

Share Pledges and Margin Call Pressure[☆]

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Abstract

Our paper documents that companies may use corporate resources as attempts to protect personal incentives of insiders. When insiders pledge their shareholdings as collaterals for a personal loan, they are subject to margin calls as the stock prices may fall below the desired level. We argue that insiders may tend to protect their pledged shares to maintain their control right. Among plausible ways to support price, repurchases seem to be more effective to relieve the potential threat of margin calls on their share pledge. Our results also show that investors will perceive insiders' incentive and hence discount the potential benefits of repurchase programs.

JEL classification: G30, G35

Key words: share pledges, repurchases, controlling shareholders

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1. Introduction

The ownership structure of controlling shareholders has attracted much attention in the literature (e.g., LaPorta, Lopez-De-Silanes, and Shleifer, 1999; Claessens, Djankov, Fan, and Lang, 2002; Masulis, Pham, and Zein, 2011). However, an important component of the ownership structure of controlling shareholders, namely the personal share pledged, is under-explored. In practice, insiders may pledge their shareholdings as collaterals for a personal loan. This paper proposes and finds that personal share pledges by controlling shareholders may affect corporate decisions for their private benefits because insiders may have incentives to use corporate resources. Specifically, when the market value of the pledged shares drops below some certain level (such as the maintenance requirement), there is a tendency for controlling shareholders to initiate buyback programs as attempts to alleviate the pressure from margin calls to maintain their control right.

The practice that corporate insiders pledge their stocks as collaterals for a personal loan is not unusual. According to a recent survey, 982 directors or officers in the U.S. reported a pledge in the proxy statement from 2006 to 2009 (Larcker and Tayan, 2010). In India and Taiwan, more than 20% of insiders pledged part of their holdings in 2013. Recently, share pledges have caught the attention of regulators and participants worldwide. Regulators in India, Singapore, U.S., and U.K. start to require the disclosure of pledges by insiders.

An ISS recent survey finds that 49% of institutional shareholders thought that “any pledging of shares by executives or directors is significantly problematic” (Institutional Shareholder Services, 2012). The pledging practice especially got a bad publicity when the Wall Street Journal reported a forced sale event (Salisbury, 2012). In May 2012, Robert Stiller, the founder and the Chairman of the Board of a Nasdaq company Green Mountain Coffee Roasters, was

forced to sell 5 million shares, or about 3.2% of shares outstanding, to cover margin calls on loans pledged against his shareholding. Stiller has since been removed from the Chairman position.¹

Given that the consequence of a forced sale can be dire, it can affect the personal incentives faced by insiders when making corporate decisions. In particular, when insiders pledge their shareholdings, they are subject to margin calls as the stock prices may fall below the desired level.² When the market value of the pledged shares drops below the maintenance requirement, the lender can sell the shares pledged. The forced sale can be very costly to insiders because they may lose the control of the firm. To avoid being forced to sell shares, insiders have great incentives to use corporate resources as attempts to alleviate the pressure from margin calls. While there could be potential ways for insiders to exploit corporate resources, the literature shows that share repurchases are one low-cost and effective approach to support price (Chan, Ikenberry, Lee, and Wang, 2010; Cook, Krigman, and Leach, 2004; Ginglinger and Hamon, 2007).

In this paper, we develop and test a margin call hypothesis that insiders may initiate an open market repurchase program to absorb the selling pressure and to support the falling stock price. The margin call worry is stronger when recent stock prices decline sharply. As a result, we expect that insiders are more likely to initiate buyback programs when they have share pledges in conjunction with recent poor stock returns. If repurchases are used merely to support prices to benefit insiders with share pledges rather than to signal favorable information to the market, investors are less likely to update their view of the stock positively. Therefore, the market

¹ Another forced sale event occurred for a Singapore listed company, Sino-Environment Technology Group, in March 2009 (CFA, 2009).

² Like buying stock on margin, the share pledge contracts usually stipulate a maintenance requirement. When the market value of the pledged shares drops below the maintenance requirement, the borrower must meet the margin call.

reaction to pledge-related repurchase announcements, unlike the otherwise positive effect generally observed in repurchases, may not be favorable.

To test the margin call hypothesis, we employ a unique share pledge data set that spans a twelve-year period from Taiwan. Taiwanese data are of particular interest because insiders of listed companies are required to file shares owned and shares pledged at a monthly basis. Empirically, we show that companies are more likely to initiate repurchase programs when their insiders have a higher percentage of share pledges. The propensity to repurchase is especially high when a large price drop occurs. Results are similar when we examine the actual buyback (i.e., the higher the share pledges, the more actual buyback activities). Besides, the market response to the repurchase announcement decreases with share pledges, especially after a significant price decline. This finding suggests that investors may perceive insiders' incentive to avoid margin calls and hence discount the potential benefits of repurchase programs. We perform a robustness check by conducting counterfactual simulations. We find that repurchasing firms under margin call pressure perform worse than not only repurchasing firms with no margin call pressure but also non-repurchase firms under margin call pressure, consistent with the prediction of margin call hypothesis.

Our findings are consistent with a control right explanation: controlling shareholders choose repurchases to relieve the margin call pressure in order to keep their holdings to maintain their control of corporate resources and extract private benefits. We provide supporting evidence based on widely held firms that are run by professional managers whose control right does not depend on their shareholding. Because selling shares will not cost their control for professional managers, we do not expect to see the relation between repurchases and margin call pressure. Consistent with this control right explanation, we find that the repurchase decision and

announcement return are not significantly related to the margin call pressure for widely held firms.

The fear of losing the control right can affect corporate behaviors is not new. Previous research has studied this issue by looking at the corporate bankruptcy state in which the control right is transferred to lenders (Gilson, 1990; Eckbo and Thorburn, 2003). The novelty of this paper is that it examines a price-contingent state caused by the margin call pressure that when the market price is too low the control right can be sold involuntary.

We evaluate several potential explanations, such as undervaluation, optimism, and risk attitude, that potentially affect both repurchase and pledge decisions. We find that undervaluation is not likely to explain our evidence that the repurchase announcement effect is worse when pledged shares are higher. To rule out that omitted variables such as optimism and risk attitude can explain our results, we use instrumental variables estimators. The instruments are exogenous regulation changes that impose costs on share pledges but have nothing to do with individual optimism and risk attitude. Our results hold when the instrumental variable approach is used.

Repurchases may not be the only possible approach that can relieve margin call pressure. We evaluate four such plausible actions, including two personal actions (selling shares and increasing pledges) and two corporate actions (increasing dividend and managing earnings). We find that repurchases are more likely to occur and announcement returns are less favorable even after controlling for these personal and corporate actions.

This study contributes to three strands of literature. The first strand links executives' personal attributes to corporate behaviors. Recent literature shows the impact of CEOs' characteristics, experiences, and social network on corporate decisions (Malmendier, Tate, and Yan, 2011; Fracassi and Tate, 2012; Kaplan, Klebanov, and Sorensen, 2012). Cronqvist, Makhija, and Yonker (2012) examine CEOs' personal leverage in their home purchases and find that it is

positively related to corporate leverage. Our study contributes to this literature by adding that controlling shareholders' personal share pledging affects the corporate payout policy.

The second strand of related literature is on open market repurchases and corporate governance. The literature reports a variety of managerial motives behind repurchases, such as undervaluation, disgorgement of free cash flow, and takeover deterrence (e.g., Stulz, 1988; Jensen, 1986; Dittmar, 2000; Chan, Ikenberry, and Lee, 2004; Billett and Xue, 2007). We document an additional motive for firms to initiate repurchase programs; that is, insiders use repurchases to relieve the margin call pressure to keep their control rights. Repurchases with such a motive do not generate economic benefits as general buyback programs do.

The third related literature is about margin requirements. Previous research examines how the margin requirements in the equity and futures markets will affect the market price, volatility, and trading volume (Jennings, Starks, and Fellingham, 1981; Mitchell, Pulvino, and Stafford, 2002; Seguin and Jarrell, 1993). No prior research, however, has examined how the margin requirement can affect corporate behaviors.

The remainder of this study is organized as follows. Section 2 develops hypotheses. Section 3 describes institution environment of Taiwan and data used in the empirical analysis. Section 4 reports empirical results. Section 5 is a robustness check. Section 6 provides the conclusion.

2. Hypotheses Development

Controlling shareholders sometimes pledge the shares they own to borrow money for personal consumption. Of course, the controlling shareholder can also sell shares to obtain money for consumption. However, they may not want to sell shares for either an information reason or for a control reason. First, if controlling shareholders have information that leads them to believe that the market price is less than its fundamental value, they may be reluctant to sell

their shares. Thus, they can borrow money against the shares and wait until the market price goes up to its fundamental value to sell. Second, the controlling shareholders want to maintain their control rights by holding enough voting power. Selling shares can reduce shareholders' voting power and may risk losing their control rights.

When keeping control is important, a controlling shareholder may also borrow money to support the firm's investment projects. When a firm has good investment projects but lacks internal cash flow, the firm may choose to issue new equity as a financing source if more leverage is costly. To maintain their relative control rights, controlling shareholders must buy the newly issued shares. If their personal wealth is not sufficient, controlling shareholders can borrow money against their current shares to buy new shares. Therefore, borrowing against stocks is one way that controlling shareholders use to pursue investment projects under personal financial constraints (Chen and Hu, 2007).

Despite these benefits, borrowing against stocks carries with the risk of losing control. Under the stock pledge agreement, the lender imposes a maintenance requirement that the market value of the pledged stock cannot fall below. If the maintenance requirement is not met, the loan is in default. Other than the usual default risk, there is an additional element of market price risk. The market price can drop to a level that violates the maintenance requirement. When this happens, the lender may sell the pledged shares unilaterally. Lacking the voting power from pledged shares, the controlling shareholder risk losing control rights.

When the risk is imminent that the market price will drop to a level that violates the maintenance requirement, controlling shareholders may use company funds to repurchase stocks to support or even artificially increase the market price. A repurchase announcement can increase the stock price if investors are misled to believe that the repurchase firm is undervalued (Chan,

Ikenberry, Lee, and Wang, 2010). A repurchase can also be used to support a falling stock price by absorbing the sell pressure (Cook et al., 2004; Ginglinger and Hamon, 2007).

If investors understand that a repurchase is only used to support prices (or to mislead them), they will not revise their estimate of the fundamental value. Therefore, given a repurchase announcement, investors will estimate the fundamental value based on the probability of price support: The higher the probability of price support is, the less positive the market reaction will be.

To summarize our discussions so far, we formulate two hypotheses, which we refer to as the margin call hypothesis:

***H1a:** The higher the pledge ratio of controlling shareholders, the more likely the company will repurchase shares.*

***H2a:** The higher the pledge ratio of controlling shareholders, the less positive the market reaction to a repurchase announcement will be.*

Holding other things constant, the sensitivity of the relative net worth to the pledge ratio depends on the firm's recent stock returns. Lower stock return reduces the personal asset level and creates a difference with debt levels. The difference increases in relation to the number of shares owned and decreases in relation to the pledge ratio. Therefore, the sensitivity of the probability of repurchase and the market reaction to the pledge ratio is stronger when the recent stock returns are lower. Therefore, we state our second hypotheses in two parts:

***H1b:** The sensitivity of the probability of repurchase to the pledge ratio is more positive when the firm's recent stock returns are lower.*

***H2b:** The sensitivity of the market reaction to the pledge ratio is more negative when the firm's recent stock returns are lower.*

3. Institutional Features and Data

3.1. Repurchases in Taiwan

Taiwan's Securities and Exchange Law was revised in August 2000 to allow listed companies to buy back their own stock in the open market (Article 28-2). The security laws were also amended to prohibit insiders and their spouses and children to sell stock during the buyback period.

A repurchase program must be authorized by the board of a company. Within two days after authorization, firms must disclose the detailed repurchase plan to the public.³ The repurchase period can last for two months from the announcement date.⁴ For each repurchase program, the number of shares bought cannot exceed 10% of shares outstanding. The buyback each day is limited to one-third of the intended repurchase shares disclosed at the announcement.⁵

One feature of Taiwanese repurchases is the strict disclosure requirement of the execution status.⁶ Firms are obliged to provide a detailed execution report within five days of repurchase completion or the expiration of repurchase period, whichever comes first. Firms must disclose their execution status within two days if they buy more than 2% of shares outstanding throughout the program. The report should include the number of shares bought, the dollar amount

³ The disclosure should include the purpose of repurchases, intended number of shares to be purchased, price range that the program is to be executed, maximum dollar amount to be spent on the program, and execution of prior buyback programs announced in the past three years.

⁴ Initially, the repurchase program was valid only for 30 days from the firm's public disclosure. The one-month repurchase period was extended to two months from October 2000.

⁵ Article 8 of the Regulations Governing Share Repurchases by Listed and OTC Companies.

⁶ Before 2004, U.S. companies had no obligation to disclose any information regarding execution of open market repurchase programs. In December 2003, U.S. Securities and Exchange Commission promulgated a new disclosure requirement for share repurchases. Since then, firms are required to disclose the number of shares purchased each month, the average price paid per share, the total number of shares purchased as part of a publicly announced repurchase program, and the maximum number of shares that may yet be purchased under the program for the past quarter in their 10-Q and 10-K filings. More detailed information is available from the Purchases of Certain Equity Securities by Issuer and Others, Exchange Act Release No. 33-8335, 68 Fed. Rec. 64,952 (Nov. 17, 2003).

purchased, and the average share price of buyback. These disclosure requirements in Taiwan enable us to track the buyback execution with ease.

3.2. Data

We employ two samples to test our hypotheses. The first sample includes quarterly data for firms with actual buyback and firms without buybacks. This sample facilitates the test on whether shares pledges affect the actual repurchase decision. The second sample comprises repurchase announcements, which can be used to examine the predictability of shares pledges on announcement returns.⁷ All repurchases and financial data are retrieved from the *Taiwan Economic Journal* (TEJ) database. TEJ is the most comprehensive financial database of the Taiwanese market. TEJ provides stock returns, accounting data, repurchase announcements, and share pledge information. For industry classifications, we obtain SIC codes from Datastream.

The first sample starts with all common stocks listed on Taiwan Stock Exchange and GreTai Securities Market (i.e., the Taiwanese OTC market) for each quarter from October 2000 to December 2012. We exclude financial firms, state-owned firms, and firms that have no controlling shareholders. We further require quarterly financial data for sample firms. The final sample consists of 46,838 firm-quarters observations.⁸ We call this sample as the quarterly sample.

For the second sample, we first retrieve 3,729 repurchase announcements during the period of October 13, 2000 to December 31, 2012.⁹ We drop off 266 observations made by financial

⁷ The announcement date is the date that a share repurchase appears in the database or the date that the news is reported in the newspaper, whichever is earlier.

⁸ Margin call pressure may take place at any time. We, therefore, focus on quarterly, rather than annual, frequency for each sample firm. A shorter window is suitable to examine the relation between the share pledge and the propensity to repurchase.

⁹ We drop observations before October 13, 2000 because their execution period was shorter than others.

firms or state-owned firms, and exclude 426 cases as we cannot identify controlling shareholders or obtain required data. The final sample consists of 3,035 repurchase programs announced by 791 firms. We refer this as the announcement sample.

The most important variable in this paper is share pledge. Share pledge data are available for Taiwanese listed companies since 1997.¹⁰ The Securities and Exchange Law requires corporate insiders, such as directors, supervisors, managers, and large shareholders (who hold more than 10% of shares outstanding), to file the number of shares held and the number of shares pledged to Securities and Futures Bureau every month. Throughout the paper, we define the share pledge ratio as the shares pledged to bank loans divided by the shares owned by the controlling shareholders.

We choose to focus on controlling shareholders, rather than other stakeholders, to compute the share pledge ratio because they are the decision makers of buyback programs. Controlling shareholders also decide and execute important corporate activities. As a result, their incentives to pledge shares may have significant effect on repurchases and firm value.¹¹

The calculation of voting rights is based on the notion of ultimate control that traces the pyramid of ownership structure (La Porta, Lopez-de-Silanes and Shleifer, 1999). Voting rights consist of the direct and indirect voting rights held by the controlling shareholders of a company. Direct voting rights include the rights to those shares registered under the name of the ultimate owner and the owner's family members related through blood or marriage. Indirect voting rights are the rights to those shares held by entities (e.g., corporations, investment companies, and other

¹⁰ Article 25 of the Securities and Exchange Law requires that firms file to the Securities and Futures Bureau and announce to the public when their insiders pledge shares for personal loan. According to paragraph 3 of Article 22-2 of the Securities and Exchange Law, the pledged shares here must include the shares held by shareholders under the names of their spouses, minor children, and those held in the name of other parties.

¹¹ One advantage of using TEJ is that it identifies the controlling shareholder as the shareholder (or a group of shareholders who are related) with the most voting rights and effective managerial authority in a firm. TEJ applies both quantitative information (e.g., annual report) and qualitative sources (such as reports in financial press and corporate events) to ensure that the controlling shareholder identified is indeed the ultimate owner of the firm.

legal entities), which are controlled by the ultimate owner. If we cannot identify the controlling shareholder based on voting rights, we exclude the firm from our analysis.

We first check the quarterly sample whether repurchase firms indeed have more share pledges than non-repurchase firms. We assign a firm-quarter observation as the repurchase quarter if the firm made a repurchase announcement in that given quarter. The remaining quarters are classified as non-repurchase quarters. We examine firm characteristics and share pledges at the prior quarter-end for the two groups. Panel A of Table 1 reports the results.

[TABLE 1 ABOUT HERE]

We find that the share pledge ratio is 10.8% for repurchase quarters and 8.5% for non-repurchase quarters; the difference is significant at the 1% level. This result suggests that controlling shareholders in repurchase firms pledge more shares in banks. The other firm characteristics are consistent with the repurchase literature. For example, repurchase firms show significantly lower returns prior to announcements, consistent with the undervaluation story. In addition, repurchase firms have lower leverage and higher free cash flow, both adjusted for industry median, consistent with the managerial motives of altering capital structure and disgorging excess cash, respectively.

The summary statistics for the announcement sample are reported in Panel B of Table 1. On average, sample firms intend to buy back 3% of equity at announcements. The actual buyback is 1.9% of shares outstanding during the two-month repurchase period, with a mean completion ratio of 68%. Repurchase firms tend to be big- and value-oriented, with larger size and book-to-market than the average firm in the stock market. Similar to the quarterly data, repurchase announcements have significantly negative returns in the prior three months. Firms

have higher free cash flow and lower leverage relative to industry medians. Again, the results are consistent with the motives of undervaluation, free cash flow distribution, and leverage adjustment.

4. Empirical Results

4.1. Propensity to Repurchase

We examine if the rationale behind repurchases is related to the share pledge of controlling shareholders. Our hypothesis predicts that firms with higher share pledges have higher propensity to repurchase. Moreover, the positive relation between share pledges and repurchases is stronger when share price is low.

To test our hypothesis, we first use the quarterly sample to run logit regressions of repurchases on share pledges. The dependent variable is a repurchase dummy that equals 1 if the firm makes a repurchase announcement in a given quarter, and zero elsewhere. The literature argues that repurchase decisions may be affected by undervaluation, free cash flow distribution, capital structure adjustment, and dividend substitution (e.g., Ikenberry et al., 1995; Dittmar, 2000; Chan et al., 2004). The summary statistics in Table 1 indicate that our repurchase sample also keeps the firm characteristics consistent with the literature. Therefore, we control for the book-to-market ratio (B/M), prior return, industry-adjusted free cash flow (FCF), industry-adjusted leverage (LEV), and cash dividend in regressions. All independent variables are measured at the prior quarter-end. Table 2 reports the results of logit regressions.

[TABLE 2 ABOUT HERE]

We find that share pledges are significantly and positively related to the probability of initiating a repurchase program. The effect of share pledges remains strong even when we control for a variety of variables proved to be important in the literature to affect repurchase decisions (Model 2). To proxy for the margin call pressure, we define the low return dummy that equals 1 if the prior stock return is below -15% , and zero otherwise.¹² We use the interaction term of share pledge and low return dummy to test the impact of share pledge on repurchases when there is price pressure. We find that the coefficient of the interaction term is significantly positive (Model 3). For example, for firms with low prior returns, the share pledge effect is 1.243 ($= 0.566 + 0.677$), more than twice of the effect for firms with higher prior returns (0.566). Our result holds after controlling for the firm fixed effect (Model 4). These results are consistent with our hypothesis predictions. That is, the higher the share pledge ratio of the controlling shareholder, the more likely the firm will initiate buyback programs. This incentive to buy back due to high share pledges is particularly strong when there is margin call pressure.

Prior research finds that open market repurchases are not binding and firms have flexibility and discretion in executing repurchase programs (Stephens and Weisbach, 1998; Chan et al., 2010). For robustness, we test our hypothesis by examining the impact of share pledges on actual buyback. We run Tobit regressions of actual buyback where actual buyback is defined as shares purchased during the two-month repurchase period following the announcement divided by shares outstanding prior to the announcement.¹³ We find that the pledge ratio positively affects the propensity to repurchase. The relation between share pledge and actual buyback is strengthened when the margin call pressure is intense. As these results are similar to Table 2, we report in Appendix Table AI.

¹² We try various thresholds to define the prior returns dummy, ranging from -10% to -20% , and results are similar to what we report here.

¹³ We also use the completion ratio (the actual buyback ratio divided by the intended ratio) as an alternative dependent variable. The results are qualitatively similar. To save space, we do not report here.

To shed light on the economic significance of share pledges on repurchases, we estimate the probability of initiating repurchases based on logit regressions. Our baseline model is Model 3 of Table 2 with sample means applying to all explanatory variables. We then examine how each of explanatory variables affects the likelihood of repurchases by increasing or decreasing one standard deviation from the sample mean while holding others variables constant.¹⁴ As these explanatory variables proxy for motives documented in the literature, we are able to assess relative importance of different motives behind buyback programs.

[TABLE 3 ABOUT HERE]

Table 3 shows that the magnitude of the pledge motivation is economically significant. As reported in Row 2, the propensity to repurchase increases by 1.52% (from 5.17% to 6.69%), which is a 29.5% increase from the base case, when the firm experiences an increase in share pledge and market pressure. By contrast, the probability of repurchases increases by 0.29% and 1.02% when the firm has one standard deviation increase in B/M and FCF, respectively. Compared to the other well-documented motives of repurchases, the pledge motivation generates the most impact on the propensity to repurchase.¹⁵

Overall, repurchase firms are associated with higher share pledges by controlling shareholders. The higher pledged shares incentivize firms to initiate buyback programs and

¹⁴ We set the low return dummy to one in the pledge motivate and zero in the remaining cases to address the impact of margin call pressure on the repurchase decision.

¹⁵ If repurchase firms tend to have more share pledges, one question is whether firms continue to use share buybacks to reduce potential price pressure due to high share pledges. We sort the repurchase announcements by the number of repurchases in the sample period and find that the share pledge ratio increases with the number of repurchase announcements. We further run order logic regressions and find that the probability of initiating more than one buyback programs is higher than that of initiating one or zero buyback program. These result are consistent with the notion that controlling shareholders are motivated to use multiple share repurchases to release margin call pressure. To save space, we do not tabulate these results.

increase the propensity to buy back. This relation between repurchases and share pledges is particularly strong when margin call pressure is prevalent. These results are consistent with our margin call hypothesis.

4.2. Short-term market reaction

We show that share pledges by controlling shareholders affect the likelihood of firms to buy back stock. We now go one step further to examine whether the market responds to share pledges at the repurchase announcement in any systematic pattern. Our hypothesis predicts that if controlling shareholders initiate buybacks to reduce their personal price pressure rather than to increase shareholder value, the market reaction will be less favorable. Our hypothesis also predicts that the negative impact of share pledges on repurchase announcement returns is much stronger when there is margin call pressure.

We test our hypothesis predictions by running regressions of repurchase announcement returns on share pledges. The dependent variable is the five-day ($-2, +2$) buy-and-hold abnormal return (BHAR), measured by the difference in the five-day compound return between repurchasing firms and their corresponding matching benchmarks. The matching pool includes non-repurchase firms in the two pre-event years with the same size ranking (big vs. small) and the same book-to-market ranking (low, medium, high). Among all firms in the matching pool, we select five matching firms with the closest book-to-market ratio to that of the repurchasing firm as the matching benchmark.¹⁶ As the same way in Table 2, we employ a low return dummy that equals 1 if the prior stock return is below -15% to proxy for the margin call pressure. We

¹⁶ Our results hold when we employ three-day window ($-1, +1$) buy-and-hold abnormal returns as the dependent variable.

examine whether the interaction term of share pledge and low return dummy is significant in the regression.

[TABLE 4 ABOUT HERE]

Table 4 reports results of announcement returns regressions. In Model 1, we find that share pledges are significantly and negatively related to short-term market reactions. In Model 2, we include variables B/M, prior returns, FCF, and LEV to control for the undervaluation, free cash flow and capital structure motives behind repurchases. We also follow the previous research to control for the program size (e.g., Chan et al., 2004). Finally, we include the change in cash flow rights of the controlling shareholders to control for optimism (we will explain in details in next section). Even with the inclusion of all these control variables, the pledge coefficient remains significantly negative.

We test the share pledge effect under margin call pressure in Model 3. We find the interaction term of share pledge and low return is significantly negative but the share pledge itself is insignificant. This result suggests that the negative effect of share pledges on the announcement returns is mainly driven by cases with poor recent stock returns. As a result, our evidence is consistent with the notion that the negative impact of share pledges is accentuated at the time when a margin call is expected.¹⁷

¹⁷ We perform two sets of robustness checks on regressions. First, we sort sample firms into quartiles based on prior three-month returns and run regressions for each quartile subsample. Except for the highest prior return quartile, all other three groups exhibit a negative share pledge effect. The magnitudes of negative impact are monotonic decreasing with prior returns, indicating that the damaging impact of pledges is accentuated in firms with poor past returns. Second, we control for the Kaplan and Zingales's (1997) KZ index because Chen and Wang (2012) argue that financial constraints are important in explaining the performance of share buybacks. Our result does not alter after controlling for financial constraints. To save space, we do not report these results.

In sum, we find that share pledges have a negative effect on the repurchase announcement returns. The more the percentage of their shares that controlling shareholders pledge, the less favorable the market response around repurchase announcements. This negative aspect is especially strong when the margin call is more imminent.¹⁸

4.3. Is margin call hypothesis driven by the control right concern?

Why are firms more likely to initiate repurchase programs when the share pledge is higher? We propose a control right motive for the controlling shareholder. In particular, a concern of receiving margin calls arises for the controlling shareholder with share pledges when the proportion of pledged shares is high or when share price decreases. If the controlling shareholder cannot provide sufficient collaterals or funds when getting margin calls, the financial institution may sell off the pledged shares. This will reduce the ownership of the controlling shareholder. If the proportion of shares pledged is large, the reduced ownership will significantly lower the control power of the controlling shareholder and thus decrease her ability to extract private benefits of firms. As a result, the more the percentage of share pledges, the more concern of the controlling shareholder to receive margin calls. Under the threat of losing control when share price drops, the controlling shareholder has incentives to maintain share price to avoid margin calls. Our control right explanation therefore argues that the controlling shareholder is more likely to initiate repurchase programs to keep share price from dropping below the maintenance level when share price falls.

While a direct test on the control right explanation is not feasible as the incentives to maintain share price and avoid margin calls is unobservable, an indirect way is to examine firms

¹⁸ To avoid repurchase announcement returns being affected by other confounding information, e.g. earnings announcement, we exclude the buyback programs from our sample if there is an earnings release within five days (-2,+2) around the repurchase announcement. Our result holds with this robustness check.

without a controlling shareholder, i.e. widely held firms that are run and controlled by professional managers (La Porta et al, 1999). In such firms, because there is no investor with large ownership to control firms, the fear of losing control would not be the first-order consideration to affect the repurchase decision. As a result, we do not expect to see a close relation between share pledges of the managerial teams and repurchase decisions (and repurchase announcement returns) for firms without a controlling shareholder.

In TEJ, we are able to find widely held firms and compute the share pledge ratios of managerial teams (or professional managers) during the period of October 2000 to December 2012. As mentioned before, we exclude financial firms or state-owned firms from our sample. We then assign a firm/quarter as a repurchase quarter if the widely held firm made a repurchase announcement in that given quarter, and the remaining quarters are classified as non-repurchase quarters. Consequently, we have 5,584 firm-quarters observations and 372 repurchase announcements for widely held firms.¹⁹

[TABLE 5 ABOUT HERE]

Table 5 reports the results of logit regression of repurchase decisions and OLS regressions of repurchase announcement returns for widely held firms. We find that the propensity to repurchase is unrelated to share pledges once a variety of control variables are included in the regressions (Models 2 and 3).²⁰ The market reaction to repurchases is not reliably related with share pledges either (Models 4 and 5). The interaction term of pledges and low prior returns even turns to be positive, suggesting that the more share pledge with low prior returns, the more

¹⁹ In untabulated results, we find the descriptive statistics of widely held firms are qualitatively similar to firms with controlling shareholders. For instance, the share pledge ratio is 12.87% for repurchase quarters and 9.63% for non-repurchase quarters for widely held firms, while the difference is significant at the 1% level.

²⁰ The result remains the same even after controlling for firm fixed effect.

positive market reaction to repurchase announcements. Accordingly, the results in Tables 2 and 4 are mainly driven by the firms dominated by controlling shareholders. The finding here is consistent with the notion that the controlling shareholder is concerned about the losing control with share pledges and uses repurchases to relieve the margin call pressure.

5. Additional Tests

5.1. Can alternative explanations account for the margin call hypothesis?

Prior studies propose numerous theories to explain the managerial motive of buybacks. Three major motives are undervaluation, free cash flow, and leverage (e.g., Dittmar, 2000; Chan et al., 2004). It is plausible that firms with high share pledges initiate repurchases to signal undervaluation, to resolve a potential agency problem, or to adjust corporate leverage. For example, controlling shareholders who perceive share price trading below fair value may choose not to sell but to borrow and pledge with shares for personal financing. To mitigate concerns of agency problems due to high share pledges, controlling shareholders can use repurchases to distribute free cash flows. Moreover, a firm's capital structure decision reflects debt tolerance of its controlling shareholder and such tolerance also determines the controlling shareholder's personal leverage choice (Cronqvist et al., 2012). The controlling shareholder initiates repurchase programs simply to adjust corporate leverage and thus to match her debt tolerance.

We argue that these three stories do not offer a complete picture for our results. First, we have included variables in regressions to control for these three motives in Tables 2 and 4 (i.e., book-to-market ratio, free cash flows, and leverage). It is less likely that the share pledge effect on repurchases is still largely driven by undervaluation, free cash flow, and leverage. Second, if the pledge ratio proxies for the extent of undervaluation and agency problems, we would expect

a positive relation between share pledges and buyback announcement returns. That is, the higher the degree of undervaluation or potential agency costs measured by share pledges, the better the market reaction to repurchase announcements. Yet, we find that firms with high pledges actually receive a less favorable market reaction around the announcement (Table 4).²¹ Third, if the positive correlation between the pledge ratio and repurchases reflects a common debt tolerance, this relation would be stronger when the firm leverage drops following a rise in stock price. However, we find that the relation is stronger following a decline in stock price in logit regressions (Table 2).

One alternative explanation to account for our results would be optimism. If a controlling shareholder is optimistic about the future performance of the company, her forecast will be biased upward. She may act on the belief that the firm's stock is undervalued even when it is fairly priced by the market. As such, an optimistic controlling shareholder is unlikely to sell her shareholdings. If she needs money, she can pledge shares to borrow. She may even use proceeds from pledges to purchase more shares. Optimistic controlling shareholders will also convince the firm to repurchase stock. As a result, we should observe a positive relation between the pledge ratio and repurchases. Optimism can also explain the negative relation between the pledge ratio and market reactions when investors realize the repurchase is driven by optimism.

To test whether optimism drives our results, we include the change in cash flow rights of the controlling shareholders in the announcement return regressions (Tables 4) to control for optimism (e.g., Malmendier, Tate, and Yan, 2011).²² Empirically, we find the estimated

²¹ We also include the change in the cash flow rights of controlling shareholders to proxy for undervaluation. If controlling shareholders believe firms are undervalued, they are likely to increase their cash flow rights to profit from the mispricing. Therefore, we expect to see a positive relation between market reaction and the change in cash flow rights if the undervaluation story accounts for our results. However, we do not find such evidence.

²² Malmendier, Tate, and Yan (2011), and among others, argue that CEOs are overconfident if the CEOs systematically maintain high personal exposure to company-specific risk. Following the same rationale, we argue that the optimistic controlling shareholders are more likely to increase their cash flow rights.

coefficient on the change in cash flow rights is insignificant, and pledge-related variables are still significant as we predict. As a result, we believe that optimism is unlikely to account for our main results.

5.2. Using the 2SLS approach to control for potential endogeneity

To further evaluate the alternative explanations, we use two-stage least square (2SLS) regressions to control for potential endogeneity or the omitted variables problem. We identify two exogenous shocks on pledges during the sample period. First, from February 2007, the Financial Supervisory Commission in Taiwan imposed a restriction on the ratio of the market value of pledged shares to the loan amount that bank can offer to insiders. This action was to mitigate the potential negative effects of pledges. Second, effective from November 2011, the amendment of the Corporate Act discounts the voting power of shares pledged by directors of listed companies.²³ These two shocks only reduce the incentives for controlling shareholders to pledge shares but have no direct impact on repurchases. As a result, the two regime shifts in pledges can serve as appropriate instruments. Based on these policy changes, we define two instrument variables: a dummy variable indicating the date after January 2007 and another dummy variable representing the date after November 2011.

[TABLE 6 ABOUT HERE]

Table 6 reports the results of two-stage regressions. In the first-stage, we run an OLS regression of share pledges on two instrument variables and control variables. We show that both

²³ Specifically, for those directors who have pledged shares more than 50% of the shares owned when they are elected, no voting will be allowed for those pledged shares over the 50% threshold.

instrumental variables are significantly negative, indicating that the two natural experiment changes lead to lower shares pledged by controlling shareholders. In the second-stage, we run logit regressions by including the fitted value of share pledges obtained from the first-stage regression. We find that both the share pledge and the interaction term of pledge and low return dummy are significantly positive. In other words, firms are more likely to initiate a buyback program when the controlling shareholder has high share pledges, and this relation is stronger when margin call pressure is high. The result in Table 6 lends support to the margin call hypothesis.²⁴

5.3. Are there other ways to release margin call pressure?

Can firms or controlling shareholders choose ways other than repurchases to mitigate the margin call pressure? We examine four possible actions, two at the personal level and two at corporate level, to highlight the importance of using repurchases to support share price. We examine if the relation between pledges and repurchases holds after controlling for the possible personal and corporate actions.

At the personal level, the controlling shareholders need to put more money in their bank accounts when they anticipate margin calls. They can either pledge more shares to get additional funds or sell some shares to repay the loans. As a result, increasing shares pledged and selling shares owned can be alternative choices for controlling shareholders to relieve margin call pressure. In unreported models, we run logit regressions of increase in shares pledged and decrease in shares owned, separately, on proxies of margin call pressure (i.e., the share pledge and the interaction term of share pledge and low return dummy). We find that controlling

²⁴ Our results still hold when we examine the effect of pledges by using Tobit regression of actual repurchase in the second-stage.

shareholders are more likely to increase shares pledged or reduce shares owned when they face margin call pressure.

At the corporate level, firms may choose to inflate earnings to relieve the margin call pressure. In particular, firms can perform earnings management by inflating discretionary accruals (DA) to boost up stock price (Subramanyam, 1996; Teoh, Welch, and Wong, 1998; Shivakumar, 2000). Prior research also suggests that dividend increases can support share price because dividend growth indicates cash-flow shocks and can induce positive market reactions (Guay and Harford, 2000). However, we argue that neither earnings management nor dividend increases can be reasonable alternatives in our sample firms. First, we find a negative relation between DA and share pledges in untabulated result. When there is margin call pressure, DA reduces rather than increases, suggesting that firms do not use DA to relieve share price pressure. Second, Taiwanese companies pay dividends annually rather than quarterly. With such a low frequency in paying dividends, it is difficult for firms to time the dividend increase announcements to relieve margin call pressure that can occur at any point in time. Nevertheless, we will control for DAs and dividend increases in repurchase regressions and examine if the share pledge effect remains.

[TABLE 7 ABOUT HERE]

In Table 7, we run logit regressions of repurchase decisions (Panel A) and OLS regressions of repurchase announcement returns (Panel B), and test whether the relation between repurchases and share pledges holds. While the alternative ways to relieve price pressure (i.e., increase pledges, decrease shares, DA, and dividend increase) are related to repurchase decisions, the interaction term of pledge and low return dummy remains strongly positive. The coefficient on

the interaction term is similar to that in Table 2. In announcement return regressions, none of these alternative actions (except for decrease shares) are significant. In sum, while we cannot completely rule out the possibility that controlling shareholders use other approaches to relieve margin call pressure, our main results in Tables 2 and 4 are not affected by these alternative personal and corporate actions.

5.4. Counterfactual test on pseudo-events

To examine whether the impact of share pledges on stock returns exists only in the repurchase announcements, we conduct counterfactual tests by simulations. We test the relation between short-run returns and margin call pressure around repurchase announcements as a comparison to that in the nonevent period.

We carry out simulations using three approaches to generate pseudo-events. First, we select non-repurchase date for a sample firm and treat it as the pseudo-event date. Second, a pseudo-event is chosen by randomly picking up a size and B/M matched non-repurchase firm (no repurchase announcement in the prior two months) with available pledge information on the actual repurchase announcement date. Finally, we randomly select size and B/M matched non-repurchase firms from non-repurchase dates to form pseudo-events.

We simulate a pseudo-event for each observation in the repurchase announcement sample to generate a pseudo sample. We then run a cross-sectional regression on the pseudo sample as if it were the repurchase sample. The dependent variable is the five-day buy-and-hold abnormal return, adjusted by the Taiwan stock market index return over the same period, around the pseudo-events. We repeat this process 1,000 times. An empirical p -value is computed as the percentage of trials with the simulated coefficient lower than that of the repurchase sample. A

small p -value represents that the coefficient of repurchase sample is empirically significant, compared with random firms.

[TABLE 8 ABOUT HERE]

Table 8 reports the simulation results. The regression models correspond to the models in Table 4.²⁵ To save space, we do not report the coefficients of control variables. For the ease of comparisons, we report the regression result based on the (original) repurchase sample in Panel A. The coefficients in Panel A are very similar to those in Table 4, indicating that the market reaction is lower for high pledge firms, especially when margin call pressure is high. In Panel B, Model 1, the average coefficient of share pledge is 0.002 with a p -value of 0.000, suggesting that no trial in simulations generates a coefficient as low as that in the repurchase sample. A similar result is found in Model 2, even with the inclusion of control variables. In Model 3 of Panel B, the p -value of the interaction term of pledge and prior return is only 0.002, supporting the notion that the negative effect of share pledge on short-run returns is strong for repurchase firms, compared with random firms, when margin call pressure is present. Panels C and D show qualitatively similar results even when we use different simulation approaches.

In sum, our results are consistent with the margin call hypothesis. The announcement return is lower for repurchase firms with high share pledges, especially when the margin call pressure is high. Our simulated results also suggest that the share pledge has strong return predictability for repurchase announcement returns. While firms have incentives to support share price under

²⁵ There are two differences between models in Table 4 and models in Table 8. First, we do not include the intended ratio in regression models in Table 8 because pseudo firms do not have repurchase announcements and therefore the intended ratio is not available for pseudo firms. Second, we use the market-adjusted return as the dependent variable in Table 8, rather than the abnormal return adjust for the size and book-to-market matching firm in Table 4, to ease the simulation process.

margin call pressure, the market reacts negatively, at least partially, to the repurchase programs that may not be initiated to enhance shareholder value.

6. Conclusions

The pledged shares by insiders have recently received much attention by regulators worldwide. However, the relevance of pledged shares to corporate decisions is little understood. Renwick (2006), in comments on the U.S. Securities and Exchange proposal on disclosure, objected that share pledging “is not material information, as we are aware of no empirical evidence suggesting that the pledging of stock would adversely influence the individual’s decisions regarding the issuer.” Renwick’s remarks highlight the general lack of information on pledged shares and their impact on firms.(this statement can be put into introduction)

We fill this gap by examining the impact of controlling shareholders’ share pledges on the share repurchases. We propose a margin call hypothesis and posit that the controlling shareholders use share repurchases to mitigate the potential concerns of margin calls when they have pledged shares for personal loans. Because these repurchases are used to relieve the share price pressure rather than to disseminate good information, the market reaction to the repurchase announcement will be less favorable compared to that documented in the literature.

Consistent with our margin call hypothesis, we find that companies are more likely to initiate buyback programs when the percentage of shares pledged is higher. This likelihood of having a buyback is especially high when the firm experiences a recent large drop in stock price. We show that investors are, at least partially, aware of the margin call incentive of controlling shareholders. The market reaction to the repurchase announcement is negatively associated with share pledges, particularly under the margin call pressure.

We perform a variety of robustness checks. First, we find the alternative theories, such as undervaluation, disgorgement of free cash flow, adjustment of leverage, and managerial optimism, cannot account for our results. Second, we examine several ways other than repurchases to relieve margin call pressure. We do not find these approaches affect the relation between share pledges and repurchases. Finally, we show that repurchasing firms under margin call pressure perform worse than repurchasing firms without margin call pressure and also worse than non-repurchase firms under margin call pressure. All these results are consistent with the margin call pressure hypothesis.

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Appendix

A. Variable definitions

Actual buyback amount is the dollar amount (in NT\$ million) of shares actually purchased during the two-month repurchase period following repurchase announcements, adjusted for 2012 consumer price index.

Intended ratio is the percentage of shares that the firm intends to buy at the announcement relative to shares outstanding prior to the repurchase announcement.

Actual buyback is the percentage of shares actually purchased during the two-month repurchase period following repurchase announcements to shares outstanding prior to repurchase announcements.

Completion ratio is the actual buyback ratio relative to the intended ratio.

Share pledge is the controlling shareholder's shareholdings that are pledged to banks relative to shares owned by the controlling shareholder.

Size is the natural logarithm of the market value of equity (in NT\$ million) at the month-end prior to the repurchase announcement.

B/M is the book-to-market ratio at the month-end prior to the repurchase announcement.

Prior return is the three-month buy-and-hold raw return ending three days prior to the repurchase announcement.

Low return dummy is equal to one if the prior return is lower than -15% , and zero otherwise.

LEV is the industry-adjusted leverage, defined as the difference between the net leverage in the year prior to the repurchase announcement and the target net leverage ratio where the net leverage is the ratio of net debt (debt minus cash and equivalents) to total assets and the target net leverage ratio is the median net debt-to-asset of all firms in the same industry.

FCF is free cash flow measured by Lehn and Poulsen (1989) divided by sales in the year prior to the repurchase announcement and is adjusted for industry median within the same two-digit SIC code.

Change in cash flow rights is defined as the change in cash flow rights over the one year prior to repurchase announcements. To adjust the impact of share distribution, we ignore the increase in cash flow rights in the month of distributing stock dividends. Cash flow rights are the sum of the direct and indirect cash flow rights held by the controlling shareholders. Direct cash flow rights are equal to the direct voting rights minus the shareholding held by the foundation. Indirect cash flow rights are the product of the shareholdings for each chain of ownership that is characterized by a pyramid structure and cross-shareholdings among different groups within a company.

Increase pledged shares dummy is equal to one if the controlling shareholders increase pledged shares (scaled by outstanding shares), and zero otherwise.

Reduce shares owned dummy is equal to one if the controlling shareholders reduce their own shares (scaled by outstanding shares) and zero otherwise.

DA is quarterly discretionary accrual adjusted by industry and performance, suggested by Gong, Louis, and Sun (2008).

Increase dividend dummy is equal to one if a firm has announced (cash) dividend increase, and zero otherwise.

Dividend missing is equal to one if a firm does not have dividend announcement event, and zero otherwise.

Appendix Table AI
Tobit Regression of Actual Repurchases on Share Pledges

This table provides the Tobit regressions of actual repurchase activity on share pledges. The sample consists of 46,838 firm-quarter observations during October 2000 to December 2012. The dependent variable is equal to actual buyback if it is a repurchase quarter, and zero otherwise, where a repurchase quarter is the firm-quarter observation that the firm made a repurchase announcement in a given quarter. Actual buyback is defined as the percentage of shares actually purchased during the two-month repurchase period relative to shares outstanding prior to repurchase announcement. *Share pledge*, *size*, *B/M*, *prior return*, *FCF*, *LEV*, and *cash dividend* are defined in Table 1. *Low return dummy* is equal to one if the prior three-month return is lower than -15%, and zero otherwise. All variables are measured prior to the given quarter and are winsorized at top and bottom 1%. Numbers in brackets are *p*-values adjusted by Petersen's (2009) clustered standard errors at the firm level. ***, **, and * denote significance of 1%, 5%, and 10%, respectively. *N* is the numbers of observations in regressions.

Dep. variable = Actual buyback/ Model	1	2	3
Intercept	-0.073*** [0.000]	-0.087*** [0.000]	-0.087*** [0.000]
Share pledge	0.015*** [0.000]	0.019*** [0.000]	0.014*** [0.003]
Share pledge × Low return dummy			0.014*** [0.001]
Size		0.002*** [0.001]	0.002*** [0.001]
B/M		0.002*** [0.003]	0.002** [0.015]
Prior return		-0.028*** [0.000]	-0.027*** [0.000]
FCF		0.015*** [0.000]	0.015*** [0.000]
LEV		-0.022*** [0.000]	-0.022*** [0.000]
Cash dividend		-0.005*** [0.003]	-0.005*** [0.004]
Pseudo R^2 (%)	0.91	11.82	12.04
<i>N</i>	46,838	46,838	46,838

Table 1
Descriptive Statistics

This table reports descriptive statistics for our sample. Panel A consists of 46,838 firm-quarter observations for companies with controlling shareholders during October 2000 to December 2012. A repurchase quarter (the second column) is the firm-quarter observation that the firm made a repurchase announcement in the given quarter. All remaining firm-quarter observations that are not classified as repurchase quarters are called non-repurchase quarters (the third column). *Share pledge* (in %) is the controlling shareholder's shareholdings that are pledged to banks relative to shares owned by the controlling shareholder. *Size* is the natural log of the market value of equity. *B/M* is the book-to-market ratio defined as the book value of common equity divided by the market value of equity. *Prior return* is the prior three month buy-and-hold abnormal return, adjusted by Taiwan Stock Exchange Capitalization Weighted Stock Index return. *LEV* is the industry-adjusted leverage, defined as the difference between the net leverage and the target net leverage, where the net leverage is the ratio of net debt (debt minus cash and equivalents) to total assets and the target net leverage ratio is the median of net debt-to-asset ratios of all firms in the same two-digit SIC industry. *FCF* is free cash flow measured by Lehn and Poulsen (1989) scaled by sales and is adjusted by the industry median. *Cash dividend* is the cash dividend scaled by net income before extraordinary items, while cash dividend is set to 1 if the dividends exceed the net income before extraordinary items. All variables are measured prior to the given quarter and are winsorized at top and bottom 1%. For each column, the first row reports the mean and the second row reports the median (in brackets). The last column reports the difference in firm characteristics between repurchase firms and non-repurchase firms. ***, **, and * denote significance of 1%, 5%, and 10%, respectively, of *t*-statistics for means and *z*-statistics for medians. *N* is the numbers of firm-quarter observations. Panel B reports descriptive statistics of 3,035 buyback programs from October 13, 2000 to December 31, 2012. All variable definitions are detailed in Appendix A and are winsorized at top and bottom 1% to mitigate the impact of outliers.

Panel A. Firm-Quarter Observations for Repurchases versus Non-Repurchases				
	(1) Overall sample	(2) Repurchase	(3) Non-repurchase	(2) – (3) Difference
	<i>N</i> = 46,838	<i>N</i> = 2,742	<i>N</i> = 44,096	
Share pledge (%)	8.676 [0.000]	10.821 [0.000]	8.542 [0.000]	2.278*** [0.000]
Size	7.892 [7.756]	8.114 [7.987]	7.878 [7.740]	0.236*** [0.247]***
B/M	0.990 [0.788]	1.035 [0.930]	0.987 [0.780]	0.048*** [0.150]***
Prior return (%)	2.426 [-1.623]	-3.902 [-5.205]	2.819 [-1.311]	-6.721*** [-3.894]**
LEV (%)	-1.890 [0.000]	-7.115 [-2.677]	-1.565 [0.000]	-5.550*** [-2.677]**
FCF (%)	-2.870 [0.000]	1.981 [0.432]	-3.172 [0.000]	5.153*** [0.432]***
Cash dividend (%)	56.846 [60.887]	52.177 [52.363]	57.136 [61.453]	-4.959*** [-9.090]**

Table 1 (Continued)

Panel B. Repurchase Announcements Events(<i>N</i> = 3,035)		
	Mean	Median
Actual buyback amount (NT\$ MM)	120.05	43.00
Intended ratio (%)	3.01	2.60
Actual buyback (%)	1.92	1.57
Completion ratio (%)	68.40	80.00
Share pledge (%)	11.19	0.00
Size	8.09	7.94
B/M	1.08	0.99
Prior return (%)	-15.13	-16.06
LEV (%)	-6.91	-2.42
FCF (%)	2.45	0.45
Cash dividend (%)	52.10	52.35
Change in cash flow rights (%)	-0.22	-0.08

Table 2
Logit Regression of Repurchase Decisions on Share Pledges

This table reports logit regressions of repurchase decisions on share pledges. The sample consists of 46,838 firm-quarter observations for companies with controlling shareholders during October 2000 to December 2012. The dependent variable is equal to one if it is a repurchase quarter, and zero otherwise, where a repurchase quarter is the firm-quarter observation that the firm made a repurchase announcement in a given quarter.

$$\Pr(\text{Repurchase}=1) = \alpha_{it} + \beta_1 \text{Share pledge}_{it} + \beta_2 \text{Share pledge}_{it} \times \text{Low return dummy}_{it} + \beta_3 \text{Size}_{it} + \beta_4 \text{B/M}_{it} + \beta_5 \text{Prior return}_{it} + \beta_6 \text{FCF}_{it} + \beta_7 \text{LEV}_{it} + \beta_8 \text{Cash dividend}_{it} + \varepsilon_{it}$$

Share pledge, *size*, *B/M*, *prior return*, *FCF*, *LEV*, and *cash dividend* are defined in Table 1. *Low return dummy* is equal to one if the prior three-month return is lower than -15%, and zero otherwise. All variables are measured prior to the given quarter and are winsorized at top and bottom 1%. Numbers in brackets are *p*-values adjusted by Petersen's (2009) clustered standard errors at the firm level. ***, **, and * denote significance of 1%, 5%, and 10%, respectively.

Dep. variable = Repurchase decision/ Model	1	2	3	4
Intercept	-2.842*** [0.000]	-3.766*** [0.000]	-3.758*** [0.000]	-11.70*** [0.000]
Share pledge	0.668*** [0.000]	0.827*** [0.000]	0.566*** [0.006]	0.424 [0.134]
Share pledge × Low return dummy			0.677*** [0.001]	1.354*** [0.000]
Size		0.112*** [0.000]	0.112*** [0.000]	0.176** [0.019]
B/M		0.074*** [0.004]	0.063** [0.018]	0.353*** [0.000]
Prior return		-1.379*** [0.000]	-1.303*** [0.000]	-1.339*** [0.000]
FCF		0.710*** [0.000]	0.716*** [0.000]	0.258 [0.310]
LEV		-1.006*** [0.000]	-1.004*** [0.000]	-1.293*** [0.000]
Cash dividend		-0.208*** [0.006]	-0.200*** [0.008]	-0.240*** [0.004]
Firm fixed effect	No	No	No	Yes
Pseudo R-square (%)	0.20	2.84	2.90	26.45
Number of used observations	46,838	46,838	46,838	46,838

Table 3
Estimated Probability of Share Repurchases

This table reports the estimated probability levels of share repurchase on specific hypothesized values of the explanatory variables that are related to different motivations of share repurchase in Table 2. We use the fitted coefficient values in Model 3 of Table 2 to describe the estimated probability of share repurchase, indicating that repurchasing firms may face larger market pressure on share price (a lower prior returns) when describing a pledge motivation.

$$\Pr(\text{Repurchase}=1) = -3.758 + 0.566 \times \text{Sharepledge}_{it} + 0.677 \times \text{Sharepledge}_{it} \times \text{Low return dummy}_{it} \\ + 0.112 \times \text{Size}_{it} + 0.063 \times \text{B/M}_{it} - 1.303 \times \text{Prior return}_{it} + 0.716 \times \text{FCF}_{it} - 1.004 \times \text{LEV}_{it} - 0.200 \times \text{Cash dividend}_{it} + \varepsilon_{it}$$

We set a low return dummy to equal 1 in Row 2 and to zero in the remaining rows. Row 1 considers the base case, assuming all explanatory variables are set at their sample means. Row 2 reports the probability of a repurchase for a firm that face pledge motivation, with a share pledge ratio at sample mean plus one standard deviation and holding other explanatory variables with mean values. Rows 3–6 describe the impact of traditional motivations, while holding the others constant at neutral levels. Row 3 is for undervaluation motivation, with a B/M ratio at sample mean plus one standard deviation. Row 4 is for free cash flow motivation, with a FCF at sample mean plus one standard deviation. Row 5 is for leverage motivation, with a LEV at sample mean minus one standard deviation. Row 6 is for dividend substitute, with a cash dividend at sample mean minus one standard deviation.

Repurchase motivation	Share pledge	Share pledge× Low return dummy	Size	B/M	Prior return	FCF	LEV	Cash dividend	Estimate of logit	Odds ratio	Repurchase probability as a function of repurchase motivation (%)	Compare to neutral repurchase motivation (%)
Base case	0.087	0.000	7.892	0.990	0.024	-0.029	-0.019	0.568	-2.910	0.055	5.17%	100.00%
Pledge motivation	0.260	0.260	7.892	0.990	0.024	-0.029	-0.019	0.568	-2.635	0.072	6.69%	129.48%
Undervaluation motivation	0.087	0.000	7.892	1.897	0.024	-0.029	-0.019	0.568	-2.852	0.058	5.46%	105.56%
Free cash flow motivation	0.087	0.000	7.892	0.990	0.024	0.239	-0.019	0.568	-2.718	0.066	6.19%	119.79%
Leverage motivation	0.087	0.000	7.892	0.990	0.024	-0.029	-0.254	0.568	-2.674	0.069	6.46%	124.90%
Dividend substitute	0.087	0.000	7.892	0.990	0.024	-0.029	-0.019	0.199	-2.836	0.059	5.54%	107.24%

Table 4
Regressions of Repurchase Announcement Returns on Share Pledges

This table reports cross-sectional regressions of short-run returns around repurchase announcements on share pledges. The sample consists of 3,035 repurchase announcements made by companies with controlling shareholders during our sample period. The dependent variable is a five-day (-2, +2) buy-and-hold abnormal return around repurchase announcement, adjusted for the size and book-to-market matching firm return over the same period. The variables are defined in Appendix A. All variables are winsorized at top and bottom 1%. Year dummies are included but not reported. Numbers in parentheses are *p-values* with White's (1980) standard errors. ***, **, and * denote significance of 1%, 5%, and 10%, respectively.

Dep. variable = Five-day BHAR/ Model	1	2	3
Intercept	3.073*** [0.000]	3.153*** [0.003]	2.949*** [0.006]
Share pledge	-0.026*** [0.000]	-0.019** [0.012]	0.002 [0.839]
Share pledge × Low return dummy			-0.040*** [0.002]
Size		-0.342*** [0.001]	-0.337*** [0.002]
B/M		0.925*** [0.000]	0.957*** [0.000]
Prior return		-0.018** [0.021]	-0.026*** [0.001]
FCF		-0.015 [0.190]	-0.014 [0.213]
LEV		-0.017*** [0.003]	-0.017*** [0.002]
Intended ratio		0.403*** [0.000]	0.403*** [0.000]
Change in cash flow rights		0.049 [0.140]	0.048 [0.153]
Adj. R^2 (%)	0.84	4.61	4.88
Number of used observations	3,035	3,035	3,035

Table 5
Regressions of Repurchase Announcement Returns and Logit Regression of Repurchase Decisions on Share Pledges: Widely held firms with Professional Managers

This table reports logit regressions of repurchase decisions (Models 1 to 3) and cross-sectional regressions of repurchase announcement returns (Models 4 to 6). For Models 1 to 3, the sample consists of 5,583 firm-quarter observations for widely held firms that are controlled by professional managers during October 2000 to December 2012. The dependent variable is equal to one if it is a repurchase quarter, and zero otherwise, where a repurchase quarter is the firm-quarter observation that the firm made a repurchase announcement in a given quarter. *Share pledge* (in %) is the professional manager's shareholdings that are pledged to banks relative to shares owned by the professional manager. *Size*, *B/M*, *prior return*, *FCF*, *LEV*, and *cash dividend* are defined in Table 1. *Low return dummy* is equal to one if the prior three-month return is lower than -15%, and zero otherwise. All variables are measured prior to the given quarter and are winsorized at top and bottom 1%. Numbers in brackets are *p*-values adjusted by Petersen's (2009) clustered standard errors at the firm level. For Models 4 to 6, the sample consists of 372 repurchase announcements made by widely held companies that are controlled by professional managers during our sample period. The dependent variable is a five-day (-2, +2) buy-and-hold abnormal return around repurchase announcement, adjusted for the size and book-to-market matching firm return over the same period. *Share pledge* is the professional manager's shareholdings that are pledged to banks as percentage of relative to number of shares owned by the professional managers prior to repurchase announcement. The remaining variables are defined in Table 4. All variables are winsorized at top and bottom 1%. Year dummies are included but not reported. Numbers in parentheses are *p*-values with White's (1980) standard errors. For all regression models, ***, **, and * denote significance of 1%, 5%, and 10%, respectively.

Model	Logit (Dep. variable = Rep. decision)			OLS (Dep. variable = Five-day BHAR)		
	1	2	3	4	5	6
Intercept	-2.784*** [0.000]	-3.346*** [0.000]	-3.357*** [0.000]	6.466*** [0.000]	0.040 [0.988]	0.117 [0.966]
Share pledge	0.710* [0.087]	0.664 [0.113]	0.547 [0.228]	-0.007 [0.735]	-0.002 [0.902]	-0.036 [0.191]
Share pledge × Low return dummy			0.353 [0.422]			0.055* [0.087]
Size		0.096** [0.031]	0.094** [0.034]		0.105 [0.673]	0.118 [0.634]
B/M		0.025 [0.240]	0.026 [0.231]		2.668*** [0.000]	2.657*** [0.000]
Prior return		-1.289*** [0.000]	-1.333*** [0.000]		-0.014 [0.440]	-0.005 [0.784]
FCF		0.278* [0.085]	0.280* [0.083]		-0.017 [0.307]	-0.016 [0.310]
LEV		-0.735** [0.014]	-0.735** [0.014]		0.018 [0.282]	0.017 [0.308]
Cash dividend		-0.445** [0.012]	-0.448** [0.012]			
Intended ratio					0.753*** [0.000]	0.767*** [0.000]
Change in cash flow rights					-0.026 [0.741]	-0.032 [0.688]
Pseudo R-square (%)	0.38	3.49	3.52			
Adj. R ² (%)				0.52	8.76	9.27
Number of used observations	5,584	5,584	5,584	372	372	372

Table 6
Two-Stage Regressions of Share Repurchases

This table reports two-stage regressions. The sample consists of 46,838 firm-quarter observations for companies with controlling shareholders during October 2000 to December 2012. The first stage is an OLS regression of share pledge on instrumental variables and control variables. In the second stage, we run logit regressions of repurchase decisions on fitted values of share pledge and control variables. Two instrumental variables are included in the first-stage regression. The first one is a dummy variable *After Jan 2007* that is equal to one if the date is after January 2007, and zero otherwise. The second one is a dummy variable *After Nov 2011* that is equal to one if the date is after November 2011, and zero otherwise. *Share pledge*, *size*, *B/M*, *prior return*, *FCF*, *LEV*, and *cash dividend* are defined in Table 1. *Low return dummy* is equal to one if the prior three-month return is lower than -15%, and zero otherwise. All variables are measured prior to the given quarter and are winsorized at top and bottom 1%. Numbers in brackets are *p*-values adjusted by Petersen's (2009) clustered standard errors at the firm level. ***, **, and * denote significance of 1%, 5%, and 10%, respectively.

	First Stage:	Second Stage:	
	Dep. variable = share pledge	(Dep. variable = 1 if it is a repurchase quarter, and zero otherwise)	
		1	2
Intercept	-9.352*** [0.000]	-3.446*** [0.000]	-3.300*** [0.000]
After Jan 2007	-2.919*** [0.000]		
After Nov 2011	-0.707** [0.016]		
Share pledge		3.687** [0.048]	3.162* [0.097]
Share pledge × Low return dummy			3.317*** [0.000]
Size	1.842*** [0.000]	0.058 [0.138]	0.046 [0.251]
B/M	4.688*** [0.000]	-0.067 [0.457]	-0.175* [0.057]
Prior return	-0.026** [0.018]	0.813*** [0.000]	0.856*** [0.000]
FCF	0.112*** [0.000]	-1.320*** [0.000]	-1.371*** [0.000]
LEV	0.010 [0.122]	-0.212*** [0.005]	-0.177** [0.018]
Cash Dividend	0.013*** [0.001]	-1.418*** [0.000]	-1.160*** [0.000]
Pseudo R^2 (%)	9.90	3.23	3.52
Number of used observations	46,838	46,838	46,838

Table 7
Regressions of Share Pledges and Actions to Release Margin Call Pressure

This table examines the share pledge effect after controlling for alternative actions to relieve margin call pressure. Panel A reports logit regressions of repurchase decisions on share pledges. The sample consists of 46,838 firm-quarter observations for companies with controlling shareholders during October 2000 to December 2012. The dependent variable is equal to one if it is a repurchase quarter, and zero otherwise, where a repurchase quarter is the firm-quarter observation that the firm made a repurchase announcement in a given quarter. *Share pledge*, *size*, *B/M*, *prior return*, *FCF*, *LEV*, and *cash dividend* are defined in Table 1. *Low return dummy* is equal to one if the prior three-month return is lower than -15%, and zero otherwise. *Increase shares pledged dummy* is equal to one if the controlling shareholders increase pledged shares (scaled by outstanding shares), and zero otherwise. *Decrease shares owned dummy* is equal to one if the controlling shareholders reduce their own shares (scaled by outstanding shares) and zero otherwise. *DA* is quarterly discretionary accrual adjusted by industry and performance. *Increase dividend dummy* is equal to one if a firm has announced (cash) dividend increase, and zero otherwise. *Dividend missing* is equal to one if a firm does not have dividend announcement event, and zero otherwise. All variables are measured prior to the given quarter and are winsorized at top and bottom 1%. Numbers in brackets are *p*-values adjusted by Petersen's (2009) clustered standard errors at the firm level. Panel B reports cross-sectional regressions of repurchase announcement returns. The sample consists of 3,035 repurchase announcements made by companies with controlling shareholders during our sample period. The dependent variable is a five-day (-2, +2) buy-and-hold abnormal return around repurchase announcement, adjusted for the size and book-to-market matching firm return over the same period. All variables are defined in Appendix A and are winsorized at top and bottom 1%. Year dummies are included but not reported. Numbers in parentheses are *p*-values with White's (1980) standard errors. For all regression models, ***, **, and * denote significance of 1%, 5%, and 10%, respectively.

Table 7 (Continued)

Panel A: Logit regressions of repurchase decisions						
Dep. var. = Repurchase decision/ Model	1	2	3	4	5	6
Intercept	-3.727*** [0.000]	-3.772*** [0.000]	-3.747*** [0.000]	-3.785*** [0.000]	-3.626*** [0.000]	-3.641*** [0.000]
Share pledge	0.164 [0.446]	0.571*** [0.005]	0.164 [0.446]	0.534** [0.012]	0.592*** [0.004]	0.154 [0.484]
Share pledge× Low return dummy	0.613*** [0.002]	0.667*** [0.001]	0.598*** [0.003]	0.694*** [0.001]	0.643*** [0.001]	0.569*** [0.006]
Increase shares pledged dummy	0.630*** [0.000]		0.642*** [0.000]			0.640*** [0.000]
Decrease shares owned dummy		0.083* [0.065]	0.110** [0.014]			0.079* [0.086]
DA				-0.012*** [0.007]		-0.013*** [0.005]
Increase dividend dummy					0.354*** [0.000]	0.359*** [0.000]
Dividend missing					-0.150*** [0.004]	-0.150*** [0.005]
Size	0.103*** [0.000]	0.109*** [0.000]	0.099*** [0.000]	0.117*** [0.000]	0.105*** [0.000]	0.098*** [0.001]
B/M	0.068*** [0.010]	0.064** [0.015]	0.071*** [0.007]	0.056** [0.042]	0.073*** [0.006]	0.076*** [0.005]
Prior return	-1.273*** [0.000]	-1.304*** [0.000]	-1.274*** [0.000]	-1.343*** [0.000]	-1.279*** [0.000]	-1.284*** [0.000]
Free cash flow	0.690*** [0.000]	0.718*** [0.000]	0.691*** [0.000]	0.705*** [0.000]	0.676*** [0.000]	0.638*** [0.000]
Leverage	-1.015*** [0.000]	-1.008*** [0.000]	-1.021*** [0.000]	-0.989*** [0.000]	-0.991*** [0.000]	-0.993*** [0.000]
Cash dividend	-0.183** [0.014]	-0.194*** [0.010]	-0.175** [0.019]	-0.159** [0.039]	-0.228*** [0.003]	-0.166** [0.033]
Pseudo R-square (%)	4.11	3.60	4.15	3.68	3.97	4.64
N	46,838	46,838	46,838	43,768	46,838	43,768

Table 7 (Continued)

Panel B: OLS regressions of repurchase announcement returns						
Dep. var. = Five-day BHAR/ Model	1	2	3	4	5	6
Intercept	2.957*** [0.006]	3.107*** [0.004]	3.108*** [0.004]	2.703** [0.013]	3.338*** [0.006]	3.346*** [0.006]
Share pledge	0.001 [0.916]	0.002 [0.866]	0.001 [0.884]	0.005 [0.648]	0.002 [0.829]	0.006 [0.609]
Share pledge× Low return dummy	-0.040*** [0.002]	-0.039*** [0.003]	-0.039*** [0.002]	-0.040*** [0.004]	-0.040*** [0.002]	-0.040*** [0.003]
Increase shares pledged dummy	0.102 [0.780]		0.016 [0.966]			-0.099 [0.794]
Decrease shares owned dummy		-0.505** [0.050]	-0.504* [0.052]			-0.355 [0.174]
DA				2.432 [0.442]		2.521 [0.426]
Increase dividend dummy					-0.098 [0.912]	-0.292 [0.745]
Dividend missing					-0.438 [0.461]	-0.592 [0.325]
Size	-0.338*** [0.002]	-0.327*** [0.002]	-0.327*** [0.002]	-0.328*** [0.003]	-0.334*** [0.002]	-0.316*** [0.004]
B/M	0.957*** [0.000]	0.886*** [0.000]	0.886*** [0.000]	0.993*** [0.000]	0.964*** [0.000]	0.949*** [0.000]
Prior return	-0.026*** [0.002]	-0.027*** [0.001]	-0.027*** [0.001]	-0.027*** [0.001]	-0.026*** [0.002]	-0.027*** [0.001]
FCF	-0.014 [0.211]	-0.013 [0.236]	-0.013 [0.236]	-0.017 [0.133]	-0.014 [0.217]	-0.017 [0.150]
LEV	-0.017*** [0.002]	-0.017*** [0.003]	-0.017*** [0.003]	-0.019*** [0.001]	-0.017*** [0.002]	-0.019*** [0.001]
Intended ratio	0.404*** [0.000]	0.406*** [0.000]	0.406*** [0.000]	0.412*** [0.000]	0.404*** [0.000]	0.414*** [0.000]
Change in cash flow rights	0.047 [0.157]	0.040 [0.229]	0.040 [0.230]	0.046 [0.176]	0.048 [0.153]	0.041 [0.228]
Adjusted R-square (%)	4.85	4.96	4.93	4.97	4.83	4.94
N	3,035	3,035	3,035	2,931	3,035	2,931

Table 8
Regressions of Announcement Returns on Pledges in Simulations

This table shows the significance of share pledge and the interaction term between share pledge and low return dummy on announcement returns. Panel A reports cross-sectional regressions of short-run returns around repurchase announcements based on the repurchase (original) sample. The dependent variable is a five-day (-2, +2) buy-and-hold abnormal return around repurchase announcement, adjusted for Taiwan stock market index return over the same period. All independent variables are defined in Appendix A and are winsorized at top and bottom 1%. Year dummies are included but not reported. Numbers in parentheses are *p-values* based on t-tests with White's (1980) standard errors. ***, **, and * denote significance of 1%, 5%, and 10%, respectively. In Panel B, we randomly select a non-repurchase date as a pseudo-event date for each repurchase firm. In Panel C, for each repurchase firm, we randomly pick non-repurchase firms that are controlled by a controlling shareholder with available pledge information and did not have any buyback program in prior two months as a pseudo firm on the actual announcement date. The pseudo firm must closely correspond to the repurchase firm in terms of size and book-to-market of equity. In Panel D, we randomly select a non-repurchase firm as a pseudo firm and a non-repurchasing date as a pseudo-event date. We run the regression around the pseudo-event. We repeat this process 1,000 times to generate 1,000 coefficients on the share pledge and the interaction term between share pledge and low return dummy. In Panel B, C, and D, the number in brackets is the empirical *p-value*, which is defined as the percentage of trials with the simulated coefficient lower than that of the repurchase sample.

Dep. variable = Five-day BHAR/ Model	1	2	3
Panel A. Repurchase sample			
Share pledge	-0.022*** (0.005)	-0.013* (0.094)	0.007 (0.472)
Share pledge × Low return dummy			-0.040*** [0.004]
Control variables	No	Yes	Yes
Panel B. Repurchase samples on non-repurchase dates			
Share pledge	0.002 [0.000]	0.000 [0.020]	0.000 [0.841]
Share pledge × Low return dummy			-0.001 [0.002]
Control variables	No	Yes	Yes
Panel C. Non-repurchase sample on repurchase dates			
Share pledge	-0.003 [0.007]	-0.006 [0.138]	-0.003 [0.121]
Share pledge × Low return dummy			-0.007 [0.015]
Control variables	No	Yes	Yes
Panel D. Non-repurchase samples on non-repurchase dates			
Share pledge	-0.002 [0.002]	-0.005 [0.097]	-0.004 [0.071]
Share pledge × Low return dummy			-0.004 [0.004]
Control variables	No	Yes	Yes