Share Pledge and Stock Repurchase: The Role of Stock Mispricing and Corporate Governance

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Abstract

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Keywords: Corporate governance; Share pledge; Stock mispricing; Stock repurchase.

JEL Classification: G30; G34; G35

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Abstract

Prior research documents a positive relation between controlling shareholders' share pledge and the probability of stock repurchase announcement. This study investigates whether and how stock mispricing and corporate governance affect this relation. By extending the framework of Chan, Chen, Hu, and Liu (2018), we first show that the share pledge is not only positively related to the probability of stock repurchase, but also proportionally related to the amount purchased. Moreover, for firms with shares pledged by controlling shareholders, stock overpricing is associated with lower probability of stock repurchase and less amount of stock repurchase, and better firm-level corporate governance predicts less amount of stock repurchase. Our evidence supports the market timing theory and that better corporate governance moderates the agency problem between controlling and small shareholders.

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1. Introduction

The protection of minority shareholders in corporations has long been of interest and discussed in the literature (Shleifer and Vishny, 1997; La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1999; Johnson, La Porta, Lopez-de-Silanes, and Shleifer, 2000; La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 2000; Djankov, La Porta, Lopez-de-Silanes, and Shleifer, 2008). Chan et al.'s (2018) margin call hypothesis suggests that, when controlling shareholders face margin call threats associated with their pledged shares, they are inclined to initiate stock repurchase to protect the pledged shares and their controlling rights. Their evidence indicates a positive relationship between controlling shareholders' share pledge and the probability of stock repurchase, implying an agency problem—controlling shareholders use corporate resources for their own benefits. This study details an investigation of this positive relationship and proposes that stock overpricing and better firm-level corporate governance could alleviate this agency problem between the controlling and minority shareholders.

The agency problem of corporation is an essential element of the so-called contractual view of the firm, developed by Coase (1937), Jensen and Meckling (1976), and Fama and Jensen (1983a, 1983b). The essence of the agency problem is the separation of ownership (shareholders) and control (management), referring to the difficulties investors have in assuring that their funds are not expropriated or wasted on unattractive projects. Corporate governance deals with the agency problem, and the goal of successful corporate governance system is to assure financiers that they receive an appropriate return on their financial investment. Shleifer and Vishny (1997) indicate that incentive contracts, legal protection, and ownership concentration work as corporate governance mechanisms that align managers' interests with those of

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shareholders, and, thus, alleviate the agency problem between shareholders and managers.

Large shareholders—one of the subcategories of ownership concentration—address the agency problem between managers and shareholders. That is, large shareholders have, both, a general interest in profit maximization and enough control over the assets of the firm to have their interests respected. However, extra agency problems and costs may arise from large shareholdings because large investors represent their own interests, which need not coincide with the interests of other minority investors in the firm (Shleifer and Vishny, 1997). The evidence of the expropriation of minority investors by the large investors has been extensively uncovered in the literature.[1]

In particular, Chan et al. (2018) point out a specific type of conflict of interests between controlling and minority shareholders, showing that controlling shareholders use corporate resources for their private benefit at the expense of other shareholders. Specifically, in Chan et al.'s (2018) margin call hypothesis, controlling shareholders initiate open-market share repurchase to lift the stock prices up, and, thus, mitigate potential margin calls when they have pledged shares for personal loans. The empirical evidence is in line with the hypothesis and suggests a positive relationship between controlling shareholders' share pledge and the probability of buyback program. They argue that this positive relationship is consistent with a control-rights explanation that

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[1] For example, Cheung, Stouraitis, and Wong (2005) find a positive relationship between managerial ownership and cash emoluments, suggesting that entrenched managers may use their ownership rights to extract higher salaries for themselves. Cheung, Rau, and Stouraitis (2006) report direct evidence of expropriation of minority shareholders using data on connected transactions. Liu and Tian (2012) find that, in firms with excess control rights, controlling shareholders use resources for tunneling rather than investing in positive net present value projects. Jiang, Rao, and Yue (2015) view controlling shareholders' non-operational fund occupancy as a direct measure for tunneling activity and find that better corporate governance could restrain such tunneling activities.

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controlling shareholders use repurchases to relieve margin call pressure, and the motivation is to protect their control over corporate resources and to extract private benefits.

In light of the existing literature documenting that the positive relationship between controlling shareholders' share pledge and the probability of buyback program is a self-serving behavior that expropriates minority shareholders' benefits, this study further explores whether and how firms can address the agency problem by preventing these pledge-driven repurchases. Since higher stock price refers to higher open-market repurchase costs (Ikenberry, Lakonishok, and Vermaelen, 1995; D'mello and Shroff, 2000; Baker and Wurgler, 2002), we first posit that stock overpricing would attenuate the probability of repurchase for firms with shares pledged by their controlling shareholders. Moreover, a better structure of corporate governance, which alleviates the agency problem between controlling and minority shareholders, should serve to reduce the probability and amount of these pledge-driven repurchases.

The first part of our investigation pertains to stock mispricing, which is found to be closely related to stock repurchase in the literature. Vermaelen (1981) finds that firms repurchase stock to signal undervaluation. Stephens and Weisbach (1998) show that repurchase activity is negatively correlated with prior stock returns, indicating that firms repurchase stock when their stock prices are perceived as undervalued. Dittmar (2000) simultaneously analyzes several motives to repurchase stock and finds that, throughout the sample period, firms repurchase stock to take advantage of potential undervaluation and, in many periods, to distribute excess capital. More recently, Bonaimé, Öztekin, and Warr (2014) find that underlevered and undervalued firms are more likely to announce a share repurchase program.

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That stock repurchase is positively related to stock undervaluation supports market timing theory. The notion of market timing refers to the practice of issuing shares at high prices and repurchasing them at low prices in order to exploit temporary fluctuations in the cost of equity and benefit ongoing shareholders at the expense of shareholders who are either entering or exiting (Ikenberry et al., 1995; D'mello and Shroff, 2000; Baker and Wurgler, 2002).[2] Since higher stock price incurs higher repurchase costs, which, in turn, make repurchase less favorable to existing shareholders, according to market timing theory, we hypothesize that stock overpricing reduces the probability and amount of the pledge-driven repurchases.

The second part of this study examines the role of firm-level corporate governance on the positive relationship between the share pledge and stock repurchase.[3] Extensive literature finds that more severe agency problem between controlling and minority shareholders leads to damages on investors and firm value. For example, Mitton (2002) uses firm-level data from five East Asian countries to show that firm-level corporate governance had a significant effect on performance during the Asian crisis. Baek, Kang, and Park (2004) find that more severe agency problem between controlling and minority shareholder is associated with lower firm value during the 1997 Korean financial crisis. In addition, Bae, Baek, Kang, and Liu (2012) propose a theoretical model and empirically test the hypothesis that controlling shareholders' expropriation incentives imply a link between corporate governance and firm value.

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[2] Baker and Wurgler (2002) suggest that overpriced stock reduces the cost of equity financing relative to the cost of other forms of capital.

[3] Pertaining to minority shareholder protection, there are two different strands of literature in terms of assessing and measuring corporate governance—country-level (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997, 1998, 1999, 2000, 2002; Reese and Weisbach, 2002; Doidge, Karolyi, Lins, Miller, and Stulz, 2009) and firm-level (Claessens, Djankov, Fan, and Lang, 2002; Sun, 2009; Mitton, 2002; Baek, Kang, and Park, 2004; Bae, Baek, Kang, and Liu, 2012).

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In general, the studies listed above suggest that better firm-level corporate governance implies higher firm value by reducing value-destroying or expropriation activities made by large shareholders. Since Chan et al. (2018) find that the positive pledge–repurchase relationship is a self-serving behavior of controlling shareholders, which then expropriates minority shareholders' benefits, we posit that a better structure of corporate governance, which addresses the agency problems between controlling and minority shareholders, should attenuate this positive relationship. Specifically, we empirically test the hypothesis that better firm-level corporate governance adversely affects both the probability and amount of the pledge-driven repurchases.

The sample consists of all listed companies in China. Following the sample selection criteria in Chan et al. (2018), we exclude financial firms, state-owned firms, and samples with the special treatment symbol. The final sample contains 51,069 firm-quarter observations during the period between July 2005 and December 2018. We adopt a firm's prior stock returns and market-to-book ratio (M/B ratio) to gauge the extent a stock may be mispriced (Loughran and Ritter, 1995, 1997; Baker and Wurgler, 2002; DeAngelo, DeAngelo, and Stulz, 2010; Chen, Chou, and Lin, 2019). Higher (lower) prior returns and M/B ratio imply plausible stock overpricing (underpricing).

This study uses two measures—ownership of board of director and top manager compensation—to describe the agency problem between controlling and minority shareholders. Ownership concentration has been found to be closely related to control entrenchment or expropriation on small investors in the literature (Shleifer and Vishny, 1997; Baek et al., 2004; Cheung, Stouraitis, and Wong, 2005). Accordingly, higher director ownership implies a more powerful board, and, thus, a higher agency problem, because large shareholders represent their own interests, which need not coincide with

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the interests of other minority investors in the firm. In addition, Basu, Hwang, Mitsudome, and Weintrop (2007) find that higher top executive income is associated with greater director ownership, which implies a positive relationship between top manager compensation and the agency problem. Further, since top managers are typically appointed or approved by (sometimes even sit in) the board, the board may ally itself with the top managers by high compensation, which serves as a proxy for the agency problem between controlling and minority shareholders.[4]

We begin our investigation by replicating the results of Chan et al. (2018), where the authors use Taiwan data and find a positive relationship between controlling shareholders' share pledge and stock repurchase announcements. Through examining the listed companies in China, we find consistent evidence showing that controlling shareholders' share pledge predicts higher probability of stock repurchase; thus, the pledge-driven repurchase, viewed as a self-serving behavior of controlling shareholders, is also evident in China. The empirical results are both qualitatively and quantitatively similar to those in Chan et al. (2018), facilitating our subsequent investigations of the interaction effects of stock mispricing and corporate governance on the pledge-driven repurchase.

Furthermore, we find that controlling shareholders' share pledge is not only associated with higher repurchase probability but also related to more repurchase amount. The results show that pledge firms, firms with higher pledge ratio, and firms with under-pressure pledge are associated with higher repurchase ratio, where repurchase ratio is the number of repurchase shares divided by the total number of

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[4] Cheung et al. (2005) examine the tunneling behavior of controlling shareholder and find a positive relationship between ownership concentration and executive compensation.

shares of the company. This indicates that large shareholders buy back more when the margin call pressure is more severe, and it is in line with the margin call hypothesis (Chan et al., 2018).

Next, the results confirm that stock overpricing is associated with lower probability and less amount of stock repurchase, which supports our hypothesis and is consistent with market timing theory (Ikenberry et al., 1995; D'mello and Shroff, 2000; Baker and Wurgler, 2002; Bonaimé et al., 2014). We use prior 6-month returns, prior 12-month returns, and current M/B ratio to proxy for the extent a stock may be mispriced (Loughran and Ritter, 1995, 1997; Baker and Wurgler, 2002; DeAngelo et al., 2010; Chen et al., 2019), and the coefficients on the interaction terms between these proxies and share pledge are mostly significantly negative, indicating that stock overpricing reduces such pledge-driven repurchase activities and reduces the amount of repurchase as the repurchase announced. The results are robust when we replace the current M/B ratio with the lagged ones.

Finally, we find limited evidence to support the hypothesis that better firm-level corporate governance attenuates the probability of the pledge-driven repurchase. However, we do find that better firm-level corporate governance lowers the amount of repurchase. Chan et al. (2018) suggest that restrictive regulations (i.e., country-level corporate governance) on the voting rights of pledging shares are more effective in alleviating self-serving behavior, and our findings imply that firm-level corporate governance may not be an effective substitute for the country-level governance in preventing such expropriation activities. Nevertheless, the empirical tests of the effect of pledge on repurchase amount show that better firm-level corporate governance is associated with lower amount of repurchase, indicating that firms with better firm-level

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corporate governance experience lower agency costs in such pledge-driven repurchases.

With these findings, this article contributes to prior literature in three main respects. First, we complement Chan et al.'s (2018) margin call hypothesis by examining the relationship between controlling shareholders' share pledge and the amount of repurchase. Chan et al. (2018) find that pledge firms are more likely to initiate stock repurchase, and we further show that pledge firms, firms with higher pledge ratio, and firms with under-pressure pledge would buy back more. That is, the agency costs between controlling and minority shareholders increase proportionately with the margin call pressure and pledge ratio.

Second, we provide support for market timing theory by showing that stock overpricing deters controlling shareholders from initiating stock repurchase to protect their pledged shares. Moreover, stock overpricing leads to higher costs of repurchase, resulting in less amount of repurchase when controlling shareholders initiate it. The evidence indicates that the costs of repurchase are carefully considered by controlling shareholders when they intend to initiate pledge-driven repurchases. The results are in line with the literature of repurchase and market timing theory, suggesting that firms prefer to buy back shares at relatively lower prices in order to exploit temporary fluctuations in the cost of equity, and, thus, benefit ongoing shareholders at the expense of shareholders who are exiting (Vermaelen, 1981; Ikenberry et al., 1995; Stephens and Weisbach, 1998; D'mello and Shroff, 2000; Dittmar, 2000; Baker and Wurgler, 2002; Bonaimé et al., 2014).

Third, the effectiveness and comparison between country- and firm-level corporate governance has long been of interest in the literature (Hail and Leuz, 2006; Chen, Chen, Wei, 2009; Francis, Hasan, and Song, 2012; Ge, Kim, and Song, 2012).

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Chan et al. (2018) suggest that country-level corporate governance (i.e., restrictive regulations) suppresses pledge-driven repurchase, and our evidence indicates that firm-level corporate governance works as a complement because firms with better firm-level corporate governance involve less amount of repurchase when they initiate such pledge-driven repurchase. This also implies that better firm-level corporate governance mitigates agency costs.

The remainder of the paper is organized as follows. Section 2 first describes the sample, variable construction, and empirical models used in this study, and then reports the summary statistics of the sample. Section 3 presents the empirical analyses and section 4 demonstrates additional robustness tests for our main findings. Section 5 concludes.

2. Data and methodology

2.1 Data

In China's capital market, two major regulations related to share pledge and stock repurchase of listed companies were announced and effective in November 2004 and June 2005, respectively.[5] To better investigate the issues of interest in this study, we choose a sample period subsequent to June 2005 and focus on the disclosures of share pledge released quarterly by public firms traded in Shanghai and Shenzhen Stock Exchange in China between July 2005 and December 2018. We exclude financial firms, state-owned firms (Chan et al., 2018; Huang, Yang, and Lin, 2020) and samples with the special treatment (ST) symbol, and further require quarterly financial data for

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[5] The first regulation, titled "*Measures for the administration of stock pledge loans of securities companies*," became effective on November 12, 2004. The second, titled "*The administrative measures for the repurchase of public shares by listed companies (Trial)*," became effective on June 16, 2005.

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sample firms in our regression analyses.[6] The final sample contains 51,069 firm-quarter observations, which are retrieved from the China Stock Market and Accounting Research (CSMAR) database and Research Set (Resset) database.

To proxy for repurchase, we employ two measures: *repurchase* and *repurchase ratio*. *Repurchase* is a dummy variable which equals 1 if a company announces open-market share repurchases, and zero otherwise. *Repurchase ratio* is the proportion of repurchases announced, defined as the announced amount of repurchase divided by total outstanding shares.

Controlling shareholder is the shareholder with the largest number of shares. If there are two or more shareholders with the same total number of shares, the controlling shareholder is the shareholder with the most outstanding shares. We use three measures—*pledge*, *pledge ratio*, and *pledge under pressure*—to describe the share pledge of controlling shareholders. *Pledge* is a dummy variable which equals 1 if the controlling shareholders have their shares pledged, and zero otherwise. The *pledge ratio* is the ratio of shares pledged relative to shares owned by the controlling shareholders. The larger the *pledge ratio*, the more investors worry that the controlling shareholders may be concerned about margin calls because it is more likely that controlling shareholders lose control of the company because of a sharp price drop (Chan et al., 2018). However, the *pledge ratio* does not consider whether the share price approaches the critical point and thus triggers margin calls. As pledged shares are generally marked

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[6] Following the sample selection criteria established by Chan et al. (2018), we remove state-owned companies from our sample. Huang et al. (2020) also empirically show that the positive relationship between share pledge and stock repurchase significantly exits only among non-state-owned firms in China. The evidence of this positive relationship is somewhat mixed and inconsistent for state-owned companies. We thus exclude them to better understand the interaction effects of stock mispricing and corporate governance. Stocks with the ST symbol indicate that the listed companies have negative earnings or their net assets are lower than the value of the stock for more than two consecutive years, and the stocks are traded at risks of being delisted.

to market, the probability of a margin call depends on recent stock performance. Therefore, following Chan et al. (2018), we apply the third measure, *pledge under pressure*, defined as the *pledge ratio* conditional on the previous 3-month stock return. We define *pledge under pressure* as the *pledge ratio* if the prior 3-month buy-and-hold stock return is lower than −20%, and zero otherwise.[7] The *pledge under pressure* is more relevant to triggering margin calls when firms experience recent poor stock returns.

As suggested by DeAngelo et al. (2010) and Chen et al. (2019), we gauge stock mispricing by adopting previous stock returns and the market-to-book ratio (M/B ratio). Higher previous stock returns and higher M/B ratio are expected to be associated with more stock overpricing (Loughran and Ritter, 1995, 1997; Baker and Wurgler, 2002; DeAngelo et al., 2010; Chen et al., 2019). We thus calculate *prior 6-month returns*, *prior 12-month returns*, and *M/B ratio* to describe stock mispricing. *M/B ratio* is the market value of equity divided by the book value of equity.

Finally, we use two measures—ownership of board of director and top manager compensation—to describe the agency problem between controlling and minority shareholders. *Director shareholding* is the shares held by board of directors divided by the total shares of the company. *Manager compensation* is the natural logarithm of the sum of the top three managers' compensation. Larger *director shareholding* and higher

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[7] Following Chan et al. (2018), we use an example to illustrate how we estimate margin call pressure by prior stock returns. Suppose the loan-to-value ratio is 60% and the threshold of collateral maintenance ratio, defined as the ratio of collateral security value to the loan amount, is set at 130%. When the loan is made, the initial maintenance ratio, which is simply the inverse of the loan-to-value ratio, is about 167% (=1.0/0.6). Pledgers will face a margin call when the share price drops and the collateral maintenance ratio falls below 130%. In other words, the stock price has to drop more than 22% from the initial market value (=1.30/1.67−1.00) to trigger a margin call. Based on this reasoning, we choose a prior return of −20% as the threshold at which controlling shareholders feel margin call pressure and start to take action. See Chan et al. (2018) for more details.

manager compensation indicate worse firm-level corporate governance in addressing the agency problem between controlling and minority shareholders. (Shleifer and Vishny, 1997; Baek et al., 2004; Cheung et al., 2005; Basu et al., 2007)

2.2 Methodology

We first use logit analyses to investigate the effect of share pledge on the probability of stock repurchase. The logit model is

$$Repurchase_{it} = \alpha_1 + \beta_1 Pledge_{it} + \beta_2' X_{it} + \beta_3' Z_{it} + \varepsilon_{it}, \tag{1}$$

where $Repurchase_{it}$ is a dummy variable that equals 1 if firm i announces stock repurchase in quarter repurchase.[8]

To test the relationship between share pledge and the amount of stock repurchase, we perform the ordinary least square (OLS) analyses. The model is specified as follows.

$$Repurchase\ ratio_{it} = \alpha_2 + \beta_4 Pledge_{it} + \beta_5' X_{it} + \beta_6' Z_{it} + \varepsilon_{it}, \tag{2}$$

where $Repurchase\ ratio_{it}$ is the announced amount of repurchase divided by total outstanding shares for firm i in quarter t; $Pledge_{it}$ is the *pledge*, *pledge ratio*, or *pledge under pressure* for firm i in quarter t; X_{it} is a vector of control variables for firm i in quarter t, including *size*, *B/M ratio*, *FCF*, *leverage*, *own ratio*, *cash dividend*, and *last year BHAR*; and Z_{it} is the year and industry fixed effects. A significant and positive β_4 suggests that controlling shareholder's share pledge positively affects the amount of stock repurchase.

Next, we expand Equations (1) and (2) to examine the interaction effects between

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[8] In robustness check section, we also use $pledge_{it-1}$ to address endogeneity concerns. The results are both quantitatively and qualitatively similar.

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stock mispricing and share pledge on stock repurchase. The logit and OLS models are specified as in Equations (3) and (4), respectively.

$$Repurchase_{it} = \alpha_3 + \beta_7 Pledge_{it} \times Mispricing_{it} + \beta_8 Pledge_{it} + \beta_9 Mispricing_{it} + \beta'_{10}\boldsymbol{X}_{it} + \beta'_{11}\boldsymbol{Z}_{it} + \varepsilon_{it}, \qquad (3)$$

$$Repurchase\ ratio_{it} = \alpha_4 + \beta_{12} Pledge_{it} \times Mispricing_{it} + \beta_{13} Pledge_{it} + \beta_{14} Mispricing_{it} + \beta'_{15}\boldsymbol{X}_{it} + \beta'_{16}\boldsymbol{Z}_{it} + \varepsilon_{it}, \qquad (4)$$

where $Repurchase_{it}$ is a dummy variable that equals 1 if firm i announces stock repurchase in quarter t, and 0 otherwise; $Repurchase\ ratio_{it}$ is the announced amount of repurchase divided by total outstanding shares for firm i in quarter t; $Pledge_{it}$ is the *pledge*, *pledge ratio*, or *pledge under pressure* for firm i in quarter t; $Mispricing_{it}$ is one of the three proxies for stock mispricing, *prior 6-month returns*, *prior 12-month returns*, or *M/B ratio*, for firm i in quarter t; and $\boldsymbol{X}_{it}$ and $\boldsymbol{Z}_{it}$ are defined as those in Equations (1) and (2).[9] The coefficients on the interaction terms, β_7 and β_{12}, are expected to be significantly negative, implying that stock overpricing adversely affects the positive relationship between share pledge and stock repurchase.

Similarly, we replace the proxies for stock mispricing with the proxies for firm-level corporate governance to investigate the interaction effects between corporate governance and share pledge on stock repurchase. The logit and OLS models are specified below.

$$Repurchase_{it} = \alpha_5 + \beta_{17} Pledge_{it} \times Governance_{it} + \beta_{18} Pledge_{it} + \beta_{19} Governance_{it} + \beta'_{20}\boldsymbol{X}_{it} + \beta'_{21}\boldsymbol{Z}_{it} + \varepsilon_{it}, \qquad (5)$$

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[9] We exclude the control variable, B/M ratio, in regressions where we adopt M/B ratio as the proxy for stock mispricing, because these two variables are seriously collinear, which makes the estimation inefficient.

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$$Repurchase\ ratio_{it} = \alpha_6 + \beta_{22}Pledge_{it} \times Governance_{it} + \beta_{23}Pledge_{it} +$$
$$\beta_{24}Governance_{it} + \beta'_{25}\boldsymbol{X}_{it} + \beta'_{26}\boldsymbol{Z}_{it} + \varepsilon_{it}, \qquad (6)$$

where $Governance_{it}$ is one of the two proxies for corporate governance, *director shareholding* or *manager compensation*, for firm i in quarter t. All other variables are defined as those in Equations (3) and (4). The coefficients on the interaction terms, β_{17} and β_{22}, are expected to be significantly positive, which supports our hypothesis that better corporate governance weakens the positive relationship between share pledge and stock repurchase.

2.3 Summary statistics

Table 1 presents the summary statistics of the sample, which consists of 51,069 firm-quarter observations in the period spanning from July 2005 to December 2018. Panel A reports the mean, median, standard deviation, first quarter, and third quarter for *repurchase, repurchase ratio, pledge, pledge ratio, pledge under pressure, prior 6-month returns, prior 12-month returns, director shareholding, manager compensation, size, leverage, FCF, B/M ratio, cash dividend, own ratio,* and *last year BHAR*. Further, 3.6% of our sample observations engage in stock repurchase, and the means and medians of the *repurchase ratio* are both close to zero. In addition, 39.7% of the sample have shares pledged by their controlling shareholders and the average *pledge ratio* is 25.0%.

[TABLE 1 ABOUT HERE]

Panel B of Table 1 shows arithmetic means for the sub-sample of pledge firms. Pledge firms are those with shares pledged by their controlling shareholders, and they are more likely to buy back stocks once they experience a downward shift in the stock

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prices. For example, the *prior 6-month* (*12-month*) *return* for repurchase and non-repurchase firms are -0.052 (-0.047) and 0.063 (0.168), respectively, and the difference is significant at the 1% level, indicating that stock overpricing is negatively related to stock repurchase among pledge firms. The univariate results support the market timing theory, suggesting that stock overpricing is associated with higher repurchase costs, and prevents companies from buying back their shares.

Panel B also reveals that pledge firms are more likely to buy back stocks with worse corporate governance structure. For example, the *director shareholding* and *manager compensation* for repurchase and non-repurchase firms are 0.238 (14.603) and 0.166 (14.245), respectively, and the difference is significant at the 1% level, which implies that better firm-level corporate governance prevents companies from buying back their shares among pledge firms. Moreover, some univariate patterns between repurchase and non-repurchase groups in pledge firms are consistent with the findings in the literature. For example, repurchase firms have lower leverage, higher free cash flow, and lower cash dividends (Bagwell and Shoven, 1989; Jagannathan, Stephens, and Weisbach, 2000; Fama and French, 2001; Grullon and Michaely, 2002). The results are in line with the trade-off theory of capital structure, the notion of firm life cycle, and the substitution effects between cash dividend and repurchase.

3. Empirical results

In this section, we present results from our main empirical tests. We first test the validity of controlling shareholders' share pledge as a positive shock to stock repurchase by examining its effect on the probability and amount of stock repurchase in section 3.1. We next investigate the interaction effects of stock mispricing and corporate governance on this positive relation in sections 3.2 and 3.3, respectively.

3.1 Share pledge and stock repurchase

We begin our empirical analyses by validating controlling shareholders' share pledge as a positive shock to both the probability of stock repurchase announcement and the amount of share repurchase. Columns 1, 2, and 3 of Table 2 demonstrate the results of logit analyses, in which the dependent variable is the dummy for repurchase announcement. In Column 1, the coefficient on the *pledge* dummy is 0.498, significant at the 1% level, indicating that pledge firms are more likely to initiate repurchase program. Similarly, the coefficient on *pledge ratio* is significantly positive at 0.256 in Column 2, which suggests that firms with higher pledge ratio are more inclined to announce share repurchase. In Column 3, the significant and positive coefficient on *pledge under pressure*, 0.312, reveals that pledge firms are associated with higher probability of stock repurchase when controlling shareholders are facing severe margin call pressure. In sum, in the logit analyses, we replicate similar results of Chan et al. (2018) by showing the positive coefficients on *pledge*, *pledge ratio*, and *pledge under pressure* in Columns 1, 2, and 3 of Table 2, respectively. The evidence supports the margin call hypothesis that the controlling share holders' share pledge is positively related to the probability of repurchase announcement.

[TABLE 2 ABOUT HERE]

Subsequently, we replace the *repurchase* dummy with *repurchase ratio*, and regress it on the same set of independent variables in Columns 4, 5, and 6 of Table 2. The coefficients on the *pledge* dummy and *pledge ratio* are significantly positive at 0.029 and 0.024, respectively, indicating that pledge firms and firms with higher pledge ratio tend to buy back more shares. Similar pattern holds when we replace the independent variable with *pledge under pressure* in Column 6. The coefficient on it is

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0.044 and significant at the 1% level, which suggests that pledge firms buy more shares when there exists a margin call pressure.

Overall, the empirical evidence in Table 2 suggests that pledge firms are positively related to stock repurchase announcement and repurchase amount, which is in line with the margin call hypothesis proposed by Chan et al. (2018). We next examine whether and how stock mispricing and corporate governance affect this positive relationship.

3.2 Effects of stock mispricing

To investigate the role of stock mispricing, we first use *prior 6-month returns* to proxy for the extent to which a stock may be mispriced. The results in Table 3 reveal that stock overpricing adversely affects the positive relationship between share pledge and stock repurchase. In the logit analyses of Columns 1, 2, and 3, the coefficients on the interaction terms between stock mispricing and *pledge*, *pledge ratio*, and *pledge under pressure* are -0.540, -0.604, and -2.692, respectively, and significant at the 5% level or better, indicating that stock overpricing results in lower probability of stock repurchase for pledge firms. Similarly, as the dependent variable is replaced with *repurchase ratio* in Columns 4, 5, and 6 of Table 3, the significant and negative coefficients on the interaction terms, -0.053, -0.064, and -0.341, suggest that stock overpricing is associated with less repurchase amount.

[TABLE 3 ABOUT HERE]

The empirical findings in Table 3 are consistent with the market timing theory, which suggests that firms are more likely to issue (buy back) shares when the stock prices are overvalued (undervalued). Our evidence shows that stock overpricing makes repurchase more costly for pledge firms, and, consequently, lowers both the repurchase

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probability and amount. In addition, it is interesting and worth noting that the coefficients on *pledge under pressure* in Columns 3 and 6 become insignificant or less significant, implying that the positive relationship between share pledge and stock repurchase can be substantially affected and driven by stock mispricing

Next, we use another proxy for stock mispricing, *M/B ratio*, to investigate the interaction effect. The results are consistent with what we present in Table 4, revealing that stock overpricing adversely affects the positive relationship between share pledge and stock repurchase. In the logit analyses of Columns 1, 2, and 3, the coefficients on the interaction terms between stock mispricing and *pledge, pledge ratio,* and *pledge under pressure* are -0.161, -0.217, and -0.248, respectively, and significant at the 10% level or better, indicating that stock overpricing leads to lower probability of stock repurchase for pledge firms. Similarly, as the dependent variable is replaced with *repurchase ratio* in Columns 4, 5, and 6 of Table 4, the significant and negative coefficients on the interaction terms, -0.007, -0.008, and -0.025, suggest that stock overpricing results in less repurchase amount.

[TABLE 4 ABOUT HERE]

Overall, the empirical evidence in Tables 3 and 4 suggests that that stock overpricing adversely affects the positive relationship between controlling shareholders' share pledge and stock repurchase. Our evidence supports the market timing theory that firms are more likely to buy back shares when the stock prices are undervalued (Ikenberry et al., 1995; D'mello and Shroff, 2000; Baker and Wurgler, 2002; Bonaimé et al., 2014). We next examine whether and how corporate governance affects this positive relationship.

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3.3 Effect of corporate governance

In this subsection, we adopt two measures for gauging firm-level corporate governance—*director shareholding* and *manager compensation*—to examine the interaction effects on stock repurchase. Table 5 demonstrates the logit and OLS estimation results with *director shareholding* as the proxy for corporate governance. In Columns 1, 2, and 3, the coefficients on the interaction terms between *director shareholding* and *pledge*, *pledge ratio*, and *pledge under pressure* are all positive, but the t-values are lower than the critical value of 10% level. That is, although the positive coefficients suggest that better corporate governance can attenuate the positive relationship between share pledge and the probability of stock repurchase, the evidence is somewhat limited to support our hypothesis in terms of statistical significance.

[TABLE 5 ABOUT HERE]

However, we do find consistent results from the OLS estimation, which suggests that better corporate governance moderates the positive relationship between share pledge and stock repurchase. In columns 4, 5, and 6, the coefficients on the interaction terms are 0.032, 0.064, and 0.298, respectively, and all of them are statistically significant at the 1% level, indicating that better corporate governance significantly reduces repurchase ratio and work as a mechanism to alleviate the agency problem between controlling shareholders and small investors.

The coefficient on the interaction term between *director shareholding* and *pledge under pressure* is the largest (compared to 0.032 and 0.064) and significant at 0.298, which is consistent and supports the margin call hypothesis brought up by Chan et al. (2018). In addition, the coefficient on *pledge under pressure* in Column 6 of Table 5

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becomes insignificant at 0.015, implying that the positive relationship between share pledge and repurchase amount can be significantly influenced and driven by corporate governance.

We find similar results once we replace the *director shareholding* with *manager compensation* in the empirical tests. Table 6 demonstrates the logit and OLS estimation results with *manager compensation* as the proxy for corporate governance. In Columns 1, 2, and 3, the coefficients on the interaction terms between *director shareholding* and *pledge*, *pledge ratio*, and *pledge under pressure* are all positive, but the t-values are surprisingly lower than the critical value of 10% level.

Similarly, we do find consistent results from the OLS estimation, which suggest that better corporate governance moderates the positive relationship between share pledge and stock repurchase. In columns 4, 5, and 6, the coefficients on the interaction terms are 0.024, 0.026, and 0.036, respectively, and all of them are statistically significant at the 1% level, indicating that better corporate governance significantly reduces repurchase ratio and work as a mechanism to alleviate the agency costs between controlling shareholders and small investors.

[TABLE 6 ABOUT HERE]

Overall, the empirical evidence in Tables 5 and 6 suggests that better firm-level corporate governance predicts less amount of stock repurchase and alleviates the agency problem. Chan et al. (2018) suggest that country-level corporate governance is effective in reducing such pledge-driven repurchases, and our findings imply that firm-level corporate governance may not be an appropriate substitute for country-level governance in preventing repurchase announcement. Nevertheless, better firm-level

corporate governance is associated with lower amount of repurchase, indicating that firms with better firm-level corporate governance experience less agency costs in such pledge-driven repurchases.

4. Robustness checks

In this section, we conduct a battery of additional tests to check the robustness of our main results in section 3. This section starts with the investigation on the positive relationship between share pledge and stock repurchase, followed by the interaction effects of stock mispricing and corporate governance.

To better identify the causality between controlling shareholders' share pledge and stock repurchase, we replace the concurrent *pledge*, *pledge ratio*, and *pledge under pressure* with one-quarter lagged ones. Table 7 presents the estimated coefficients and shows that the results are similar to those in Table 2. In the logit analyses, the coefficients on the lagged *pledge*, *pledge ratio*, and *pledge under pressure* are positive at 0.415, 0.175, and 0.228, respectively, and all of them are significant at the 5% level or better, suggesting that pledge firms, or firms with higher pledge ratio, predict higher probability of stock repurchase subsequently. In the OLS analyses, the coefficients on the lagged *pledge*, *pledge ratio*, and *pledge under pressure* are positive at 0.020, 0.017, and 0.031, respectively, and all of them are significant at the 1% level, indicating that pledge firms and firms with higher pledge ratio tend to buy back more shares pledge and that firms buy more shares when margin call pressure presents.

[TABLE 7 ABOUT HERE]

The consistent evidence in Table 7 suggests that pledge firms are positively related to stock repurchase announcement and repurchase amount, which is in line with the

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margin call hypothesis proposed by Chan et al. (2018). We next check the robustness of our empirical findings on the interaction effects of stock mispricing and corporate governance on this positive relation.

To better investigate the role of stock mispricing, we adopt two more measures for gauging stock mispricing. First, we replace *prior 6-month returns* with *prior 12-month returns* to proxy for the extent a stock may be mispriced. Table 8 presents the estimated coefficients and shows that the results are similar to those in Table 3. In the logit analyses, the coefficients on the interaction terms between stock mispricing and *pledge*, *pledge ratio*, and *pledge under pressure* are -0.567, -0.624, and -4.059, respectively, and all of them are significant at the 1% level, indicating that stock overpricing results in lower probability of stock repurchase for pledge firms. In the OLS analyses, the coefficients on the interaction terms between stock mispricing and *pledge*, *pledge ratio*, and *pledge under pressure* are negative at -0.039, -0.047, and -0.398, respectively, and all of them are significant at the 1% level, suggesting that stock overpricing is associated with less repurchase amount.

[TABLE 8 ABOUT HERE]

Second, we replace *M/B ratio* with lagged *M/B ratio* to proxy for stock mispricing. Table 9 presents the estimated coefficients and shows that the results are similar to those in Table 4. In Columns 1 to 6, the coefficients on the interaction terms between stock mispricing and *pledge*, *pledge ratio*, and *pledge under pressure* are all negative at -0.104, -0.170, -0.133, -0.004, -0.006, and -0.004, respectively, and five of them are significant at the 10% level or better, indicating that stock overpricing results in lower probability of stock repurchase and less repurchase amount.

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[TABLE 9 ABOUT HERE]

In sum, the empirical evidence in Tables 8 and 9 suggests that that stock overpricing adversely affects the positive relationship between share pledge and stock repurchase. Our main results for the interaction effects of stock mispricing are robust, and the evidence supports the market timing theory.

To check the robustness of the results for the interaction effects of corporate governance, we adopt four more measures for corporate governance. They are lagged *director shareholding*, lagged *manager compensation*, *director shareholding dummy*, and *manager compensation dummy*. First, we replace the concurrent *pledge*, *pledge ratio*, *pledge under pressure*, and *director shareholding* with one-quarter lagged ones. Table 10 presents the estimated coefficients and shows that the results are similar to those in Table 5. In the logit analyses, the coefficients on the interaction terms between lagged *director shareholding* and lagged *pledge*, lagged *pledge ratio*, and lagged *pledge under pressure* are not significant. However, the OLS estimation suggests that better firm-level corporate governance moderates the positive relationship between share pledge and stock repurchase. In the logit analyses, the coefficients on the interaction terms are 0.022, 0.038, and 0.141, respectively, and all of them are statistically significant at the 10% level or better, indicating that better corporate governance significantly reduces buyback ratio in such pledge-driven repurchases.

[TABLE 10 ABOUT HERE]

Second, we replace the concurrent *pledge*, *pledge ratio*, *pledge under pressure*, and *manager compensation* with one-quarter lagged ones. Table 11 reports the estimated coefficients and shows that the results are similar to those in Table 6. The

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OLS estimation indicates that firms with better structure of corporate governance experience less agency costs.

[TABLE 11 ABOUT HERE]

Third, since our measures of firm-level corporate governance can be noisy in gauging the quality of corporate governance, we create "bad governance dummy" for better identifying the effects of corporate governance. For every year, *director shareholding dummy* (*manager compensation dummy*) is set to 1 if a company's *director shareholding (manager compensation)* is among the top one-third in the sample, and zero otherwise. We then replace *director shareholding* with *director shareholding dummy* in the estimation; Table 12 demonstrates the results. Consistent with the previous findings, the OLS estimation suggests that better corporate governance moderates the positive relationship between share pledge and repurchase amount. In the OLS analyses, the coefficients on the interaction terms are 0.011, 0.018, and 0.074, respectively, and all of them are statistically significant at the 5% level or better, indicating that better corporate governance significantly reduces repurchase ratio.

[TABLE 12 ABOUT HERE]

Finally, we replace *director shareholding dummy* with *manager compensation dummy*, and consistent results are presented in Table 13. That is, better firm-level corporate governance leads to less repurchase ratio.

[TABLE 13 ABOUT HERE]

Overall, our main results for the interaction effects of corporate governance on stock repurchase are robust with different measures. The evidence in Tables 10, 11, 12,

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and 13 suggests that better corporate governance significantly reduces repurchase ratio and works as a mechanism to alleviate the agency problem between controlling shareholders and small investors in such pledge-driven repurchase activities.

5. Conclusion

The agency problems and costs between large shareholders and small investors has long been of interest and extensively discussed in the literature. In particular, by employing Taiwanese data and a regulation shock in 2011, Chan et al. (2018) develop and test a margin call hypothesis, suggesting that, when controlling shareholders face margin call threats associated with their pledged shares, they are inclined to initiate a stock repurchase to protect the pledged shares and their controlling rights. This study revisits the margin call hypothesis proposed by Chan et al. (2018), and we further posit that higher costs in stock repurchase and better firm-level corporate governance would reduce such pledge-driven repurchases, and, thus, attenuate the agency problem between controlling and minority shareholders.

By examining the data of all listed companies traded in Shanghai and Shenzhen Stock Exchange in China between July 2005 and December 2018, we first replicate similar results of Chan et al. (2018), showing that controlling shareholders' share pledge is associated with higher probability of repurchase announcement. In addition, we complement the margin call hypothesis by showing that repurchase ratio increases proportionately with pledge ratio, suggesting that the agency costs do not depend only on whether controlling shareholders' pledge their shares, but also on how much they have pledged.

Next, we examine the interaction effects of stock mispricing and corporate

governance on the pledge-driven repurchases. The results confirm that stock overpricing is associated with lower probability and less amount of stock repurchase, which supports our hypothesis and is consistent with market timing theory. Finally, we find limited evidence to support that better firm-level corporate governance attenuates the probability of the pledge-driven repurchase. However, better firm-level corporate governance can significantly lower the amount of repurchase for pledge firms.

This paper contributes to the literature in three respects. First, we complement Chan et al.'s (2018) margin call hypothesis by showing that the agency costs between controlling and minority shareholders (i.e., the repurchase ratio) increase proportionately with the pledge ratio. Second, we provide support for market timing theory by showing that stock overpricing deters controlling shareholders from initiating a stock repurchase to protect their pledged shares. Moreover, stock overpricing leads to higher costs of repurchase, resulting in less amount of repurchase when controlling shareholders initiate it.

Third, Chan et al. (2018) suggest that country-level corporate governance suppresses pledge-driven repurchases, and our evidence indicates that firm-level corporate governance works as a complement because firms with better firm-level corporate governance involve less amount of repurchase when such pledge-driven repurchases occur. This implies that better firm-level corporate governance mitigates the agency costs between controlling and minority shareholders.

As the conflicts of interest between large and small shareholders represent agency costs in a corporation, which are important determinants of firm value, we hope our investigation sheds lights on whether and how we can prevent controlling shareholders from using corporate resources to buy back shares for protecting their own benefits. In

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this paper, we focus on the effects of stock mispricing and inside firm-level corporate

governance. We call for further research (e.g., outside firm-level corporate governance)

to investigate how we can address the agency problem embedded among different

shareholders.

Appendix. Variable Definition and Description

Variable	Definition and description
Repurchase	Repurchase is 1 if a company announces open-market share repurchases, and zero otherwise.
Repurchase ratio	Repurchase ratio is the proportion of repurchases announced quarterly. We define repurchase ratio as the number of repurchase shares divided by the total number of shares of the company. We rescale repurchase ratio by multiplying it by 1000 in all our regression analyses.
Pledge	Pledge is 1 if the controlling shareholders have their shares pledged, and zero otherwise.
Pledge ratio	Pledge ratio is the proportion of shares pledged by controlling shareholders. Pledge ratio equals to the number of shares pledged by controlling shareholders divided by the total number of shares of the controlling shareholders.
Pledge under pressure	Pledge under pressure equals to pledge ratio if a stock's previous three-month stock return is lower than -20%, and zero otherwise.
Prior 6-month returns	Prior 6-month returns are the holding period yields over the past six months as of the beginning of a given quarter.
Prior 12-month returns	Prior 12-month returns are the holding period yields over the twelve months as of the beginning of a given quarter.
Director shareholding	Director shareholding is the shareholding ratio of the board of directors quarterly. Director shareholding is the shares held by board of directors divided by the total shares of the company.
Manager compensation	Manager compensation is the natural logarithm of the sum of the top three managers' compensation.
Size	Size is the natural logarithm of market value at the end of each quarter.
Leverage	Leverage is industry-adjusted financial leverage, defined as the difference between a firm's financial leverage and the industry median financial leverage. Financial leverage = (Net profit + Income tax expense + Financial expense)/ (Net profit + Income tax expense).
FCF	FCF is free cash flow measure scaled by sales and adjusted by the industry median, where free cash flow = Earnings Before Interest and Tax (EBIT) – Taxation + Depreciation & Amortization – Changes in Working Capital – Capital expenditure.
B/M ratio	B/M ratio is the book-to-market ratio, defined as the book value of common equity divided by the market value of equity.
M/B ratio	M/B ratio is the market-to-book ratio, defined as the market value of common equity divided by the book value of equity.
Cash dividend	Cash dividend is cash dividends per share.
Own ratio	Own ratio is the proportion of shares held by the controlling shareholders, and it is calculated as the number of shares held by the controlling shareholders divided by the total number of shares of the company.
Last year BHAR	Last year BHAR is the buy and hold abnormal returns (BHAR) over the previous year, and it is calculated as the holding period returns of the company in the previous year minus the holding period returns of the market in the previous year.
Director shareholding dummy	Director shareholding dummy is to describe the quality of corporate governance. In every year, Director shareholding dummy is set to 1 if a company's Director shareholding is in the top one-third, and zero otherwise.
Manager compensation dummy	Manager compensation dummy is to describe the quality of corporate governance. In every year, Manager compensation dummy is set to 1 if a company's Manager compensation is in the top one-third, and zero otherwise.

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Table 1
Summary Statistics

This table presents the summary statistics of the sample. We have 51,069 firm-quarter observations in the period spanning from July 2005 to December 2018. Panel A shows the mean, median, standard deviation (SD), first quartile (Q1), and third quartile (Q3) for all the samples. We then sort pledge firms into repurchase and non-repurchase sub-groups in Panel B, and it reports the arithmetic means for the sub-samples. Columns 1 and 2 are for repurchase firms and non-repurchase firms, respectively. ***, **, and * denote significance at 1%, 5%, and 10%, respectively. See Appendix for detailed variable definitions.

Panel A: Summary statistics

Variable	N	mean	median	SD	Q1	Q3
Repurchase	51069	0.036	0.000	0.187	0.000	0.000
Repurchase ratio ($\times 10^3$)	51069	0.038	0.000	0.267	0.000	0.000
Pledge	51069	0.397	0.000	0.489	0.000	1.000
Pledge ratio	51069	0.250	0.000	0.363	0.000	0.515
Pledge under pressure	51069	0.035	0.000	0.160	0.000	0.000
Prior 6-month returns	45680	0.087	-0.001	0.384	-0.168	0.246
Prior 12-month returns	37424	0.217	0.032	0.662	-0.220	0.446
Director shareholding	51069	0.132	0.003	0.203	0.000	0.238
Manager compensation	51069	14.161	14.175	0.777	13.673	14.652
Size	51069	22.413	22.363	0.944	21.757	22.999
Leverage	51069	0.307	-0.021	1.108	-0.134	0.269
FCF	51069	-0.104	-0.001	0.876	-0.193	0.137
B/M ratio	51069	0.817	0.580	0.754	0.347	0.992
Cash dividend	51069	0.020	0.000	0.063	0.000	0.000
Own ratio	51069	0.266	0.255	0.172	0.131	0.386
Last year BHAR	51069	0.106	-0.011	0.526	-0.192	0.257

Panel B：Sub-sample for pledge firms

Variable	Repurchase		Non-repurchase		Difference
	N	(1)	N	(2)	(2) - (1)
Repurchase ratio	1276	0.001	18991	0.000	-0.001***
Pledge ratio	1276	0.556	18991	0.634	0.078***
Pledge under pressure	1276	0.100	18991	0.089	-0.011**
Prior 6-month returns	1147	-0.052	16635	0.063	0.115***
Prior 12-month returns	936	-0.047	12947	0.168	0.214***
Director shareholding	1276	0.238	18991	0.166	-0.071***
Manager compensation	1276	14.603	18991	14.245	-0.358***
Size	1276	22.809	18991	22.571	-0.238***
Leverage	1276	0.124	18991	0.319	0.195***
FCF	1276	-0.062	18991	-0.122	-0.060**
B/M ratio	1276	0.699	18991	0.745	0.046**
Cash dividend	1276	0.020	18991	0.023	0.003*
Own ratio	1276	0.294	18991	0.317	0.022***
Last year BHAR	1276	0.017	18991	0.114	0.097***

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Table 2
Share Pledge and Repurchases

This table reports logit and OLS analyses of share pledge and repurchases. The sample consists of 51,069 firm-quarter observations during July 2005 to December 2018. In the logit regression (Columns 1, 2, and 3), the dependent variable is *repurchase*, and equal to 1 if the company announces repurchase in the current quarter; and zero otherwise. In the OLS regression (Columns 4, 5, and 6), the dependent variable is *repurchase ratio*, defined as the number of repurchase shares divided by the total number of shares of the company. *Pledge*, *pledge ratio*, *pledge under pressure*, *size*, *B/M ratio*, *FCF*, *leverage*, *own ratio*, *cash dividend,* and *last year BHAR* are as defined in Appendix. All variables are measured quarterly and winsorized at the top and bottom 1%. Industry and year fixed effects are included. Numbers in parentheses are t-values. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Logit			OLS		
Intercept	-11.943***	-11.733***	-11.668***	-0.105***	-0.102***	-0.098***
	(-9.21)	(-9.06)	(-9.01)	(-2.79)	(-2.69)	(-2.60)
Pledge	0.498***			0.029***		
	(9.05)			(10.47)		
Pledge ratio		0.256***			0.024***	
		(3.81)			(6.87)	
Pledge under pressure			0.312***			0.044***
			(2.66)			(5.86)
Size	0.262***	0.258***	0.260***	0.005***	0.005***	0.005***
	(8.07)	(7.98)	(8.02)	(3.11)	(3.09)	(3.21)
B/M ratio	-0.052	-0.083*	-0.091**	0.000	-0.001	-0.001
	(-1.11)	(-1.81)	(-1.99)	(0.09)	(-0.37)	(-0.59)
FCF	0.096***	0.092***	0.089***	0.004***	0.004***	0.004***
	(3.15)	(3.01)	(2.91)	(2.88)	(2.82)	(2.73)
Leverage	-0.263***	-0.244***	-0.223***	-0.003**	-0.003**	-0.002**
	(-5.93)	(-5.62)	(-5.33)	(-2.51)	(-2.43)	(-2.00)
Own ratio	-0.896***	-0.719***	-0.713***	-0.034***	-0.027***	-0.025***
	(-5.12)	(-4.22)	(-4.21)	(-4.51)	(-3.58)	(-3.28)
Cash dividend	0.437	0.400	0.353	-0.031	-0.028	-0.028
	(1.18)	(1.08)	(0.96)	(-1.61)	(-1.46)	(-1.47)
Last year BHAR	-0.251***	-0.237***	-0.243***	-0.011***	-0.011***	-0.011***
	(-4.12)	(-3.91)	(-4.01)	(-4.65)	(-4.50)	(-4.63)
Industry fixed effect	YES	YES	YES	YES	YES	YES
Year fixed effect	YES	YES	YES	YES	YES	YES
Adj. R^2 (Pseudo R^2)	0.157	0.153	0.152	0.030	0.029	0.028
Obs.	51069	51069	51069	51069	51069	51069

Table 3
Prior 6-month Stock Returns and Share Repurchases

This table reports logit and OLS analyses of the interaction effects between prior 6-month stock returns and share pledge on repurchases. The sample consists of 45,680 firm-quarter observations during July 2005 to December 2018. In the Logit regression (Columns 1, 2, and 3), the dependent variable is *repurchase*, and equal to 1 if the company announces repurchase in the current quarter; and zero otherwise. In the OLS regression (Columns 4, 5, and 6), the dependent variable is *repurchase ratio*, defined as the number of repurchase shares divided by the total number of shares of the company. *Prior 6-month stock return* is the holding period yields over the past six months as of the beginning of a given quarter. *Pledge*, *pledge ratio*, *pledge under pressure*, *size*, *B/M ratio*, *FCF*, *leverage*, *own ratio*, *cash dividend,* and *last year BHAR* are as defined in Appendix. All variables are measured quarterly and winsorized at the top and bottom 1%. Industry and year fixed effects are included. Numbers in parentheses are t-values. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Logit			OLS		
Intercept	-10.812***	-10.455***	-10.190***	-0.138***	-0.129***	-0.115***
	(-8.41)	(-8.16)	(-7.98)	(-3.57)	(-3.33)	(-2.97)
Prior 6-month returns ×Pledge	-0.540***			-0.053***		
	(-2.92)			(-6.87)		
Prior 6-month returns ×Pledge ratio		-0.604**			-0.064***	
		(-2.35)			(-5.76)	
Prior 6-month returns ×Pledge under pressure			-2.692**			-0.341***
			(-2.39)			(-5.39)
Pledge	0.501***			0.032***		
	(8.65)			(11.01)		
Pledge ratio		0.251***			0.028***	
		(3.48)			(7.29)	
Pledge under pressure			-0.420			-0.029*
			(-1.39)			(-1.87)
Prior 6-month returns	0.020	-0.113	-0.239**	0.003	-0.002	-0.010**
	(0.14)	(-0.91)	(-2.34)	(0.63)	(-0.50)	(-2.46)
Size	0.278***	0.268***	0.261***	0.006***	0.005***	0.005***
	(7.99)	(7.76)	(7.57)	(3.47)	(3.35)	(3.25)
FCF	0.100***	0.096***	0.094***	0.004**	0.004**	0.004**
	(2.98)	(2.85)	(2.76)	(2.55)	(2.48)	(2.36)
Leverage	-0.321***	-0.307***	-0.280***	-0.003**	-0.003**	-0.002*
	(-6.08)	(-5.89)	(-5.60)	(-2.17)	(-2.20)	(-1.85)
Own ratio	-0.895***	-0.724***	-0.721***	-0.032***	-0.026***	-0.026***
	(-4.84)	(-4.01)	(-4.02)	(-4.06)	(-3.25)	(-3.21)
Cash dividend	0.105	0.068	0.014	-0.039**	-0.036*	-0.037*
	(0.27)	(0.18)	(0.03)	(-2.02)	(-1.84)	(-1.92)
Last year BHAR	-0.274***	-0.253***	-0.255***	-0.011***	-0.011***	-0.011***
	(-4.17)	(-3.87)	(-3.89)	(-4.39)	(-4.16)	(-4.12)
Industry fixed effect	YES	YES	YES	YES	YES	YES
Year fixed effect	YES	YES	YES	YES	YES	YES
Adj. R^2 (Pseudo R^2)	0.162	0.158	0.157	0.033	0.031	0.031
Obs.	45680	45680	45680	45680	45680	45680

Table 4
Market-to-Book Ratio and Share Repurchases

This table reports logit and OLS analyses of the interaction effects between market-to-book ratio and share pledge on repurchases. The sample consists of 51,069 firm-quarter observations during July 2005 to December 2018. In the Logit regression (Columns 1, 2, and 3), the dependent variable is *repurchase*, and equal to 1 if the company announces repurchase in this quarter; and zero otherwise. In the OLS regression (Columns 4, 5, and 6), the dependent variable is *repurchase ratio*. *M/B ratio* is the market-to- book ratio, defined as the market value of common equity divided by the book value of equity. *Pledge*, *pledge ratio*, *pledge under pressure*, *size*, *FCF, leverage*, *own ratio*, *cash dividend*, and *last year BHAR* are as defined in Appendix. All variables are measured in the given quarter and winsorized at the top and bottom 1%. Industry and year fixed effects are included. Numbers in parentheses are t-values. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Logit			OLS		
Intercept	-10.062***	-9.576***	-9.273***	-0.086**	-0.076*	-0.066*
	(-9.77)	(-9.34)	(-9.08)	(-2.18)	(-1.93)	(-1.67)
M/B ratio ×Pledge	-0.161***			-0.007***		
	(-5.97)			(-5.38)		
M/B ratio ×Pledge ratio		-0.217***			-0.008***	
		(-5.19)			(-3.79)	
M/B ratio ×Pledge under pressure			-0.248*			-0.025***
			(-1.69)			(-2.77)
Pledge	0.907***			0.046***		
	(10.25)			(10.96)		
Pledge ratio		0.720***			0.040***	
		(6.42)			(7.15)	
Pledge under pressure			0.653***			0.080***
			(2.63)			(5.07)
M/B ratio	0.045**	0.014	-0.036**	-0.001	-0.002*	-0.003***
	(2.30)	(0.84)	(-2.40)	(-0.66)	(-1.92)	(-4.04)
Size	0.264***	0.252***	0.250***	0.005***	0.005***	0.005***
	(8.16)	(7.84)	(7.77)	(3.29)	(3.12)	(3.16)
FCF	0.095***	0.089***	0.089***	0.004***	0.004***	0.00352***
	(3.09)	(2.90)	(2.87)	(2.75)	(2.67)	(2.59)
Leverage	-0.317***	-0.302***	-0.270***	-0.004***	-0.004***	-0.003***
	(-6.80)	(-6.58)	(-6.19)	(-3.28)	(-3.27)	(-2.91)
Own ratio	-0.833***	-0.686***	-0.692***	-0.034***	-0.028***	-0.025***
	(-4.74)	(-4.01)	(-4.07)	(-4.53)	(-3.70)	(-3.37)
Cash dividend	0.369	0.316	0.286	-0.034*	-0.031	-0.030
	(0.99)	(0.85)	(0.77)	(-1.80)	(-1.62)	(-1.58)
Last year BHAR	-0.196***	-0.178***	-0.184***	-0.009***	-0.008***	-0.009***
	(-3.16)	(-2.87)	(-2.97)	(-3.51)	(-3.38)	(-3.49)
Industry fixed effect	YES	YES	YES	YES	YES	YES
Year fixed effect	YES	YES	YES	YES	YES	YES
Adj. R^2 (Pseudo R^2)	0.160	0.154	0.152	0.031	0.029	0.029
Avg. Obs.	51069	51069	51069	51069	51069	51069

Table 5
Director Shareholding and Share Repurchases

This table reports logit and OLS analyses of the interaction effects between director shareholding and share pledge on repurchases. The sample consists of 51,069 firm-quarter observations during July 2005 to December 2018. In the Logit regression (Columns 1, 2, and 3), the dependent variable is *repurchase*, and equal to 1 if the company announces repurchase in this quarter; and zero otherwise. In the OLS regression (Columns 4, 5, and 6), the dependent variable is *repurchase ratio* times 1000. *Director shareholding* is the share number of board of directors divided by total shares number of the company. *Pledge*, *pledge ratio*, *pledge under pressure*, *size*, *B/M ratio*, *FCF*, *leverage*, *own ratio*, *cash dividend*, and *last year BHAR* are as defined in Appendix. All variables are measured in the given quarter and winsorized at the top and bottom 1%. Industry and year fixed effects are included. Numbers in parentheses are t-values. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Logit			OLS		
Intercept	-10.680***	-10.564***	-10.504***	-0.092**	-0.089**	-0.090**
	(-10.30)	(-10.20)	(-10.17)	(-2.31)	(-2.24)	(-2.26)
Director shareholding	0.936***	1.025***	0.993***	0.019**	0.023***	0.030***
	(5.02)	(6.61)	(8.43)	(2.23)	(2.95)	(4.56)
Director shareholding ×Pledge	0.035			0.032***		
	(0.15)			(2.61)		
Director shareholding ×Pledge ratio		0.071			0.064***	
		(0.21)			(3.35)	
Director shareholding ×Pledge under pressure			1.270			0.298***
			(1.40)			(5.03)
Pledge	0.456***			0.023***		
	(6.20)			(7.11)		
Pledge ratio		0.260***			0.018***	
		(2.89)			(4.37)	
Pledge under pressure			0.119			0.015
			(0.64)			(1.55)
Size	0.298***	0.298***	0.300***	0.005***	0.005***	0.006***
	(9.05)	(9.08)	(9.12)	(3.49)	(3.51)	(3.71)
FCF	0.096***	0.092***	0.090***	0.004***	0.004***	0.004***
	(3.16)	(3.04)	(2.93)	(2.79)	(2.73)	(2.59)
B/M ratio	0.014	-0.009	-0.018	0.002	0.001	0.000
	(0.30)	(-0.19)	(-0.40)	(0.83)	(0.48)	(0.24)
Leverage	-0.237***	-0.221***	-0.197***	-0.002**	-0.002**	-0.002
	(-5.44)	(-5.16)	(-4.79)	(-2.14)	(-2.08)	(-1.50)
Own ratio	-0.851***	-0.676***	-0.668***	-0.032***	-0.024***	-0.021***
	(-4.84)	(-3.94)	(-3.93)	(-4.16)	(-3.21)	(-2.81)
Cash dividend	0.438	0.416	0.355	-0.032*	-0.029	-0.031
	(1.18)	(1.13)	(0.96)	(-1.67)	(-1.54)	(-1.61)
Last year BHAR	-0.256***	-0.244***	-0.250***	-0.012***	-0.011***	-0.012***
	(-4.23)	(-4.04)	(-4.13)	(-4.73)	(-4.59)	(-4.71)
Industry fixed effect	YES	YES	YES	YES	YES	YES
Year fixed effect	YES	YES	YES	YES	YES	YES
Adj. R² (Pseudo R²)	0.161	0.158	0.157	0.030	0.030	0.030
Avg. Obs.	51069	51069	51069	51069	51069	51069

Table 6
Manager Compensation and Share Repurchases

This table reports logit and OLS analyses of the interaction effects between manager compensation and share pledge on repurchases. The sample consists of 51,069 firm-quarter observations during July 2005 to December 2018. In the Logit regression (Columns 1, 2, and 3), the dependent variable is *repurchase*, and equal to 1 if the company announces repurchase in this quarter; and zero otherwise. In the OLS regression (Columns 4, 5, and 6), the dependent variable is *repurchase ratio*. *Manager compensation* is the Natural logarithm of top three managers' compensation. *Pledge*, *pledge ratio*, *pledge under pressure*, *size*, *B/M ratio*, *FCF*, *leverage*, *own ratio*, *cash dividend,* and *last year BHAR* are as defined in Appendix. All variables are measured in the given quarter and winsorized at the top and bottom 1%. Industry and year fixed effects are included. Numbers in parentheses are t-values. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Logit			OLS		
Intercept	-12.079***	-11.699***	-11.885***	-0.016	-0.047	-0.116***
	(-9.48)	(-10.06)	(-11.18)	(-0.37)	(-1.07)	(-2.84)
Manager compensation	0.418***	0.398***	0.412***	0.004*	0.006***	0.011***
	(6.14)	(6.96)	(9.18)	(1.72)	(2.87)	(5.51)
Manager compensation ×Pledge	0.046			0.024***		
	(0.58)			(7.39)		
Manager compensation ×Pledge ratio		0.090			0.026***	
		(0.93)			(6.21)	
Manager compensation ×Pledge under pressure			0.157			0.036***
			(0.83)			(3.20)
Pledge	-0.140			-0.309***		
	(-0.12)			(-6.73)		
Pledge ratio		-1.001			-0.346***	
		(-0.71)			(-5.77)	
Pledge under pressure			-1.901			-0.455***
			(-0.70)			(-2.91)
Size	0.087**	0.090**	0.095**	-0.000	0.000	0.000
	(2.35)	(2.45)	(2.56)	(-0.01)	(0.03)	(0.25)
FCF	0.086***	0.082***	0.079**	0.004***	0.004***	0.003**
	(2.76)	(2.64)	(2.52)	(2.73)	(2.67)	(2.53)
B/M ratio	-0.111**	-0.143***	-0.150***	-0.001	-0.003	-0.003
	(-2.33)	(-3.03)	(-3.19)	(-0.74)	(-1.35)	(-1.39)
Leverage	-0.244***	-0.227***	-0.204***	-0.002**	-0.002**	-0.002
	(-5.60)	(-5.33)	(-4.97)	(-2.19)	(-2.07)	(-1.52)
Own ratio	-0.799***	-0.618***	-0.623***	-0.029***	-0.022***	-0.023***
	(-4.57)	(-3.62)	(-3.68)	(-3.81)	(-2.96)	(-3.00)
Cash dividend	0.203	0.193	0.144	-0.040**	-0.037*	-0.036*
	(0.55)	(0.52)	(0.39)	(-2.12)	(-1.92)	(-1.88)
Last year BHAR	-0.231***	-0.218***	-0.226***	-0.011***	-0.011***	-0.011***
	(-3.79)	(-3.58)	(-3.70)	(-4.52)	(-4.38)	(-4.50)
Industry fixed effect	YES	YES	YES	YES	YES	YES
Year fixed effect	YES	YES	YES	YES	YES	YES
Adj. R^2 (Pseudo R^2)	0.164	0.159	0.158	0.032	0.030	0.029
Avg. Obs.	51069	51069	51069	51069	51069	51069

Table 7
Lagged Share Pledge and Repurchases

This table reports logit and OLS regressions of repurchase and share pledge. The sample consists of 51,069 firm-quarter observations during July 2005 to December 2018. In the Logit regression (Columns 1, 2, and 3), the dependent variable is *repurchase*, and equal to 1 if the company announces repurchase; and zero otherwise. In the OLS regression (Columns 4, 5, and 6), the dependent variable is Lagged *repurchase ratio*. Lagged *pledge* is 1 if the controlling shareholder' share pledged in the last quarter; and zero otherwise. Lagged *pledge ratio* equals the number of controlling shareholders' shares divided by the total number of shares of the company in the last quarter. Lagged *pledge under pressure* equals the lagged *pledge ratio* if the stock previous three-month stock return is lower than -20%, and zero otherwise. *Size*, *B/M ratio*, *FCF*, *leverage*, *own ratio*, *cash dividend,* and *last year BHAR* are as defined in Appendix. All variables are measured in the given quarter and winsorized at the top and bottom 1%. Industry and year fixed effects are included. Numbers in parentheses are t-values. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Logit			OLS		
Intercept	-11.650***	-11.575***	-11.682***	-0.085**	-0.088**	-0.095**
	(-8.99)	(-8.95)	(-9.02)	(-2.26)	(-2.32)	(-2.52)
Lagged Pledge	0.415***			0.020***		
	(7.70)			(7.51)		
Lagged Pledge ratio		0.175***			0.017***	
		(2.63)			(4.85)	
Lagged Pledge under pressure			0.228**			0.031***
			(2.40)			(5.42)
Size	0.257***	0.254***	0.261***	0.004***	0.004***	0.005***
	(7.94)	(7.88)	(8.03)	(2.75)	(2.84)	(3.12)
B/M ratio	-0.060	-0.084*	-0.090*	-0.001	-0.001	-0.001
	(-1.29)	(-1.84)	(-1.96)	(-0.28)	(-0.47)	(-0.59)
FCF	0.095***	0.091***	0.0890***	0.004***	0.004***	0.004***
	(3.11)	(2.97)	(2.91)	(2.90)	(2.82)	(2.68)
Leverage	-0.257***	-0.236***	-0.225***	-0.003**	-0.003**	-0.003**
	(-5.84)	(-5.48)	(-5.37)	(-2.49)	(-2.35)	(-2.10)
Own ratio	-0.818***	-0.710***	-0.711***	-0.022***	-0.021***	-0.022***
	(-4.73)	(-4.17)	(-4.20)	(-2.92)	(-2.80)	(-2.99)
Cash dividend	0.465	0.386	0.351	-0.021	-0.024	-0.027
	(1.26)	(1.05)	(0.95)	(-1.08)	(-1.27)	(-1.43)
Last year BHAR	-0.246***	-0.237***	-0.241***	-0.011***	-0.011***	-0.011***
	(-4.06)	(-3.91)	(-3.97)	(-4.54)	(-4.48)	(-4.62)
Industry fixed effect	YES	YES	YES	YES	YES	YES
Year fixed effect	YES	YES	YES	YES	YES	YES
Adj. R^2 (Pseudo R^2)	0.155	0.152	0.152	0.029	0.028	0.028
Avg. Obs.	51069	51069	51069	51069	51069	51069

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Table 8
Prior 12-month Stock Returns and Share Repurchases

This table reports logit and OLS analyses of the interaction effects between prior 12-month stock returns and share pledge on repurchases. The sample consists of 37,424 firm-quarter observations during July 2005 to December 2018. In the Logit regression (Columns 1, 2, and 3), the dependent variable is *repurchase*, and equal to 1 if the company announces repurchase in this quarter; and zero otherwise. In the OLS regression (Columns 4, 5, and 6), the dependent variable is *repurchase ratio. Prior 12-month returns* is the holding period yield over the past 12 months from the end of the quarter. *Pledge*, *pledge ratio*, *pledge under pressure*, *size*, *B/M ratio*, *FCF*, *leverage*, *own ratio*, *cash dividend,* and *last year BHAR* are as defined in Appendix. All variables are measured in the given quarter and winsorized at the top and bottom 1%. Industry and year fixed effects are included. Numbers in parentheses are t-values. ***, **, and *denote significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Logit			OLS		
Intercept	-8.452***	-7.976***	-7.560***	-0.073	-0.068	-0.046
	(-8.96)	(-8.52)	(-8.16)	(-1.60)	(-1.49)	(-1.02)
Prior 12-month returns ×Pledge	-0.567***			-0.039***		
	(-4.53)			(-7.26)		
Prior 12-month returns ×Pledge ratio		-0.624***			-0.047***	
		(-3.37)			(-5.84)	
Prior 12-month returns ×Pledge under pressure			-4.059***			-0.398***
			(-3.63)			(-6.73)
Pledge	0.587***			0.038***		
	(9.10)			(11.43)		
Pledge ratio		0.373***			0.037***	
		(4.66)			(8.54)	
Pledge under pressure			-0.750**			-0.030**
			(-2.18)			(-1.98)
Prior 12-month returns	0.115	-0.012	-0.142*	0.002	-0.001	-0.006**
	(1.18)	(-0.13)	(-1.76)	(0.63)	(-0.43)	(-2.15)
Size	0.270***	0.259***	0.248***	0.005***	0.005***	0.004**
	(6.94)	(6.71)	(6.48)	(2.66)	(2.61)	(2.43)
FCF	0.106***	0.102***	0.100***	0.004**	0.004**	0.004**
	(2.77)	(2.66)	(2.59)	(2.52)	(2.48)	(2.40)
Leverage	-0.365***	-0.357***	-0.312***	-0.003**	-0.003**	-0.003*
	(-5.63)	(-5.55)	(-5.11)	(-1.99)	(-2.12)	(-1.73)
Own ratio	-0.989***	-0.827***	-0.830***	-0.036***	-0.031***	-0.030***
	(-4.77)	(-4.08)	(-4.14)	(-4.08)	(-3.46)	(-3.35)
Cash dividend	0.011	-0.033	-0.129	-0.039*	-0.036*	-0.040**
	(0.03)	(-0.08)	(-0.31)	(-1.90)	(-1.76)	(-1.98)
Last year BHAR	-0.287***	-0.272***	-0.268***	-0.010***	-0.010***	-0.010***
	(-3.62)	(-3.43)	(-3.37)	(-3.36)	(-3.21)	(-3.07)
Industry fixed effect	YES	YES	YES	YES	YES	YES
Year fixed effect	YES	YES	YES	YES	YES	YES
Adj. R^2 (Pseudo R^2)	0.163	0.157	0.156	0.036	0.034	0.034
Avg. Obs.	37424	37424	37424	37424	37424	37424

Table 9
Lagged Market-to-Book Ratio and Share Repurchases

This table reports logit and OLS analyses of the interaction effects between market-to-book ratio and share pledge on repurchases. The sample consists of 51,069 firm-quarter observations during July 2005 to December 2018. In the Logit regression (Columns 1, 2, and 3), the dependent variable is *repurchase*, and equal to 1 if the company announces repurchase; and zero otherwise. In the OLS regression (Columns 4, 5, and 6), the dependent variable is the lagged *repurchase ratio*. Lagged *pledge* is 1 if the controlling shareholder' share pledged in the last quarter; and zero otherwise. Lagged *pledge ratio* equals the number of controlling shareholders' shares divided by the total number of shares of the company in the last quarter. Lagged *pledge under pressure* equals the lagged *pledge ratio* if the stock previous three-month stock return is lower than -20%, and zero otherwise. Lagged *M/B ratio* is the market-to-book ratio, defined as the market value of common equity divided by the book value of equity. *Size*, *FCF*, *leverage*, *own ratio*, *cash dividend*, and *last year BHAR* are as defined in Appendix. All variables are measured in the given quarter and winsorized at the top and bottom 1%. Industry and year fixed effects are included. Numbers in parentheses are t-values. ***, **, and *denote significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Logit			OLS		
Intercept	-9.688***	-9.340***	-9.264***	-0.054	-0.054	-0.060
	(-9.42)	(-9.12)	(-9.04)	(-1.37)	(-1.38)	(-1.52)
Lagged M/B ratio ×Lagged Pledge	-0.104***			-0.004***		
	(-3.97)			(-2.72)		
Lagged M/B ratio ×Lagged Pledge ratio		-0.170***			-0.006***	
		(-4.27)			(-2.85)	
Lagged M/B ratio ×Lagged Pledge under pressure			-0.133*			-0.004
			(-1.80)			(-1.01)
Lagged Pledge	0.693***			0.028***		
	(7.86)			(6.92)		
Lagged Pledge ratio		0.567***			0.028***	
		(4.98)			(5.11)	
Lagged Pledge under pressure			0.499***			0.040***
			(2.76)			(3.78)
Lagged M/B ratio	0.0263	0.0136	-0.021	-0.002*	-0.002**	-0.003***
	(1.37)	(0.82)	(-1.43)	(-1.75)	(-2.04)	(-3.85)
Size	0.252***	0.244***	0.248***	0.004***	0.004***	0.004***
	(7.81)	(7.61)	(7.70)	(2.69)	(2.72)	(2.99)
FCF	0.094***	0.090***	0.088***	0.004***	0.004***	0.003**
	(3.06)	(2.90)	(2.86)	(2.75)	(2.66)	(2.53)
Leverage	-0.300***	-0.285***	-0.267***	-0.0043***	-0.004***	-0.003***
	(-6.59)	(-6.35)	(-6.14)	(-3.31)	(-3.19)	(-2.97)
Own ratio	-0.768***	-0.676***	-0.690***	-0.022***	-0.021***	-0.023***
	(-4.42)	(-3.97)	(-4.06)	(-2.89)	(-2.84)	(-3.08)
Cash dividend	0.429	0.340	0.309	-0.022	-0.026	-0.028
	(1.16)	(0.92)	(0.84)	(-1.15)	(-1.36)	(-1.48)
Last year BHAR	-0.196***	-0.182***	-0.189***	-0.008***	-0.008***	-0.009***
	(-3.14)	(-2.91)	(-3.03)	(-3.32)	(-3.26)	(-3.40)
Industry fixed effect	YES	YES	YES	YES	YES	YES
Year fixed effect	YES	YES	YES	YES	YES	YES
Adj. R^2 (Pseudo R^2)	0.157	0.153	0.152	0.029	0.029	0.029
Avg. Obs.	51069	51069	51069	51069	51069	51069

Table 10
Lagged Director Shareholding and Share Repurchases

This table reports logit and OLS analyses of the interaction effects between director shareholding and share pledge on repurchases. The sample consists of 51,069 firm-quarter observations during July 2005 to December 2018. In the Logit regression (Columns 1, 2, and 3), the dependent variable is *repurchase*, and equal to 1 if the company announces repurchase in this quarter; and zero otherwise. In the OLS regression (Columns 4, 5, and 6), the dependent variable is *repurchase ratio*. Lagged *pledge* is 1 if the controlling shareholder' share pledged in the last quarter; and zero otherwise. Lagged *pledge ratio* equals the number of controlling shareholder' shares divided by the total number of shares of the company in the last quarter. Lagged *pledge under pressure* equals the lagged *pledge ratio* if the stock previous three-month stock return is lower than -20%, and zero otherwise. Lagged *director shareholding* is the share number of board of directors divided by total shares number of the company in the last quarter. *Size*, *B/M ratio*, *FCF*, *leverage*, *own ratio*, *cash dividend,* and *Last year BHAR* are as defined in Appendix. All variables are measured in the given quarter and winsorized at the top and bottom 1%. Industry and year fixed effects are included. Numbers in parentheses are t-values. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Logit			OLS		
Intercept	-10.602***	-10.452***	-10.532***	-0.079**	-0.081**	-0.090**
	(-10.24)	(-10.11)	(-10.18)	(-1.99)	(-2.03)	(-2.26)
Lagged Director shareholding ×Lagged Pledge	-0.079			0.022*		
	(-0.35)			(1.80)		
Lagged Director shareholding ×Lagged Pledge ratio		0.019			0.038**	
		(0.06)			(2.13)	
Lagged Director shareholding ×Lagged Pledge under pressure			0.154			0.141***
			(0.28)			(3.87)
Lagged Pledge	0.396***			0.016***		
	(5.42)			(5.25)		
Lagged Pledge ratio		0.181**			0.013***	
		(2.00)			(3.26)	
Lagged Pledge under pressure			0.196			0.015**
			(1.40)			(2.13)
Lagged Director shareholding	1.049***	1.062***	1.050***	0.030***	0.032***	0.033***
	(5.92)	(7.08)	(8.77)	(3.61)	(4.24)	(5.08)
Size	0.295***	0.294***	0.300***	0.005***	0.005***	0.006***
	(8.97)	(8.98)	(9.11)	(3.26)	(3.35)	(3.68)
FCF	0.094***	0.090***	0.088***	0.004***	0.004***	0.003**
	(3.05)	(2.93)	(2.86)	(2.75)	(2.68)	(2.51)
B/M ratio	0.012	-0.006	-0.012	0.001	0.001	0.001
	(0.25)	(-0.14)	(-0.27)	(0.69)	(0.54)	(0.39)
Leverage	-0.228***	-0.210***	-0.198***	-0.002**	-0.002*	-0.002
	(-5.29)	(-4.96)	(-4.81)	(-1.99)	(-1.88)	(-1.56)
Own ratio	-0.760***	-0.658***	-0.656***	-0.020***	-0.018**	-0.020***
	(-4.37)	(-3.84)	(-3.86)	(-2.59)	(-2.43)	(-2.62)
Cash dividend	0.467	0.402	0.364	-0.023	-0.026	-0.030
	(1.26)	(1.09)	(0.99)	(-1.20)	(-1.37)	(-1.58)
Last year BHAR	-0.253***	-0.245***	-0.248***	-0.011***	-0.011***	-0.012***
	(-4.19)	(-4.06)	(-4.11)	(-4.64)	(-4.58)	(-4.69)
Industry fixed effect	YES	YES	YES	YES	YES	YES
Year fixed effect	YES	YES	YES	YES	YES	YES
Adj. R² (Pseudo R²)	0.1603	0.1576	0.1574	0.030	0.029	0.029
Avg. Obs.	51069	51069	51069	51069	51069	51069

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Table 11
Lagged Manager Compensation and Share Repurchases

This table reports logit and OLS analyses of the interaction effects between manager compensation and share pledge on repurchases. The sample consists of 51,069 firm-quarter observations during July 2005 to December 2018. In the Logit regression (Columns 1, 2, and 3), the dependent variable is *repurchase*, and equal to 1 if the company announces repurchase in this quarter; and zero otherwise. In the OLS regression (Columns 4, 5, and 6), the dependent variable is *repurchase ratio*. Lagged *pledge* is 1 if the controlling shareholder' share pledged in the last quarter; and zero otherwise. Lagged *pledge ratio* equals the number of controlling shareholders' shares divided by the total number of shares of the company in the last quarter. Lagged *pledge under pressure* equals the lagged *pledge ratio* if the stock previous three-month stock return is than -20%, and zero otherwise. Lagged *manager compensation* is the Natural logarithm of top three managers' compensation in the last quarter. *Size*, *B/M ratio*, *FCF*, *leverage*, *own ratio*, *cash dividend,* and *last year BHAR* are as defined in Appendix. All variables are measured in the given quarter and winsorized at the top and bottom 1%. Industry and year fixed effects are included. Numbers in parentheses are t-values. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Logit			OLS		
Intercept	-12.580***	-12.347***	-11.797***	-0.030	-0.070	-0.098**
	(-9.97)	(-10.74)	(-10.95)	(-0.67)	(-1.63)	(-2.39)
Lagged Manager compensation	0.001			0.019***		
×Lagged Pledge	(0.01)			(6.00)		
Lagged Manager compensation		-0.016			0.017***	
×Lagged Pledge ratio		(-0.17)			(4.26)	
Lagged Manager compensation			0.425***			0.049***
×Lagged Pledge under pressure			(2.72)			(6.05)
Lagged Pledge	0.442			-0.241***		
	(0.39)			(-5.51)		
Lagged Pledge ratio		0.462			-0.223***	
		(0.35)			(-3.93)	
Lagged Pledge under pressure			-5.858***			-0.659***
			(-2.60)			(-5.76)
Lagged Manager compensation	0.475***	0.467***	0.413***	0.006**	0.009***	0.010***
	(7.09)	(8.26)	(8.90)	(2.46)	(3.88)	(4.93)
Size	0.074**	0.077**	0.090**	-0.001	-0.000	0.000
	(2.00)	(2.09)	(2.45)	(-0.33)	(-0.22)	(0.17)
FCF	0.081***	0.077**	0.074**	0.004***	0.003**	0.003**
	(2.58)	(2.45)	(2.33)	(2.64)	(2.56)	(2.36)
B/M ratio	-0.129***	-0.153***	-0.156***	-0.002	-0.003	-0.003
	(-2.70)	(-3.25)	(-3.31)	(-1.04)	(-1.42)	(-1.46)
Leverage	-0.236***	-0.219***	-0.204***	-0.002**	-0.002*	-0.002
	(-5.49)	(-5.19)	(-4.96)	(-1.99)	(-1.86)	(-1.61)
Own ratio	-0.723***	-0.609***	-0.621***	-0.022***	-0.020***	-0.022***
	(-4.18)	(-3.58)	(-3.66)	(-2.99)	(-2.71)	(-2.92)
Cash dividend	0.163	0.107	0.087	-0.030	-0.033*	-0.037*
	(0.44)	(0.29)	(0.24)	(-1.55)	(-1.73)	(-1.92)
Last year BHAR	-0.222***	-0.213***	-0.218***	-0.011***	-0.011***	-0.011***
	(-3.64)	(-3.51)	(-3.58)	(-4.32)	(-4.26)	(-4.40)
Industry fixed effect	YES	YES	YES	YES	YES	YES
Year fixed effect	YES	YES	YES	YES	YES	YES
Adj. R² (Pseudo R²)	0.163	0.159	0.159	0.030	0.029	0.030
Avg. Obs.	51069	51069	51069	51069	51069	51069

Table 12
Director Shareholding Dummy and Share Repurchases

This table reports logit and OLS analyses of the interaction effects between director shareholding and share pledge on repurchases. The sample consists of 51,069 firm-quarter observations during July 2005 to December 2018. In the Logit regression (Columns 1, 2, and 3), the dependent variable is *repurchase*, and equal to 1 if the company announces repurchase in this quarter; and zero otherwise. In the OLS regression (Columns 4, 5, and 6), the dependent variable is *repurchase ratio*. *Pledge, pledge ratio, pledge under pressure, director shareholding dummy, size*, *B/M ratio*, *FCF*, *leverage*, *own ratio*, *cash dividend,* and *last year BHAR* are as defined in Appendix. All variables are measured in the given quarter and winsorized at the top and bottom 1%. Industry and year fixed effects are included. Numbers in parentheses are t-values. ***, **, and *denote significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Logit			OLS		
Intercept	-10.736***	-10.697***	-10.551***	-0.092**	-0.090**	-0.088**
	(-10.35)	(-10.32)	(-10.21)	(-2.32)	(-2.27)	(-2.22)
Director shareholding dummy ×Pledge	-0.118			0.011**		
	(-1.09)			(2.14)		
Director shareholding dummy ×Pledge ratio		-0.243*			0.018**	
		(-1.76)			(2.39)	
Director shareholding dummy ×Pledge under pressure			-0.233			0.074***
			(-0.79)			(3.67)
Pledge	0.493***			0.024***		
	(6.96)			(7.56)		
Pledge ratio		0.348***			0.020***	
		(4.09)			(4.99)	
Pledge under pressure			0.379**			0.027***
			(2.50)			(3.05)
Director shareholding dummy	0.522***	0.585***	0.504***	0.008**	0.011***	0.012***
	(5.63)	(7.87)	(9.24)	(2.43)	(3.33)	(4.58)
Size	0.300***	0.303***	0.302***	0.005***	0.005***	0.005***
	(9.11)	(9.22)	(9.19)	(3.42)	(3.44)	(3.59)
FCF	0.095***	0.092***	0.089***	0.004***	0.004***	0.004***
	(3.10)	(3.00)	(2.89)	(2.77)	(2.71)	(2.61)
B/M ratio	0.007	-0.012	-0.024	0.001	0.000	0.000
	(0.14)	(-0.26)	(-0.53)	(0.64)	(0.27)	(0.03)
Leverage	-0.239***	-0.222***	-0.203***	-0.002**	-0.002**	-0.002
	(-5.48)	(-5.18)	(-4.91)	(-2.17)	(-2.08)	(-1.56)
Own ratio	-0.746***	-0.563***	-0.571***	-0.031***	-0.024***	-0.022***
	(-4.21)	(-3.25)	(-3.33)	(-4.11)	(-3.19)	(-2.85)
Cash dividend	0.429	0.410	0.361	-0.034*	-0.032*	-0.032*
	(1.15)	(1.11)	(0.98)	(-1.77)	(-1.66)	(-1.70)
Last year BHAR	-0.254***	-0.244***	-0.248***	-0.012***	-0.011***	-0.012***
	(-4.20)	(-4.04)	(-4.11)	(-4.70)	(-4.56)	(-4.68)
Industry fixed effect	YES	YES	YES	YES	YES	YES
Year fixed effect	YES	YES	YES	YES	YES	YES
Adj. R^2 (Pseudo R^2)	0.162	0.158	0.158	0.030	0.029	0.029
Avg. Obs.	51069	51069	51069	51069	51069	51069

Table 13
Manager Compensation Dummy and Share Repurchases

This table reports logit and OLS analyses of the interaction effects between manager compensation and share pledge on repurchases. The sample consists of 51,069 firm-quarter observations during July 2005 to December 2018. In the Logit regression (Columns 1, 2, and 3), the dependent variable is *repurchase*, and equal to 1 if the company announces repurchase in this quarter; and zero otherwise. In the OLS regression (Columns 4, 5, and 6), the dependent variable is *repurchase ratio*. *Pledge, pledge ratio, pledge under pressure, manager compensation dummy, Size*, *B/M ratio*, *FCF*, *leverage*, *own ratio*, *cash dividend,* and *last year BHAR* are as defined in Appendix. All variables are measured in the given quarter and winsorized at the top and bottom 1%. Industry and year fixed effects are included. Numbers in parentheses are t-values. ***, **, and * denote significance at 1%, 5%, and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Logit			OLS		
Intercept	-7.689***	-7.498***	-7.480***	-0.012	-0.010	-0.007
	(-7.26)	(-7.09)	(-7.08)	(-0.30)	(-0.25)	(-0.17)
Manager compensation dummy xPledge	-0.127			0.019***		
	(-1.20)			(3.75)		
Manager compensation dummy xPledge ratio		0.0691			0.031***	
		(0.52)			(4.34)	
Manager compensation dummy xPledge under pressure			0.480			0.053**
			(1.29)			(2.02)
Pledge	0.573***			0.023***		
	(7.81)			(7.23)		
Pledge ratio		0.253***			0.016***	
		(2.91)			(3.89)	
Pledge under pressure			0.217			0.036***
			(1.49)			(4.18)
Manager compensation dummy	0.528***	0.406***	0.402***	0.008**	0.008***	0.014***
	(5.85)	(5.45)	(7.02)	(2.51)	(2.61)	(4.88)
Size	0.158***	0.159***	0.162***	0.002	0.002	0.002
	(4.50)	(4.54)	(4.64)	(0.94)	(1.00)	(1.06)
FCF	0.091***	0.087***	0.084***	0.004***	0.004***	0.004***
	(2.95)	(2.82)	(2.72)	(2.78)	(2.73)	(2.62)
B/M ratio	-0.088*	-0.118**	-0.126***	-0.001	-0.002	-0.002
	(-1.87)	(-2.52)	(-2.70)	(-0.56)	(-1.08)	(-1.18)
Leverage	-0.256***	-0.238***	-0.214***	-0.003**	-0.002**	-0.002*
	(-5.79)	(-5.50)	(-5.16)	(-2.29)	(-2.20)	(-1.71)
Own ratio	-0.838***	-0.652***	-0.654***	-0.032***	-0.025***	-0.023***
	(-4.79)	(-3.81)	(-3.86)	(-4.26)	(-3.30)	(-3.09)
Cash dividend	0.280	0.264	0.224	-0.038**	-0.035*	-0.035*
	(0.76)	(0.72)	(0.61)	(-2.01)	(-1.83)	(-1.77)
Last year BHAR	-0.238***	-0.224***	-0.232***	-0.011***	-0.011***	-0.011***
	(-3.91)	(-3.69)	(-3.81)	(-4.56)	(-4.42)	(-4.56)
Industry fixed effect	YES	YES	YES	YES	YES	YES
Year fixed effect	YES	YES	YES	YES	YES	YES
Adj. R^2 (Pseudo R^2)	0.161	0.156	0.156	0.031	0.030	0.029
Avg. Obs.	51069	51069	51069	51069	51069	51069