

# Shares Pledged and Corporate Repurchase<sup>☆</sup>

Konan Chan, Hung-Kun Chen, Shing-yang Hu, Yu-Jane Liu<sup>\*</sup>

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## Abstract

We examine how personal shares pledged by controlling shareholders affect corporate share repurchase decisions. Shares pledged create a margin call pressure for controlling shareholders who might use repurchase to protect their control rights. Using Taiwan's data, we find evidence that high pledge companies are more likely to repurchase, especially after a significant drop in share prices. Investors perceive this incentive and the announcement effect is negatively related to shares pledged. We also provide evidence that companies suffer less such problem if there are large outside blockholders.

*JEL classification:* G30

*Key words:* share pledge, repurchase, controlling shareholders

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<sup>\*</sup> Chan is from the Department of Finance, National Chengchi University, Taiwan (Email: konan@nccu.edu.tw); Chen is the corresponding author from the Department of Banking and Finance, Tamkang University, Taiwan (Email: [hkchen@mail.tku.edu.tw](mailto:hkchen@mail.tku.edu.tw)); Hu is from the Department of Finance, National Taiwan University, Taiwan (Email: [syhu@ntu.edu.tw](mailto:syhu@ntu.edu.tw)); Liu is from Guanghua School of Management, Peking University, China (Email: [yjliu@gsm.pku.edu.cn](mailto:yjliu@gsm.pku.edu.cn)).

## **1. Introduction**

It is common in the U.S. that corporate insiders pledge their stock ownership as collateral for a personal loan. According to a recent survey twenty percent of U.S. companies allow pledging by executives and 982 directors or officers reported a pledge in the beneficial ownership section of the proxy statement from 2006 to 2009 (Larcker and Tayan, 2010).

Recently, the shares pledged have caught the attention of regulators worldwide. In a September 2006 Release, the SEC of U.S. started to require the disclosure of the number of shares pledged as security by named executive officers, directors and director nominees (SEC, 2006). In January 2009, the FSA of U.K. issued a statement confirming that shares pledged are covered by the disclosure requirement of transactions by directors (FSA, 2009). Also in January 2009, the Securities and Exchange Board of India announced to require the disclosure of shares pledged of controlling shareholders if it exceeds 25,000 shares or 1 percent of the total shareholding or voting rights of the company (SEB, 2009).

Despite its increasing importance, we know very little, if anything, about the relevance of shares pledged to corporate decisions. In comments on the SEC proposal, one objection to disclosure is that shares pledged “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, 2006)

To fill the void, this paper examines one of the incentives faced by insiders with shares pledged that will influence corporate decisions. When insiders pledge their shareholdings, they are subject to margin calls because, like buying stock on margin, pledge contracts usually include a maintenance requirement. When the market value of the pledged shares drops below the maintenance requirement, the borrower needs to meet the margin call. Otherwise, the lender can sell shares.

To reduce the pressure from margin calls, one option insiders have is to use corporate resources. Insiders can initiate an open market repurchase in the hope of supporting a falling stock price by absorbing sell pressure (Cook, Krigman, and Leach, 2004; Ginglinger and Hamon, 2007). When it revised rules regulating repurchases, the SEC explicitly expressed a concern that repurchase can be abused if it is “designed to support the market price of the issuer’s securities in order to maintain the value of securities pledged by insiders as collateral for bank loans” (SEC, 1980). Therefore, companies are more likely to announce open market repurchases when insiders pledge their shares and the pressure from margin call is high.

Given a repurchase announcement, investors will evaluate the probability that the repurchase is used for relieving the pressure of margin calls. If the probability is high, they are less likely to change their view of the fundamental value of the stock and the announcement effect should be small.

To empirically examine the effect of share pledge on the repurchase decision and its market reactions, we use a sample of 1,386 open market repurchase announcements from companies listed on the exchanges in Taiwan. Insiders of listed companies in Taiwan are required to file monthly report of the numbers of shares owned and shares pledged. These data is public available from 1997. To the best of our knowledge, Taiwan offers the longest time series for studying share pledge. Most countries either do not require or have only required such a disclosure recently and data is limited.

Consistent with our hypothesis, we find that companies are more likely to repurchase when the percentage of shares pledged is higher. The probability is especially higher when shares pledged is high and there is a large stock price drop recently, predicted by the margin call pressure hypothesis. Evidence also suggests that investors perceive this margin call incentive. We find that, the market response to the repurchase announcement is decreasing with shares pledged,

especially after a significant price drop.

There are several possible reasons why insiders faced with margin pressures will choose to repurchase instead of selling their own shares. Insiders may have positive private information that will drive up the stock price soon. Insiders may not have private information but are irrationally optimistic about company prospects. Insiders may need their shares to maintain control rights.

Positive private information can explain the correlation between shares pledged and repurchase. Insiders may choose to hold rather than sell shares because they know the market price underestimates the fundamental. An undervalued stock is also a good reason for the company to repurchase shares. Positive private information, however, cannot explain our evidence that announcement effect to repurchase as well as long-term stock performance is worse when shares pledged are higher.

Our findings of a positive correlation between shares pledged and repurchase as well as a negative correlation between shares pledged and announcement effect is consistent with optimism. We construct a measure of optimism using corporate earnings forecasts, and find our results remain the same after removing optimistic samples. Therefore, optimism is not used by controlling shareholders to reduce the margin call pressure.

We also provide evidence that companies suffer less pledge-repurchase relationship problem if they have good governance. When the outside blockholding is larger, the effect of pledge on propensity of initiating buyback program becomes weaker; investors react less negatively to a high-pledged company.

This paper is related to two strands of literature. The first one links executives' personal attributes to corporate behaviors. CEOs' experiences and behavioral biases affect investment and financing decisions (Heaton, 2002; Lin, Hu, and Chen, 2005; Malmendier and Tate, 2005;

Malmendier, Tate, and Yan, 2011). Cronqvist, Makhija, and Yonker (2012) study CEOs' personal leverage in their home purchases and find that is positively related to corporate leverage. Our paper contributes to this literature by adding that controlling shareholders' personal shares pledged affects corporate payout policy.

The second related literature is on open market repurchase and corporate governance. Repurchase can be used to distribute free cash flow or to deter takeover (Billett and Xue, 2007; Dittmar, 2000; Jensen, 1986; Stulz, 1988). Our paper argues that controlling shareholders use repurchase to meet margin call pressure in order to keep control rights.

The remainder of this paper 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 robustness check. Section 6 concludes this paper.

## **2. Hypotheses Development**

Controlling shareholders can borrow money and use shares owned as a pledge. The money borrowed can be used for personal consumption. Of course, the controlling shareholder can also sell shares to make consumption. However, they may not want to sell shares for either an information reason or for a control reason. If controlling shareholders think the market price is less than its fundamental value, they will be reluctant to sell their shares immediately. They can borrow money first and wait until the market price goes up to its fundamental value to sell.

Another reason that the controlling shareholders choose not to sell shares but to borrow is to keep control. The control right is valuable when there is private benefit. The controlling shareholders maintain their control right by holding enough voting power. Selling shares can reduce the voting power and risk losing the control right.

When keeping control is important, the 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, it may choose to issue new equity as a financing source if more leverage is costly. To maintain the relative control right, the controlling shareholder needs to buy the new issued shares. If personal wealth is not enough, the controlling shareholder will borrow money to buy the new shares. Therefore, borrow against stocks is one way that controlling shareholders use to pursue investment project under personal financial constraints (Chen and Hu (2007)).

Despite its benefits, borrowing against stocks will carry a risk of losing control. Under the stock pledge agreement, the lender will impose 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 the control right.

When there is an imminent risk that the market price will drop to a level that violates the maintenance requirement, controlling shareholders may use company fund to repurchase stock in the hope of supporting or even artificially increasing 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 sell pressure (Cook, Krigman and Leach (2004) and 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, the less positive the market reaction will be.

The probability that a repurchase is used to support prices is decreasing to the net worth of the controlling shareholders. When the net worth is high, the controlling shareholder can easily repay the loan or increase the pledge to satisfy the maintenance requirement.

Define the relative net worth as one minus the ratio of personal debt to asset. Holding other things constant, the relative net worth is decreasing to the percentage of shares pledged. Given that the initial market value of shares pledged cannot be lower than the amount borrowed, the higher the number of shares pledged, the higher the personal debt level. On the other hand, the higher the number of shares owned, the higher the personal asset level. Combining the two together, a higher the pledge ratio (shares pledged divided by the shares owned) means a higher personal debt to asset ratio or a lower personal net worth to asset ratio. Therefore, the probability that a repurchase is used to support prices is increasing to the pledge ratio.

To summarize our discussions so far, we have the following two hypotheses, namely *margin call pressure 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.*

Holding other things constant, the sensitivity of the relative net worth to the pledge ratio depends on the recent stock return. A lower stock return will reduce the personal asset level and create a difference with debt level, and the difference is increasing to the number of shares owned or decreasing 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 return is

lower.

***H1b:*** *The sensitivity of the probability of repurchase to the pledge ratio is more positive when the recent stock return is lower.*

***H2b:*** *The sensitivity of the market reaction to the pledge ratio is more negative when the recent stock return is lower.*

The sensitivity of the relative net worth to the pledge ratio also depends on the alternatives that the controlling shareholder has to meet the margin call. If there are other alternatives, the sensitivity will be smaller. Of course, a repurchase program is not the only option that the controlling shareholder can choose when facing a market price drop. The shareholder can also select to increase the number of shares pledged to satisfy the maintenance requirement or to use other assets to repay the loan. To increase the number of shares pledged will increase the risk of losing control if the maintenance requirement is violated again. Therefore, if the pledge ratio gets higher before the repurchase announcement, it signals that the controlling shareholder lacks other assets and the sensitivity is higher.

***H1c:*** *The sensitivity of the probability of repurchase to the pledge ratio is more positive when the pledge ratio experiences an increase recently.*

***H2c:*** *The sensitivity of the market reaction to the pledge ratio is more negative when the pledge ratio experiences an increase recently.*



### 3. Environment 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 (Article 28-2). The deregulation allows firms to initiate buyback programs in the open market. The security laws were also amended to prohibit the selling by insiders and their spouses and children during the buyback period.

A repurchase program has to be authorized by the board of a company. Within two days after the authorization, firms are required to disclose the detailed repurchase plan to the public. The disclosure should include its purpose, the intended total number of shares to be purchased, the range of the price per share that the program would be executed, the maximum total dollar amount to spend on the program, and the execution status of prior buyback programs announced in the past three years. The repurchase period can last for two months from the announcement date.<sup>1</sup> For each repurchase program, the number of shares bought cannot be more than 10% of the firm's outstanding shares. The shares bought each day during the buyback period cannot exceed one third of the intended total shares that were disclosed at the announcement.<sup>2</sup>

One feature of Taiwanese repurchases that is distinct from repurchases in the US is the disclosure requirement of the execution status.<sup>3</sup> Firms are obliged to provide a detailed execution report within five days of the completion of the program or the expiration of

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<sup>1</sup> Initially, the repurchase program can be valid only for 30 days from their public disclosure. The one-month repurchase period was extended to two months since October 2000.

<sup>2</sup> Article 8 of the Regulations Governing Share Repurchases by Listed and OTC Companies

<sup>3</sup> Before 2004, U.S. companies have no obligation to disclose any information regarding the status of execution of open market repurchase program. On December 2003, U.S. Securities and Exchange Commission (SEC) promulgated a new disclosure requirement for share repurchase. Firms are required to disclose the status of execution for share repurchase each month during the repurchase period and disclose their repurchase activity for the past quarter in their 10-Q and 10-K filings beginning in January 2004. More detailed information could be found at Purchases of Certain Equity Securities by Issuer and Others, Exchange Act Release No. 33-8335, 68 Fed. Rec. 64,952 (Nov. 17, 2003).

repurchase period, whichever comes first. Firms also need to disclose their execution status within two days if they have bought more than 2% of outstanding shares throughout the program. The report should include the actual number of shares bought, the actual dollar amount purchased, and the average share price of buybacks. Such a disclosure requirement in Taiwan enables us to easily track the buyback execution.

### **3.2. Data**

All data about repurchase and the characteristics of the firm and its controlling shareholders are retrieved from the Taiwan Economic Journal (TEJ) database. TEJ is the most comprehensive financial database of the Taiwanese market. The database also provides return, accounting, and Fama-French three-factor return data for all listed companies in Taiwan. The SIC code for each company is obtained from Thomason Financial Datastream.

The initial buyback sample includes 2,082 programs announced during the period of October 13, 2000 to December 31, 2006.<sup>4</sup> Our sample ends on 2006 because we examine three-year firm performance after repurchases. We focus on industrial firms and drop 306 observations made by financial firms. We further exclude 390 cases as we cannot identify controlling shareholders or obtain required data. Our final sample comprises of 1,386 repurchase programs made by 509 firms. The announcement date is identified as the date that a share repurchase appears in TEJ or the date that the news is reported in the newspaper, whichever is earlier.

Table 1 reports summary statistics of the sample. On average, sample firms intended to buy back 3.2% of equity at announcements. They actually purchased 2.1% of outstanding shares

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<sup>4</sup> We drop observations before October 13, 2000 because the execution period of repurchase was changed from 30 to 60 days on that day.

during the two-month repurchase period, amounting to NT\$134 million. The mean (median) completion ratio is about 70% (84%), suggesting that most of repurchase firms bought some shares as they originally planned. On average, the market offers a favorable reaction of 1.4% (1.5%) abnormal return over the three-day (five-day) window  $(-1,+1)/(-2,+2)$  relative to repurchase announcement.

Taiwanese repurchase firms tend to be larger, value firms, with size and book-to-market ratio higher than the average firm in the stock market. Consistent with the literature, we find some evidence supporting undervaluation, free cash flow and leverage adjustment hypotheses in Taiwanese repurchases. For example, these repurchase firms have significantly negative returns in the three-months prior to buyback announcements. They also have higher free cash flows and lower leverage relative to industry medians.

Share pledge data was available for Taiwanese listed companies since 1997 due to a regulation requirement<sup>5</sup>. Article 25 of the Securities and Exchange Law requires directors, supervisors, managers, and large shareholders (holding more than 10% of the outstanding shares) in listed companies to file the number of shares held and the number pledged to Securities and Futures Bureau (SFB) every month. We define the *share pledge ratio* as the shareholdings that are controlled by the controlling shareholders and pledged for bank loans divided by the shares controlled at the end of the month prior to repurchase announcement.

The controlling shareholder (ultimate owner) is the shareholder who owns the most voting rights in the company and exercises effective managerial authority identified by the TEJ database. We focus on controlling shareholders, rather than other stakeholders, because they are the key persons to initiate and execute buyback programs. Meanwhile, given their large control over the

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<sup>5</sup> According to the same Article, they should also file with the SFB and announce to the public when they pledge their shares for personal loan. According to Paragraph 3 of Article 22-2 of the Securities and Exchange Law, the pledged shares here have to include the shares held by shareholders under the names of their spouses, minor children, and those held in the name of other parties.

firm, any twist in their incentives due to their share pledge status may have significant effect on firm value.

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)). The voting rights comprise 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 his/her family members related through blood or marriage. Indirect voting rights are the rights to those shares held by entities, for example, corporations, investment companies, and other 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.

There is some variation in share pledge ratios across sample observations. Although the average of share pledge ratio is 11.7%, the median is zero. There are more than half of the sample firms whose controlling shareholders do not pledge their shares at all; however, more than 5% of repurchases keep a share pledge ratio more than 50%.

## **4. Empirical Results**

### ***4.1. Propensity to Repurchase***

In this section, we examine the extent to which firms initiate repurchases by the share pledges of controlling shareholders. Our hypothesis 1 (*H1a*) predicts that firms with higher share pledges are more likely to have buybacks. This holds true especially when there is a market pressure on share price (*H1b* and *H1c*).

Before testing our hypotheses, we first check if repurchase firms indeed have more share

pledges than non-repurchase firms. We pull out all firm-quarters during October, 2000 to December 2006. We assign a firm/quarter as a repurchase quarter if the firm made a repurchase announcement in that given quarter. The remaining quarters are classified as non-repurchase quarters. Firm characteristics and share pledges at the prior quarter-end are compared for the two groups and the results are reported in Table 2.

The share pledge ratio is 11.5% for repurchase quarters and 10.1% for non-repurchase quarters. The difference is significant at 5% level. This result suggests that controlling shareholders in repurchase firms do pledge more shares in banks. While this evidence seems to support the notion that higher pledges are associated with buybacks, it is not clear whether other factors motivate managers to initiate repurchases. For example, repurchase firms show negative returns prior to the repurchase announcements but non-repurchase firms generate positive prior returns, with a difference in returns more than 11% in the prior quarter. This suggests that firms may initiate buybacks to resolve the undervaluation problem. In addition, repurchase firms have much lower leverage and higher free cash flow, both adjusted for the industry norm, than other firms. The result is consistent with the managerial motives of disgorging excess cash that firms initiate buybacks to distribute idle cash to investors to reduce the potential free cash problem. It is also consistent with the leverage motivation that firms use repurchase to alter capital structure to reach the optimal debt ratio and increase firm value.

We employ two approaches to formally test if share pledges affect managerial incentives to buy back shares. The first approach is the logit regressions of buyback announcements based on firm-quarter observations shown in Table 2. The dependent variable is repurchase dummy which equals to one if the firm made a repurchase announcement in the given quarter and zero elsewhere. As argued in the literature, the repurchase decision could be affected by signaling for undervaluation, disgorging free cash flows, and adjusting for capital structure (e.g., Chan,

Ikenberry and Lee (2004), Dittmar (2000)). As a result, we include in regressions the book-to-market ratio (B/M) to proxy for the extent of undervaluation (Ikenberry, Lakonishok and Vermaelen, 1995) and the industry-adjusted free cash flow (FCF) and industry-adjusted leverage (LEV) to control for managerial incentives to reduce agency costs of free cash flows and to seek for optimal capital structure. All independent variables are measured prior to the quarter in question.

The results of logit regressions are reported in Table 3. We find that share pledges are significantly and positively related to the probability that firms initiate a repurchase program even when we control for B/M, FCF and LEV (Model 1). This result supports *H1a*; the higher the percentage of shares pledged by controlling shareholders, the more likely the company will repurchase shares. The next few regression models examine if firms tend to initiate buyback programs when their prior performance is poor or when there is an enormous margin call pressure faced by controlling shareholders. We use the interaction terms of share pledge and stock return in the prior quarter to estimate the propensity to repurchase in the presence of share price pressure. We find a negative coefficient of this interaction term, suggesting that the worse the prior stock performance is, the stronger the effect of pledge on the probability that firms will initiate buyback programs (Model 2). When we measure the share price pressure by a low prior return dummy that equals to one if the prior stock return is below -20%, we find a consistent result (Model 3).<sup>6</sup> For firms with prior returns below -20%, the effect of pledge on the probability of repurchase is 0.95, more than twice the effect for firms with a better prior return (0.35). Finally, we use the increase in share pledges as a proxy for the margin call pressure faced by controlling shareholders. If high-pledged controlling shareholders have increased their

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<sup>6</sup> We try various thresholds to define the prior return dummy, ranging from -10% to -25% and results are similar to what we report here.

pledged share, they are more likely to be facing the margin call pressure and using repurchase to relieve the pressure. Model 4 provides consistent results. All these results support our hypothesis 1b and 1c; the lower the prior stock performance or the larger margin call pressure, the more likely the company will repurchase shares.

To shed more light on the economic significance of pledge-motivated repurchase, we estimate the probability of repurchase given specific values of explanatory variables based on Model 1 (or Model 5) of Table 3. We report the results in Table 4: Panel A uses the fitted coefficient values of Model 1 and Panel B uses the fitted coefficient values of Model 5.

In Panel A, each row describes different motivations of repurchase. Row 1 considers the base case, assuming all explanatory variables are set at their sample means. The remaining rows describe the impact of different motivations of share repurchases. For each row, we consider a key variable with an increase (a decrease) of one standard deviation from sample mean, holding others explanatory variables at their means (neutral levels). For instance, we set the share pledge ratio at mean plus one standard deviation (0.30) to describe the *pledge motivation*, holding others explanatory variables at their means (Row 2). We set B/M ratio at sample mean plus one standard deviation to describe *undervaluation motivation* (Row 3), set FCF at sample mean plus one standard deviation to describe *free cash flow motivation* (Row 4), set LEV at sample mean minus one standard deviation to describe *leverage motivation* (Row 5), and set cash dividend at sample mean minus one standard deviation to describe *dividend substitute* (Row 6).

Panel A shows that the magnitude of the pledge motivation is economically significant. As reported in Row 2, we find that the propensity to repurchase increases by 0.54%, which is a 10% increase from the base case, when the firm experience an increase of one standard deviation in share pledge. By contrast, the probability of repurchase increases by 0.40% and 1.10% when the firm has an increase of one standard deviation in B/M and FCF, respectively. A decrease of one

standard deviation in LEV (Cash dividend) leads to an increase of 1.76% (1.29%) in the probability of repurchase. Compared to other well-documented explanations for repurchase, the *pledge motivation* is larger than the *undervaluation motivation*, but lower than the *free cash flow*, *leverage*, and *dividend substitute motivations*.

The pledge-motivated repurchase becomes much more important when controlling shareholders face larger market pressure on margin call, i.e., a lower prior return and an increase in the share pledge ratio. In Panel B, we set the low prior return dummy and the increase pledge dummy to be zero in the base case and equal one in the pledge motivation Row 2. We find that an increase of one standard deviation in share pledge given the market pressure implies an increase of 2.05% (from 5.29% to 7.34%) in repurchase probability, which is a 38% of increase from the base case. Compared to an increase of 0.33% to 1.71% for the traditional motivations, the relative impact of the *pledge motivation* is the strongest of all.

The second approach we use to examine the effect of pledges is the Tobit regression of actual repurchases. Since there is no binding mechanism for repurchases and no penalty for not buying back shares, repurchase firms have the flexibility and discretion in executing the repurchase programs (Stephens and Weisbach (1998) and Chan, Ikenberry, Lee and Wang (2010)). Here, we examine the extent to which the actual repurchase activity is driven by share pledges. The dependent variable is the actual buyback defined as the shares actually purchased during the two-month repurchase period following the announcement divided by the shares outstanding prior to the announcement.<sup>7</sup> As in Table 3, we include B/M, FCF, LEV, and cash dividend in regressions to control for key motives behind repurchases, such as undervaluation, distribution of excess cash and optimal leverage adjustment.<sup>8</sup> The regression results are reported

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<sup>7</sup> We also use the completion ratio (the actual buyback ratio divided by the intended ratio) as the dependent variable for robustness checks. The results are qualitatively similar. To save space, we do not report here.

<sup>8</sup> Gong, Louis and Sun (2008) and Chan, Ikenberry, Lee and Wong (2010) find that discretionary accruals (DA) are



in Table 5.

We find that the pledge ratio positively affect the propensity to buy back shares. The relation between pledge and actual buyback is strengthened when there is stress on share price or margin call pressure. Model 2 shows that the lower the prior returns, the more shares firms will repurchase. When prior return is remarkably low (e.g., below -20%), the pledge effect on repurchase is much stronger (2.39 vs. 0.99). If controlling shareholders increase their pledges previously, the potential margin call pressure provides extra incentives for them to buy back shares.

Overall, repurchase firms are associated with higher share pledges by controlling shareholders. The higher share pledges incentivize firms to initiate buyback programs and increase the propensity to actually purchase shares. This is particularly true when margin call pressure is prevalent. These results are consistent with our hypothesis 1.

#### ***4.2. Short-term market reaction***

We have documented that share pledged by controlling shareholders affect their incentives to repurchase. In this section, we go one step further to examine if the market responds to share pledges in any systematic pattern. Our hypothesis 2 argues that if controlling shareholders initiate buybacks more for reducing their personal price pressure than for increasing general shareholder value, the market reaction would be less favorable. We test this idea in Table 6 by regression analyses. The dependent variable is a three-day (-1, +1) cumulative return around repurchase announcement adjusts for the value-weighted market index return over the same

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negatively related to actual buyback. We employ Gong et al approach to compute DA and find our results are not affected by DAs. Because using DA will significantly reduce the sample size, we do not report the results here.

window.<sup>9</sup>

Table 6 reports results of announcement return regressions. As shown in Model 1, pledge ratio is significantly and negatively related to short-term market reaction. The literature offers an undervaluation theory to explain the favorable market reaction of repurchases (Ikenberry, Lakonishok and Vermaelen (1995) and Dittmar (2000)). Prior research also suggests the rationales of disgorging free cash flow and altering capital structure for repurchases. In Model 2, we include variables B/M, FCF, LEV, and prior returns to control for these well-documented stories. We also control for the intended ratio as the previous research shows that the abnormal announcement return is positively related to program size (e.g., Chan, Ikenberry and Lee (2004)). Yet, with the inclusion of all these control variables in the regression, the pledge coefficient only changes from -0.028 to -0.023 and remains significantly negative.

In the next few models, we test if the market response is more negative when the repurchase is more likely due to a margin call pressure. As in Table 3 and Table 5, we gauge the margin call pressure by three measures: prior returns, a low prior return dummy and prior increases in share pledges dummy. Controlling shareholders are more likely to face a margin call pressure when the stock price has dropped or when they have increased their pledge ratio to meet the maintenance requirement. Our results suggest that the negative effect of share pledges on the announcement returns concentrates on the situation when the margin call pressure is high. For example, in Models 4, the interaction terms of pledges and low prior return dummy is significantly negative, suggesting that the market respond more negatively for a higher pledge ratio when the market drops more than 20%. While the interaction terms are significant, the share pledge itself is not significant anymore. As a result, the evidence here indicates that the negative impact of share

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<sup>9</sup> Our results hold when we employ five-day window (-2, +2) cumulative abnormal returns as the dependent variable.

pledges is accentuated at the time when a margin call is expected.<sup>10</sup>

Chen and Wang (2012) argue that financial constraints are important in explaining the performance of share buybacks. To account for such an effect, we also control for Kaplan and Zingales' (1997) KZ index in Model 7. We do not include FCF and LEV in this model because they are components in the KZ index. After controlling for financial constraints, our main result continues to hold.

In summary, we find that share pledges have a negative effect on the announcement returns of repurchases. The more controlling shareholders pledge their shares, the less favorable the market reacts. This negative aspect is especially strong when the margin call is more imminent. All these results are consistent with our hypothesis 2.

#### ***4.3. Long-run returns***

Under an efficient market, stock price will quickly incorporate information released at the repurchase announcement. Yet, an extensive literature reports a long-run return drift following corporate decisions.<sup>11</sup> Therefore, we examine three-year abnormal returns after buyback announcements and report results in Table 7. The method used to estimate long-run returns is illustrated in the Appendix B.

The long-run stock performance following repurchase announcements is generally consistent with the immediate market reaction reported in Table 6. There is a strong negative

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<sup>10</sup> To better understand the share pledge effect on shareholder value, we perform the regression on different sub-samples as in Models 3 and 4 of Table 6. First, we sort sample firms into prior three-month return quartiles and run regressions. Except 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. In addition, we also classify the sample into firms with increases in pledges in the past three months and those without prior pledge increases. The result shows that only firms with prior pledge increases show a negative share pledge effect. To save space, the results are available from the authors upon request.

<sup>11</sup> See, for example, Ikenberry, Lakonishok and Vermaelen (1995) and Chan, Ikenberry and Lee (2004) for repurchases and Loughran and Ritter (1995) for equity offerings.

relation between share pledges and future stock returns suggesting that investors do not fully account for the pledge effect. We do not find additional long-run effect for firms with a higher margin call pressure. Therefore, there is no evidence that the announcement effect is reversed in the future.

## **5. Robustness Check**

### ***5.1. Existing explanations for repurchase***

Prior studies propose numerous theories to explain the managerial motive of buybacks. Three major ones are undervaluation, free cash flow, and leverage (e.g., Dittmar, (2000), Chan, Ikenberry and Lee (2004)). It is plausible that firms with high share pledges initiate repurchases to signal an undervaluation, to resolve the potential agency problem, or to increase the firm leverage.

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. These controlling shareholders who have favorable information about firms' fundamentals may even use proceeds from pledges to purchase more shares to take advantage of current low share price. The conviction of undervaluation can also motivate the companies controlled by the same people to repurchase shares.

On the other hand, firms with high share pledges have the potential of more agency problems as controlling shareholders have incentives to use corporate resources to support share price for their personal benefit. In order to persuade outside shareholders that these agency problems will not occur, controlling shareholders can use repurchase to distribute free cash flows to mitigate the potential agency problem.

Finally, behavioral consistency theory suggests that the leverage decision of a firm should reflect the debt tolerance of its controlling shareholder and such tolerance also decides the controlling shareholder's personal leverage choice (Cronqvist, Makhija, and Yonker, 2012). Therefore, the purpose of the repurchase is to increase the firm leverage to match its controlling shareholder's high debt tolerance.

Although the three explanations offered, undervaluation, agency problem, and debt tolerance can all explain a positive correlation between pledge ratio and the probability of repurchase, they cannot fully explain all the evidence presented so far. First, we have included in all tables variables to control for the three explanations: book-to-market value of equity (B/M) to control for undervaluation, free cash flows (FCF) to control for agency problem, and leverage (LEV) to control for debt tolerance. These control variables indeed behave the way they are supposed to: repurchase firms tend to have higher B/M, higher free cash flows, and lower debt ratio. Share pledge is unlikely to capture the three explanations given that they have been controlled for. 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 return. On the contrary, we find that firms with high pledges actually get less favorable market reaction both on the announcement (Table 6) and afterwards (Table 7). We have also included 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 right in order to profit from the difference. Therefore, we expect to see a positive relation between market reaction and the change in cash flow rights. However, we do not find such evidence. Third, if the positive correlation between pledge ratio and repurchase reflects a common debt tolerance, this relation should be stronger when the firm leverage drops following a rise in stock price. Instead, we find that the relation is stronger following a drop in

stock price using logit (Table 3) or Tobit (Table 5) regressions..

### ***5.2. An alternative explanation based on optimism***

Optimism can be an alternative explanation for what we have observed. If a controlling shareholder is optimistic about the future performance of the company, his forecast will be biased upward and he will think the stock of his company is undervalued even when it is fairly priced by the market. An optimistic controlling shareholder is unlikely to sell his shareholdings. If he needs money, he can pledge shares to borrow. He may even use proceeds from pledges to purchase more shares. An optimistic controlling shareholder will also make the firm to repurchase its shares. As a result, we will observe a positive relation between the pledge ratio and repurchase. Optimism can also explain the negative relation between the pledge ratio and market reactions when investors realize the repurchase is driven by optimism.

To make sure optimism is not the reason for our results; we provide two pieces of evidence. First, we have included in the return regression (Tables 6 and 7) the change in cash flow right of controlling shareholders to control for optimism. Optimistic controlling shareholders are likely to increase their cash flow rights. The estimated coefficient on the change in cash flow right is not significantly different from zero and pledge-related variables are still significant as we predict. However, the change in cash flow right can also be a measure of the true extent of undervaluation and we need a better measure of optimism.

If controlling shareholders are optimistic, their forecasts of companies' future performance are likely to be biased upward. Lin, Hu, and Chen (2005) use this concept to construct a measure of optimism. A controlling shareholder is defined to be optimistic if more than half of their companies' forecasts of its own annual earnings are higher than the realized ones.

To make sure our results are not driven by optimism, we exclude from the sample the 257 buyback programs initiated by firms with optimistic controlling shareholders. We then reexamine the short-run announcement effect around repurchase announcements and report results in Table 8. Table 8 notes that our margin call pressure hypothesis continues to hold in this non-optimistic sample. The results are similar to the full sample results reported in Table 6. For non-optimistic controlling shareholders, their pledge ratio has a significantly negative impact on the announcement return, especially when the margin call pressure is high. Therefore, optimism is unlikely to drive our results.

### **5.3. Control rights concern**

Facing a margin call pressure, controlling shareholders can choose to sell some shares to reduce his borrowing. The reason not to sell shares but to use repurchase is to prevent the losses of control right and the associated private benefit. This argument is based on the assumption that the controlling shareholders' power solely comes from shareholding. However, if shareholding is not the only source of their power, controlling shareholders will have less incentive to use repurchase to support price. As a result, the negative impact of share pledge on stock return will be smaller for these companies.

To test this margin call hypothesis, we separate the whole sample into two groups according to the median of controlling shareholders' voting rights: One has the bottom 50% of control rights and the other has the top 50%. The bottom 50% group consists of the companies whose controlling shareholder have smaller voting right, indicating that their power is less likely to only come from shareholding. The control power of those companies in the top 50% group is more likely to be based on shareholding. We perform cross-sectional regression of short-run returns

around repurchase announcement for both two groups. Under margin call hypothesis, we expect to see a stronger negative correlation between share pledge and stock return for the top 50% group.

Numbers in Table 9 indeed shows that the coefficient on pledge is different across the two groups. The coefficients of share pledge and the interaction terms between share pledge and margin call pressure are all significantly negative for the top 50% group. By contrast, we do not find any significant coefficient in the bottom 50% group. The evidence is consistent with the margin call hypothesis.

#### ***5.4. Repurchase and corporate governance***

Shleifer and Vishny (1997), among others argue that corporate governance deals with the agency problem. For example, large shareholders, e.g. institutional shareholders and blockholders, are shown to reduce the concern of agency problem (Shleifer and Vishny, 1986; Pagano and Roell, 1998; Gillian and Starks, 2000; Gompers and Metrick, 2001). The presence of independent (or outside) directors also decreases the cost of monitoring and improves the quality of monitor (Hermalin and Weisbach, 1998; Adams and Ferreira, 2007; Raheja, 2005). In this section, we investigate whether good governance can reduce the pledge-repurchase relationship. The hypothesis is that the pledge-repurchase relationship problem becomes weaker when the firm has good governance.

Table 10 reports the results on governance. Models 1 and 2 perform logit and tobit regression in examining which firms initiate repurchases. We find the effect pledge on the probability of initiating buyback programs becomes significantly weaker when the largest outside blockholder's ownership increases. The largest outside blockholder has the incentive,



information, directorship, and votes to affect the decision of the controlling shareholder. On the other hand, institutional investor holdings and independent directors do not have noticeable impact on the propensity to repurchase.

Model 3 is the announcement return regression. We find that the coefficient of share pledge is significantly negatively related to short-term market reaction as in Table 6. The interaction term between share pledge and blockholder holdings is positive (the  $t$  value is 1.37 with a one-tail probability of 8.5%). The marginally significant and positive coefficient means that investors take into account of the governance mechanism. When the outside blockholding is larger, investors react less negatively to a high-pledged company.

## **6. Conclusions**

More recently, the shares pledged of insiders have received much attention of regulators worldwide. However, the relevance of shares pledge to corporate decisions is little understood. We fill this gap by examining the impact of controlling shareholders' shares pledged on the repurchase decisions and its market reactions from Taiwan stock market. We focus on these data because insiders of listed companies in Taiwan are required to file monthly report of the number of shares owned and share pledged.

Consistent with the notion of margin call pressure hypothesis, we find that companies are more likely to initiate buyback program when the percentage of shares pledged is higher. This probability is higher especially when share pledged is high and when there is a large stock drop recently. We also find that investors are aware of the margin call incentive. The market reaction to the repurchase announcement is negatively associated with share pledged, especially after a significant price drop. In particular, our results of positive correlation between shares pledged as well as a negative relation between shares pledged and announcement effect are not fully

explained by undervaluation, free cash flow, leverage, and managerial optimism explanations. Finally, we also provide evidence that companies suffer less pledge-repurchase relationship problem when the outside blockholding is larger.

We contribute to the literature by two dimensions. First, we add to our understanding about the impact of controlling shareholders' shares pledges on corporate payout policy. Second, we contribute to the literature by adding that controlling shareholders are more likely to use repurchase to meet margin call pressure in order to keep control rights.

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## Appendix

### A. Variable definition

The definitions of variables we use in the return regressions are listed below.

*Actual buyback amount* is the dollar amount (in NT\$ million) of shares actually purchased by firms during the two-month repurchase period following repurchase announcements, adjusted for 2009 consumer price index.

*Intended ratio* is the percentage of shares intended to buy at the announcement to shares outstanding prior to 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 announcement.

*Completion ratio* is the ratio of actual buyback ratio to intended ratio.

*Three-day CAR/Five-day CAR* is the three-day cumulative return over (-1, +1)/(-2, +2) relative to repurchase announcements, adjusted to the value-weighted market index return over the same window.

*Share pledge* is the percentage of the controlling shareholder's ownership that is pledged to banks at the month-end prior to repurchase announcement.

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

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

*Size (B/M) decile rank* is the decile ranking of size (B/M) relative to stock universe.

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

*Low prior return dummy* is equal to one if the prior return is lower than -20%, zero otherwise.

*Increase pledge dummy* is equal to one if the change in share pledges is positive during three months prior to repurchase announcement, 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 Poulson (1988) divided by sales in the year prior to repurchase announcement and is adjusted for industry median within the same two-digit

SIC code.

*Control rights* is the sum of the direct and indirect voting rights held by the controlling shareholders of a company at the month-end prior to the repurchase announcement. Direct voting rights consist of the rights to those shares registered in the name of the controlling shareholder and his/her family members who make up the same group of people related through blood or marriage. Indirect voting rights are the rights to those shares held by entities, which are controlled by the controlling shareholder.

*Cash flow rights* is the sum of the direct and indirect cash flow rights held by the controlling shareholders of a company at the month-end prior to the repurchase announcement. Direct cash flow rights is 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 the different groups within a company.

*Change in cash flow rights* is defined as the change of cash flow rights for one-year prior to repurchase announcement and is adjusted for stock bonus. To adjust the impact of stock bonus, we ignore the increase of cash flow rights in the month of paying stock bonus.

*KZ index* is developed by Kaplan and Zingales (1997) which is used to measure a firm's financial constraint.

*Institutional ownership* is the percentage of shareholdings for institutional investor at the month-end prior to repurchase announcement.

*Blockholder ownership* is the percentage of shareholdings for the largest outsider at the month-end prior to repurchase announcement.

*Board independence* is equal to one if the proportion of independent director to board size is more than 50%, zero otherwise; the definition of independent director is the board members who do not belong to the control shareholder and the insider.

## **B. Long-run return methodology**

To examine the relation between share pledges and long-run abnormal returns, we follow a two-step procedure by Brennan, Chordia and Subrahmanyam (1998). The first step is to extract the factor component, allowing varying factor loadings across firms, and estimate the risk-adjusted return each month. Using all monthly returns during the sample period, we run the Fama-French (1993) three-factor model for each sample firm.

$$R_{it} - R_{ft} = \alpha_0 + \alpha_{1i}(R_{mt} - R_{ft}) + \alpha_{2i}\text{SMB}_t + \alpha_{3i}\text{HML}_t + \varepsilon_{it} \quad (\text{A1})$$

where  $(R_{it} - R_{ft})$  is the excess return for stock  $i$ ,  $(R_{mt} - R_{ft})$  is the market excess return,  $\text{SMB}_t$  is



the size factor, and  $HML_t$  is the book-to-market factor, all in month  $t$ . The risk-adjusted return is the sum of regression intercept ( $\alpha_0$ ) and error term ( $\varepsilon$ ). Then we run Fama-MacBeth (1973) cross-sectional regressions in the second step. For each month from November 2000 to December 2009, the monthly regression is carried out by regressing risk-adjusted returns against share pledges and control variables. To avoid the impact of outliers, risk-adjusted returns are winsorized at top and bottom 0.5%. Sample firms that have announced repurchases in any of the past 36 months will be included in the regressions.

**Table 1**  
**Descriptive Statistics**

This table reports descriptive statistics of the repurchase sample from October 13, 2000 to December 31, 2006. Panel A reports characteristics of repurchase program, and Panel B reports key variables in this study. The variable definitions are detailed in the appendix. All variables are winsorized at top and bottom 1% to mitigate the impact of outliers. *N* is the numbers of observations.

	Mean	STD	Min	Q1	Median	Q3	Max
<i>Panel A. Characteristics of share repurchase (N = 1,386)</i>							
Actual buyback amount (NT\$ MM)	133.9	305.9	0.0	16.9	41.6	108.2	2,247.3
Intended ratio (%)	3.18	1.99	0.38	1.75	2.74	4.21	10.00
Actual buyback (%)	2.05	1.60	0.00	0.83	1.71	2.90	7.59
Completion ratio (%)	69.2	34.6	0.0	38.5	84.4	100.0	100.0
Three-day CAR (%)	1.44	5.48	-14.61	-1.68	1.59	4.45	15.87
Five-day CAR (%)	1.51	7.06	-18.21	-2.46	1.51	5.67	21.02
<i>Panel B. Key variables (N = 1,386)</i>							
Share pledge (%)	11.7	17.9	0.0	0.0	0.0	18.8	72.5
Size	7.99	1.35	5.68	6.98	7.80	8.71	12.05
B/M	1.13	0.63	0.18	0.64	1.03	1.50	3.06
Size decile rank	5.95	2.68	1.00	4.00	6.00	8.00	10.00
B/M decile rank	6.12	2.56	1.00	4.00	6.00	8.00	10.00
Prior return (%)	-12.63	21.87	-59.62	-26.71	-13.04	0.37	56.73
LEV (%)	-7.43	22.38	-72.43	-20.70	-3.60	7.26	35.73
FCF (%)	1.88	12.36	-43.42	-3.55	0.11	5.60	52.81
Cash flow rights	21.22	14.04	1.07	10.82	17.55	29.86	61.00
Change in cash flow rights	-0.43	4.02	-15.10	-1.63	-0.10	0.79	13.98
Institution ownership (%)	7.43	10.05	0.00	0.51	3.68	9.59	49.89
Blockholder ownership (%)	2.67	3.00	0.00	0.01	1.94	3.91	15.86
Independent directors (%)	39.96	19.91	0.00	28.57	41.67	55.56	80.00

**Table 2**  
**Firm Characteristics of Repurchase and Non-Repurchase Quarters**

This table reports firm characteristics for repurchase and non-repurchase firms during October 2000 to December 2006. A *repurchase* quarter (the first 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 second column). *Share pledge* is the percentage of the controlling shareholder's ownership that is pledged to banks. *Size* is the natural log of 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 raw 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 net debt-to-asset of all firms in the same two-digit SIC code. *FCF* is free cash flow measured by Lehn and Poulson (1988) scaled by sales and is adjusted by industry median with the same two-digit SIC code. *Cash dividend* is the cash dividend by the market value of equity. *Institutional ownership* is the percentage of shareholdings for institutional investor. *Blockholder ownership* is the percentage of shareholdings for the largest outsider. *Independent director* is the proportion of independent director to board size, while the definition of independent director is the board members who do not belong to the control shareholder and the insider. All variables are measured prior to the given quarter and are winsorized at top and bottom 1%. For each column, the first row reports mean value and the second row reports median value (with parentheses). The last column reports the difference in firm characteristics between repurchase and non-repurchase firms. For the third column, \*, \*\*, and \*\*\* denote significance of 10%, 5%, and 1%, respectively, of *t*-statistics for means and *z*-statistics for medians. *N* is the numbers of firm-quarter observations.

	Repurchase (1)	Non-repurchase (2)	Difference (1) – (2)
	<i>N</i> = 1,345	<i>N</i> = 21,714	(T-stat)
Share pledge (%)	11.54 [0.00]	10.14 [0.00]	1.39** [0.00]
Size	8.03 [7.85]	7.77 [7.64]	0.26*** [0.21]***
B/M	1.09 [0.97]	1.10 [0.85]	-0.01 [0.12]***
Prior return (%)	-7.60 [-8.76]	3.19 [-0.27]	-10.79*** [-8.49]***
LEV (%)	-7.38 [-3.62]	-1.66 [0.00]	-5.72*** [-3.62]***
FCF (%)	1.49 [0.25]	-3.13 [0.00]	4.62*** [0.25]***
Cash dividend (%)	1.96 [1.08]	2.13 [0.81]	-0.17* [0.27]
Institutional ownership (%)	7.63 [3.90]	8.44 [3.46]	-0.81** [0.44]
Blockholder ownership (%)	2.75 [2.03]	3.17 [1.96]	-0.42*** [0.07]
Independent director (%)	40.02 [41.67]	39.68 [42.86]	0.33 [-1.19]

**Table 3**  
**Logit Regression of Share Repurchase**

This table reports logit regressions of repurchases. 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.

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

Share pledge, size, B/M, prior return, LEV, FCF and cash dividend are defined in Table 2. *Low prior return dummy* is equal to one if the prior three-month return is lower than -20%, zero otherwise. *Increase pledge dummy* is equal to one if the change in share pledges is positive during three months prior to the given quarter, zero otherwise. All variables are winsorized at top and bottom 1%. Numbers in brackets are *p*-values. \*, \*\*, and \*\*\* denote significance of 10%, 5%, and 1%, respectively. *N* is the numbers of observations in regressions.

Model	1	2	3	4	5
Intercept	-3.714 [0.000]***	-3.683 [0.000]***	-3.700 [0.000]***	-3.721 [0.000]***	-3.707 [0.000]***
Share pledge	0.515 [0.001]***	0.451 [0.003]***	0.354 [0.037]**	0.291 [0.124]	0.158 [0.433]
Share pledge*Prior return		-0.018 [0.000]***			
Share pledge*Low prior return dummy			0.592 [0.025]**		0.551 [0.037]**
Share pledge*Increase pledge dummy				0.506 [0.038]**	0.465 [0.056]*
Size	0.112 [0.000]***	0.113 [0.000]***	0.112 [0.000]***	0.112 [0.000]***	0.113 [0.000]***
B/M	0.080 [0.033]**	0.047 [0.211]	0.065 [0.085]*	0.084 [0.024]**	0.070 [0.063]*
FCF	0.008 [0.000]***	0.008 [0.000]***	0.008 [0.000]***	0.008 [0.000]***	0.008 [0.000]***
LEV	-0.013 [0.000]***	-0.013 [0.000]***	-0.013 [0.000]***	-0.013 [0.000]***	-0.013 [0.000]***
Cash dividend	-0.073 [0.000]***	-0.075 [0.000]***	-0.073 [0.000]***	-0.073 [0.000]***	-0.073 [0.000]***
Pseudo R-squared (%)	2.403	2.649	2.461	2.454	2.504
<i>N</i>	23,058	23,058	23,058	23,058	23,058

**Table 4**  
**Estimated Probability of Share Repurchase**

This table reports the estimated probability levels of share repurchase on specific hypothesized values of the explanatory variables which are related to different motivations of share repurchase in Table 3. Panel A uses fitted coefficient values in Model 1 of Table 3 to describe the estimated probability of repurchase. 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. Panel B uses the fitted coefficient values in Model 5 of Table 3 to describe the estimated probability of share repurchase, indicating that repurchasing firms may face larger market pressure on share price (a lower prior returns and an increase of share pledge ratio) when describe control-agency motivation. All estimated methods are as same as Panel A, except for we set low prior return dummy and the increase pledge dummy to equal one in Row 2, and to be zero in remaining rows.

Panel A. Based on the fitted coefficient values reported in Model 1 of Table 3:

$$\Pr(\text{Repurchase} = 1) = -3.714 + 0.515 * \text{Share pledge}_{it} + 0.112 * \text{Size}_{it} + 0.08 * \text{B/M}_{it} + 0.008 * \text{FCF}_{it} - 0.013 * \text{LEV}_{it} - 0.073 * \text{Cash dividend}_{it} + \varepsilon_{it}$$

Repurchase motivation	Share pledge ratio	Size	B/M	FCF	Leverage	Cash dividend	Estimate of logit	Odds ratio	Repurchase probability as a function of repurchase motivation	Compare to neutral repurchase motivation
Base case	0.10	7.79	1.10	-2.86	-2.00	2.12	-2.85	0.06	5.45%	100.00%
Pledge motivation	<b>0.30</b>	7.79	1.10	-2.86	-2.00	2.12	-2.75	0.06	5.99%	109.82%
Undervaluation motivation	0.10	7.79	<b>2.03</b>	-2.86	-2.00	2.12	-2.78	0.06	5.85%	107.23%
Free cash flow motivation	0.10	7.79	1.10	<b>21.48</b>	-2.00	2.12	-2.66	0.07	6.55%	120.09%
Leverage motivation	0.10	7.79	1.10	-2.86	<b>-24.97</b>	2.12	-2.55	0.08	7.21%	132.28%
Dividend substitute	0.10	7.79	1.10	-2.86	-2.00	<b>-0.97</b>	-2.63	0.07	6.74%	123.58%

**Table 4**  
**Estimated Probability of Share Repurchase**

Panel B. Based on the fitted coefficient values reported in Model 5 of Table 3:

$$\Pr(\text{Repurchase} = 1) = -3.707 + 0.158 * \text{Share pledge}_{it} + 0.551 * \text{Share pledge}_{it} * \text{Low prior return dummy}_{it} + 0.465 * \text{Share pledge}_{it} * \text{Increase pledge dummy}_{it} \\ + 0.113 * \text{Size}_{it} + 0.07 * \text{B/M}_{it} + 0.008 * \text{FCF}_{it} - 0.013 * \text{LEV}_{it} - 0.073 * \text{Cash dividend}_{it} + \varepsilon_{it}$$

Repurchase motivation	Share pledge ratio	Share pledge* Low prior return dummy	Share pledge* Increase pledge dummy	Size	B/M	FCF	Leverage	Cash dividend	Estimate of logit	Odds ratio	Repurchase probability as a function of repurchase motivation	Compare to neutral repurchase motivation
Base case	0.10	0.00	0.00	7.79	1.10	-2.86	-2.00	2.12	-2.89	0.06	5.29%	100.00%
Pledge motivation	<b>0.30</b>	<b>0.30</b>	<b>0.30</b>	7.79	1.37	-2.86	-2.00	2.12	-2.54	0.08	7.34%	138.78%
Undervaluation motivation	0.10	0.00	0.00	7.79	<b>2.03</b>	-2.86	-2.00	2.12	-2.82	0.06	5.62%	106.31%
Free cash flow motivation	0.10	0.00	0.00	7.79	1.10	<b>21.48</b>	-2.00	2.12	-2.69	0.07	6.35%	120.13%
Leverage motivation	0.10	0.00	0.00	7.79	1.10	-2.86	<b>-24.97</b>	2.12	-2.59	0.08	7.00%	132.36%
Dividend substitute	0.10	0.00	0.00	7.79	1.10	-2.86	-2.00	<b>-0.97</b>	-2.66	0.07	6.54%	123.64%

**Table 5**  
**Tobit Regression of Actual Repurchases**

This table provides the Tobit regressions of actual repurchase activity. 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 to shares outstanding prior to repurchase announcement. Share pledge, size, B/M, prior return, LEV, FCF and cash dividend are defined in Table 2. *Low prior return dummy* is equal to one if the prior three-month return is lower than -20%, zero otherwise. *Increase pledge dummy* is equal to one if the change in share pledges is positive during three months prior to the given quarter, zero otherwise. All variables are winsorized at top and bottom 1%. Numbers in brackets are *p*-values. \*, \*\*, and \*\*\* denote significance of 10%, 5%, and 1%, respectively. *N* is the numbers of observations in regressions.

Model	1	2	3	4	5
Intercept	-8.902 [0.000]***	-8.830 [0.000]***	-8.869 [0.000]***	-8.919 [0.000]***	-8.887 [0.000]***
Share pledge	1.365 [0.000]***	1.249 [0.000]***	0.990 [0.010]**	0.817 [0.057]*	0.524 [0.249]
Share pledge*Prior return		-0.041 [0.000]***			
Share pledge*Low prior return dummy			1.399 [0.023]**		1.278 [0.040]**
Share pledge*Increase pledge dummy				1.251 [0.026]**	1.139 [0.044]**
Size	0.172 [0.001]***	0.174 [0.001]***	0.172 [0.001]***	0.173 [0.001]***	0.173 [0.001]***
B/M	0.120 [0.166]	0.054 [0.542]	0.089 [0.312]	0.132 [0.129]	0.102 [0.244]
FCF	0.019 [0.000]***	0.018 [0.000]***	0.019 [0.000]***	0.018 [0.000]***	0.018 [0.000]***
LEV	-0.031 [0.000]***	-0.031 [0.000]***	-0.031 [0.000]***	-0.031 [0.000]***	-0.031 [0.000]***
Cash dividend	-0.154 [0.000]***	-0.158 [0.000]***	-0.154 [0.000]***	-0.153 [0.000]***	-0.153 [0.000]***
Pseudo R-squared (%)	1.229	1.356	1.250	1.249	1.264
<i>N</i>	23,058	23,058	23,058	23,058	23,058

**Table 6**  
**Regressions of Announcement Returns**

This table reports cross-sectional regressions of short-run returns around repurchase announcements. The dependent variable is a three-day (-1, +1) cumulative return around repurchase announcement, adjusted for the value-weighted market index return over the same period. The variable definitions are detailed in the appendix. All variables are winsorized at top and bottom 1%. Year dummies are included but not reported. Numbers in parentheses are *t*-statistics with White's (1980) standard errors. \*, \*\*, and \*\*\* denote significance of 10%, 5%, and 1%, respectively. *N* is the number of observations in the regression.

Model	1	2	3	4	5	6	7
Intercept	2.037 (4.85)***	0.235 (0.18)	-0.001 (0.00)	0.073 (0.06)	0.429 (0.34)	0.268 (0.21)	0.457 (0.37)
Share pledge	-0.028 (-3.05)***	-0.023 (-2.28)**	-0.003 (-0.23)	-0.010 (-0.90)	-0.005 (-0.39)	0.003 (0.21)	-0.001 (-0.09)
Share pledge*Prior return			0.149 (3.11)***				
Share pledge *Low prior return dummy				-0.034 (-1.89)*		-0.028 (-1.52)	-0.026 (-1.41)
Share pledge *Increase pledge dummy					-0.032 (-2.14)**	-0.027 (-1.80)*	-0.028 (-1.83)*
Size		-0.021 (-0.17)	-0.021 (-0.17)	-0.016 (-0.13)	-0.040 (-0.33)	-0.034 (-0.28)	-0.053 (-0.47)
B/M		0.960 (3.32)***	0.977 (3.42)***	0.972 (3.37)***	0.927 (3.23)***	0.942 (3.28)***	1.059 (3.61)***
FCF		-0.015 (-1.08)	-0.016 (-1.16)	-0.015 (-1.09)	-0.014 (-1.05)	-0.015 (-1.06)	
LEV		-0.016 (-2.23)**	-0.017 (-2.38)**	-0.016 (-2.29)**	-0.016 (-2.20)**	-0.016 (-2.26)**	
Intended ratio		0.262 (3.36)***	0.260 (3.43)***	0.264 (3.43)***	0.254 (3.27)***	0.257 (3.33)***	0.262 (3.39)***
Prior return		-0.019 (-2.22)**	-0.038 (-3.91)***	-0.025 (-2.81)***	-0.020 (-2.43)**	-0.025 (-2.84)***	-0.023 (-2.61)***
Change in cash flow rights		-0.012 (-0.32)	-0.015 (-0.42)	-0.014 (-0.39)	-0.015 (-0.41)	-0.017 (-0.46)	-0.013 (-0.35)
KZ index							-0.121 (-1.01)
Adj. R-squared (%)	1.929	4.404	5.530	4.645	4.700	4.826	4.570
<i>N</i>	1,386	1,386	1,386	1,386	1,386	1,386	1,386



**Table 7**  
**Long-Run Abnormal Returns**

This table reports monthly cross-sectional regressions of long-run abnormal returns. The dependent variable is the monthly risk-adjusted return in %. The estimation of risk-adjusted returns is shown in the appendix. The variable definitions are detailed in the appendix and are winsorized at top and bottom 1%. The numbers reported in this table are the time-series averages of coefficients based on monthly cross-sectional regressions. Numbers in parentheses are *t*-statistics based on time-series coefficients. To mitigate the outlier effect, we drop months where the number of firms is below 20. There are 108 months used in the test. The number in parentheses is *t*-statistics with Newey-West (1987) standard errors. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% levels, respectively.

Model	1	2	3	4	5	6
Intercept	-1.446 (-10.27)**	-1.126 (-2.33)**	-1.183 (-2.29)**	-1.096 (-2.11)**	-1.138 (-2.21)**	-1.126 (-1.94)*
Share pledge	-0.014 (-3.17)***	-0.014 (-2.32)**	-0.012 (-1.39)	-0.004 (-0.52)	-0.013 (-2.10)**	-0.003 (-0.69)
Share pledge*Prior return			-0.028 (-0.64)			
Share pledge*Low prior return dummy				-0.006 (-0.47)		-0.012 (-1.05)
Share pledge*Increase pledge dummy					-0.0002 (-0.02)	0.004 (0.31)
Size		-0.079 (-1.26)	-0.074 (-1.08)	-0.081 (-1.28)	-0.078 (-1.23)	-0.078 (-1.18)
B/M		0.221 (1.44)	0.255 (1.69)*	0.229 (1.35)	0.208 (1.22)	0.232 (1.22)
FCF		-0.019 (-1.39)	-0.021 (-1.42)	-0.019 (-1.41)	-0.022 (-1.55)	-0.022 (-1.61)
LEV		-0.011 (-3.11)***	-0.012 (-3.12)***	-0.012 (-3.12)***	-0.011 (-3.12)***	-0.012 (-3.10)***
Actual buyback		-0.017 (-0.68)	-0.031 (-1.10)	-0.026 (-0.82)	-0.013 (-0.51)	-0.024 (-0.77)
Change in cash flow rights		-0.005 (-0.15)	-0.006 (-0.17)	-0.012 (-0.36)	-0.006 (-0.21)	-0.016 (-0.46)

**Table 8**  
**Regressions of Announcement Returns: Exclude Optimistic Samples**

This table reexamines cross-sectional regressions of short-run returns around repurchase announcements. We use Lin, Hu, and Chen's (2005) overconfidence measure to exclude overconfidence samples from our sample. The dependent variable is a three-day (-1, +1) cumulative return around repurchase announcement, adjusted for the value-weighted market index return over the same period. The variable definitions are detailed in the appendix. All variables are winsorized at top and bottom 1%. Year dummies are included but not reported. Numbers in parentheses are *t*-statistics with White's (1980) standard errors. \*, \*\*, and \*\*\* denote significance of 10%, 5%, and 1%, respectively. *N* is the number of observations in the regression.

Model	1	2	3	4	5	6
Intercept	2.280 (4.81)***	0.428 (0.30)	0.178 (0.13)	0.207 (0.15)	0.644 (0.45)	0.396 (0.28)
Share pledge	-0.035 (-3.30)***	-0.028 (-2.38)**	-0.009 (-0.70)	-0.009 (-0.71)	-0.010 (-0.70)	0.002 (0.12)
Share pledge*Prior return			0.144 (2.76)***			
Share pledge*Low prior return dummy				-0.051 (-2.39)**		-0.045 (-2.07)**
Share pledge*Increase pledge dummy					-0.033 (-1.84)*	-0.024 (-1.37)
Size		-0.016 (-0.12)	-0.014 (-0.10)	-0.010 (-0.07)	-0.037 (-0.27)	-0.027 (-0.20)
B/M		1.056 (3.04)***	1.072 (3.13)***	1.069 (3.09)***	1.010 (2.93)***	1.033 (3.01)***
FCF		-0.014 (-0.89)	-0.015 (-0.98)	-0.016 (-0.97)	-0.014 (-0.87)	-0.015 (-0.95)
LEV		-0.019 (-2.45)**	-0.020 (-2.59)***	-0.020 (-2.56)**	-0.019 (-2.44)**	-0.020 (-2.54)**
Intended ratio		0.225 (2.63)***	0.227 (2.72)***	0.232 (2.76)***	0.222 (2.61)***	0.230 (2.73)***
Prior return		-0.025 (-2.62)***	-0.042 (-3.99)***	-0.034 (-3.36)***	-0.027 (-2.79)***	-0.034 (-3.39)***
Change in cash flow rights		-0.004 (-0.10)	-0.006 (-0.14)	-0.007 (-0.17)	-0.005 (-0.14)	-0.008 (-0.19)
Adj. R-squared (%)	2.205	4.821	5.916	5.353	5.077	5.452
<i>N</i>	1,129	1,129	1,129	1,129	1,129	1,129

**Table 9**  
**Regressions of Announcement Returns: Different Controlling Power Groups**

This table reports cross-sectional regressions of short-run returns around repurchase announcements for different controlling power groups. We divide the whole sample into two groups according to the median of controlling shareholders' control rights. "Below median" represents the companies with lower control concern; while "Above median" represents the companies with larger control rights. The dependent variable is a three-day (-1, +1) cumulative return around repurchase announcement, adjusted for the value-weighted market index return over the same period. The variable definitions are detailed in the appendix. All variables are winsorized at top and bottom 1%. Year dummies are included but not reported. Numbers in parentheses are *t*-statistics with White's (1980) standard errors. \*, \*\*, and \*\*\* denote significance of 10%, 5%, and 1%, respectively. *N* is the number of observations in the regression.

Model	Below median		Above median	
	1	2	3	4
Intercept	-1.609 (-0.94)	-1.585 (-0.93)	0.487 (0.25)	0.481 (0.25)
Share pledge	0.0009 (0.07)	0.011 (0.68)	-0.044 (-3.13)***	0.004 (0.15)
Share pledge*Low prior return dummy		-0.006 (-0.25)		-0.052 (-2.09)**
Share pledge*Increase pledge dummy		-0.015 (-0.70)		-0.044 (-1.89)*
Size	0.094 (0.57)	0.090 (0.55)	0.018 (0.09)	0.004 (0.02)
B/M	0.893 (2.42)**	0.881 (2.40)**	1.211 (2.67)***	1.223 (2.75)***
FCF	-0.023 (-1.25)	-0.023 (-1.23)	-0.012 (-0.58)	-0.012 (-0.57)
LEV	-0.035 (-3.73)***	-0.035 (-3.71)***	0.004 (0.40)	0.004 (0.39)
Intended ratio	0.352 (3.16)***	0.351 (3.15)***	0.237 (2.13)**	0.222 (2.05)**
Prior three-month return	-0.017 (-1.64)	-0.020 (-1.72)*	-0.028 (-2.20)**	-0.038 (-2.91)***
Change in cash flow rights	-0.071 (-1.18)	-0.074 (-1.22)	-0.008 (-0.18)	-0.018 (-0.38)
Adj. R-squared (%)	5.060	4.898	4.766	5.965
<i>N</i>	693	693	693	693

**Table 10**  
**Share Repurchase and Corporate Governance**

This table examines how corporate governance affects share repurchase. Models 1 and 2 report logit and tobit regression of repurchase, respectively. Model 3 reports cross-sectional regressions of short-run returns around repurchase announcements. All procedures are as same as Table 3, Table 5, and Table 6. For models 1 and 2, numbers in brackets are  $p$ -values. For model 3, Numbers in parentheses are  $t$ -statistics with White's (1980) standard errors. \*, \*\*, and \*\*\* denote significance of 10%, 5%, and 1%, respectively.  $N$  is the number of observations in the regression.

	Logistic Model	Tobit Model	Three-day CAR
Model	1	2	3
Intercept	-3.729 [0.000]***	-8.939 [0.000]***	0.026 (0.02)
Share pledge	0.838 [0.000]***	2.014 [0.000]***	-0.027 (-1.97)**
Share pledge*Institutional ownership	-0.010 [0.434]	-0.021 [0.471]	-0.072 (-0.99)
Share pledge*Blockholder ownership	-0.122 [0.004]***	-0.256 [0.004]***	0.391 (1.37)
Share pledge*Board independence	0.203 [0.506]	0.611 [0.379]	0.012 (0.60)
Size	0.114 [0.000]***	0.178 [0.001]***	0.002 (0.02)
B/M	0.074 [0.049]**	0.110 [0.206]	0.978 (3.39)***
FCF	0.008 [0.000]***	0.019 [0.000]***	-0.014 (-1.05)
LEV	-0.013 [0.000]***	-0.031 [0.000]***	-0.016 (-2.29)**
Cash dividend	-0.072 [0.000]***	-0.152 [0.000]***	
Intended ratio			0.256 (3.29)***
Prior return			-0.019 (-2.23)**
Change in cash flow rights			-0.014 (-0.38)
Pseudo R-squared/ Adj-R-squared (%)	2.546	1.266	4.424
$N$	23,058	23,058	1,386