In addition, the coefficient of *SOE* indicates that when an IPO firm is state owned, it will set a lower offer price to attract investors.

5.3. Robustness tests

5.3.1. Alternative measures of the dependent variable

China's security regulators impose controls on the first-day trading price of IPOs to maintain market stability and protect the interests of investors. The Shanghai and Shenzhen Stock Exchanges first imposed restrictions on the opening prices of IPOs in 2013, requiring (i) the effective declared price in the pool bidding phase to not be higher than 120% or lower than 80% of the issue price and (ii) the effective declared price in the continuous bidding phase to not be higher than 144% or lower than 64% of the issue price. These regulatory limits mean that using the first-day closing price to compute the *FDR* for IPOs of Chinese firms may not be ideal. Thus, following Chung et al. (2005) and Huang et al. (2021), we use the mean closing price during the first 10 trading days after IPOs to calculate the level of underpricing and denote it as *FDR10*. For comparison, we also calculate the market-adjusted first-day returns, *AdjFDR10*, by subtracting the concurrent market returns of the A-shares from *FDR10.* We present the findings in Table 3, and as the coefficients of *RuralFirm* are all positive and significant at the 5% level, they are robust to alternative measures of IPO underpricing.

5.3.2. Using matched samples

To precisely establish the differences in IPO underpricing between rural and urban IPO firms, we match our treatment group (i.e., rural IPO firms) 1:1 with the control group (i.e., urban IPO firms) using several different matching methods. We present the results in Table 4.

Table 2
The impact of rural firms' locations on IPO underpricing.

Variable	(1) *FDR*	(2) *AdjFDR*
RuralFirm	0.169**	0.170**
	(2.35)	(2.39)
OfferSize	−0.073***	−0.071***
	(−2.66)	(−2.61)
TimeLag	0.066**	0.064**
	(2.06)	(2.01)
Age	0.000	0.000
	(0.01)	(0.00)
Cost	−0.098***	−0.098***
	(−4.20)	(−4.21)
Big4	0.056	0.055
	(0.97)	(0.95)
Size	−0.010	−0.009
	(−0.49)	(−0.48)
ROE	−0.275**	−0.280**
	(−2.06)	(−2.10)
Cash	0.063	0.066
	(1.60)	(1.65)
SOE	0.051**	0.049**
	(2.09)	(2.01)
Duality	0.009	0.009
	(0.45)	(0.46)
Industry	YES	YES
Year/Month	YES	YES
Constant	2.053***	2.046***
	(9.07)	(8.95)
Observations	2,587	2,587
Adjusted R^2	0.555	0.555

Notes: This table presents the regression results for the impact of firm location on IPO underpricing. The t-statistics calculated based on robust standard errors clustered by year/month are reported in parentheses. ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

As shown in Panel A of Table 4, we first construct a 1:1 matched sample based on the criteria that firms are (i) in the same industry, (ii) in the same quarter when considering firm size (*Size*) and (iii) closest in terms of profitability (*EPS*). The coefficients of *RuralFirm* in Columns (1) and (2) are 0.161 and 0.166, respectively, and have statistical significance. In addition, we use propensity score matching (PSM) to construct a 1:1 matched sample between rural and urban firms. Based on Eq. (1), we use the set of control variables to perform a logit regression to select the control group. We present the mean differences of these variables after the PSM in

Table 3
Regression results using alternative measures for the dependent variable.

Variable	(1) *FDR10*	(2) *AdjFDR10*
RuralFirm	0.156**	0.156**
	(2.35)	(2.36)
Controls	YES	YES
Industry	YES	YES
Year/Month	YES	YES
Observations	2,587	2,587
Adjusted R^2	0.694	0.693

Notes: The t-statistics calculated based on robust standard errors clustered by year/month are reported in parentheses. ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

Table 4
Robustness checks using matched samples.

Panel A: 1:1 matching of approximate *Size* and *EPS* within the same *Industry*		
Variable	(1) *FDR*	(2) *AdjFDR*
RuralFirm	0.161*	0.166*
	(1.72)	(1.76)
Controls	YES	YES
Industry	YES	YES
Year/Month	YES	YES
Observations	128	128
Adjusted R^2	0.439	0.432

Panel B: Covariate balance after propensity score matching (PSM)						
Variable	*RuralFirm*		*UrbanFirm*		MeanDiff.	p-Value
	N	Mean	N	Mean		
OfferSize	64	13.036	64	12.946	0.091	0.473
TimeLag	64	3.237	64	3.199	0.038	0.541
Age	64	2.126	64	2.097	0.029	0.837
Cost	64	8.098	64	8.052	0.046	0.730
Big4	64	0.078	64	0.047	0.031	0.469
Size	64	20.523	64	20.299	0.224	0.242
ROE	64	0.208	64	0.211	−0.003	0.854
Cash	64	0.197	64	0.182	0.016	0.555
SOE	64	0.391	64	0.344	0.047	0.586
Duality	64	0.188	64	0.250	−0.063	0.396

Panel C: Regression results using the PSM matched samples		
Variable	(1) *FDR*	(2) *AdjFDR*
RuralFirm	0.246*	0.252*
	(1.77)	(1.82)
Controls	YES	YES
Industry	YES	YES
Year/Month	YES	YES
Observations	128	128
Adjusted R^2	0.406	0.402

Notes: The t-statistics calculated based on robust standard errors clustered by year/month are reported in parentheses. ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

Panel B of Table 4, which show no differences between rural and urban firms in terms of these characteristics. We present the regression results of the PSM sample in Panel C of Table 4. The coefficients of *RuralFirm* in Columns (1) and (2) are positive and significant at the 10% level, further supporting the main findings in Table 2.

5.3.3. Controlling for the regional factors

Huang et al. (2016) find that firms in financially developed areas of China face lower IPO underpricing. Most Chinese firms tend to go public in financially developed areas, such as Beijing, Shanghai and Shenzhen. The IPO underpricing for firms listed in these developed cities is inherently lower, so regional factors may affect the robustness of our baseline results. Thus, we take the following measures to exclude any unfavorable effects of regional factors. We present the results in Table 5.

First, we eliminate observations located in the three most financially developed cities (i.e., Beijing, Shanghai and Shenzhen). We thus have 1,949 remaining observations, and we keep all 64 rural IPO firms. As Panel A of Table 5 shows, our baseline results remain robust. Second, we consider area fixed effects in our model of Eq. (1), and we set dummy variables based on the province where the firm is located. Panel B of Table 5 shows that the coefficients of *RuralFirm* are still positive and significant at the 10% level, which are consistent with the baseline

Table 5
Regression results controlling for the regional factors.

Panel A: Elimination of the samples located in financially developed cities (i.e., Beijing, Shanghai and Shenzhen)		
Variable	(1) *FDR*	(2) *AdjFDR*
RuralFirm	0.171**	0.172**
	(2.27)	(2.30)
Controls	YES	YES
Industry	YES	YES
Year/Month	YES	YES
Observations	1,949	1,949
Adjusted R^2	0.551	0.551
Panel B: Using alternative fixed effect model		
Variable	(1) *FDR*	(2) *AdjFDR*
RuralFirm	0.149*	0.149*
	(1.69)	(1.71)
Controls	YES	YES
Industry	YES	YES
Year/Month	YES	YES
Area	YES	YES
Observations	2,587	2,587
Adjusted R^2	0.557	0.557
Panel C: Excluding the samples located in financially developed cities (i.e., Beijing, Shanghai and Shenzhen)		
Variable	(1) *FDR*	(2) *AdjFDR*
RuralFirm	0.163*	0.163*
	(1.79)	(1.81)
Controls	YES	YES
Industry	YES	YES
Year/Month	YES	YES
Area	YES	YES
Observations	1,949	1,949
Adjusted R^2	0.553	0.553

Notes: The t-statistics calculated based on robust standard errors clustered by year/month are reported in parentheses. ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

results. Finally, we simultaneously exclude observations of firms located in the three financially developed cities and control for area-fixed effects. The results in Panel C of Table 5 also show that our findings are robust.

5.4. Post-IPO performance

To examine the differences in the performance of rural and urban firms after IPOs, we replace the dependent variable with *Performance* based on Eq. (1) and build Eq. (2) as follows:

$$Performance_i = \alpha_0 + \alpha_1 RuralFirm + Controls_i + Industry_i + Year + \varepsilon_i \quad (2)$$

where *Performance* refers to the firm's (market and operating) performance. We use the short-term excess return (*CAR*) and long-term excess return (*BHAR*) to measure market performance, and we use *ROA* and *ROE* to measure the operating performance. The detailed variable definitions are presented in Appendix B.

5.4.1. Market performance

Our baseline results are that IPO underpricing is higher for rural IPO firms, when the underpricing is calculated based on the closing price on the first trading day. We then examine whether the impact of the geographic location of firms on IPO underpricing extends beyond the first trading day.

Table 6
Post-IPO market performance of rural firms.

Panel A: Univariate tests

Variable	(1) *RuralFirm*	(2) *UrbanFirm*	(3) Mean and median differences
CAR_D(1, 10)	0.294	0.347	−0.052
	[0.075]	[0.158]	[−0.083]
CAR_D(1, 30)	0.293	0.390	−0.097
	[0.082]	[0.153]	[−0.071]
CAR_D(1, 60)	0.298	0.358	−0.060
	[0.076]	[0.149]	[−0.073]
BHAR_M(0, 12)	0.170	0.302	−0.133
	[−0.009]	[−0.003]	[−0.006]
BHAR_M(0, 24)	−0.187	0.144	−0.330**
	[−0.206]	[−0.094]	[−0.112*]
BHAR_M(0, 36)	−0.944	−0.049	−0.895***
	[−0.448]	[−0.186]	[−0.262**]

Panel B: Regression results

Variable	(1) *CAR_D (1, 10)*	(2) *CAR_D (1, 30)*	(3) *CAR_D (1, 60)*	(4) *BHAR_M (0, 12)*	(5) *BHAR_M (0, 24)*	(6) *BHAR_M (0, 36)*
RuralFirm	0.022	−0.024	−0.014	0.027	0.104	−0.037
	(0.68)	(−0.51)	(−0.24)	(0.20)	(0.53)	(−0.12)
Controls	YES	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES	YES
Year/Month	YES	YES	YES	YES	YES	YES
Observations	2,587	2,587	2,587	2,346	2,346	2,232
Adjusted R^2	0.812	0.764	0.726	0.474	0.240	0.293

Notes: Panel A of this table presents and compares the mean and median (in brackets) values of the *RuralFirm* and *UrbanFirm* in *CAR* and *BHAR*, while panel B shows the regression results. The t-statistics calculated based on robust standard errors clustered by year/month are reported in parentheses. ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

We examine short-term excess returns (*CAR*) at 10, 30 and 60 days after IPOs and long-term excess returns (*BHAR*) at 1, 2 and 3 years after IPOs. Panels A and B of Table 6 give the results of the univariate tests and regressions, respectively. Panel A indicates that the differences in *CAR* and *BHAR* between rural and urban firms are almost non-significant, and the regression results in Panel B indicate that there is no significant systematic difference in market performance between rural and urban firms. Overall, the results support H1b, suggesting that rural firms have difficulty improving their market performance due to information asymmetry.

5.4.2. Operating performance

We also examine operating performance before and after IPOs (1 year before and 1 and 3 years after). The results are presented in Table 7.

Panel A of Table 7 shows the results for the univariate tests. We find no significant difference in the fundamentals between rural and urban firms at 1 year before IPOs. However, the fundamentals of rural firms significantly outperform those of urban firms 1 year after the IPOs. Surprisingly, the average fundamentals 3 years after IPOs demonstrate no substantial differences. The regression results in Panel B of Table 7 show the same findings. We argue that this finding is due to rural firms facing more serious financial constraints than urban firms. Their shortage of capital is only relieved for a short period of time after they receive funds through the IPOs, thus helping them improve their fundamentals in the short term. However, their fundamentals cannot be improved effectively over the long term due to their geographic location. Thus, due to the geographic locations of rural firms, the funds obtained through IPOs only bring short-term benefits to their operating performance but do not have a substantial effect over the longer term.

Table 7
Post-IPO operating performance of rural firms.

Panel A: Univariate tests

Variable	(1) *RuralFirm*	(2) *UrbanFirm*	(3) Mean and median differences
ROA(B, 1)	0.120	0.128	−0.008
	[0.106]	[0.116]	[−0.010]
ROE(B, 1)	0.211	0.229	−0.017
	[0.203]	[0.214]	[−0.011]
ROA(A, 1)	0.071	0.062	0.009*
	[0.068]	[0.058]	[0.010**]
ROE(A, 1)	0.099	0.090	0.009
	[0.098]	[0.086]	[0.012*]
ROA(A, 3)	0.058	0.056	0.002
	[0.049]	[0.053]	[−0.004]
ROE(A, 3)	0.088	0.083	0.005
	[0.080]	[0.081]	[−0.002]

Panel B: Regression results

Variable	(1) *ROA(B, 1)*	(2) *ROE(B, 1)*	(3) *ROA(A, 1)*	(4) *ROE(A, 1)*	(5) *ROA(A, 3)*	(6) *ROE(A, 3)*
RuralFirm	0.001	0.003	0.013**	0.015	0.008	0.015
	(0.20)	(0.29)	(2.07)	(1.55)	(0.88)	(1.32)
Controls	YES	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES	YES
Year/Month	YES	YES	YES	YES	YES	YES
Observations	2,587	2,587	2,346	2,346	2,141	2,141
Adjusted R^2	0.658	0.510	0.211	0.126	0.196	0.135

Notes: Panel A of this table presents and compares the mean and median (in brackets) values of the *RuralFirm* and *UrbanFirm* in *ROA* and *ROE* in the year before and after IPOs, while panel B shows the regression results. The t-statistics calculated based on robust standard errors clustered by year/month are reported in parentheses. ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

6. Mechanism analysis

A developed traffic system has been found to alleviate information asymmetry (Zhao et al., 2018; Chen et al., 2021), as locations with better traffic systems are likely to have superior information flows and low information asymmetry. To test this information mechanism, we divide rural IPO firms into several groups according to the conditions of their local traffic systems. The three dimensions we use to measure the condition of the traffic system in poor counties are (i) the presence of high-speed railway stations, (ii) the driving time to the nearest train station in the provincial capital city and (iii) the driving time to the nearest airport in the provincial capital city. Then we divide rural IPO firms into the two categories of more developed and less developed traffic systems. *RuralFirm_(Non)Station*, *RuralFirm_TraShort(Long)* and *RuralFirm_AirShort(Long)* are all dummy variables. *RuralFirm_(Non)Station* equals 1 if there is (not) a high-speed train station in the county and 0 otherwise. *RuralFirm_TraShort(Long)* equals 1 if the driving time from the county to the nearest railway station in the provincial capital city is lower (higher) than the median and 0 otherwise. *RuralFirm_TraShort(Long)* equals 1 if the driving time from the county to the nearest airport in the provincial capital city is lower (higher) than the median and 0 otherwise. Panel A of Table 8 reports the regression results, which indicate that IPO underpricing is higher for rural firms regardless of whether the traffic system is developed or not, but the impact of the geographic location on IPO underpricing is only significant for rural firms in locations with less developed traffic systems. These results confirm our theoretical proposition that poorer areas face greater information asymmetry and thus have higher IPO underpricing.

Following Bernile et al. (2015), we then examine the potential local bias mechanism in urban areas (versus rural areas), and define two new variables. *Inst_Dum* is a dummy variable that equals 1 if the shares of firms in urban areas are held by local institutional investors and 0 otherwise, and *Inst* is the proportion of shares of

Table 8
Regression results of the mechanism analysis.

Panel A: Information asymmetry tests						
Variable	(1) *FDR*	(2) *AdjFDR*	(3) *FDR*	(4) *AdjFDR*	(5) *FDR*	(6) *AdjFDR*
RuralFirm_NonStation	0.197**	0.201**				
	(2.41)	(2.48)				
RuralFirm_Station	0.139	0.137				
	(1.21)	(1.20)				
RuralFirm_TraLong			0.225**	0.226**		
			(2.01)	(2.04)		
RuralFirm_TraShort			0.105	0.106		
			(1.02)	(1.02)		
RuralFirm_AirLong					0.239**	0.240**
					(2.08)	(2.11)
RuralFirm_AirShort					0.096	0.097
					(0.96)	(0.97)
Controls	YES	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES	YES
Year/Month	YES	YES	YES	YES	YES	YES
Observations	2,587	2,587	2,587	2,587	2,587	2,587
Adjusted R^2	0.555	0.555	0.555	0.555	0.555	0.555

Panel B: Local bias tests		
Variable	(1) *Inst_Dum*	(2) *Inst*
UrbanFirm	0.166***	0.064***
	(2.82)	(3.83)
Controls	YES	YES
Industry	YES	YES
Year/Month	YES	YES
Observations	2,587	2,587
Adjusted R^2	0.102	0.114

Notes: The t-statistics calculated based on robust standard errors clustered by year/month are reported in parentheses. ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

firms in urban areas held by local institutional investors. If local institutional investors hold a higher percentage of ownership, they have a stronger local bias. Panel B of Table 8 reports the regression results, which indicate that local institutional investors hold more shares of local firms in urban areas. This suggests that these investors may have advantages in acquiring private information in urban areas and thus have local bias. Therefore, we can exclude the local bias of investors for rural IPO firms. This further confirms our main mechanism that IPO firms in poor counties face greater information asymmetry and thus have higher levels of IPO underpricing.

7. Further analysis based on different regions and sample periods

7.1. Different regions

As discussed, we define poor areas based on the list published by the National Administration for Rural Revitalization. To consider the effects of regional differences, we also distinguish poor areas based on their GDP per capita at the municipal and provincial levels, then calculate their mean values per year and define areas with GDP per capita lower than the quintile as poor areas for further analysis. We present the results in Table 9.

Panel A of Table 9 presents the regression results using GDP per capita at the municipal level as a measure of poor areas. The coefficients of *FDR* and *AdjFDR* are smaller and weaker than those in the baseline results in

Table 9
Results for different regions.

Panel A: Using GDP per capita at the municipal level to measure poor areas		
Variable	(1) *FDR*	(2) *AdjFDR*
RuralFirm	0.114*	0.116*
	(1.74)	(1.79)
Controls	YES	YES
Industry	YES	YES
Year/Month	YES	YES
Observations	1,896	1,896
Adjusted R^2	0.678	0.678
Panel B: Using GDP per capita at the provincial level to measure poor areas		
Variable	(1) *FDR*	(2) *AdjFDR*
RuralFirm	0.032	0.031
	(1.01)	(0.99)
Controls	YES	YES
Industry	YES	YES
Year/Month	YES	YES
Observations	2,346	2,346
Adjusted R^2	0.671	0.672

Notes: The t-statistics calculated based on robust standard errors clustered by year/month are reported in parentheses. ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

Table 2, but the signs remain the same. Panel B of Table 9 presents the regression results using GDP per capita at the provincial level as a measure of poor areas. Although the coefficients of *RuralFirm* in Columns (1) and (2) are positive, neither is significant. These results suggest that when using the provincial GDP per capita metric, rural firms do not exhibit higher IPO underpricing. In summary, the results lead to the intuitive assumption that the impact of geographic location on IPO underpricing gradually becomes weaker and the noise increases when we broaden the regional scope of the poor area metric. These findings indicate that (i) the identification criteria for China's poor counties is a trade-off, but it accurately identifies poor areas, and (ii) rural IPO firms have higher IPO underpricing.

7.2. Different sample periods

Although the regulations on the IPO market in China are relatively young, they have gone through several stages. Our sample spans the period from 1995 to 2020, so we can further identify any distinct differences depending on the stage. By examining the institutional history of IPOs in China (Section 2), we can divide the full sample into three sub-samples around two important events.

First, the book-building system was implemented on 1 January 2005 in the primary market. The purpose of this system was to improve the communication of information, reduce information asymmetry between issuers and investors and enhance the accuracy of IPO pricing. The regulatory restrictions on the opening price of IPOs, implemented on 13 December 2013, is the second event. The Shanghai and the Shenzhen Stock Exchanges issued the *Notice on Further Strengthening the Supervision of Trading at the Initial Listing of New Shares* and the *Notice on the Intraday Temporary Trading Suspension System and Other Matters on the First Day of Listing of IPO Shares*, which both imposed restrictions on the trading behavior of new shares on the first day of an IPO. They include limits on the top and bottom daily stock returns. Thus, our sample can be divided into three periods around these two key events: (i) from 17 February 1995 to 31 December 2004; (ii) from 1 January 2005 to 13 December 2013; and (iii) from 14 December 2013 to 31 December 2020.

Table 10 shows the results based on these sample periods. From Panel A of Table 10, we find no significant difference in the IPO underpricing between the IPOs of rural and urban firms in the first period. However, IPO underpricing is significantly higher for rural firms in the second and third periods. The same conclusion can be

Table 10
Results for different sample periods.

Panel A: Univariate tests								
Year	*RuralFirm*			*UrbanFirm*			Mean and median differences	
	N	*FDR*	*AdjFDR*	N	*FDR*	*AdjFDR*	*FDR*	*AdjFDR*
1995.2.17–2004.12.31	20	1.348	1.337	262	1.116	1.116	0.232	0.221
		[1.240]	[1.226]		[1.002]	[1.001]	[0.238*]	[0.225]
2005.1.1–2013.12.13	12	0.729	0.723	879	0.442	0.443	0.287*	0.280*
		[0.608]	[0.602]		[0.298]	[0.303]	[0.310]	[0.299]
2013.12.14–2020.12.31	32	0.651	0.657	1,382	0.503	0.501	0.148**	0.156**
		[0.440]	[0.443]		[0.440]	[0.438]	[−0.000]	[0.005**]

Panel B: Regression results						
Variable	1995.2.17–2004.12.31		2005.1.1–2013.12.13		2013.12.14–2020.12.31	
	(1) *FDR*	(2) *AdjFDR*	(3) *FDR*	(4) *AdjFDR*	(5) *FDR*	(6) *AdjFDR*
RuralFirm	−0.084	−0.085	0.253*	0.245*	0.149*	0.153*
	(−0.38)	(−0.38)	(1.74)	(1.72)	(1.75)	(1.81)
Controls	YES	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES	YES
Year/Month	YES	YES	YES	YES	YES	YES
Observations	282	282	891	891	1,414	1,414
Adjusted R^2	0.572	0.570	0.633	0.635	0.274	0.274
Diff.(p-value)			(3)-(5) 0.29	(4)-(6) 0.35		

Notes: Panel A of this table presents and compares the mean and median (in brackets) values of the *RuralFirm* and *UrbanFirm* in *FDR* and *AdjFDR* in different sample periods. Panel B shows the regression results. The t-statistics calculated based on robust standard errors clustered by year/month are reported in parentheses. ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

drawn from the regression results in Panel B of Table 10. We also find that IPO underpricing has decreased in both rural and urban areas over the past three decades, suggesting that the book-building system reform alleviated the information asymmetry between IPO firms and investors.

The above findings are consistent with our baseline results. After the book-building system reform, urban firms can more easily ensure good information communication, whereas rural firms still suffer from inadequate information transmission due to their geographic locations. The difference in IPO underpricing between rural and urban firms is therefore more pronounced after the book-building system reform.

8. Further analysis based on investor attention and agency cost

8.1. Investor attention

O'Brien and Tan (2015) document that geographic location affects investor attention. Thus, we further analyze the attention investors give rural firms after their IPOs. We use *Analyst* to measure firms' investor attention[4], where *Analyst* equals the natural logarithm of 1 plus the number of analysts covering a firm in the fiscal year. For brevity, we define a new variable *Analyst(A, y)* as the mean of *Analyst* in *y* years after IPOs. Table 11 gives the results of the analysis based on investor attention.

Panel A of Table 11 indicates no significant difference in attention between rural and urban firms. However, the mean of the investor attention of rural firms is significantly lower than that of urban firms at 1, 2 and 3 years after IPOs. Panel B shows that the coefficient of *RuralFirm* in Column (1) is not significant, whereas

[4] In the unreported results, we also use *Report* to measure firms' attention, where *Report* equals the natural logarithm of one plus the number of analysts' reports covering a firm in the fiscal year. The results are consistent with Table 11.

Table 11
Investor attention of the rural firms before and after the IPOs.

Panel A: Univariate tests

Variable	(1) *RuralFirm*	(2) *UrbanFirm*	(3) Mean and median differences
Analyst(A, 0)	1.471	1.690	−0.219
	[1.386]	[1.792]	[−0.405]
Analyst(A, 1)	1.062	1.439	−0.377**
	[0.693]	[1.386]	[−0.693**]
Analyst(A, 2)	1.033	1.456	−0.423**
	[0.693]	[1.445]	[−0.752**]
Analyst(A, 3)	1.009	1.450	−0.441**
	[0.530]	[1.410]	[−0.880***]

Panel B: Regression results

Variable	(1) *Analyst(A, 0)*	(2) *Analyst(A, 1)*	(3) *Analyst(A, 2)*	(4) *Analyst(A, 3)*
RuralFirm	0.033	−0.306**	−0.370**	−0.389**
	(0.37)	(−2.03)	(−2.48)	(−2.49)
Controls	YES	YES	YES	YES
Industry	YES	YES	YES	YES
Year/Month	YES	YES	YES	YES
Observations	2,489	2,334	2,220	2,129
Adjusted R^2	0.677	0.289	0.291	0.295

Notes: Panel A of this table presents and compares the mean and median (in brackets) values of the *RuralFirm* and *UrbanFirm* in *Analyst* in the year after the IPOs, while panel B shows the regression results. The t-statistics calculated based on robust standard errors clustered by year/month are reported in parentheses. ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

the coefficients in Columns (2), (3) and (4) are negative and significant. This also indicates that rural firms receive lower levels of investor attention. Thus, rural firms do not receive more investor attention after IPOs, and if firms are widely followed their information asymmetry can be effectively reduced (O'Brien and Tan, 2015). Thus, the results confirm that geographic location affects the degree to which a firm is followed and that rural firms suffer from greater information asymmetry due to their remote geographic locations.

8.2. Agency cost

To further examine the mechanism behind information asymmetry, we analyze the agency costs of rural firms in the year before and after IPOs. Following Dai et al. (2016), we use *AgC* to measure firms' agency costs, where *AgC* equals administrative expenses divided by annual sales in the fiscal year. For brevity, we define a new variable *AgC(B/A, y)* as the mean of *AgC* in *y* years (before) after the IPO. Table 12 shows the results of the analysis based on agency cost.

As shown in Panel A of Table 12, The mean of the agency cost for rural firms is significantly greater than that for urban firms in the year before and after IPOs. The significant and positive coefficients in Columns (1), (2), (3) and (4) of Panel B also indicate higher agency costs for rural firms. The finding that rural IPO firms face higher agency costs than urban IPO firms corresponds to H1b, confirming that rural firms face greater information asymmetry due to their geographic locations.

9. Conclusions

Motivated by Nielsson and Wójcik (2016), we identify rural and urban IPO firms using the list of 832 poor counties in China published by the National Administration for Rural Revitalization and investigate the pricing and performance of these IPOs. We document that the information asymmetry between Chinese firms located in rural areas and their investors is so severe that these IPO firms in poor counties are associated with significantly higher IPO underpricing. We do not find any significant market performance differences between

Table 12
Agency cost of rural firms before and after the IPOs.

Panel A: Univariate tests

Variable	(1) *RuralFirm*	(2) *UrbanFirm*	(3) Mean and median differences
AgC(B, 1)	0.208	0.159	0.049***
	[0.174]	[0.135]	[0.040***]
AgC(B, 0)	0.211	0.165	0.046***
	[0.175]	[0.140]	[0.035***]
AgC(A, 1)	0.234	0.174	0.059***
	[0.174]	[0.144]	[0.030***]
AgC(A, 3)	0.255	0.177	0.077***
	[0.199]	[0.146]	[0.053***]

Panel B: Regression results

Variable	(1) *AgC(B, 1)*	(2) *AgC(B, 0)*	(3) *AgC(A, 1)*	(4) *AgC(A, 3)*
RuralFirm	0.045***	0.049***	0.053**	0.071**
	(2.76)	(2.97)	(2.25)	(2.59)
Controls	YES	YES	YES	YES
Industry	YES	YES	YES	YES
Year/Month	YES	YES	YES	YES
Observations	2,587	2,587	2,346	2,141
Adjusted R^2	0.238	0.246	0.235	0.239

Notes: Panel A of this table presents and compares the mean and median (in brackets) values of the *RuralFirm* and *UrbanFirm* in *AgC* in the year before and after the IPOs, and panel B shows the regression results. The t-statistics calculated based on robust standard errors clustered by year/month are reported in parentheses. ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

rural and urban firms after IPOs, but the fundamentals of rural firms only improve in the short term. We also test the mechanisms of information asymmetry through considering the traffic systems, and we find that it is more severe for rural areas compared to urban areas. Further analyses based on different regions and sample periods confirm the findings that poor counties face greater information asymmetry, suggesting that IPO underpricing is higher for firms in poorer counties. Our additional tests reveal that rural IPO firms in China have significantly lower investor attention and higher agency costs compared to urban IPO firms. In conclusion, our findings challenge the hypothesis of local bias and superior local information proposed in the U.S. literature and suggest that China's poor counties face greater information asymmetry and that rural firms may appear less credible than urban firms.

Our study has two important implications. First, firms should consider the economic impact of their geographic locations when they go public. Our findings show that China's poor counties face greater information asymmetry, and thus the IPO underpricing of rural firms is higher than for those in urban areas, thus reducing the efficiency of their resource allocation. Rural firms should therefore pay more attention to the release of information and take effective measures to improve communication with investors, creditors and analysts to alleviate the information disadvantage. Second, Chinese regulatory authorities should continue to strengthen and improve their specific IPO systems. To help alleviate poverty, the CSRC takes the initiative to support fast-tracks firms located in poor areas that wish to go public. However, we find that firms located in such areas suffer from lower levels of IPO pricing efficiency and higher agency costs than other firms. Thus, regulators should introduce policies to promote the economic development of poor areas and protect the interests of investors.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Distribution of poor counties and rural firms

Panel A: Regional distribution of poor counties

Province	Number of poor counties	Number of rural firms	Number of urban firms
Yunnan	88	5	12
Tibet	74	18	0
Guizhou	66	6	13
Sichuan	66	2	82
Gansu	58	8	9
Shaanxi	56	2	30
Hebei	45	1	38
Qinghai	42	1	2
Hunan	40	3	74
Henan	38	6	45
Shanxi	36	2	15
Guangxi	33	0	18
Xinjiang	32	1	26
Neimenggu	31	1	10
Hubei	28	1	54
Jiangxi	24	2	31
Anhui	20	3	79
Heilongjiang	20	0	13
Chongqing	14	1	31
Jilin	8	1	13
Ningxia	8	0	5
Hainan	5	0	11
Total	832	64	611

Panel B: Industrial distribution of rural IPO firms

Industry	N	Percent
Manufacturing	39	60.94%
Mining	7	10.94%
Production and supply of electricity, coal & water	5	7.81%
Agriculture, forestry, livestock farming & fishery	4	6.25%
Water, environment & public facilities management	3	4.69%
Information technology	3	4.69%
Scientific research & technical service	1	1.56%
Real estate	1	1.56%
Wholesale & retail trade	1	1.56%
Total	64	100%

Appendix B. Variable definition

Variable	Definition
FDR	The difference between the first-day closing price and the offer price divided by the offer price.
AdjFDR	The market-adjusted first-day returns (*FDR*). Market returns are the market returns for A shares.
CAR_D(1, d)	The cumulative market-adjusted stock returns from the day after IPO (1) to day *d*. Market returns are the value-weighted returns for A shares.
BHAR_M(0, m)	The cumulative market-adjusted stock returns from the month of IPO (*0*) to month *m*. Market returns are the value-weighted returns for A shares.
ROA(B/A, y)	The mean *ROA* in *y* years before (after) IPO. *ROA* equals the ratio of earnings to total assets in the fiscal year.
ROE(B/A, y)	The mean *ROE* in *y* years before (after) IPO. *ROE* equals the ratio of earnings to total equity in the fiscal year.
Inst_Dum	A dummy variable that equals 1 if shares are held by institutional investors located in the same province as the listed firm and 0 otherwise.
Inst	The ratio of shares held by institutional investors located in the same province as the listed firm.
Analyst(A, y)	The mean of *Analyst* in *y* years after IPO. *Analyst* equals the natural logarithm of 1 plus the number of analysts following a firm in the fiscal year.
Report(A, y)	The mean of *Report* in *y* years after IPO. *Report* equals the natural logarithm of 1 plus the number of analysts' reports following a firm in the fiscal year.
AgC(B/A, y)	The mean of *AgC* in *y* years before (after) IPO. *AgC* equals administrative expenses divided by annual sales in the fiscal year.
RuralFirm	A dummy variable that equals 1 if the firm is located in a poor county and 0 otherwise.
UrbanFirm	A dummy variable that equals 1 if the firm is located in a non-poor county and 0 otherwise.
RuralFirm_(Non) Station	A dummy variable that equals 1 if the poor counties in which the rural firms are located (do not) have a high-speed rail station or a railway station and 0 otherwise.
RuralFirm_TraShort (Long)	A dummy variable that equals 1 if the driving time from the poor counties in which the rural firms are located to the nearest railway station in the provincial capital is lower (higher) than the median and 0 otherwise.
RuralFirm_AirShort (Long)	A dummy variable that equals 1 if the driving time from the poor counties in which the rural firms are located to the nearest airport in the provincial capital is lower (higher) than the median and 0 otherwise.
OfferSize	The ratio of the amount of IPO proceeds to total assets.
TimeLag	The natural logarithm of 1 plus the number of days between disclosing the IPO prospectus and the listing day.
Age	The natural logarithm of 1 plus the age of the firm in the IPO year.
Cost	The natural logarithm of the total issuance costs.
Big4	A dummy variable that equals 1 if the firm is audited by one of the big four accounting firms and 0 otherwise.
Size	The natural logarithm of total assets in the pre-IPO year.
ROE	The return on equity in the pre-IPO year.
Cash	The ratio of cash assets to total assets in the pre-IPO year.
SOE	A dummy variable that equals 1 if the firm is state-owned in the IPO year and 0 otherwise.
Duality	A dummy variable that equals 1 if the board chairman is also CEO and 0 otherwise.

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The role of accounting conservatism in M&A target selection

Qingquan Tang [a,b], Jingjing Guo [a,b,*], Zhihong Huang [a]

[a] School of Business, Sun Yat–sen University, China
[b] Center for Accounting, Finance and Institutions, Sun Yat–sen University, China

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ABSTRACT

Mergers and acquisitions (M&As) are among the most important investment activities for companies, but they contain great risks. We investigate the role of accounting conservatism in M&A target selection and risk. We find that for risk-averse reasons, firms with high accounting conservatism are likely to acquire profitable targets and avoid loss-making targets. When such firms acquire loss-making targets, the conservatism's risk-control role reduces M&A risk and increases M&A performance, but only when control of the target is transferred and the acquirer has high long-term debt and low management power. Furthermore, accounting conservatism reduces risk by increasing the maturity match between cash flow and debt. Our results suggest that accounting conservatism plays not only a risk-averse role but also a risk-control role, providing new evidence for the usefulness of accounting conservatism in M&A decisions.

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1. Introduction

Selecting the right target is important for the success of M&As but is also one of the most challenging issues in M&A decisions. The target itself and the post-merger integration often carry significant risks and uncertainties. Accounting conservatism, as an important corporate governance mechanism (Ball, 2001; Ball and Shivakumar, 2005; Watts, 2003), has a significant impact on a firm's M&A decisions (Francis and Martin, 2010). However, the literature remains controversial regarding the governance mechanisms of accounting conservatism and the conservatism's impact on M&A performance. Some studies suggest that accounting

* Corresponding author at: School of Business, Sun Yat–sen University, China.
E-mail address: guojj23@mail2.sysu.edu.cn (J. Guo).

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conservatism helps management make M&A decisions that enhance a firm's value (Francis and Martin, 2010). Other studies find that accounting conservatism motivates firms to be risk averse, causing such firms to avoid M&A targets with positive net present value (NPV) but high risk, thus leading to underinvestment (Kravet, 2014; Roychowdhury, 2010). We argue that the research controversy exists because the role of accounting conservatism in the M&A process has not been explored in depth. Based on this argument, we explore the role of accounting conservatism in M&A target selection from the perspective of target profitability. Specifically, we try to answer the following questions: Do companies with high accounting conservatism tend to avoid acquiring loss-making targets for risk-averse reasons? More importantly, if a company chooses to acquire a loss-making target, does accounting conservatism help the company control M&A risk effectively and thus improve M&A performance?

Our research perspective on target profitability is determined by the Chinese institutional context. First, after experiencing unstable and rapid development, the profitability of Chinese companies is now declining, and many companies are facing serious losses (Lin et al., 2010). As China's economic development enters the "new normal," many distressed companies are under pressure to transform and upgrade. However, laws and enforcement procedures related to bankruptcy are still being refined, and most companies can only exit the market through M&As. For example, in our sample, 32% of the M&A targets are in a loss-making condition in the year before acquisition. Second, in the Chinese institutional context, listed companies face greater uncertainties and risks in the acquisition of loss-making targets than they would in other markets. The acquisition of loss-making targets faces strict regulation by the China Securities Regulatory Commission (CSRC). Furthermore, the potential loss of the M&A target will directly affect the operating performance of the acquirer. Given the requirement of high profitability for the secondary equity offering (SEO) qualification, such a loss can affect the SEO qualification of the acquirer. Moreover, if a company has losses for two consecutive fiscal years, it will be marked as an "ST" stock and face a risk of delisting. Therefore, the ability of a target to return profits may bring additional risks that are specific to Chinese listed companies. Our study based on target profitability is unique. The results are aligned with the current development of the Chinese economy and China's special institutional background.

For listed companies, loss-making targets may present good opportunities for acquisition. According to neoclassical economics, improved operational efficiency and tax-shield gains make it easy for firms to achieve synergies by acquiring distressed targets (Huang and Walkling, 1987; Peel and Wilson, 1989). However, for acquirers, loss-making targets may bring higher risks than profitable targets do (Bruyland and de Maeseneire, 2016). First, the acquisition of a loss-making target may increase operational risk, and idle assets and continuous losses after an acquisition may diminish operational performance. Considering the relevant Chinese capital market regulations, the poor operating performance of a listed company may affect its SEO qualification. Second, loss-making targets often carry large amounts of debt because they are poorly operated. Therefore, compared with other targets, distressed targets transfer additional risks from the targets to the acquirers, increasing the possibility that an acquirer will fall into financial distress and face its own financial crisis (Bruyland and de Maeseneire, 2016).

Accounting conservatism can make firms risk averse and prevent their engagement in high-risk M&As (Callen et al., 2016; Kravet, 2014). These consequences arise because accounting conservatism comes primarily from demand by the issuers of debt and compensation covenants (Callen et al., 2016; Watts, 2003). To protect their own interests, creditors and shareholders require companies to implement prudent accounting policies, meaning that the companies must be cautious in recognizing "good news" but timely in recognizing "bad news." This feature of accounting conservatism can help creditors and shareholders monitor a company's management. Management's acquisition of loss-making targets may increase the likelihood of asset impairment and diminish the performance of the acquirer, increasing the risk of covenant defaults and dismissals (Kravet, 2014). Therefore, we expect accounting conservatism to make managers more cautious in their M&A decisions, favoring profitable targets and avoiding the increased risk and risk transfer that may be associated with the acquisition of loss-making targets.

Why, then, do firms with high accounting conservatism still choose to acquire loss-making targets? Biddle et al. (2013) argue that accounting conservatism plays a risk-control role, ensuring that the associated uncertainties and risks are fully considered. It can prompt managers and other stakeholders to take remedial actions to address risk consequences before they occur. Specifically, in M&As, accounting conservatism can motivate

firms to increase the maturity match between cash flow and debt to reduce the risk of a loss-making target's acquisition causing downward cash flow fluctuations and debt default (Biddle et al., 2020; Kirschenheiter and Ramakrishnan, 2010). Therefore, if a firm with high accounting conservatism chooses to acquire a loss-making target, it indicates that the firm has identified the potential value of the target and has sufficiently assessed the target's risks. Once a risk's consequence arises, the company is therefore able to quickly respond and control the situation, allowing the realization of potential synergies.

Based on the above analysis, we empirically examine the impact of accounting conservatism on M&A target selection, risk and performance using Chinese M&A events from 2007 to 2016. Our findings show that firms with higher versus lower accounting conservatism are more likely to acquire profitable targets and avoid loss-making targets. However, when firms with high accounting conservatism choose to acquire loss-making targets, their conservatism's risk-control role results in lower M&A risk and higher M&A performance. This relationship holds only when the acquiring company's long-term debt is high, the management power of the acquirers is low and control of the target is transferred. Further analysis finds that accounting conservatism motivates firms to increase the maturity match between cash flow and debt, reducing M&A risk. Our findings suggest that accounting conservatism helps firms to not only avert risk but also to control it.

We aim to contribute to the literature on accounting conservatism and investment risk. The most closely related study is that of Kravet (2014), but ours differs from it in three significant ways. First, our findings about the role of accounting conservatism differ from those of Kravet (2014). Kravet (2014) argues that accounting conservatism leads management to be risk averse and avoid NPV-positive but high-risk projects, which is detrimental to firm value. However, we find that accounting conservatism plays not only a risk-averse role but also a risk-control role. This conclusion is supported by the argument that accounting conservatism can motivate management to control risks and ultimately enhance firm value, even if a firm acquires a high-risk loss-making target. Therefore, we extend the theory of Kravet (2014). Second, the sources of M&A risk in our study are quite different from those in Kravet (2014). Kravet (2014) focuses on total M&A risk. However, total M&A risk may come from multiple factors, including aspects of the acquirers, the targets and the post-merger integration (Bruyland and de Maeseneire, 2016; Furfine and Rosen, 2011). Unlike Kravet (2014), we deepen the study of M&A risks by refining the total M&A risk with a focus on the specific target risks. Third, unlike Kravet's (2014) study, which was based on mature capital markets, this study is based on the unique institutional context of M&As in China. As a rapidly developing emerging economy, China's capital market and M&A system are still in the process of continuous reform, development and improvement. Hence, when acquiring loss-making targets, acquirers may be exposed to greater regulatory uncertainty in China than they are in mature markets. Therefore, compared with Kravet (2014), our study on the impacts of target profitability is more pertinent to China's specific institutional context.

Based on the above analysis, we contribute to the literature in several ways. First, we provide new theoretical insights into the association between accounting conservatism and investment. Studies in this field apply the perspectives of information asymmetry and risk aversion based on contract theory (Bushman et al., 2011; Francis and Martin, 2010; Lafond and Roychowdhury, 2008). These studies find that accounting conservatism can reduce information asymmetry and enhance investment efficiency, but its associated risk aversion may lead to underinvestment and hence reduce firm value (Roychowdhury, 2010). In addition to the risk-averse role of accounting conservatism in M&As, our further finding of its role in risk-control expands the study of accounting conservatism's economic consequences.

Second, we contribute to the literature on M&A risks by focusing on the specific risks associated with M&A targets. The ability to effectively control risks arising from M&A activities is a key factor affecting the success of M&As (Furfine and Rosen, 2011). Studies show that the risks arising from the target companies are among the most important sources of total M&A risk (Bruyland and de Maeseneire, 2016). Based on the Chinese institutional context, we explore the role of accounting conservatism in avoiding and controlling target risks, deepen the understanding of M&A decision-making and risk-control and provide theoretical guidance for M&A activities.

Finally, we enrich the research on the decision usefulness of accounting information relative to its quality. The literature argues that accounting conservatism has a significant impact on a firm's investment activities (Ahmed and Duellman, 2011; Ferracuti and Stubben, 2019; Roychowdhury et al., 2019). We provide new

empirical evidence of the usefulness of accounting information by exploring the impact of accounting conservatism on the selection of M&A targets.

The remainder of this paper is organized as follows. Section 2 presents the institutional background and hypothesis development. Section 3 describes the research design. Section 4 discusses the empirical results. Section 5 conducts the robustness tests and Section 6 concludes the paper.

2. Institutional background and hypothesis development

2.1. Institutional background

In the context of China's "new normal" economic development, companies are under pressure to transform and improve their practices. Many companies are encountering operational difficulties in the face of significant changes in the external economic environment. As the laws and enforcement procedures relevant to bankruptcy are still being refined in China, most companies can only exit the market through M&As. In our sample, 32% of the M&A targets are in a loss-making condition in the year before acquisition. Therefore, our focus on the profitability of the M&A targets is consistent with the current development status of the Chinese economy.

Furthermore, from the perspective of a potential acquirer, a target's profitability is important information for the assessment of its associated risks. Unlike mature capital markets, China's capital market is characterized by emerging and transitional features. In the absence of an adequate delisting system, M&As between listed companies are relatively rare in China in comparison to other markets. Hence, most Chinese M&A targets are private companies, meaning that they lack the public market transactions that could otherwise be used to assess their risks based on market performance. In such cases, only financial performance can be used to assess the profitability and development prospects of a target. Poor financial performance indicates that a target is not effectively utilizing its existing resources and faces high uncertainty and risk. Target profitability is a recent focus of the CSRC's regulatory supervision, and acquisitions of loss-making targets are facing stricter oversight. For example, "uncertainty about the sustained profitability of the target assets" is the most commonly reported reason for the M&A project rejections in the first half of 2019.[1]

Moreover, the potential losses of a target can directly impact the operating performance of its acquirer, which can then affect the acquirer's SEO qualification. One of the conditions for public issuances of securities (including convertible corporate bonds, allotment of shares and additional issuance) by companies listed on the main board and on small and medium-sized boards in China is the sustainability of profit-making ability under the Securities Law of the People's Republic of China (Amended, 2014). Under these regulations, the additional issuance and allotment of shares requires that a company's average return on net assets be no lower than 6% for the past 3 years after deduction of nonregular profits and losses. The issuance of corporate convertible bonds requires a company to be continuously profitable for the past 3 years with an average return on net assets of at least 10%. Furthermore, companies with a negative net profit for two consecutive fiscal years are marked as "ST" stocks and face possible delisting.

2.2. Literature review

Accounting conservatism includes unconditional accounting conservatism and conditional accounting conservatism (Ball and Shivakumar, 2005). Unconditional accounting conservatism is also known as balance sheet conservatism or ex ante conservatism, and it is independent of information changes in the external environment. This type of conservatism, which includes the historical cost method and the accelerated depreciation of fixed assets, requires firms to adopt prudent accounting policies before external news becomes available. Conditional conservatism, also known as ex post conservatism, refers to its asymmetry in the recognition of losses and gains. Conditional conservatism requires that losses be recognized in a timely manner but

[1] Securities Daily: "8 companies were rejected in the first half of M&A: uncertainty of sustained profitability is the main reason"https://baijiahao.baidu.com/s?id=1638083308204612878&wfr=spider&for=pc

that gains not be recognized until sufficient substantiating evidence is available (Ball and Shivakumar, 2005; Basu, 1997; Watts, 2003). Unconditional conservatism differs significantly from conditional conservatism and may have different effects on a firm's real investment activities. The former is a rule-based approach based on strict accounting standards, whereas the latter is a principle-based approach that arises mainly from demand by the issuers of debt and compensation covenants (Watts, 2003) and leaves more flexibility for firms to choose how losses and gains are recognized. As it involves the disclosure of information that is difficult to verify, only conditional accounting conservatism affects the efficiency of covenants and helps creditors and shareholders monitor management's investment behavior (Ball and Shivakumar, 2005). Of the two forms, we argue that conditional accounting conservatism is better able to influence a firm's risk preference for target selection. Therefore, our analysis focuses on conditional accounting conservatism.

Research argues that accounting conservatism can act as a corporate governance mechanism that decreases the incentives for managers to make NPV-negative investments (Ahmed and Duellman, 2011; García Lara et al., 2016; Watts, 2003). The demand for accounting conservatism comes primarily from the parties that make contracts with the affected companies, because it helps investors and creditors obtain timely information about a firm's performance and facilitates monitoring of its management by external stakeholders (Ahmed and Duellman, 2011). To avoid creditor and investor monitoring and reduce the risks of reputational damage and dismissal, managers are more likely to reject projects with negative NPV and promptly withdraw from projects that cause losses (Ball, 2001; Lafond and Roychowdhury, 2008). Bushman et al. (2011) find that the relationship between accounting conservatism and investment is related to the availability of investment opportunities, such that conservatism can only motivate managers to abandon poorly performing projects when investment opportunities are declining. Francis and Martin (2010) argue that accounting conservatism helps management make M&A decisions that are conducive to enhancing a firm's value, with the result that firms with high accounting conservatism perform better in M&As and are less likely to experience divestitures after M&As. Using a sample of M&A events in China, Li and Chen (2015) find that accounting conservatism can act as a corporate governance mechanism and enhance M&A performance by reducing information asymmetry between managers and other contracting parties.

Accounting conservatism also has a risk-averse effect that can reduce the incentives for managers to make high-risk investments (Kravet, 2014; Roychowdhury, 2010). Corporate investment projects tend to be long-lasting and high-risk. As accounting conservatism requires the timely recognition of losses, if an investment fails, its losses will be reflected in the company's earnings in a timely manner, and management will consequently be held liable. To avoid the personal cost of investment failure, managers therefore tend to accept low-risk investments and avoid higher risk but NPV-positive investments, resulting in underinvestment overall (Roychowdhury and Watts, 2007). Kravet (2014) finds that accounting conservatism leads managers to make low-risk acquisitions. However, this choice has the potential cost of management forgoing high-risk but NPV-positive acquisitions that would otherwise improve a company's M&A performance.

In summary, prior studies regarding the impacts of accounting conservatism on investment focus on investment efficiency and M&A performance (Francis and Martin, 2010; García Lara et al., 2016; Kravet, 2014). It is generally agreed that accounting conservatism can enhance a firm's investment efficiency. Previous studies also examine the role of accounting conservatism from a risk aversion perspective. However, Biddle et al. (2013) argue that accounting conservatism is a prudent response to risk and uncertainty that can help control risk and reduce a firm's cash flow and bankruptcy risks. Therefore, accounting conservatism may also have a role in controlling risks specific to M&A decisions. We examine this possible role by investigating the impacts of accounting conservatism on the selection of M&A targets, the integration of acquired companies and the consequences of their acquisitions.

2.3. Hypothesis development

As investments, M&As carry high risk and uncertainty. Studies find that the risks faced by acquiring companies increase significantly after M&As (Furfine and Rosen, 2011; Geppert and Kamerschen, 2008; Langetieg et al., 1980; Lubatkin and O'Neill, 1987).

One of the main sources of M&A risk relates to the profitability of M&A targets; compared to profitable targets, loss-making targets pose a higher risk to the acquirer (Bruyland and de Maeseneire, 2016). Due to the

uncertainty around a loss-making target's revenue stability and future profitability, extensive resources are required to reverse its loss-making status and realize synergies from its integration with the acquiring company (Bruyland and de Maeseneire, 2016). If the acquirer is unable to mitigate or eliminate the operating distress of a loss-making target, idle assets and continuous losses after the acquisition may burden the acquirer. This may lead to increases in the acquirer's corporate costs and expenses, reduce its operating performance and increase its operational risk. In China, poor operating performance may affect a listed company's SEO qualification. Moreover, if reduced performance results in losses for two consecutive years, a firm may become listed as an "ST" company, increasing its risk of delisting. Furthermore, the acquisition of a loss-making target may increase the acquiring firm's financial risk. Bruyland and de Maeseneire (2016) find that compared with acquiring other targets, acquiring a distressed target may incur a notable transfer of risk from the target to the acquirer, increasing the possibility that the acquirer will fall into financial crisis. In summary, if an acquirer ignores or does not accurately judge the potential risks of a loss-making target, it increases the pressure that the target is likely to impose on the acquirer's subsequent operations and financial conditions. In such a case, an acquisition can increase operational risk, delisting risk and bankruptcy risk.

Accounting conservatism can play a risk-averse role and constrain firms from engaging in high-risk M&As (Callen et al., 2016; Kravet, 2014). First, in the M&A decision-making process, higher accounting conservatism increases the likelihood that an acquiring firm will recognize losses and effectively curbs incentives for its managers to overestimate earnings and assets and underestimate expenses and liabilities. According to the International Financial Reporting Standards Foundation and China's own accounting standards, firms should maintain accounting conservatism by being cautious in recognizing "good news" but timely in recognizing "bad news." This means that the criteria for recognizing losses should be lower than the criteria for recognizing earnings (Basu, 1997). Therefore, if a company with high accounting conservatism chooses to acquire a loss-making target, gains from the acquisition require higher recognition criteria for inclusion in financial statements than losses do; losses associated with the investment are difficult to defer to future periods and must be recognized in the company's financial statements in a timely manner. Hence, the requirement to recognize "bad news" in a timely manner may increase the likelihood of asset impairment, which may affect post-acquisition operating performance and reduce management's incentive to acquire a loss-making target.

Second, under conservative accounting policies, the possibility of reporting significant asset impairments and investment losses can cause serious consequences for firms and managers if they acquire loss-making targets. Two important potential consequences for managers are debt default and the risk of dismissal (Kravet, 2014). Debt covenants are one of the key reasons for the emergence of accounting conservatism (Watts, 2003). When a firm acquires a project that incurs losses, the resulting increased risk may result in a loss of wealth for its creditors. To protect their own interests, creditors rely on accounting information to assess the risk of default. Hence, they demand different levels of accounting conservatism, depending on the loan terms. When issuing long-term loans to firms, the risks are higher than those for short-term loans, so creditors demand greater accounting conservatism and include debt covenant clauses that limit high-risk investments. In such cases, the acquisition of a high-risk loss-making target may trigger a debt default clause. In addition, accounting conservatism is an important indicator for shareholder monitoring of management. The risk of performance declines resulting from acquisitions of loss-making targets may increase management's risk of reductions in compensation or even dismissal (Kravet, 2014). Hence, in firms with high accounting conservatism, the risks of debt default and dismissal reduce the likelihood that management will acquire loss-making targets.

Based on the above analysis, we believe that under a conservative accounting policy, managers tend to restrict their investment in high-risk projects that carry high uncertainty. This leads to the following hypothesis:

H1. Firms with higher accounting conservatism are less likely to acquire loss-making targets than are firms with lower accounting conservatism.

Although accounting conservatism can induce firms to avoid high-risk investment projects, it may also lead firms to avoid high-risk but NPV-positive projects (Kravet, 2014). As previously noted, loss-making targets often carry increased risks due to poor operational performance. However, synergy theory suggests that

the acquisition of distressed targets can expand firm size, increase market power, reduce costs and create new growth opportunities (Bruton et al., 1994). Synergies can be achieved when the acquirer has a better ability to make use of resources than the target. Therefore, avoiding such M&A targets is not conducive to increasing the value of an acquiring firm. The key to the creation of synergies depends on whether the acquirer can effectively control the risk of a loss-making target and then integrate the target to stimulate its potential value.

We argue that accounting conservatism plays a role in M&A risk-control as well as risk aversion. Even if a firm acquires a high-risk project with positive NPV, accounting conservatism can help the firm control risk and thus exploit M&A synergies. Accounting conservatism helps control M&A risks because it ensures prudent consideration of the uncertainty and risk inherent in business situations and promotes optimal decision-making by managers (Biddle et al., 2013). In the M&A process, a conservative accounting policy can motivate firms to conduct more detailed due diligence on a target, to explore the potential integration value of a loss-making target and to fully and carefully consider and assess a target's risks. Under conservative accounting, managers and other stakeholders, such as creditors, retain additional resources before the risk consequences occur and take timely remedial actions to address them when they happen (Biddle et al., 2013). Specifically, in response to the potential operational and financial risks associated with loss-making targets, accounting conservatism can motivate firms to enhance the maturity match between cash flow and debt, reducing the risk of downward fluctuations in cash flow and the risk of debt default (Biddle et al., 2020; Kirschenheiter and Ramakrishnan, 2010). Effective control of a target's associated risks can prevent negative impacts on the acquirer's operating and financial conditions, allowing potential synergies to be realized and increasing corporate value. This leads to our second hypothesis:

H2. If listed firms with high accounting conservatism choose to acquire loss-making targets, the M&A risk is lower and the M&A performance is higher than in such acquisitions by firms with low accounting conservatism.

3. Research design

3.1. Sample and data

Our initial sample includes all of the completed M&A transactions announced by A-share listed firms in China from 2007 to 2016, as listed in the China Stock Market and Accounting Research (CSMAR) database. Since the implementation of the new Accounting Standards for Business Enterprises (ASBE) in 2007, the accounting policies of business enterprises have changed significantly, so we begin our sample period then. In addition, because the M&A performance commitment period is generally 3 years, we extend the M&A event date forward by 3 years, to 2016, to explore the M&A risk and M&A performance 3 years after each M&A transaction. The sample selection process is as follows: (1) we retain all transactions where the acquirer is a publicly listed firm, (2) we exclude M&As involving financial firms because these firms have their own distinct regulations and accounting rules, (3) we exclude firms that initiated multiple M&A acquisitions on a single day and (4) we exclude samples in which data required for the computation of the dependent and control variables are missing. By adopting these screening standards, we obtain a final sample of 3735 M&A events. The M&A transaction data and financial data of the listed companies are obtained from the CSMAR database. The financial data of the target companies are manually collected and compiled from M&A announcements.

3.2. Regression model

To capture the effect of accounting conservatism on M&A target selection, we estimate the following regression model:

$$Prob(Loss = 1) = F(\alpha_0 + \alpha_1 Cscore + \sum Controls + \sum Year + \sum Industry + \varepsilon) \quad (1)$$

In this equation, *Loss* is the dependent variable and represents the profitability of the target. It is an indicator variable that equals 1 when the net profit of the target is negative in the year before the acquisition and 0 otherwise. The independent variable, *Cscore*, measures firm-year-specific conditional conservatism, as developed by Khan and Watts (2009), drawing from the Basu (1997) model. We expect a negative relationship between *Loss* and *Cscore*. That is, in comparison to firms with low accounting conservatism, firms with high accounting conservatism are more likely to acquire profitable targets and less likely to acquire loss-making targets. *Controls* is a vector of control variables that affect M&A decisions and M&A risk, including firm characteristics and M&A characteristics. Drawing on previous studies (Ahern, 2012; Ishii and Xuan, 2014; Kravet, 2014; Lee et al., 2018), we include control variables for the acquiring firm's size (*Asset*), leverage (*Lev*), free cash flow (*FCF*), return on assets (*ROA*), market-to-book ratio (*Tobin'Q*), age (*Age*), managerial overconfidence (*Overconfidence*), deal size (*RelativeSize*) and payment type (*PayType*) and for whether the firms involved in the M&A are in the same industry (*Sameind*). The model's regression constant, *Cscore* regression coefficient and error terms are given by α_0, α_1 and ε, respectively.

To test H2, we extend the above analysis to investigate the effect of accounting conservatism on M&A risk and M&A performance when firms choose to acquire loss-making targets. We select a sample of loss-making target firms and estimate the following regression to test the hypothesis:

$$Risk/Performance = \alpha_0 + \alpha_1 Cscore + \sum Control + \sum Year + \sum Industry + \varepsilon\# \quad (2)$$

In this equation, *Risk* refers to M&A risk. As in Agrawal and Mandelker (1987) and Kravet (2014), we measure *Risk* as the change in the standard deviation of an acquirer's industry-adjusted abnormal returns for 1–3 years before and after its M&A transaction. *Performance* refers to the acquirer's long-term performance, measured by 1-, 2- and 3-year post-acquisition buy-and-hold abnormal returns (*BHAR*). Specifically, following the studies of Dong et al. (2021), we measure *BHAR* as the difference between the buy-and-hold returns of a sample firm and that of the market portfolio return over the 1-, 2- and 3-year periods following an M&A deal. *Cscore* is the independent variable and again indicates accounting conservatism. We expect a negative relationship between *Risk* and *Cscore* and a positive relationship between *Performance* and *Cscore*. This expectation suggests that when firms with high accounting conservatism choose to acquire loss-making targets, the risk-control effect of accounting conservatism reduces M&A risk and increases M&A performance.

We include industry-fixed effects and year-fixed effects in the *Risk/Performance* regression. Industries are classified according to the 2012 industry classification standard of the CSRC. To mitigate endogeneity problems, such as reverse causality, all firm-level control variables in the model are lagged by 1 year relative to their corresponding announcement years. To eliminate the influence of extreme values, winsorization is performed on the main continuous variables at the 1% and 99% levels. The robust standard errors are clustered at the firm level to account for any correlations among the firms. Table 1 defines the variables in detail.

4. Empirical results and analysis

4.1. Descriptive statistics

Table 2 reports the descriptive statistics of the key variables used in this study. Among the statistics, we note that the mean value of *Loss* is 0.316, which indicates that approximately 31.6% of the target firms in the sample have a negative net profit for the year before the M&A. We also note that the mean value of *Cscore* is 0.016 and its standard deviation is 0.092.

4.2. Empirical results

4.2.1. Accounting conservatism and M&A target selection

Table 3 reports the results from our testing of the association between accounting conservatism and M&A target selection using Eq. (1). The dependent variable is *Loss* and the independent variable is *Cscore*. In column (1), the reported coefficients control only for the characteristics of the acquiring firm. In column (2), additional coefficients are included to control for the transaction characteristics of the M&A activity. The *Cscore* coefficients are all significantly negative at the 5% level in both columns, indicating that firms with higher

Table 1
Variable definitions.

Variable	Definition
Loss	Dummy variable that equals 1 when the net profit of the target is negative in the year before the acquisition and 0 otherwise
Risk1	The change in the standard deviation of the acquirer's industry-adjusted abnormal returns for 1 year before and after the M&A
Risk2	The change in the standard deviation of the acquirer's industry-adjusted abnormal returns for 2 years before and after the M&A
Risk3	The change in the standard deviation of the acquirer's industry-adjusted abnormal returns for 3 years before and after the M&A
BHAR1	The difference between the buy-and-hold returns of a sample firm and those of the market portfolio return over the 1-year period following an M&A deal
BHAR2	The difference between the buy-and-hold returns of a sample firm and those of the market portfolio return over the 2-year period following an M&A deal
BHAR3	The difference between the buy-and-hold returns of a sample firm and those of the market portfolio return over the 3-year period following an M&A deal
Cscore	The year-specific conditional conservatism of the acquiring firm, as developed by Khan and Watts (2009)
Asset	The natural logarithm of the total assets
Lev	The ratio between the acquiring firm's debts and its total assets
FCF	Operating income before depreciation, interest expenses, income taxes and capital expenditures, scaled by total assets
ROA	The acquiring firm's earnings scaled by total assets
Tobin'Q	The ratio between the market value of the acquiring firm's assets and the book value of its assets
Age	The natural logarithm of the acquiring firm's listing time
Overconfidence	Dummy variable that equals 1 if the acquiring firm's managers increase their holdings and 0 otherwise
Relative Size	The ratio between the transaction size and the acquiring firm's assets
Pay Type	Dummy variable that equals 1 if the deal is paid with cash and 0 otherwise
Sameind	Dummy variable that equals 1 if the acquirer and the target are in the same industry and 0 otherwise

Table 2
Descriptive statistics.

Variables	Observations	Mean	SD	Min	Max
Loss	3735	0.316	0.465	0.000	1.000
Risk1	3272	–0.089	1.129	–3.305	3.039
Risk2	3272	–0.119	0.878	–2.690	2.238
Risk3	3272	–0.110	0.778	–2.169	2.030
BHAR1	2917	–0.029	0.711	–5.985	11.478
BHAR2	2917	–0.205	1.070	–14.321	12.677
BHAR3	2917	–0.414	1.595	–34.271	8.340
Cscore	3735	0.016	0.092	–0.420	0.207
Asset	3735	21.830	1.129	19.226	25.404
Lev	3735	0.438	0.211	0.040	0.974
FCF	3735	–0.005	0.120	–0.534	0.260
ROA	3735	0.044	0.049	–0.156	0.209
Tobin'Q	3735	2.786	1.955	0.943	12.258
Age	3735	1.975	0.759	0.000	3.135
Overconfidence	3735	0.395	0.489	0.000	1.000
Relative Size	3735	0.215	0.822	0.000	7.327
Pay Type	3735	0.852	0.355	0.000	1.000
Sameind	3735	0.267	0.442	0.000	1.000

accounting conservatism are more likely to acquire profitable targets and avoid loss-making targets. These results confirm H1.

4.2.2. Accounting conservatism, loss-making targets and M&A risk

We further examine whether the M&A risk of firms with high accounting conservatism is significantly lower than that of firms with low accounting conservatism when acquiring loss-making targets. The results from the

Table 3
Accounting conservatism and M&A target selection: ***Loss*** regression results from Eq. (1).

Variable	(1) *Loss*	(2) *Loss*
Cscore	–0.969**	–0.967**
	(–2.05)	(–1.96)
Asset	–0.094*	–0.214***
	(–1.95)	(–4.12)
Lev	0.567**	0.723***
	(2.32)	(2.76)
FCF	–0.148	–0.074
	(–0.48)	(–0.23)
ROA	–3.349***	–5.445***
	(–3.69)	(–5.41)
Tobin'Q	–0.038	–0.000
	(–1.33)	(–0.01)
Age	–0.081	–0.051
	(–1.39)	(–0.87)
Overconfidence	0.123	0.086
	(1.55)	(1.07)
Relative Size		–0.666***
		(–2.74)
Pay Type		1.140***
		(6.96)
Sameind		–0.062
		(–0.72)
Constant	1.605	3.050***
	(1.56)	(2.76)
Year	Yes	Yes
Industry	Yes	Yes
Pseudo R^2	0.04	0.08
Observations	3735	3735

Note: The robust z-statistics are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively. Standard errors are adjusted for clustering at the firm level.

regression of Eq. (2) are presented in Table 4. The results in columns (1) to (3) show that the *Cscore* coefficients are significantly negative at the 1% confidence level for Risk1 to Risk3, respectively, and that the absolute values gradually increase with the correspondingly increasing time windows around the acquisition year. This finding indicates that when firms choose to acquire loss-making targets, the M&A risk decreases as accounting conservatism increases, suggesting that accounting conservatism plays a significant role in controlling long-term M&A risk. These results align with H2.

4.2.3. Accounting conservatism, loss-making targets and M&A performance

The above analysis suggests that accounting conservatism can inhibit managers from acquiring high-risk loss-making targets. When firms with high accounting conservatism choose to acquire loss-making targets, the accompanying M&A risk tends to be significantly lower than that taken on by firms with lower accounting conservatism. However, the literature on accounting conservatism and investment efficiency also argues that accounting conservatism is likely to lead firms to avoid high-risk but NPV-positive projects and instead choose low-risk projects, even if they are not necessarily NPV-positive (Kravet, 2014; Roychowdhury, 2010). We therefore consider whether publicly listed firms with high accounting conservatism perform well when acquiring loss-making targets and whether firms choose loss-making targets because they create value or simply to avoid risk.

Table 5 presents our empirical results from the examination of the impacts of accounting conservatism on the long-term performance of M&As involving loss-making targets. The results show that accounting conservatism does not have a significant effect on M&A performance in the first year after an M&A transaction.

Table 4
Accounting conservatism, loss-making targets and M&A risk: ***Risk*** regression results from Eq. (2).

Variable	*Risk*1	*Risk*2	*Risk*3
Cscore	–1.005***	–1.204***	–1.134***
	(–2.81)	(–4.08)	(–3.93)
Asset	–0.159***	–0.121***	–0.118***
	(–3.32)	(–3.25)	(–3.64)
Lev	0.096	–0.180	–0.095
	(0.38)	(–0.90)	(–0.54)
FCF	0.204	0.384	0.574**
	(0.58)	(1.38)	(2.25)
ROA	2.811***	0.931	0.633
	(2.93)	(1.29)	(1.01)
Tobin'Q	–0.130***	–0.119***	–0.096***
	(–4.27)	(–4.87)	(–4.30)
Age	0.074	0.060	0.047
	(1.16)	(1.17)	(1.04)
Overconfidence	–0.136*	–0.117*	–0.051
	(–1.78)	(–1.87)	(–0.92)
Relative Size	–0.004	0.067	0.128
	(–0.03)	(0.70)	(1.64)
Pay Type	0.047	0.067	0.035
	(0.29)	(0.50)	(0.29)
Sameind	0.080	0.063	0.024
	(0.94)	(0.97)	(0.41)
Constant	3.418***	2.450***	2.440***
	(3.48)	(3.18)	(3.65)
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Adj. R^2	0.05	0.03	0.03
Observations	1031	1031	1031

Note: The robust t-statistics are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively. Standard errors are adjusted for clustering at the firm level.

However, over time, the positive impacts of accounting conservatism begin to emerge, and they gradually increase over the second and third years after a transaction. As anticipated by H2, these results suggest that accounting conservatism is positively associated with long-term market performance after listed firms acquire loss-making targets.

4.3. Further analysis

4.3.1. Impact of debt covenants

Debt contracting requirements present one of the primary explanations for the emergence of accounting conservatism (Watts, 2003). To verify the mechanism by which debt covenants influence acquisition outcomes, we use debt maturity to divide the collective sample into acquiring firms that carry high long-term debt and those that carry low long-term debt. We then perform subsample regressions for each of these two groups. The regression results are presented in Table 6. The results show that accounting conservatism is significantly and negatively correlated with M&A target selection and M&A risk in firms with high long-term debt, whereas there is no significant correlation in firms with low long-term debt. This suggests that accounting conservatism makes firms more cautious in selecting loss-making targets if their long-term debt is high.

4.3.2. Impact of the transfer of corporate control

Compared to acquiring a minority stake in a target, acquiring control of a target has a greater impact on the acquirer; after an M&A transaction is completed, the acquirer needs to participate in the operational deci-

Table 5
Accounting conservatism, loss-making targets and M&A performance: ***Performance*** regression results from Eq. (2).

Variable	*BHAR*1	*BHAR*2	*BHAR*3
Cscore	0.324	0.979***	1.483***
	(1.57)	(2.94)	(3.03)
Asset	0.087***	0.312***	0.626***
	(4.18)	(6.64)	(4.23)
Lev	–0.218*	–0.858***	–2.072**
	(–1.80)	(–2.72)	(–1.98)
FCF	–0.188	–0.139	0.092
	(–1.18)	(–0.44)	(0.24)
ROA	–0.904*	–1.618*	–3.592
	(–1.95)	(–1.72)	(–1.16)
Age	–0.092***	–0.134**	–0.104
	(–2.97)	(–2.38)	(–1.46)
Overconfidence	–0.039	–0.123*	–0.181
	(–0.91)	(–1.69)	(–1.62)
Relative Size	–0.078	–0.243***	–0.274*
	(–0.79)	(–2.63)	(–1.71)
Pay Type	–0.154*	–0.185	–0.277
	(–1.69)	(–1.58)	(–1.36)
Sameind	–0.004	0.081	0.225*
	(–0.10)	(1.20)	(1.92)
Constant	–1.552***	–5.880***	–11.856***
	(–3.70)	(–6.59)	(–4.82)
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Adj.R^2	0.06	0.12	0.16
Observations	907	907	907

Note: The robust t-statistics are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively. Standard errors are adjusted for clustering at the firm level.

sions of the target, and the financial condition of the target will be recorded in the acquirer's consolidated financial statements. Therefore, firms with high accounting conservatism will be more cautious and better prepared in M&A decisions that involve a transfer of corporate control than they will be in decisions that do not. We expect that accounting conservatism will play a significant role only when an acquirer buys control of their target.

We divide the sample into two groups according to whether the transaction transfers control of the target. We then perform subsample regressions of Eqs. (1) and (2) for each of these two groups. The results are shown in Table 7. In the group that includes transfer of control, the coefficients of *Cscore* on *Loss* and *Risk* are significantly negative at the 1% and 5% confidence levels, respectively. In contrast, the coefficients of *Cscore* are not significant in the group for which no transfer of control occurred. These results indicate that the impact of accounting conservatism on M&A decisions and M&A risk is only significant in the group that includes transfer of control.

4.3.3. Impact of management power

The literature suggests that there is a complementary relationship between accounting conservatism and corporate governance. Accounting conservatism works only in firms with good internal oversight mechanisms (García Lara et al., 2009; Kravet, 2014). If management has too much power, this power will increase management's ability to make high-risk investments and reduce its subsequent accountability for the accompanying risks. In such cases, accounting conservatism plays a limited role and has a low inhibitory effect on high-risk investment behavior. Therefore, we argue that management with low power is more likely to be affected by accounting conservatism than management with high power. By this argument, only in listed firms with low

Table 6
The impact of debt covenants: ***Loss*** and ***Risk*** regression results from Eqs. (1) and (2), respectively.

Variable	*Loss*		*Risk1*	
	Low long-term debt group	High long-term debt group	Low long-term debt group	High long-term debt group
Cscore	–0.270	–2.609***	–0.437	–1.341***
	(–0.33)	(–3.46)	(–0.86)	(–3.50)
Asset	–0.151**	–0.278***	–0.069	–0.173***
	(–2.09)	(–3.41)	(–1.47)	(–3.56)
Lev	0.451	0.457	0.026	0.064
	(0.89)	(1.04)	(0.08)	(0.22)
FCF	–0.403	0.074	0.701	0.513
	(–0.74)	(0.18)	(1.63)	(1.64)
ROA	–5.974***	–5.199***	1.105	–0.288
	(–3.92)	(–3.79)	(1.23)	(–0.32)
Tobin'Q	0.065	–0.070*	–0.082**	–0.087***
	(1.43)	(–1.67)	(–2.40)	(–3.08)
Age	–0.135	0.049	0.060	0.079
	(–1.52)	(0.58)	(0.84)	(1.25)
Overconfidence	0.097	0.090	–0.098	0.029
	(0.80)	(0.79)	(–1.15)	(0.39)
Relative Size	–0.592***	–0.817	0.154	0.101
	(–2.60)	(–1.61)	(1.46)	(1.02)
Pay Type	1.170***	1.113***	0.123	0.023
	(5.16)	(4.35)	(0.71)	(0.16)
Sameind	–0.149	0.019	–0.067	0.138*
	(–1.18)	(0.15)	(–0.76)	(1.66)
constant	2.350	4.060**	1.040	3.587***
	(1.52)	(2.37)	(1.10)	(3.46)
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Pseudo/Adj. R^2	0.09	0.10	0.03	0.04
Observations	1691	2039	560	518

Note: The robust t/z-statistics are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively. Standard errors are adjusted for clustering at the firm level.

management power will the associated M&A risk cause accounting conservatism to be negatively related to the probability of acquiring loss-making targets.

We divide the sample into two groups according to management power, and we regress Eqs. (1) and (2). To do so, we follow previous studies in using the combination of chairman and manager as a proxy for management power. If the chairman and the manager are the same person, it means that management power is high; otherwise, management power is low. The subsample regression results for each of these two groups are shown in Table 8. The coefficient of *Cscore* on both *Loss* and *Risk* is significantly negative in the low management power group. In contrast, in the high management power group, the coefficients of *Cscore* are not significant. These results indicate that the roles of accounting conservatism in M&A decisions and M&A risk exist only in the low management power group. In the high management power group, the influence of management power inhibits the ability of accounting conservatism to play a disciplining role.

4.3.4. Mediation mechanism

The previous section argues that accounting conservatism serves a risk-control role because a conservative accounting policy increases the resources that an acquirer will retain to consolidate its target, thereby reducing the risk of default due to illiquidity. Based on this concept, we use the ratio between the net cash flow from operating activities and the current liabilities (*OCF/D*) to measure the maturity match between cash flow and debt. We further test how accounting conservatism achieves its risk-control role.

Table 9 presents the results of our *OCF/D* regressions. Column (1) presents the results of the first stage, which considers the relationship between *OCF/D* and accounting conservatism. The results indicate that

Table 7
The impact of the transfer of corporate control: ***Loss*** and ***Risk*** regression results from Eqs. (1) and (2), respectively.

Variable	*Loss*		*Risk1*	
	With the transfer of control	Without the transfer of control	With the transfer of control	Without the transfer of control
Cscore	–2.028***	0.180	–1.138**	–0.560
	(–2.79)	(0.25)	(–2.06)	(–1.08)
Asset	–0.282***	–0.148**	–0.153**	–0.148**
	(–3.73)	(–1.97)	(–2.14)	(–1.97)
Lev	0.683*	0.801**	0.275	–0.002
	(1.86)	(2.06)	(0.80)	(–0.01)
FCF	–0.358	0.315	–0.403	0.793*
	(–0.79)	(0.67)	(–0.72)	(1.65)
ROA	–4.794***	–5.993***	2.009	3.531**
	(–3.22)	(–4.34)	(1.29)	(2.53)
Tobin'Q	–0.057	0.049	–0.142***	–0.124***
	(–1.28)	(1.13)	(–2.87)	(–2.68)
Age	0.017	–0.093	0.137	–0.024
	(0.20)	(–1.00)	(1.48)	(–0.22)
Overconfidence	0.077	0.098	–0.087	–0.167
	(0.66)	(0.81)	(–0.79)	(–1.40)
Relative Size	–0.891***	–0.555	0.146	–0.280
	(–3.36)	(–1.63)	(0.71)	(–1.08)
Pay Type	1.159***	0.860***	0.074	0.175
	(5.48)	(2.79)	(0.36)	(0.45)
Sameind	–0.196	0.058	0.176	–0.011
	(–1.55)	(0.46)	(1.41)	(–0.09)
Constant	4.856***	1.388	2.954*	3.481**
	(3.04)	(0.83)	(1.95)	(2.18)
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Pseudo/Adj. R^2	0.05	0.02	0.04	0.03
Observations	1886	1684	512	496

Note: The robust t/z-statistics are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively. Standard errors are adjusted for clustering at the firm level.

compared to firms with low accounting conservatism, firms with high accounting conservatism retain more cash flow to deal with acquisition risk. Column (2) shows the results of the second stage, in which *OCF/D* is added to the variables in the Eq. (2) *Risk* model. We find that *OCF/D* has a significant negative relationship with M&A risk. The *Cscore* coefficient in the *Risk1* model is –0.943, and it is significantly negative at the 1% level. These results suggest that *OCF/D* plays a partial mediating effect on acquisition risk. Hence, accounting conservatism can prompt firms to increase resources retained for risk prevention and control.

5. Robustness tests

We perform additional tests to confirm the robustness of our findings.

5.1. Alternative measure of target profitability

First, we broaden our definition of target profitability. For this section only, we redefine *Loss* as equal to 1 if the target's operating performance has experienced a loss in the 3 years before its acquisition and 0 otherwise. We then rerun the regressions of Eqs. (1) and (2). The regression results, which are shown in Table 10, do not significantly change our findings.

Table 8
The impact of management power: ***Loss*** and ***Risk*** regression results from Eqs. (1) and (2), respectively.

Variable	*Loss*		*Risk1*	
	High management power	Low management power	High management power	Low management power
Cscore	–0.061	–1.569***	–0.587	–1.122**
	(–0.06)	(–2.60)	(–0.84)	(–2.55)
Asset	–0.376***	–0.198***	–0.065	–0.169***
	(–3.05)	(–3.35)	(–0.57)	(–3.06)
Lev	1.170**	0.531*	0.365	–0.022
	(2.28)	(1.70)	(0.82)	(–0.07)
FCF	0.505	–0.090	0.421	0.320
	(0.85)	(–0.23)	(0.83)	(0.64)
ROA	–3.657*	–5.985***	5.878***	0.645
	(–1.90)	(–4.99)	(4.25)	(0.51)
Tobin'Q	0.015	–0.030	–0.137**	–0.101**
	(0.26)	(–0.80)	(–2.48)	(–2.29)
Age	0.119	–0.048	–0.275*	0.141*
	(0.88)	(–0.67)	(–1.87)	(1.70)
Overconfidence	0.111	0.121	–0.217	–0.094
	(0.69)	(1.24)	(–1.36)	(–1.03)
Relative Size	–0.980**	–0.617***	–0.005	0.036
	(–2.36)	(–3.23)	(–0.01)	(0.31)
Pay Type	1.137***	1.163***	0.161	0.007
	(3.54)	(6.07)	(0.65)	(0.03)
Sameind	–0.147	–0.090	–0.018	0.060
	(–0.80)	(–0.88)	(–0.08)	(0.63)
Constant	5.658**	2.751**	1.774	3.641***
	(2.07)	(2.20)	(0.77)	(3.20)
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Pseudo/Adj. R^2	0.11	0.08	0.12	0.04
Observations	981	2695	288	724

Note: The robust t/z-statistics are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively. Standard errors are adjusted for clustering at the firm level.

5.2. Regression with the Basu (1997) model

To mitigate the possible measurement error problem caused by *Cscore*, we follow Kravet (2014) and develop the following modified Basu (1997) model to test the relationship between accounting conservatism and M&A risk:

$$\begin{aligned} NI_{i,t-s} = \beta_0 + \beta_1 D_{i,t-s} + +\beta_2 RET_{i,t-s} + \beta_3 D_{i,t-s} * RET_{i,t-s} + \beta_4 Risk_{i,t} + \beta_5 D_{i,t-s} * Risk_{i,t} \\ +\beta_6 RET_{i,t-s} * Risk_{i,t} + \beta_7 D_{i,t-s} * RET_{i,t-s} * Risk_{i,t} + \varepsilon_{i,t-s} \end{aligned} \quad (3)$$

In this equation, $NI_{i,t-s}$ is the ratio of net income to market value of acquiring firm i in year $t-s$. $Risk_{i,t}$ means the M&A risk of firm i in year t and year t is the fiscal year of the acquisition announcement. $RET_{i,t-s}$ denotes the annual stock return of the acquiring firm from April of year $t-s$ to March of the following year. $D_{i,t-s}$ is an indicator variable that equals 1 if$RET_{i,t-s} < 0$ and 0 otherwise. We include data from year $t-5$ to $t-1$ for the regression. Of the β coefficients, we focus on β_7. A negative estimate of β_7 indicates a significant negative relationship between accounting conservatism and M&A risk. Columns (1) to (3) of Table 11 present the regression results for the relationship between accounting conservatism and M&A risk over the 1-, 2- and 3-year periods following an M&A transaction. The results show that the coefficients of *Risk1*D*RET*, *Risk2*D*RET* and *Risk3*D*RET* are all significantly negative, which is consistent with the results of Kravet (2014).

Table 9
The mediation mechanism: Results from regressions incorporating.***OCF/D***

Variable	(1) *OCF/D*	(2) *Risk1*
Cscore	0.453**	–0.943***
	(2.52)	(–2.66)
OCF/D		–0.136**
		(–2.01)
Asset	0.046**	–0.152***
	(2.29)	(–3.20)
Lev	–0.486***	0.031
	(–3.77)	(0.12)
FCF	0.546**	0.277
	(2.30)	(0.79)
ROA	1.517**	3.020***
	(2.42)	(3.07)
Tobin'Q	0.002	–0.130***
	(0.05)	(–4.37)
Age	0.019	0.077
	(0.83)	(1.20)
Overconfidence	–0.012	–0.137*
	(–0.41)	(–1.80)
Relative Size		0.001
		(0.01)
Pay Type		0.041
		(0.25)
Sameind		0.083
		(0.98)
Constant	–0.716	3.323***
	(–1.52)	(3.40)
Year	Yes	Yes
Industry	Yes	Yes
Adj. R^2	0.04	0.09
Observations	1031	1031

Note: The robust t-statistics are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively. Standard errors are adjusted for clustering at the firm level.

5.3. Omitted variable bias

A firm's manager is its primary decision maker. Managers who tend to choose high accounting conservatism may be more risk averse than those choosing lower accounting conservatism and may avoid choosing high-risk loss-making targets for acquisition. To moderate the influence of management characteristics on our results, we further control for management compensation (*Payment*) and management shareholding (*Managerholder*). The updated regression results in column (1) of Table 12 show that our findings remain unchanged after controlling for these previously omitted variables.

A firm's life cycle may also affect both accounting conservatism and M&A target selection. We control for relevant variables in two ways. First, after controlling for the age of the acquirer, we further control for the quadratic term of the age of the acquirer (Age^2). Arikan and Stulz (2016) find that corporate M&A behavior shows a significant U-shaped relationship with respect to the age of the acquiring firm. Second, we classify firms into those in stages of growth, maturity and decline based on their cash flow portfolios (Dickinson, 2011). If investment cash flow is negative and financing cash flow is positive, a firm is in the growth stage (*Growth*). If operating cash flow is positive and investment cash flow and financing cash flow are negative, a firm is in the maturity stage (*Maturity*). All other cash flow combinations indicate that a firm is in decline (*Recession*). The regression results with inclusion of the *Maturity* and *Recession* dummy variables are shown in column (2) of Table 12. After controlling for life cycle stages, accounting conservatism remains significantly and negatively related to the selection of M&A targets and M&A risk.

Table 10
Alternative measure of the profitability of the target: Three-year ***Loss*** and ***Risk*** regression results from Eqs. (1) and (2), respectively.

Variable	(1) *Loss*	(2) *Risk1*
Cscore	–1.360***	–1.064***
	(–3.02)	(–3.24)
Asset	–0.219***	–0.148***
	(–4.59)	(–3.50)
Lev	0.561**	0.166
	(2.33)	(0.73)
FCF	0.190	0.243
	(0.63)	(0.81)
ROA	–4.701***	2.710***
	(–5.07)	(3.28)
Tobin'Q	–0.026	–0.133***
	(–0.96)	(–4.88)
Age	0.019	0.044
	(0.34)	(0.79)
Overconfidence	0.177**	–0.121*
	(2.34)	(–1.80)
Relative Size	–0.310***	–0.017
	(–3.46)	(–0.24)
Pay Type	0.583***	0.045
	(4.71)	(0.39)
Sameind	0.015	0.034
	(0.18)	(0.47)
Constant	4.155***	3.322***
	(4.09)	(3.79)
Year	Yes	Yes
Industry	Yes	Yes
Pseudo/Adj. R^2	0.05	0.04
Observations	3735	1353

Note: The robust t/z-statistics are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively. Standard errors are adjusted for clustering at the firm level.

A firm's financing environment may affect both its accounting conservatism and its risk-taking propensity. John et al. (2008) find that financing constraints affect the attitudes of corporate decision makers toward risk. Relief of external financing constraints can also decrease accounting conservatism (Rao and Jiang, 2011). Therefore, we further control for the financing constraints (*FC*) of the acquirers in our sample and re-examine the effects of accounting conservatism on M&A decisions. The results are shown in column (3) of Table 12. Our findings remain unchanged.

A firm's corporate governance may affect both accounting conservatism and M&A decisions. Research suggests that firms with better corporate governance are likely to have higher accounting conservatism than those with poorer corporate governance (García Lara et al., 2009). Corporate governance also affects a firm's M&A decisions (Ahn et al., 2010; Renneboog and Vansteenkiste, 2019). We further control for corporate governance variables, including the percentage of shares owned by the largest shareholder (*Top1*), the board size (*Boardsize*), the combination of chairman and manager (*Dual*) and the percentage of independent directors (*Indedirector*). Our empirical regression results are shown in column (4) of Table 12. The findings do not change after controlling for the corporate governance variables.

Furthermore, a target's profitability may be affected by the target's life cycle stage, and an acquirer may acquire firms in different life cycle stages for strategic purposes. Ransbotham and Mitra (2010) find that companies tend to acquire younger high-tech firms to quickly acquire key technologies and reduce M&A costs. However, because of high technology content and high initial research and development investment, growth-stage high-tech firms often experience operating losses for many years before they can achieve profitability. To control for the effects of the target life cycle stages, we further control for the target age (*Tar_age*),

Table 11
Regression results from the Basu (1997) model.

Variable	(1) *NI*	(2) *NI*	(3) *NI*
*Risk1*D*RET*	–0.043**		
	(–2.03)		
*Risk1*RET*	0.000		
	(0.25)		
*Risk1*D*	–0.008**		
	(–2.36)		
Risk1	0.001**		
	(2.07)		
*Risk2*D*RET*		–0.075**	
		(–2.44)	
*Risk2*D*		–0.013**	
		(–2.50)	
*Risk2*RET*		–0.000	
		(–0.21)	
Risk2		0.002**	
		(2.42)	
*Risk3*D*RET*			–0.129***
			(–3.27)
*Risk3*D*			–0.020***
			(–3.06)
*Risk3*RET*			0.001
			(0.36)
Risk3			0.002*
			(1.92)
D	0.008***	0.006***	0.005***
	(4.07)	(3.33)	(2.74)
RET	–0.007***	–0.007***	–0.007***
	(–11.16)	(–10.36)	(–10.97)
*D*RET*	0.067***	0.059***	0.048***
	(6.53)	(6.46)	(6.33)
constant	0.029***	0.029***	0.029***
	(50.99)	(39.51)	(39.04)
Adj. R^2	0.02	0.03	0.05
Observations	15,416	15,970	16,000

Note: The robust t-statistics are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively. Standard errors are adjusted for clustering at the firm level.

the quadratic term of the target age (Tar_age^2), whether the target is a high-tech firm (*Tar_ IT*) and the fixed effect of the target industry. The regression results are shown in column (5) of Table 12. In these results, accounting conservatism retains a significant negative relationship with M&A target selection and M&A risk.

Finally, we add all of the above omitted variables to the regression model. The results are shown in column (6) of Table 12. The findings do not change after controlling for the relevant omitted variables.

5.4. Sample selection bias

Our results could suffer from sample selection bias. For example, our sample contains only successful M&As, but the decision of a firm to initiate an M&A is influenced by a form of risk aversion. We use Heckman's two-stage regression method to mitigate this potential problem. In the first stage, we construct a probit model that uses the full sample to estimate the probability of a firm initiating an M&A. The dependent variable is a dummy variable indicating whether a firm initiates an M&A (*Merger*). To control for other variables that influence M&A decisions, we use the M&A frequency of firms that are in the same province and belong to the same industry as an exogenous variable (*PI_Merger*). Our results are presented in column (1) of Table 13.

Table 12
Omitted variable bias: ***Loss*** (Panel A) and ***Risk*** (Panel B) regression results from Eqs. (1) and (2), respectively.

Panel A Controlling for the effect of omitted variables on the target selection

Variable	(1) *Loss*	(2) *Loss*	(3) *Loss*	(4) *Loss*	(5) *Loss*	(6) *Loss*
Cscore	–0.918*	–0.972**	–0.985**	–0.999**	–1.161**	–1.223**
	(–1.85)	(–1.97)	(–1.99)	(–2.00)	(–2.22)	(–2.28)
Payment	0.071					–0.024
	(0.22)					(–0.07)
Managerholder	0.116					–0.060
	(0.35)					(–0.16)
FC		0.220				0.180
		(1.00)				(0.57)
Age^2			–0.012			0.024
			(–0.19)			(0.30)
Maturity			0.072			0.084
			(0.79)			(0.83)
Recession			0.028			0.078
			(0.25)			(0.62)
Top1				–0.004		–0.004
				(–1.43)		(–1.40)
Dual				0.145		0.038
				(1.62)		(0.37)
Board size				–0.655***		–0.571**
				(–2.66)		(–2.12)
Indedirector				–0.469		–0.243
				(–0.54)		(–0.26)
Tar_age					–0.568**	–0.579**
					(–2.46)	(–2.44)
Tar_age^2					–0.074	–0.073
					(–1.15)	(–1.11)
Tar_ IT					–0.078	–0.081
					(–0.45)	(–0.46)
Constant	2.964**	7.827	2.926***	3.843***	3.504***	8.084
	(2.55)	(1.59)	(2.59)	(3.12)	(2.91)	(1.14)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Acq_Industry	Yes	Yes	Yes	Yes	Yes	Yes
Tar_ Industry	No	No	No	No	Yes	Yes
Pseudo R^2	0.08	0.08	0.08	0.08	0.15	0.15
Observations	3704	3735	3735	3676	3713	3626

Panel B Controlling for the effect of omitted variables on M&A risk

Variable	(1) *Risk1*	(2) *Risk1*	(3) *Risk1*	(4) *Risk1*	(5) *Risk1*	(6) *Risk1*
Cscore	–1.027***	–0.988***	–0.979***	–0.921**	–1.055***	–0.947**
	(–2.87)	(–2.76)	(–2.72)	(–2.57)	(–2.80)	(–2.45)
Payment	–0.280					–0.262
	(–0.90)					(–0.78)
Managerholder	0.102					0.200
	(0.34)					(0.59)
FC		0.259				0.329
		(1.27)				(1.17)
Age^2			0.050			0.057
			(0.52)			(0.53)
Maturity			–0.080			–0.080
			(–0.88)			(–0.85)
Recession			–0.011			–0.033
			(–0.09)			(–0.29)

Top1				0.005*		0.005*
				(1.86)		(1.79)
Dual				–0.047		–0.048
				(–0.56)		(–0.50)
Board size				0.175		0.042
				(0.78)		(0.18)
Indedirector				1.938**		1.473
				(2.26)		(1.63)
Tar_age					0.346*	0.335*
					(1.96)	(1.83)
Tar_age^2					–0.108**	–0.103*
					(–2.12)	(–1.96)
Tar_ IT					–0.266*	–0.281*
					(–1.68)	(–1.72)
Constant	3.701***	9.044**	3.699***	2.583**	2.976***	10.058
	(3.55)	(1.98)	(3.55)	(2.28)	(2.76)	(1.57)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Acq_Industry	Yes	Yes	Yes	Yes	Yes	Yes
Tar_ Industry	No	No	No	No	Yes	Yes
Adj. R^2	0.05	0.05	0.05	0.05	0.04	0.04
Observations	1022	1031	1031	1011	1022	995

Note: The robust z-statistics are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively. Standard errors are adjusted for clustering at the firm level.

Table 13
Heckman's two-stage regression results.

Variable	(1) *Merger*	(2) *Loss*
PI_Merger	0.220***	
	(14.11)	
Cscore		–0.957**
		(–2.04)
IMR		–0.030
		(–0.07)
Constant	–1.401***	1.646
	(–7.60)	(1.24)
Controls	Yes	Yes
Year	Yes	Yes
Industry	Yes	Yes
Pseudo R^2	0.05	0.05
Observations	19,770	3735

Note: The robust z-statistics are in parentheses. ***, ** and * denote significance at the 0.01, 0.05 and 0.10 levels, respectively. Standard errors are adjusted for clustering at the firm level.

In the second stage, we estimate Eq. (1) by including the inverse Mills ratio (*IMR*), estimated in the first stage, as a control variable. The results are presented in column (2) of Table 13. Accounting conservatism remains significantly and negatively correlated with the probability of acquiring loss-making targets in these results.

6. Conclusion

In this study, we empirically examine the impacts of accounting conservatism on M&A target selection decisions. The findings show that relative to firms with lower accounting conservatism, firms with higher accounting conservatism are more likely to acquire profitable targets and avoid loss-making targets for

risk-averse reasons. However, when firms with high accounting conservatism choose to acquire loss-making targets, the conservatism's risk-control role reduces M&A risk and improves M&A performance. This relationship holds only when the acquiring company's long-term debt is high, the management power of the acquirer is low and control of the target is transferred. Further analysis finds that accounting conservatism reduces the risk by increasing the maturity match between cash flow and debt. These findings suggest that accounting conservatism plays not only a risk-averse role but also a risk-control role.

Our results have implications for the design of M&A policies. Target profitability is a recent focus of the CSRC's regulation activity, and one of the most common reasons for the CSRC's rejection of M&A proposals is uncertainty about the ongoing profitability of proposed targets. The findings of this study suggest that the CSRC's concern about target profitability is justified and that poor profitability adds risk to M&As. However, regulators cannot take a uniform approach to the level of target profitability. We find that accounting conservatism can help listed companies control the risks associated with loss-making targets and thus realize potential synergies by acquiring them. Therefore, we suggest that synthetic evaluation of accounting conservatism and target profitability can allow regulators to make more comprehensive judgments on the feasibility of M&As and the integration abilities of the acquiring companies. By taking such an approach, regulators can improve their regulatory abilities and achieve precise regulation for the M&A market.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Are zombie firms more incentivized to financialize?

Haomin Wu [a], Meng Yang [b,*], Jun Gu [c]

[a] School of Accounting, Yunnan University of Finance and Economics, Kunming, Yunnan, China
[b] School of Economics and Management, Shihezi University, Shihezi, Xinjiang, China
[c] Department of Accounting & Research Center for Finance and Accounting, College of Economics, Shenzhen University, Shenzhen, Guangdong, China

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ABSTRACT

This paper investigates whether zombie firms demonstrate a tendency to invest in the financial sector, a practice we term *financialization* strategy. Unlike those in the United States, Japan, and Europe, we find that zombie firms in China are not necessarily small and that they rely heavily on government subsidies in addition to bank loans for survival. In addition, we document that zombie firms in China experience limited investment opportunities in their core businesses. This combination of readily available funding and limited investment opportunities jointly motivate the financialization of firms with zombie status. We further find that financialization is preferred by non-state-owned firms and by those located in regions with less developed markets. Finally, we suggest that a contagion effect can occur in terms of financialization in provinces that have a high percentage of zombie firms. This research sheds light on the effects of a triangular relationship among firms, government agencies, and financial institutions on both the operations of individual firms and overall market efficiency.
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1. Introduction

The rise and fall of zombie firms, which struggle to survive, rely on loan finance, and fail to improve their productivity, has recently attracted attention from both practitioners and academics in recent years (Ahearne and Shinada, 2005; Caballero et al., 2008; Shen and Chen, 2017). Understanding how zombie firms survive may help resolve various problematic social issues, such as lowering unemployment rates, and can help banks and other financial institutions identify non-performing assets. If banks allocate large amounts of resources to

* Corresponding author.
E-mail addresses: whm_1977@126.com (H. Wu), 1040774704@qq.com (M. Yang).

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firms that are not financially healthy, the resulting social outcomes may be suboptimal and can result in overall low market efficiency (Liu and Zhou, 2011; Tan et al., 2017; Wang et al., 2018).

Numerous factors underlie the development of zombie firms. Some studies show that the low interest rates of recent years have enabled zombie firms to extend their loans with comparatively low costs, despite having marginal levels of profitability (Caballero et al., 2008; Nakamura and Fukuda, 2013; Banerjee and Hofmann, 2018). Besides, government subsidies in the form of emergency aid funding also greatly extend the life of such firms. In emerging markets, however, rapid changes in the business environment, customer preferences, and in technology have left some firms behind, as they have failed to make timely changes to their businesses or to update their equipment and technology. Thus, they eventually become zombie firms (Huang and Chen, 2017; Yu et al., 2017).

Recent developments in the Chinese market provide a unique opportunity to study the behavior of zombie firms. The Chinese economy has grown rapidly since the late 1970s, when Deng Xiaoping opened up the country's domestic market to the world, thus embracing the trend of globalization at a time when manufacturing was moving from the United States and Europe to Asian countries such as China, India, Thailand, and Vietnam. This move triggered the widespread growth of China's manufacturing industry, and even today manufacturing firms still constitute more than 50% of the A-Share listed companies in China.

However, the intense competition in the manufacturing sector of recent decade in China means huge demand of major funding for both technological upgrades and daily maintenance, as the operation of these firms is highly reliant on PPEs (property, plant and equipment). In addition, the profitability induced by intense competition in the manufacturing sector can be low and thus would be unlikely to provide sufficient reserve with sole reliance on their earnings (Shen and Chen, 2017; Yu et al., 2017). Thus, the asset structures of firms, combined with rapid technological development, have led to the emergence of numerous zombie firms in China when they have insufficient funds to upgrade. This differs from the context of the U.S. market, where the low interest rates on bank loans have been a major driver of zombie firms.

The recent cooling of the global economy, due to both previous overheating and the impact of the Covid-19 epidemic, has focused the attention of Chinese regulators back on the efficiency of its domestic market, where overcapacity is now a major concern. Given that the emergence of zombie firms can eventually lower the market efficiency, the Chinese government is recently determined to dispense with firms subject to overcapacity as they are not sufficiently productive, and many of these can be classified as zombie firms (Huang and Chen, 2017). Thus, numerous zombie firms are under great regulatory stress since the regulator aims to identify and deal with them, and to leave these firms two options: *improve their financial performance* or *be eliminated*. Therefore, firms must find ways to increase their profitability in the hope that they are no longer classified as zombie firms and that such increased regulatory pressures be alleviated (Wang et al., 2016a; Huang and Chen, 2017).

We investigate whether zombie firms in China are now seeking to increase their profitability by making financial investments. Unlike the relatively small financial returns that firms in manufacturing and other conventional industries can obtain through their core businesses due to intense competition, financial investment returns (e.g., through individual stocks, mutual funds, and the housing market) are relatively high (Hu et al., 2017; Huang et al., 2018). Thus, zombie firms are motivated to invest financially and (some resources) are thus deviated from their core business operations. These deviations can boost firms' reported earnings in the short term but can damage their future prosperity, because the returns from such speculative investments are unlikely to be sustained for long due to their high volatility. Eventually, resources that may otherwise have been invested in the firms' ordinary operations will be diverted.

We regard firms as zombie firms if their total annual real profits, calculated as net income excluding both government and bank subsidies (on credit) over a three-year period, are negative. This ensures we capture the net results of the firms' core businesses rather than the impact of any subsidy and enables us to mitigate the effect of short-term distortions due to market volatility. To measure the extent to which firms financialize themselves, we calculate the percentage of financial assets that are held for the purpose of speculation relative to total assets, which is a measure used in several other studies (e.g., Peng et al., 2018). A high level of speculative asset holdings suggests a firm is pursuing buy-and-hold returns to supplement the income from its core business.

We adopt a sample of 17,855 firm-year observations for the 2006–2019 period comprised of Chinese A-share listed firms (i.e., those listed on either the Shenzhen or Shanghai stock exchanges) and find that

zombie firms are more likely to hold high levels of financial assets than non-zombie firms. This supports the assumption that zombie firms seek to financialize themselves as a way to increase their reported earnings and to avoid being categorized as zombie firms in the future.

We also find that zombie firms in China hold high levels of bank loans, measured by their total short- and long-term borrowing amounts; receive high levels of government subsidies; and have reduced opportunities for operating investment, as measured by Tobin's q for the observation year. In addition, we find that zombie firms are more likely to financialize themselves if they receive large amounts of bank loans and subsidies. This appears reasonable, as firms with substantial funding but without adequate investment opportunities in their primary businesses have pronounced preferences to transfer their resources to the financial sector. By further grouping firms according to whether they are state-owned and to whether they are located in developed regions with the development measure of Wang et al. (2016b), we find that non-state-owned zombie firms and those in less developed regions have higher levels of financialization. We also measure peer pressure among zombie firms residing the same region, and the outcomes suggest that the financialization of zombie firms is contagious.

This paper sheds light on several lines of research in accounting and finance. First, we demonstrate that zombie firms are strongly motivated to financialize themselves by increasing the financial assets they hold. We therefore offer suggestions for alternative methods of improving financial performance for zombie firms in the unique context of China (Ding et al., 2011; Stuart and Wang, 2016). Second, by investigating the roles of government subsidies and bank loans, we find that zombie firms do indeed receive funding in excess of their requirements when investment opportunities in their primary business sectors are scarce. This motivates the firms to financialize and gives rise to questions concerning proper resource assignment and social equality (Hu et al., 2017; Huang and Chen, 2017; Peng et al., 2018). Finally, we find a potential contagion effect among regional groups of zombie firms, which contributes to studies of contagion and spillover effects (Jin et al., 2019; Wang and Gao, 2019; Xiao et al., 2019).

The remainder of this paper is organized as follows. In Section 2 we describe the institutional background of zombie firms in China and their regulatory landscape and review studies examining zombie firms, with a particular focus on the determinants of their rise and fall. In Section 3 we develop our hypothesis, provide the framework of our research design and sample, and present the descriptive statistics. Our main results are presented in Section 4. Further analyses and robustness tests are discussed in Section 5. An investigation of the possible contagion effect of the financialization strategy among zombie firms is presented in Section 6. We conclude the paper with Section 7.

2. Literature review and research question

2.1. Prosperity, industrial transformation, and zombie firms

Kane (1987) suggests that thrifts in the U.S. possessing zombie status can have serious impact to the whole market, as they heavily utilize the pool of government deposit insurance, which is meant for emergency use only, and absorb depositors by raising annual premiums, thus significantly affecting peer institutions in the market. Caballero et al. (2008) then apply the term "zombie" to severely financially distressed firms in Japan, when the country's economy peaked and then declined very rapidly after the asset price bubble burst in the early 1990s. This rapid change exhausted the whole capital market as nearly all collateral that held by institutions lost value, and on-book non-performing assets piled up. To reduce the risk profiles of their asset portfolios, Japanese banks sought to lower their levels of non-performing assets by issuing and extending loans to non-viable firms, even if they were in financial distress. The supply of bank loans combined with the low levels of profitability for firms that struggle to repay their principal debts jointly resulted in the rise of zombie firms in the Japanese market.

Most other studies of zombie firms therefore focus on the Japanese market and the 2008 global crisis, which has made it difficult for banks to decide whether to issue loans (Bushman et al., 2016; Foos et al., 2010). Scrutinizing lending decisions and controlling credit can help secure banks' regulatory capital levels but can have negative impacts on small and medium firms that rely heavily on bank loans (Beatty et al., 2013). This reluctance by the banks to fully eliminate the loan supply has led to the rise and fall of zombie firms around each

financial crisis (Agarwal et al., 2014). Banerjee and Hofmann (2018) examine a recent survey conducted by the Bank of International Settlement and find that low interest rates reduce firms' interest expenses, thus further extending the survival of zombie firms.

However, the characteristics of zombie firms in China are slightly different from those in the U.S. and European markets. Compared with the low interest rates observed in most developed countries, the annual rate of borrowing in China is still relatively high. Thus, relying solely on a low interest rate for survival is challenging. Instead, numerous zombie firms without adequate bank loans in China then turn to government funds, which are typically linked to industrial policies or government-led strategies. In a survey of zombie firms in China around 2010, Wang and Liu (2018) suggest that non-market factors (e.g., industrial policies) and political connections are the main causes for the rapid increase in the number of zombie firms since 2008, when the growth of the Chinese economy began to diminish.

The Chinese economic boom started in the late 1970s, when the central government opened the domestic market and embraced globalization. This openness led to a first wave of transformation in the 1980s, in which many small and medium manufacturing firms in southern China began accepting orders from customers overseas and exporting their products directly to the U.S. and European markets. These firms were straightforwardly organized and diversified. They contributed much to the Chinese economic boom of the last 20 years of the 20th century but also created problems that are hard to resolve.

In fact, the early emergence of zombie firms and the threat they posed to the economy were initially negligible, until the recent cooling of the global economy after the 2008 financial crisis, when the overcapacity of firms and industries has become obvious, and maintaining profitability requires active strategies and increased efforts rather than the passive approaches previously taken by entrepreneurs. A recent China Enterprise General Survey (CEGS) of Chinese firms indicates that the average return on assets is 4.6%, but this varies greatly among industries and types of ownership, suggesting that firms find it difficult to maintain or improve their financial performance by solely focusing on their own business area without any diversification or external support.

Thus, to maintain their profitability, firms in the manufacturing industry must engage in innovation and market development and expansion, in addition to increasing production (Yu et al., 2017). Shen (2016) finds that the loss of competitive advantages due to a lack of investment in innovation or inappropriate corporate governance mechanisms can account for the recent increase in zombie firms. Firms that do not devote sufficient resources toward innovation and business expansion, or those that invest resources inappropriately, often experience severely impaired financial performance over time.

The struggle to retain their profitability, combined with the global economic slowdown after the 2008 financial crisis and the recent Covid-19 epidemic, may accelerate the enforcement of firms into zombie status. However, this may not mean that such a firm quickly goes bankruptcy. Jiang et al. (2017) suggest that zombie firms in China are often supported by government aid funds that were initially set up to stabilize the market by providing quick bailouts to businesses in temporary distress, which is a significantly different situation from that of zombie firms in the U.S. and Japan. In terms of funding sources, zombie firms in China are not necessarily SMEs and can be large state-owned enterprises that are struggling, due to out-of-date technology or products rather than external financing difficulties. Their large size and significant contributions to regional development motivate local governments to unconditionally fund them with the intentions of ensuring both industry development and the welfare of the residents.

2.2. Financialization and growth opportunities in non-financial sectors

The term financialization was originally coined to describe a preference for or concentration of social investment in financial rather than non-financial sectors. However, the term has led to much academic controversy as no single definition has been agreed on, and both macro- and microeconomic aspects of financialization have been investigated. We limit our scope to the firm-level aspects of financialization, in particular, firms' decisions to make financial investments, such as stocks, bonds, or real estate, with the purpose of making speculative gains. Although we later refer to the economic consequences of the collective financializaton of firms in a sector or in a regional market, this is not a main concern in our work.

The financialization of firms does not necessarily lead to negative impacts on either the firms or the market. Financial investments represent a transfer of liquidity among various economic agents or market participants,

and thus should have limited effects on non-financial participants that use financial resources to support their business models (Penman, 2016). However, market imperfections can result in mixed signals and information asymmetry that increase agency costs, and management preferences may lead to transfers of financial resources and eventually underinvestment problems. Thus, growth opportunities in non-financial sectors may be affected, resulting in negative impacts for the whole market (Stockhammer, 2004).

The popularity of financial innovation can strengthen the effects of financialization. Recent developments in financial instruments and derivatives, and related hybrid products, can further encourage the financialization of firms by making such instruments more available to market participants than it used to be so they can manage their assets and risk levels. This extension enables non-professional investors to pursue reasonable returns from the financial market while avoiding the speculation or misbehavior that can arise from market rumors or investor inexperience. Thus, many firms are further motivated to invest, resulting in an increase in financial investment in recent years (Greenwood and Scharfstein, 2013). This trend may be further perpetuated by a boom period involving the appreciation of key types of investments such as the S&P 500 index and house prices (Brunnermeier, 2009; FCA, 2009), which may then be followed by a market crash when firms have limited access to investment opportunities (Liu and Ryan, 2006).

2.3. Pressure of financialization on zombie firms

Zombie firms may be incentivized to promote their reported earnings due to external pressure, as their zombie status may lead to intense regulatory attention and internal pressure from shareholders, which increases uncertainty regarding a firm's future (Jensen and Meckling, 1976). In particular, regulatory intervention can threaten the survival of firms, and thus they will naturally attempt to avoid such situations. Conflicts between shareholders, management, and board members can threaten the job security of managers when firms announce weak performance, which can act as a further incentive. Thus, managers will be highly motivated to achieve good financial performance, if only for the sake of their own careers.

Recent regulatory changes in China indicate that zombie firms may be both contributors to and victims of overcapacity, and their termination should be considered carefully (Huang and Chen, 2017). Regulatory measures can have various influences on the decisions firms make, and simple earnings management via accrual items may be effective. The reported numbers may be manipulated via aggressive accounting policy choices, as documented in various contexts (Jones, 1991; Watts and Zimmerman, 1978). Although aggressive accounting policies can temporarily boost reported performance in each period, longer-term improvements are difficult to achieve as they require much more fundamental changes (Healy, 1985). In addition, accrual-based earnings management can be easily detected, and firms may thus be penalized by the market (Barth et al., 2001).

Firms can alternatively adjust their transactions or slightly change their business models to improve financial performance. Roychowdhury (2006) suggests that firms can use commercial promotions and the timing of revenue recognition to temporarily improve their reported numbers, and that these real earnings management methods are more likely to be used than accrual-based methods in particular circumstances, such as when a firm's current reported earnings are close to important benchmarks (Cohen et al., 2008). Thus, firms experiencing temporary financial difficulties may have strong motivations to increase their reported earnings.

Although changing the business model based on market research and innovation may be an optimal solution for zombie firms with outdated technologies or products, this can be difficult to achieve *de facto*. Even if they succeed, the process can take years to accomplish. Thus, zombie firms may instead seek a quick solution due to either the fear of instant external regulatory scrutiny or internal concerns regarding shareholder wealth. Rapidly improving financial performance can involve diverting firm resources that were meant for business operations into speculative financial investments, such as the buying and holding of mutual funds, establishing stock portfolios, or acquiring real estate in popular areas, with the expectation of investment gains via the appreciating value of assets in these categories. Under the current Chinese Generally Accepted Accounting Principles (GAAP), these are recognized in firm accounts as trading assets and changes in their fair values are reported directly in the income statements so that their appreciation in value enables firms to conduct quasi–earnings management. However, these concerns can lead some firms to use such investments to make rapid changes to their business models.

Our research question in this study is whether zombie firms in China invest in financial sectors to improve their reported earnings. We define this type of investment, rather than investment in daily operations, as *financialization.*

3. Research design

3.1. Definition of zombie firms

In 2015, the Chinese government issued a set of simple criteria to identify zombie firms: those that suffered financial losses in three consecutive years and whose technology is regarded as outdated. Guidance was provided to indicate industries and technologies that are prioritized for development. The government further suggested that such firms should be terminated through official or regulatory intervention. This regulation is simple to implement as it is based on reported earnings, but its definition is too broad to be applied theoretically, as we aim to identify firms with exceptionally low profitability and poor prospects rather than those that have temporary difficulties but strong future growth potential.

Caballero et al. (2008) introduced the CHK method, named after the paper's authors, to identify zombie firms, which has since become a common approach in the literature. The method is based on the finding that zombie firms frequently rely on bank loans with exceptionally low rates, such as governmental subsidized loans, and other forms of credit. Thus, if firms take on large amounts of credit at costs lower than the market level, they are likely to be zombie firms. However, it is impossible to obtain the details of each loan that a firm has by using only information in its financial reports, so the CHK method estimates the lower bound of interest rates that firms are likely to be subject to at ordinary market rates.

In this study, we identify zombie firms using earnings information adjusted to remove the effects of government subsidies and subsidized interest costs. We first estimate firms' market-rate interest costs following Caballero et al. (2008) and Nakamura and Fukuda (2013) and compare them to the actual interest costs incurred. We measure the lower bound of interest payable by assuming that all credit on the firm's books is subject to the lowest level that the market offers and by applying weights linked to the firm's asset structure. The lower bound of interest is defined as

$$R^{*}_{i,t} = rs_{t-1}BS_{i,t-1} + \left(\frac{1}{5}\sum_{j=1}^{5} rl_{t-j}\right)BL_{i,t-1} + rcb_{\min(-5,t),t} \times Bonds_{i,t-1} \tag{3.1}$$

In equation (3.1) $BS_{i,t}$, $BL_{i,t}$, and $Bonds_{i,t}$ represent the amounts of short-term bank loans (with maturity less than 1 year), long-term bank loans (with maturity more than 1 year), and bonds issued by firm i at year t, respectively. $rs_{i,t}$, rl_t, and $rcb_{\min(-5,t),t}$ represent the average values of the lowest interest rates of short-term loans, long-term loans, and bonds issued in the past five years, respectively. As all rates are valued at the lowest rate, $R^{*}_{i,t}$ represents the lower bound of the overall market-rate interest cost that firms are likely to bear. All components are valued at their lower bound, and the probability of achieving the lower bounds of all components simultaneously is low, so $R^{*}_{i,t}$is an understated value that is difficult for firms to achieve. In the CHK method, actual interest rate $R_{i,t}$ lower than the calculated lower bound $R^{*}_{i,t}$ is regarded an indicator of zombie status, because zombie firms may receive favorable interest rates or interest subsidies from the government.

However, Fukuda and Nakamura (2011) and Imai (2016) suggest that firms with higher potentials can be charged a lower rate of borrowing than other firms, thus complicating the results. Therefore, to avoid the impact of short-term volatility, we compare firm profitability and estimated interest rate over three consecutive years and treat low profitability and a low interest rate as indicators of zombie status. Firms in China often receive subsidies based on government industrial policies, so our measure of profitability is calculated after removing all such subsidies from the net income. We also treat an interest rate that is lower than the derived lower-bound market interest rate as an indication that a firm has received a credit or interest subsidy, following Caballero et al. (2008). By further removing the subsidy from net income, we obtain the underlying firm income and take the averaged value of this figure over a three-year rolling window ending in the observation year. We regard firms as zombie firms if their three-year average adjusted income is negative.

3.2. Measure of financialization

To capture the degree to which firms invest their resources in the financial sector instead of daily operations, we measure financialization by calculating the percentage of assets (relative to total assets) that are financial and are likely to be used for speculative purposes. Financial assets include trading assets, derivative instruments, the net value of issued loans and advances to customers, repurchased financial assets, and the net value of available-for-sale (AFS) assets, held-to-maturity (HTM) assets, investment in real estate, and other forms of long-term investment. We consider a broad range of financial investments, which include many transactions that may be used for earnings manipulation. Some of these may be acknowledged in firms' accounts at historical cost or at fair value, with changes in value recognized in other comprehensive income rather than net income, because the profits earned on these investments will eventually be recognized in net income when the investments are sold. By combining the values of these items, we obtain the total level of financial investment, and we scale this figure by total assets. A high level of financial investment indicates that firms are highly motivated to financialize.

3.3. Other variables

We control for multiple factors that could affect the investment behavior of firms, independent of concerns related to their zombie status. For example, we control for firm ownership structure, that is, whether they are state- or non-state-owned firms, because state-owned firms are often large and may have large cash holdings that exceed their operating needs, which can be invested. Firm leverage, sales growth rate, and current year profitability are also controlled for, as they may affect firms' financial investments. In addition, we control for net cash flow from operations, firm size (calculated as the natural logarithm of total assets), and firm age (calculated as the length of time they have been listed on either the Shenzhen or Shanghai A-share stock markets). We also control for macroeconomic factors including regional GDP per capita, regional reliance on primary and secondary industries with respect to GDP, and whether the region as a whole suffers from deficits. Regional development is often closely associated with the development of the financial market and the activities of institutional investors, which can directly or indirectly affect the willingness to invest.

3.4. Sampling and descriptive statistics

We obtain sample data for all firms listed in the Chinese A-share market from 2006 to 2019. All financial and market data are obtained from the China Stock Market & Accounting Research (CSMAR) database and government subsidies data are from WIND. We exclude financial and insurance firms because they are subject to slightly different regulatory requirements and the structure of their financial statements differs significantly from non-financial firms. We also exclude all observations that contain missing values for variables used in our estimation. After applying these restrictions, our sample comprises 17,855 firm-year observations. All continuous variables are winsorized at the level of top and bottom 1%.

Table 2 provides the general descriptive statistics for our sample. The mean value of *Zombie* indicates that around 17% of observations in our sample are regarded as zombie firms. We note that using a sample comprising only of listed firms is likely to significantly understate the prevalence of zombie firms, because listed firms in general are more profitable and are larger in size than non-listed firms. However, this sample also offers advantages when investigating financialization. Following the discussion in Section 2.3, financialization entails diverting resources to the capital market instead of the product market, which requires large amounts of cash and sophisticated knowledge, both of which listed firms may have more access to. Using a sample consisting of both listed and non-listed firms could underestimate the extent of the financialization trend, as many non-listed firms may not have sufficient access to the capital market, due to access limitations to both cash and professional consulting services.

The distribution of the variable *FIN* supports our assertion that listed firms have a strong preference for investing in the financial sector, either for the purpose of increasing income or due to a lack of investment opportunities in their operating activities. On average, financial assets (as defined in Section 3.2) represent 6.7% of total assets, and the holdings range from zero to over half of a firm's total assets. This suggests that

firms' preferences for financial investment vary considerably. A more detailed analysis reveals the firms that have strong or weak demands for financialization, and whether zombie firms are more or less likely to be involved in financialization, as documented in Section 4.1.

We also examine the size, balance sheet structure, revenue growth, and leverage of the firms in our sample. We find that firm size, measured by the natural logarithm of total assets, has a mean of 22.23 and ranges from 19.98 to 22.06, indicating that our sample covers both large firms and SMEs. The average of *LEV* is 43.40%, suggesting moderate levels of debt finance. However, the maximum level of leverage exceeds 85%, indicating a high reliance on debt financing. This suggests that firms in our sample have very diverse levels of demand for external credit. The mean of *GROWTH* is 20%, with values ranging from a 43% reduction to an over 200% increase in revenue, suggesting that the overall performance of firms in our sample differs greatly. Similarly, we find a high variation in cash flows (*CFO*) and reliance on fixed assets (*FA*).

The indicator *Ownership* reveals that around 50% of observations in our sample are state-owned firms, indicating a balanced distribution between state- and non-state-owned firms. The mean *AGE* of 2.78 indicates that firms have been listed for an average of 16 years. The youngest firm in our sample is approximately 5 years old, and the oldest is around 30 years, suggesting it was first listed during the early days of the Chinese stock market in the 1990s. In general, these results indicate that our sample is well-balanced in terms of the type of ownership structure and covers a wide range of firm ages. Old firms and those that are state-owned are expected to be comparatively inflexible in their business strategies and are increasingly affected by government guidance regarding industrial development, and so are extremely important in the context of our research.

4. Empirical test and results

4.1. Are zombie firms more likely to financialize themselves?

We apply a panel regression model with firm-level fixed effects to capture the effect of firms' zombie status on their financialization behavior. All variables are as defined in Table 1. The main regression model is as follows:

$$FIN_{i,t} = \alpha_0 + \alpha_1 Zombie_{i,t} + \beta Controls_{i,t} + \varepsilon \tag{4.1}$$

where *FIN* indicates the degree of a firm's financialization and *Zombie*, the indicator variable of interest in this study, equals 1 if a firm is identified as a zombie firm and 0 otherwise.

Table 1
Key variable definitions.

Variable of Interest	
FIN	The sum of trading assets, derivative instruments, the net value of issued loans and advances to customers, repurchased financial assets, and the net values of available-for-sale assets, held-to-maturity assets, investments in real estate, and other forms of long-term investment, scaled by total assets
Zombie	An indicator variable that equals 1 for zombie firms, and 0 otherwise. Zombie firms are defined following Imai (2016), as detailed in Section 3.1
Control Variables	
Size	The natural logarithm of total assets on the balance sheet
Lev	The ratio of total liabilities to total assets on the balance sheet
ΔSales	$(\text{Revenue}_t - \text{Revnue}_{t-1})/\text{Revnue}_{t-1}$
CFO	Net free cash flow from operations scaled by total assets
Capital	The ratio of property, plant, and equipment to total assets
Age	The natural logarithm of the number of years that the firm has been listed plus 1
Profitability	Gross profit margin scaled by revenue
Ownership	An indicator variable that equals 1 for state-owned firms and 0 for others
GDP	The natural logarithm of regional GDP per capita
ΔGDP	The annual change in GDP scaled by GDP in the previous year
Industry	The percentage of regional GDP generated by primary and secondary industries
Deficit	The gap between government expenses and government income in the region, scaled by the region's GDP

Table 2
Descriptive statistics.

	N	*MEAN*	*SD*	*MIN*	*MEDIAN*	*MAX*
Zombie	17,855	0.170	0.376	0.000	0.000	1.000
FIN	17,855	0.067	0.095	0.000	0.030	0.502
Size	17,855	22.230	1.243	19.980	22.062	26.147
Lev	17,855	0.435	0.195	0.062	0.432	0.858
ΔSales	17,855	0.209	0.421	−0.431	0.128	2.795
CFO	17,855	0.049	0.067	−0.139	0.047	0.239
Capital	17,855	0.227	0.158	0.006	0.195	0.693
Age	17,855	2.779	0.361	1.609	2.833	3.434
Profitability	17,855	0.279	0.164	0.023	0.246	0.797
Ownership	17,855	0.425	0.494	0.000	0.000	1.000
GDP	17,855	11.002	0.508	9.665	11.058	11.966
ΔGDP	17,855	1.087	0.024	0.975	1.080	1.178
Industry	17,855	0.498	0.122	0.169	0.520	0.675
Deficit	17,855	0.073	0.065	0.013	0.043	0.334

This table provides descriptive statics of the key variables used in our test. All variables are as defined in Table 1.

Table 3
Financialization trend of zombie firms in China.

	I	II
Zombie	0.0041*	0.0041**
	(1.930)	(1.990)
Size		−0.0129***
		(-5.06)
Lev		−0.0177*
		(−1.94)
ΔSales		−0.0077***
		(−6.54)
CFO		−0.010
		(−1.09)
Age		0.0900***
		(6.910)
Profitability		−0.0318**
		(−2.45)
Ownership		−0.002
		(−0.30)
Capital		−0.0831***
		(−8.32)
GDP		0.001
		(0.130)
ΔGDP		0.1484***
		(2.680)
Industry		(−0.039)
		(−1.04)
Deficit		−0.071
		(−0.88)
Constant	0.0571***	0.005
	(23.79)	(0.04)
Year	Fixed	Fixed
Firm	Fixed	Fixed
Adj-R^2	0.048	0.085
F-value	22.3312***	21.8613***
N	17,855	17,855

This table reports the results of the relation between zombie status and financialization. Variables are as defined in Table 1. All regressions control for firm and year fixed effects. t-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 3 presents the main results of our study. The results in Column I report the results for the simple relationship between zombie status and financialization, and Column II reports the results with controls for all of the key variables that may affect firms' financialization behavior. The coefficients on *Zombie* in Columns I and II are positive and significant at the 10% and 5% levels, respectively, suggesting that zombie status impacts the holding of financial assets. These results support our assumption that zombie firms have a strong motivation to increase their holding of financial assets, as this may help improve their financial reporting numbers.

4.2. Why and how do zombie firms financialize themselves?

The results in Table 3 only indicate that zombie firms are more likely to financialize than non-zombie firms and do not provide evidence of the economic reasons for this relationship. As discussed in Section 2.1, zombie firms may share common characteristics, such as a high level of reliance on bank loans and government subsidies and few opportunities for operating investment.

To address these concerns, we take a two-stage approach in our testing. The first stage identifies whether zombie firms are more likely to receive government subsidies and bank loans and are less likely to encounter opportunities for operating investment, compared with non-zombie firms. The rationale behind focusing on these factors is straightforward. The supply of government subsidies and the extension of bank loans provide firms with adequate cash flows with which they can make both operational and financial investments, but these cash flows alone cannot enhance value, because firms also require sufficient investment opportunities to earn returns that exceed the required return (or cost of capital) so that they can maintain their value and achieve stable growth.

If firms do not have sufficient opportunities for investment but do receive large amounts of cash, particularly in the form of loans, these favorable policies can produce unfavorable results. Loans are not free and the interest charged represents a fixed cost, which can further contribute to poor financial performance, for example when sales are low due to poor market conditions. If the reported financial results are poor, firms may to seek to improve their performance, and financialization is a simple means of achieving this.

We first examine whether zombie firms are more likely to receive external funding support from government and banks, despite their limited investment opportunities. We use the amount of subsidies scaled by total assets to measure government subsidies, total short- and long-term bank loans scaled by total assets to measure the bank loans firms receive, and Tobin's Q to measure firms' opportunities for operating investment. We use the following model:

$$X_{i,t} = \alpha_0 + \alpha_1 Zombie_{i,t} + \beta Controls_{i,t} + \varepsilon \tag{4.2}$$

The results are shown in Table 4, where the dependent variables in the three columns are government subsidies, bank loans, and investment opportunities. In the first column, the coefficient on *Zombie* is 0.0011 and is statistically significant, which suggests that zombie firms receive higher government subsidies than non-zombie firms. In the second column, the coefficient on *Zombie* is 0.016 and is significant at the 1% level, suggesting that zombie firms receive 1.6% more bank loan funding than non-zombie firms. This contradicts the intuition that better-performing firms should receive more bank loans (as Chinese firms generally favor bank loans over other forms of funding). Although zombie firms are in financial distress, they attract more loans than other firms. These two sets of results suggest that zombie firms emerge because they receive government subsidies and credit from banks, rather than becoming bankrupt as would be expected under market rules.

The final column in Table 4 presents the relation between zombie status and investment opportunities, measured by Tobin's Q. The coefficient on *Zombie* is −0.0088 and is significant at the 5% level, suggesting that the value of Tobin's Q for zombie firms may be approximately 1% lower on average than other firms. Taken together, we find that zombie firms receive government subsidies and bank credit that exceed the levels other firms obtain, and their investment opportunities are lower than other firms. This is consistent with the literature that suggests zombie firms are highly reliant on government subsidies and bank credit for survival.

We then further extend model by incorporating the three key variables of *government subsidies*, *bank loans*, and *investment opportunity* to examine whether these key factors drive the financialization of zombie firms. We interact each of the three variables in turn with *Zombie*. A coefficient that is statistically significantly and is not

Table 4
Relations between zombie status and external funding supply and investment opportunities.

	Subsidy	Bank Loans	Investment Opportunity
Zombie	0.0011***	0.0160***	−0.0088**
	(4.10)	(6.21)	(−2.41)
Size	−0.0003	0.0024	0.0469***
	(−0.70)	(0.82)	(10.43)
Lev	0.0008	0.4811***	0.5374***
	(0.63)	(45.55)	(33.01)
ΔSales	0.0022***	−0.0064***	0.0297***
	(4.71)	(−4.72)	(11.65)
CFO	0.0006	−0.2020***	−0.0382**
	(0.41)	(−18.91)	(−2.02)
Age	−0.0009	0.0100	−0.3634***
	(−0.82)	(0.80)	(−15.45)
Profitability	0.0025	0.0270**	0.1356***
	(1.48)	(1.98)	(6.17)
Ownership	−0.0005	−0.0045	−0.0251**
	(−0.77)	(−0.62)	(−1.98)
Capital	0.0002	0.0836***	−0.0888***
	(0.16)	(5.14)	(−4.70)
GDP	0.0010	−0.0021	0.0288
	(0.79)	(−0.17)	(1.43)
ΔGDP	0.0021	−0.0410	−0.0701
	(0.26)	(−0.59)	(−0.64)
Industry	0.0012	0.0475	−0.1587**
	(0.24)	(1.15)	(−2.23)
Deficit	−0.0111	−0.0419	0.2003
	(−1.32)	(−0.46)	(1.56)
Constant	−0.0003	−0.0703	0.1920
	(−0.01)	(−0.46)	(0.78)
Year	Fixed	Fixed	Fixed
Firm	Fixed	Fixed	Fixed
Adj-R^2	0.0235	0.4704	0.3737
F-value	6.1227***	154.0437***	177.9386***
N	14,429	17,855	17,855

This table reports the results of the relations between zombie status and availability of bank loans, government subsidies, and investment opportunities. The first column reports the relation between zombie status and government subsidies received. The variable *Subsidy* is defined as the natural logarithm of total government subsidies received in the fiscal year. The second column reports the relation between zombie status and bank loans. *Bank* is defined as the natural logarithm of outstanding short- and long-term bank loans scaled by total assets. The third column reports the relation between zombie status and investment opportunities, measured by Tobin's Q, where a low Tobin's Q indicates limited investment opportunities. Other variables are as defined in Table 1. All regressions control for firm and year fixed effects. t-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

zero indicates that the variable has an impact on the financialization of zombie firms. The model is defined as follows, where Y represents one of the three key variables:

$$FIN_{i,t} = \alpha_0 + \alpha_1 Zombie_{i,t} + \alpha_2 Y_{i,t} + \alpha_3 Y_{i,t} * Zombie_{i,t} + \beta Controls_{i,t} + \varepsilon \quad (4.3)$$

The results are presented in Table 5, in which the three columns identify the impact of government subsidies, the supply of bank credit, and investment opportunities. In Column I, the coefficient on *Zombie*Subsidy* is 0.3914 and is statistically significant, whereas that on *Zombie* is 0.0015 and is not statistically significant, suggesting that zombie firms with government subsidies are more likely to financialize by holding increased amounts of financial assets. In Column II, the coefficient on *Zombie*Bank* is 0.0098 and is statistically significant, indicating that zombie firms with greater bank loans have an increased likelihood to financialize. Together, these two columns suggest that zombie firms with increased financial resources from government

Table 5
Determinants of financialization by zombie firms.

	I	II	III
Zombie	0.0015	0.0088***	0.0012
	(0.60)	(3.20)	(0.53)
Subsidy	−0.3455**		
	(−2.52)		
*Zombie*Subsidy*	0.3914**		
	(2.35)		
Bank		−0.0103***	
		(−5.18)	
*Zombie*Bank*		0.0098**	
		(2.49)	
Tobin Q			−0.0097***
			(−5.52)
*Zombie*Tobin Q*			−0.0078**
			(−2.32)
Size	−0.0161***	−0.0131***	−0.0117***
	(−5.50)	(−5.17)	(−4.64)
Lev	−0.0243**	−0.0310***	−0.0056
	(−2.40)	(−3.20)	(−0.62)
ΔSales	−0.0075***	−0.0075***	−0.0071***
	(−5.68)	(−6.42)	(−6.12)
CFO	−0.0193**	−0.0040	−0.0113
	(−2.01)	(−0.43)	(−1.24)
Age	0.0937***	0.0884***	0.0807***
	(6.18)	(6.84)	(6.28)
Profitability	−0.0334**	−0.0321**	−0.0278**
	(−2.37)	(−2.48)	(−2.15)
Ownership	−0.0063	−0.0014	−0.0019
	(−0.79)	(−0.19)	(−0.26)
Capital	−0.0923***	−0.0861***	−0.0861***
	(−7.82)	(−8.60)	(−8.64)
GDP	−0.0061	0.0020	0.0028
	(−0.49)	(0.18)	(0.24)
ΔGDP	0.1270**	0.1479***	0.1476***
	(2.09)	(2.69)	(2.67)
Industry	−0.0094	−0.0397	−0.0437
	(−0.23)	(−1.08)	(−1.19)
Deficit	−0.0875	−0.0686	−0.0614
	(−1.03)	(−0.86)	(−0.77)
Constant	0.1639	0.0186	−0.0059
	(1.06)	(0.14)	(−0.04)
Year	Fixed	Fixed	Fixed
Firm	Fixed	Fixed	Fixed
Adj-R^2	0.0878	0.0886	0.0910
F-Value	18.4990***	20.5525***	21.8616***
N	14,429	17,855	17,855

This table reports the results of the effects of bank loans, government subsidies, and investment opportunities on financialization by zombie firms, by interacting the corresponding indicators with the zombie firm indicator. The first column reports the impact of government subsidies. The variable *Subsidy* is defined as the natural logarithm of total government subsidies received in the fiscal year. The second column reports that of bank loans. *Bank* is defined as the natural logarithm of outstanding short- and long-term bank loans scaled by total assets. The third column reports the impact of investment opportunities, measured by Tobin's Q, where a low Tobin's Q indicates limited investment opportunities. Other variables are as defined in Table 1. All regressions control for firm and year fixed effects. t-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

subsidies or bank loans are likely to hold greater financial assets than other zombie firms, which is consistent with the literature and industrial experience indicating that zombie firms rely heavily on these two types of external support.

Column III of Table 5 shows the results of the potential effects of the available investment opportunities. The coefficient on *Zombie*Tobin Q* is −0.0078 and is statistically significant at the 5% level. A high value for Tobin's Q indicates high expectations of a firm and thus a high valuation from market participants, suggesting that the firm has strong investment opportunities. Thus, the negative coefficient on the interaction between zombie status and Tobin's Q suggests that zombie firms with good investment opportunities are less likely to financialize than those without such opportunities.

Together, the empirical tests in this section show that zombie firms are more likely to financialize themselves by increasing their holdings of financial assets. These firms often receive increased government subsidies and bank loan extensions while encountering insufficient investment opportunities in their main operations. This combination of abundant cash flow and scarce operating investment opportunities leads to the decision to financialize, which is thus a suboptimal strategy that fails to improve the firm's operational performance but secures a reasonable financial return and thus improves the financial numbers it reports.

5. Further studies and robustness checks

5.1. State-owned versus non-state-owned firms

We next analyze whether different ownership structures affect the association between zombie status and financialization. We examine whether the outcomes for state- and non-state-owned firms differ. Anecdotal evidence suggests that these two types of firms typically differ in terms of size, market share, and sometimes their links to the government.

Such differences have important implications for firm operations. State-owned firms are typically large, operating at several points on the supply chain, and dominate their markets in China. They may therefore be more likely to be affected by industrial guidance policies (Li and Yu, 2012). In addition, the executives and high-ranking management of many state-owned firms are former government officials, and retain their political connections, which can be beneficial in terms of influencing industrial policies but can also have negative consequences. These connections can help them obtain significant funding for investment in fixed assets such as plants and equipment, but this can make change difficult in terms of technological improvement and replacing old equipment and procedures. This drawback may result in a failure to appropriately adjust the firm's business model, thus leading to financial distress.

However, a firm in financial distress will not necessarily become bankrupt. Good government connections ensure easy access to subsidies, thus providing a first safeguard against bankruptcy. In addition, large firms that typically rely heavily on equipment can obtain sufficient resources to use as collateral when taking on debt, and their political connections can also help them obtain bank loans at reasonable cost. This provides a second safeguard.

Non-state-owned firms first emerged in China on the late 1970s. They are smaller in size than state-owned firms, but their profitability is not necessarily lower. Their small size, sensitivity to market and consumer changes, and their focus on R&D enable them to rapidly implement changes when needed. However, their flexibility can also make them vulnerable to various systematic risks, and if they grow into large corporate groups their flexibility can diminish, making them subject to some of the same challenges as state-owned firms. However, non-state-owned firms generally have less access to external support such as government subsidies and bank loans than state-owned firms. Thus, non-state-owned firms must independently solve any problems they encounter. Thus, we argue that non-state-owned zombie firms are more likely to financialize themselves than state-owned firms.

The two leftmost columns in Table 6 provide the results of our analysis on the different effects of zombie status on the financialization behavior of state- and non-state-owned firms. We find no statistically significant evidence that state-owned firms with zombie status are more likely to financialize, although the coefficient on *Zombie* is positive. However, the coefficient on *Zombie* for non-state-owned firms is positive and significant at

Table 6
Impacts of ownership structure and market development.

	Ownership Structure		Market Development	
	State-owned	Non-state-owned	More Developed	Less Developed
Zombie	0.0010	0.0053**	0.0008	0.0073***
	(0.30)	(2.05)	(0.24)	(3.03)
Constant	0.2173	0.1080	0.0233	0.1914
	(1.33)	(0.47)	(0.10)	(1.17)
Controls	Controlled	Controlled	Controlled	Controlled
Year	Fixed	Fixed	Fixed	Fixed
Firm	Fixed	Fixed	Fixed	Fixed
N	0.078	0.131	0.092	0.083
Adj-R^2	7,594	10,261	8,956	8,899
F-Value	7.1849***	20.1939***	12.5035***	10.0566***

This table reports the results of the effects of ownership structure and market development on financialization by zombie firms. The left columns examine the impact of whether firms are state-owned. The right columns examine the impact of market development. Regions are classified as having high or low development following the market development index of Wang et al. (2016a), Wang et al. (2016b). Regions are classified as more developed if their index value is above the sample median, and less developed otherwise. Other variables are as defined in Table 1. All regressions control for firm and year fixed effects. t-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

the 5% level, suggesting that non-state-owned zombie firms seek to increase their holdings of financial assets through financialization, which is consistent with our expectations.

5.2. Impact of market development

Whether and how market development affects firm behavior is an area of debate in academia. A developed market environment implies abundant investment opportunities, an enhanced regulatory setting that provides excellent investor protection, and good professional services such as consulting. A less developed market environment may not provide firms with these advantages (La Porta et al., 1997).

The Chinese market provides a unique setting to test the effects of market development. A single-country market ensures unity of regulation but modes of compliance differ according to variations in regional development. We examine whether and how the external market environment can impact zombie firms' financialization behavior. Firms in fully developed markets have access to various investment opportunities, and such an environment enables them to make timely and appropriate adjustments to their own business models. Zombie firms can either become bankrupt or quickly make changes using the resources available to them. These opportunities may not be available for firms in less developed markets, and some studies suggest that the concept of *guanxi* plays a central role in such markets (Berger et al., 2018; Yeung and Tung, 1996).

We propose that zombie firms' strategies regarding financialization can differ depending on the market in which they are based. Financialization is a last resort for firms, and those in developed markets may carefully consider adopting such an approach. However, firms in less developed markets may not have any other options available, and so financialization may be their optimal choice. They may obtain external support through local governmental connections in the form of subsidies and/or as low-cost loans, which can then secure their survival. However, they may have limited opportunities to invest in their business operations (Wu and Song, 2018).

Following Xiao et al. (2019), we apply the regional market development index of China from Wang et al. (2016a), Wang et al. (2016b) as our measure and treat regions with index scores above the median as *more developed regions* and others as *less developed regions*. The sample is then divided into these two groups. The results, shown in the rightmost columns of Table 6, support our expectations. The coefficient on *Zombie* for the more developed market group is positive but not statistically significant, which indicates that zombie firms in developed markets do not seek to financialize. In contrast, the coefficient on *Zombie* for the less devel-

oped market group is positive and significant at the 1% level, suggesting that in less developed regions zombie firms seek to financialize. Together with the discussion in Section 4.2, these findings suggest that the scarcity of investment opportunities in such markets may drive firms to financialization as a last resort.

5.3. Robustness checks

We first test an alternative to the CHK method for identifying zombie firms. We use the government's official criteria and regard zombie firms as those suffering three consecutive years of losses. Using this indicator, we replicate the tests based on model ; the results are reported in Column I of Table 7, Panel A. In addition, given the possibility that the local market environment can affect the decisions of zombie firms to financialize, as suggested in Section 5.2, we further examine regional trends by interacting the region and year indicators to

Table 7
Robustness tests.

Panel A

	Alternative Identification	Provincial Impact
Zombie	0.0057***	0.0036*
	(2.74)	(1.78)
Controls	Controlled	Controlled
*Year*Province*	None	Controlled
Year	Fixed	Fixed
Firm	Fixed	Fixed
Adj-R^2	0.087	0.109
N	17,855	17,855

Panel B

	Stage I	Stage II
IV	0.6136***	
	(14.03)	
Zombie		0.0518**
		(2.81)
Controls	Controlled	Controlled
Year	Fixed	Fixed
Firm	Fixed	Fixed
Adj-R^2	0.1123	0.0674
N	17,855	17,855

Panel C

	DID	PSM-DID
After × *Treat*	0.0058**	0.0153**
	(2.20)	(2.19)
Controls	Controlled	Controlled
Year	Fixed	Fixed
Firm	Fixed	Fixed
Adj-R^2	0.1123	0.0674
N	17,855	17,855

This table reports the results of robustness tests. Panel A presents the results using an alternative definition of zombie firms and controlling for province. Panel B reports the two-stage regression results with an instrumental variable defined as the percentage of firms that are zombie firms in the previous fiscal year. Panel C provides difference-in-differences (DID) results for both the full sample and a propensity-score-matched subsample. *After* is an indicator variable that takes the value 1 for all years after a firm becomes a zombie firm and 0 for other years. *Treat* is the first time that a firm changes from a normal state into a zombie status. Other variables are as defined in Table 1 and omitted statistics are available upon request. All regressions control for firm and year fixed effects. t-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels.

control for such effects. The results are shown in Column II of Panel A. Both sets of results are consistent with our main findings.

The distribution of zombie firms among industries may be unbalanced, which raises the concern that our main results may be driven by trends in different industries, rather than by zombie status. To address this, we take a two-stage approach and use the industry-wide percentage of zombie firms in the previous fiscal year as an instrumental variable. We regress the financialization of firms with the industry-wide percentage in the first stage and regress it again with the residuals obtained from Stage I with the zombie indicator. The results of the second stage suggest that zombie firms are strongly incentivized to financialize, regardless of whether they are in an industry with high or low levels of zombie firms.

Firms can financialize themselves in an attempt to improve the figures in their financial reports, whether they are zombie firms or not. Thus, our main findings could be led by firm characteristics other than zombie status. To alleviate this concern, we construct a difference-in-differences (DID) framework that simultaneously tests changes from non-zombie to zombie status and any effects coinciding with the timing of such changes. The results in both the DID and PSM-DID columns in Panel C of Table 7 suggest that the likelihood of financialization is enhanced substantially after a firm becomes a zombie firm, which is consistent with our main findings.

5.4. Spillover effect of financialization for zombie firms: A consequence

A final question remains to be addressed in this study. Although zombie firms may choose to financialize based on considerations such as their own characteristics, the industries that they belong to, and prevailing market conditions, whether such behavior can have spillover effects is unclear. Such effects may arise due to intense competition among market participants, which combined with the problem of low profitability that is particularly common in manufacturing industries, may lead to a trend of learning or imitation of enhancing cash holdings by, for example, obtaining subsidies and reduced-rate loans. This trend could be severe when markets are cooling or if firms are based in less developed regions where investment opportunities with positive net present value are scarce.

Following our finding that regional development inequality can lead to differing preferences for financialization by zombie firms, we further investigate whether zombie firms in specific provinces learn from each other when choosing a financialization strategy. We treat the percentage of total assets and liabilities held by zombie firms relative to the total amounts held by all zombie firms in a province as a proxy to measure the soft budgeting environment of these firms. If they are located in a province that has an exceedingly high level of zombie assets or liabilities holding, this indicates that the province can offer very limited operation investment opportunities, and thus zombie firms will find it difficult to recover if they are solely reliant on their

Table 8
Spillover effect of financialization for zombie firms.

	I	II
Zombie_assets	0.0193**	
	(2.53)	
Zombie_liabilities		0.0148**
		(2.14)
Controls	Controlled	Controlled
Year	Fixed	Fixed
Firm	Fixed	Fixed
Adj-R^2	0.0857	0.0855
N	17,855	17,855

This table reports the results of the possible contagion effect for financialization among zombie firms in a region. We identify the variables *Zombie_assets* and *Zombie_liabilities* as the percentage of assets and liabilities, respectively, that are held by zombie firms relative to the total amount of assets and liabilities held by all firms in that province. Other variables are as defined in Table 1 and omitted statistics are available upon request. All regressions control for firm and year fixed effects. t-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

core businesses, rather than financializing themselves by increased investment in the financial sector. This could trigger a contagion (or spillover) effect of financialization, particularly where the strategy is regarded as successful.

The OLS regression results with their residuals clustered at firm-level and with the firm-level fixed effect controlled are presented in Table 8. We find that the coefficients on *Zombie_assets* and *Zombie_liabilities* are positive and statistically significant at the 5% level. This is consistent with our expectation that financialization behavior is contagious in regions with high levels of zombie firms.

6. Conclusion and final remarks

We use a sample of Chinese A-share listed firms (listed on either the Shanghai or Shenzhen stock exchanges) from the 2006–2019 period, and find that zombie firms in China are more likely than other firms to invest in financial assets, which we define as financialization. We argue that such firms seek to profit from investment returns to offset business losses or improve their profitability. In line with previous studies of zombie firms in China that consider both bank lending and government industrial guidance, we find that these firms often have access to substantial subsidies and bank loans with reduced costs. Both resources ensure that zombie firms do not immediately become bankrupt. We also find that these firms may have very few operating investment opportunities, perhaps because of their outdated products or market strategies. These limited operating investment opportunities may trigger a diversion of resources to financial investments due to access to subsidies and bank loans, thus leading to high rates of financialization by zombie firms.

By examining the effects of firm ownership structure and regional market development, we find that the financialization of zombie firms is more common in regions that are not that well developed and where firms may have few opportunities to make operating investments and for non-state-owned firms. In addition, we find that the financialization strategy can be contagions among zombie firms in provinces with poor market development and with high percentages of zombie assets and liabilities, which suggests zombie firms find it difficult to recover if they rely solely on their core businesses.

Our findings reveal a triangular relationship among firms, government, and banks, which is difficult to untangle. An appropriate mechanism to align the interests of the three parties is required to secure the stability and prosperity of regional and national markets. For any region or country, a clear understanding of the conditions that create zombie firms and their behavior is of vital importance, as the existence of zombie firms can threaten the whole market by reducing efficiency and consuming resources that could have been assigned to agents able to make better use of them.

The financialization of zombie firms may also threaten the market by spreading risk from manufacturing to financial sectors. This risk can then be further extended to individuals who participate in the market through financial innovations such as securitization and hybrid derivatives. To alleviate such problems, eliminating zombie firms in a cautious but timely manner through accurate identification and simultaneously implementing reforms that respect the market and restrict government intervention, except in emergency conditions, are both extremely important.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Erratum

Erratum regarding missing Declaration of Competing Interest statements in previously published articles

Declaration of Competing Interest statements were not included in the published version of the following articles that appeared in previous issues of China Journal of Accounting Research.

The appropriate Declaration/Competing Interest statements, provided by the Authors, are included below.

1. "Government ownership and the capital structure of firms: Analysis of an institutional context from China" (China Journal of Accounting Research, 2018; 11(3): 171–185) https://doi.org/10.1016/j.cjar.2018.07.001

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2. "Anti-corruption, government subsidies, and investment efficiency" (China Journal of Accounting Research, 2019; 12(1): 113–133) https://doi.org/10.1016/j.cjar.2018.12.001

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Erratum

Erratum regarding previously published articles

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The appropriate Declaration/Competing Interest statements, provided by the Authors, are included below.

1. The impact of the Social Security Fund on auditor litigation risk [China Journal of Accounting Research, 2020;13/2:201–221]

The authors were contacted after publication to request a Declaration of Interest statement.

2. Annual report readability and corporate agency costs [China Journal of Accounting Research, 2018;11/3:187–212]

The authors were contacted after publication to request a Declaration of Interest statement.

3. The impact of accounting standards convergence on Chinese firms' overseas mergers and acquisitions [China Journal of Accounting Research, 2019;12/3:231–250]

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4. Monetary policy, government control and capital investment: Evidence from China [China Journal of Accounting Research, 2018;11/3:233–254]

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5. Pledgee competition, strategic disclosure, and future crash risk [China Journal of Accounting Research, 2019;12/3:271–291]

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6. Can material asset reorganizations affect acquirers' debt financing costs? – Evidence from the Chinese Merger and Acquisition Market [China Journal of Accounting Research, 2018;11/2:71–90]

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7. The effect of shared auditors in the supply chain on cost stickiness [China Journal of Accounting Research, 2019;12/4:337–355]

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8. Value relevance of proportionate consolidation versus the equity method: Evidence from Hong Kong [China Journal of Accounting Research, 2018;11/4:255–278]

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14. Are state ownership and auditors locality determinants of asset write-downs? Evidence from China [China Journal of Accounting Research, 2018;11/4:385–405]

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15. Quality of information disclosure, property rights, and bank loans: A bank heterogeneity perspective [China Journal of Accounting Research, 2019;12/1:63–92]

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Erratum

Erratum regarding previously published articles

Declaration of Competing Interest statements were not included in the published version of the following articles that appeared in previous issues of China Journal of Accounting Research.

The appropriate Declaration/Competing Interest statements, provided by the Authors, are included below.

1. Does independent directors monitoring affect reputation? Evidence from the stock and labor markets [China Journal of Accounting Research, 2018;11/2:91–127]

The authors were contacted after publication to request a Declaration of Interest statement.

2. Non-CEO top managers monitoring power and CEO pay-performance sensitivity in state-owned enterprises: Evidence from Chinese state-owned listed firms [China Journal of Accounting Research, 2019;12/4:411–430]

The authors were contacted after publication to request a Declaration of Interest statement.

3. The puzzling association between inventory and auditor pricing in China [China Journal of Accounting Research, 2018;11/4:351–366]

The authors were contacted after publication to request a Declaration of Interest statement.

4. Voluntary CSR disclosure, institutional environment, and independent audit demand [China Journal of Accounting Research, 2019;12/4:357–377]

The authors were contacted after publication to request a Declaration of Interest statement.

5. Do major customers promote firms innovation? [China Journal of Accounting Research, 2019;12/2:209–229]

The authors were contacted after publication to request a Declaration of Interest statement.

6. Is the quality of female auditors really better? Evidence based on the Chinese A-share market [China Journal of Accounting Research, 2018;11/4:325–350]

The authors were contacted after publication to request a Declaration of Interest statement.

7. Short-sale refinancing and price adjustment speed to bad news: Evidence from a quasi-natural experiment in China [China Journal of Accounting Research, 2019;12/4:379–394]

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