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公司股票購回與控制股東個人利益之研究

Share Repurchase and Controlling Shareholder's Personal Interest

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公司股票購回與控制股東個人利益之研究
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　　本論文係 陳鴻崑 君（D92723002）在國立臺灣大學財務金融所完成之博士學位論文，於民國九十九年一月十三日承下列考試委員審查通過及口試及格，特此證明

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公司股票購回與控制股東個人利益之研究

中文摘要

　　本研究藉由檢測短期宣告效果，探討公司宣告股票購回是否在謀求控制股東的個人利益，而非全體股東的利益。實證結果發現，當控制股東大量使用本身持股作為個人銀行借款的擔保之用，或者擁有較少的現金流量請求權時，市場投資人會將公司股票購回的行為解讀為控制股東在謀求個人利益，因此市場不會有任何宣告效果，符合個人利益假說(personal interest hypothesis)的預期。反之，如果控制股東沒有藉由個人股票質押取得銀行借款，或者擁有較多的現金流量請求權時，公司股票購回的宣告效果則顯著為正，符合過去文獻中訊息釋放假說(signaling hypothesis)。此外，當我們檢測公司長期營運績效與長期異常報酬時，亦得到相同的結果。

關鍵字：股票購回、控制股東、個人利益、訊息釋放

Share Repurchase and Controlling Shareholder's Personal Interest

ABSTRACT

This paper differs from the existing literature as it takes into account the possibility that share repurchases are not used to serve for the general shareholders' interests. When controlling shareholders heavily use their stockholdings as a pledge for personal loans or when their cash flow rights is low, investors do not respond to the announcement of repurchases. This evidence is in favor of a personal interest hypothesis. On the contrary, the market reacts favorably to buyback programs when there are no pledged stocks or when the cash flow rights is high. The evidence is consistent with the signaling hypothesis. Evidence based on operating performances and long-run abnormal return paints the same conclusion.

Keywords: Share repurchase, Controlling shareholder, Personal interest, Signaling.

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1. Introduction

This paper examines how ownership structure of controlling shareholders affects the valuation effect of share repurchases. Using the ownership structure of a company, we provide supporting evidence to the personal interest hypothesis that a subset of the controlling shareholders is more likely to pursue their own benefit through a share repurchase.

The previous research finds a positive market reaction, on average, to repurchase announcements and proposes two major theories to account for the favorable announcement returns. The first one is the signaling hypothesis that the repurchase constitutes a positive signal regarding either an improvement of profitability or undervaluation (Bartov, 1991; Comment and Jarrell, 1991; Ikenberry, Lakonishok, and Vermaelen, 1995; and Vermaelen, 1981). The secondary key explanation, namely free cash flow hypothesis, suggests that managers initiate share repurchases to mitigate potential agency problems by returning free cash flow to shareholders (Jensen, 1986). The positive announcement return for share repurchases may reflect the benefit of lowered agency cost between managers and shareholders.

This paper differs from the existing literature as it takes into account the possibility that share repurchases are not used to serve for the general shareholders' interests. We use stock pledge ratio of a controlling shareholder, an ownership structure of a company to identify the managerial intent. We then argue that the alignment of interest between the controlling shareholders and minor shareholders will affect the valuation effect of share repurchase, a dimension that has not been addressed in the literature. Accordingly, we provide new evidence that is different from the existing hypotheses, e.g., the signaling

hypothesis or free cash flow hypothesis.

The stock pledge ratio is the percentage of the controlling shareholder's shareholdings that are pledged for their personal bank loans. The existence of pledged stocks will create a wedge between the interest of controlling shareholders and the interest of shareholders. When controlling shareholders use their shares as collateral, banks will require that the pledged shares maintain a minimum amount of market value. Once the stock price falls below the minimum requirement, controlling shareholders are under stress to increase collateral or to face liquidation of the pledged stocks. A liquidation of stocks means a loss of control rights and the associated private benefits[1]. Therefore, controlling shareholders whose wealth is tied up with the firm are likely to take unusual steps to prevent the loss from happening.

Share repurchases can be one channel to support the stock price, hoping that it will have a long-lasting effect. Although this concern has not received too much attention in the literature, the U.S. Securities and Exchange Commission (SEC) indeed used to be concerned with that corporations may use share repurchase 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 (Grullon and Michaely, 2000). In this paper, we hypothesize that investors will interpret repurchases from high-stock-pledge companies as self-interest pursuit rather than as a positive signal and will not adjust their valuations. As a result, the short-term market reaction should be zero for companies with high stock pledge ratios. We refer to this as the personal interest hypothesis.

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[1] According to the CFA Institute's report on September, 2009, in Asian market, there are several cases of changing in control at the companies that their controlling shareholders and directors had pledged their shares to banks for margin loans in 2008. They are including Sino-Environment Technology Group in Singapore, Satyam Computer in India, and ABC Learning Centres in Australia.

When buybacks are used to serve for the controlling shareholder's personal interest, the prediction of the free cash flow hypothesis is exactly the opposite of that of the personal interest hypothesis. To prevent the loss of control rights, controlling shareholders can also expropriate company asset and use the money as collateral. A repurchase program can reduce liquid assets that may be expropriated and thus is beneficial to general shareholders. Therefore, the free cash flow hypothesis will suggest that the market reaction should be more positive for repurchasing firms with high stock pledge ratios.

To test the personal interest hypothesis against the free cash flow hypothesis, we use a sample of 1,573 share repurchase programs in Taiwan during 2000 to 2006. Taiwanese data are appropriate to address our research questions for two reasons. First, the existence of controlling shareholders is prevalent in Taiwan and most Taiwanese companies have one controlling shareholder. Claessens, Djankov and Lang (2000) reported that 43% of Taiwanese companies are controlled by a single shareholder. The controlling shareholders, in general, have decision rights to expropriate minor shareholders and sufficient voting power to shield themselves from outside monitoring. Many studies also document that the controlling shareholders are more likely to expropriate minority shareholders for their own benefits (Bae, Kang and Kim, 2002; Cheung, Rau and Stouraitis, 2006; Claessens, Djankov, Fan and Lang, 2002; and Lemmon and Lins, 2003). Using a sample of companies with controlling shareholders allows for the possibility that a repurchase program is not used to serve for the general shareholders' interests.

The second benefit of using a sample from Taiwan is that the government requires a disclosure from directors and managers of their shareholdings as well as the percentage of the respective amounts used as a pledge for their personal debt. Such disclosure

requirement is superior to other Asian Pacific countries, e.g. Singapore, India, and Hong Kong.[2] We use the stock pledge ratio to identify a subset of repurchases that are more likely to be beneficial to the controlling shareholder.

Our empirical results support the personal interest hypothesis but not the free cash flow hypothesis. The market reaction is zero for companies with high stock pledge ratio. The difference in market reaction between companies with high and those with low stock pledge ratios is significantly negative. These findings hold after controlling for firm size, book-to-market ratio, free cash flow, program size, and prior returns. In short, our evidence suggests that the controlling shareholders are more likely to pursue their own interests through share repurchases when they heavily use their shareholdings as collateral for their personal loan.

While investors only react favorably to share repurchases announced by companies with low stock pledge ratios, we also provide supporting evidence to the signaling hypothesis. In addition, the results of multivariate analysis also indicate that the market reaction is greater when the book-to-market ratio is high and the prior return is low. Such evidence is consistent with prior literature (e.g. Ikenberry, Lakonishok, and Vermaelen, 1995, 2000; Stephens and Weisbach, 1998; Kahle, 2002; and Chan, Ikenberry, and Lee, 2004) and supports the signaling/undervaluation story.

Our result still holds when we use cash flow rights of a controlling shareholder as a measure of ownership structure to determine the alignment of interest. As we use the cash flow rights of a controlling shareholder to split the overall repurchase sample, the

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[2] The disclosure requirements among these countries are very different. In Singapore, there are no specific rules under SGX listing rules or Securities and Futures Act. India started to introduce regulations that require disclosure of pledged shares from January, 2009. In Hong Kong, specific regulations of pledge shares are only for controlling shareholders rather than all directors.

announcement return in companies with low cash flow rights is worse than that in companies with high cash flow rights. This result retains consistency even after controlling for other control variables.

We perform robustness checks on firms whose controlling shareholder owns more than 10% of the control rights, firms whose prior returns are below the mean (median) of prior return of the whole sample, and firms with high stock pledge ratios and an increasing in stock pledge ratio. All results are aligned with the prediction of the personal interest hypothesis. While companies with high free cash flow cannot outperform those with low free cash flow in short-term market reactions, on the other hand, our result also indicates that the free cash flow hypothesis is not a better explanation of share repurchases.

Regarding the long-run performance, we first examine the change in operating performance around the repurchase announcement. As a result, we support both the personal interest and the signaling hypothesis. There is evidence that only companies with high cash flow rights experience a significant improvement in operating performance after a repurchase announcement. For companies with low cash flow rights, however, the operating performances exhibit a significant decline subsequent to the repurchase announcement year. Similarly, companies with high stock pledge ratios exhibit a poor operating performance after a repurchase announcement. This is confirmation that only companies with low stock pledge ratio (high cash flow rights) can convey a positive signal to shareholders through share repurchase. For companies with high stock pledge ratio (low cash flow rights), share repurchases are more likely to be used to serve for the controlling shareholders' interest. Thus the operating performance will not become better after repurchase announcement.

We also examine the long-run abnormal return to investigate whether the market underreacts to a repurchase announcement or not. The result of short-term market reaction still holds in the long horizon. Over the long-run, the differences in average return between companies with high and those with low stock pledge ratios are significantly negative. These findings are robust based on the calendar-time approach, event-time approach, and multivariate analysis.

There are two papers related to ours. The first one is Kahle (2002) who argues that managers may announce a share repurchase to maximize their own wealth and to fund employee stock option exercises. Another one is Howe, Vogt, and He (2003) suggesting that both short-term and long-term returns are positively associated with managerial ownership following tender-offer repurchases. In this paper, we make a clearer story why share repurchases are more likely to be used to serve for the controlling shareholders' personal interest. In comparison with the incentive of employee stock option exercises, the stock pledge ratio provides a more direct measure to identify whether the controlling shareholder's interest is tie up with the firm value or not. As a result, we can have a subset that either a buyback program is used to pursue the controlling shareholders' personal interest or constitutes a positive signal.

The remainder of this paper is organized as follows. Section 2 describes the regulation of share repurchases in Taiwan. Section 3 presents the data used in the empirical analysis. Section 4 reports the short-term market reaction to repurchase announcements. Section 5 reports long-run performance following the repurchases announcement. Finally, Section 6 provides a summary of and a conclusion to this paper.

2. Regulatory Environment

Starting from August 8, 2000, public companies in Taiwan were allowed to directly repurchase their own shares in the open market. A share repurchase has to be approved by the board.[3] Once approval for the repurchase is obtained from the board, the company needs to report to the Securities and Futures Bureau (SFB) within two days of the board having approved the repurchase. Each repurchase program must be completed within two months from the day the reporting to the SFB takes place.[4] For each repurchase program, the number of shares to be bought back cannot exceed 10% of the firm's outstanding shares, and the amount bought back cannot exceed the sum of retained earnings and capital surplus.[5]

The disclosure requirements regarding share repurchases in Taiwan are very different from those in the United States. In the U.S., there is no restriction on the buyback period. Before 2004, companies in U.S. have no obligation to disclosure any information regarding the status of execution of open market repurchase program, either.[6] However, companies in Taiwan are obliged to announce detailed information regarding the share repurchase to the public and the authority, e.g. the SFB. In accordance with repurchase regulations, companies must report items such as the purpose of the repurchase, the types of shares, the number of shares, the price range of the shares to be repurchased, the planned period for the

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[3] Article 28-2 of the Securities and Exchange Law.
[4] Prior to October 13, 2000, the repurchase program in Taiwan had to be executed within 30 days from the date of getting approval. More detailed information could be found at Regulations Governing Share Repurchases by Listed and OTC Companies.
[5] Article 8 of the Regulations Governing Share Repurchases by Listed and OTC Companies.
[6] On December 2003, U.S. Securities and Exchange Commission (SEC) promulgated a new disclosure requirement for share repurchase. According to this new disclosure rule, the repurchasing firms have to disclose the status of execution for share repurchase each month during the repurchase period. The repurchasing firms, in addition, must 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, the method to be adopted for the repurchase, and so on.[7] Once the repurchase program is completed, the company has to submit a report to the SFB to declare the status of execution within five days.[8] The report should include items such as the actual number of shares bought, the actual amount, and the average repurchase price. Such a disclosure requirement in Taiwan enables investors to easily determine the status of execution of the share buyback and to identify whether a repurchase program is a signal of commitment or not.

3. Data and Sample Selection

3.1. Repurchase sample

The initial sample used in this study includes 2,084 share repurchase programs that were launched from October 13, 2000 through December 31, 2006. They were announced by 645 companies that are listed on the Taiwan Stock Exchange and the Gre Tai Securities Market (over the counter market). The sample starts from October 13, 2000 because the execution period of repurchase was changed from 30 to 60 days on that day. We first exclude 302 observations related to financial companies from our initial sample. We also delete (1) 7 repurchases from state-owned enterprises, (2) 166 repurchases from the companies that can not be defined a controlling shareholder, and (3) 32 repurchases that lack the required data. Finally, we have 1,573 share repurchase programs from 522 listed companies to make up our repurchasing sample. All information regarding the share repurchase programs is obtained from the Taiwan Economic Journal (TEJ) database.

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[7] Article 2 of the Regulations Governing Share Repurchases by Listed and OTC Companies.
[8] Article 5 of the Regulations Governing Share Repurchases by Listed and OTC Companies.

[Insert Table 1 here]

Table 1 reports the distribution of share repurchase announcements by year in our sample, while the announcement date is defined as the date that firms announce share repurchase program or the date of repurchase news is reported on the newspaper. During the period from 2000 to 2006, around NT\$ 240 billion was spent by our sample firms and around 13 billion shares were repurchased from the Taiwan stock market. The amount of shares actually repurchased reached a peak of NT\$ 61 billion (2,805 million shares) in 2004. The average number of shares actually bought back was 8,652 thousand shares (NT\$ 153 million). Companies on average announced a repurchase of 3 % of their total outstanding shares, and 2% of total outstanding shares were actually repurchased. The average completion ratio was 70%.

3.2. Identification of controlling shareholder

The controlling shareholder (ultimate owner) is the shareholder who owns the most voting rights and exercises effective managerial authority over a company. The calculation of voting rights is based on the ultimate control concept that traces the chain of ownership (La Porta, Lopez-de-Silanes, and Shleifer, 1999). The voting rights constitute the sum of the direct and indirect voting rights held by the controlling shareholders of a company. Direct voting rights consist of the rights to those shares registered in the name of the ultimate owner 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, for example, corporate entities, investment companies, and other legal entities, which are controlled by the ultimate owner. The effective managerial authority of a

company is identified by the TEJ database. Companies that do not match these two criteria are excluded from our sample. In most cases, the shareholder who wields effective managerial authority is also the shareholder who owns the most voting rights in the company. However, an exception occurs when a professional manager has the effective managerial authority but does not own the most voting rights within the firm. For example, Dr. Morris Chang, who is the chief executive officer (CEO) and chairman of the board of Taiwan Semiconductor Manufacturing Company (TSMC), wields effective managerial authority but has less than 1% of the voting rights of the company. On the contrary, Philips Electronics Corporation has the most voting rights in TSMC but does not have any managerial authority. Therefore, we exclude TSMC from our sample.

3.3. Ownership structure data and other variables

We categorize our sample into misaligned companies and incentive-aligned companies to describe the incentives of the controlling shareholder. A misaligned company means that the controlling shareholder's interests will deviate from those of the minority shareholders, so that the incentive to expropriate is stronger. Alternatively, an incentive-aligned company means that the interests of the controlling shareholder are aligned with those of the minority shareholders of the company so that the controlling shareholder will maximize the minority shareholders' wealth.

To decide whether a company is misaligned or incentive-aligned, we use the stock pledge ratio and cash flow rights of the controlling shareholder.[9] The stock pledge ratio is the percentage of the controlling shareholder's shareholdings that are pledged for bank

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[9] The control right deviation is another measure of ownership structure expressly used in the literature. However, since there are too many zero values for the control right deviation in our sample, we then exclude this variable from our ownership structure measure to increase the power of our tests.

loans at the end of the month prior to the repurchase announcement. The government requires that directors, supervisors, managers, and large shareholders (who own more than 10% of the total shares of the company) in public companies to file the number of shares held and the number pledged for loans and credits every month[10]. Previous studies document that the stock pledge ratio of the controlling shareholders (directors and supervisors) is positively related to the risk of financial distress and is associated with a worse performance in the future (Lee and Yeh, 2004; and Chen and Hu, 2007). As we have already mentioned previously, the controlling shareholders will have more intention to support the stock price when they pledge more shares for their personal bank loan. Therefore, a company with high stock pledge ratio is assigned to be a misaligned company.

We also use the percentage of cash flow rights owned by the controlling shareholder to decide whether a company is misaligned or incentive-aligned. Cash flow rights represent the sum of the direct cash flow rights and indirect cash flow rights in the company at the end of the month prior to the repurchase announcement. The direct cash flow rights equal the direct voting rights minus the shareholding held by the foundation. The 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. For example, there is a controlling shareholder, H, who personally holds 5%, 50% and 50% ownership shares of firms A, B and C, respectively. Firms B and C also have 10% and 20% ownership shares of firm A, respectively. Since H has a 5% direct ownership, and a 15% indirect ownership ($0.5 \times 10\% + 0.5 \times 20\% = 15\%$) through the shareholdings of firms B and C, H has 35% ($5\% + 10\% + 20\% = 35\%$) of the voting rights

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[10] According to Article 22-2 and Article 25 of the Securities and Exchange Law, the percentage of shareholdings that are pledged 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.

in firm A, and H's cash flow rights for firm A amount to 20% (5% + 15% = 20%).

Cash flow rights are extensively used to measure the ownership structure of a company in the literature (Claessens, Djankov, and Lang, 2000; Claessens, Djankov, Fan, and Lang, 2002; Lemmon and Lins, 2003; Cheung, Rau, and Stouraitis, 2006; Yeh, 2005). A low level of cash flow rights owned by the controlling shareholder increases agency costs and decreases firm value (Bebchuk, Kraakman, and Triantis, 2000; and Claessens, Djankov, Fan, and Lang, 2002). Therefore, a company with low cash flow rights also represents a misaligned company.

Other variables used in the empirical work are firm size, book-to-market ratio, free cash flow, and prior return. Firm size is the market value of common equity at the end of the month prior to the repurchase announcement. The book-to-market ratio is the ratio of book value of equity to the market value of equity. In calculating the book-to-market ratio, the book value of equity is its value at the end of fiscal year *t-1* when a share repurchase is announced from July in fiscal year *t* through June in fiscal year *t+2*, since the financial statements are usually announced with a time lag; market value of equity is its value at the end of the month prior to the repurchase announcement. The free cash flow is defined as the operating income before depreciation minus tax, interest expenses, the preferred stock cash dividend, and the common stock cash dividend to measure the after-tax cash flow that is not distributed to stakeholders in the form of either interest or dividend payments (Lehn and Poulsen, 1989). In the following analysis, the free cash flow is expressed as a percentage of market value of common equity at the end of the fiscal year immediately preceding the year in which the repurchase is announced. Finally, the prior return is the 250-day (-252, -3) buy-and-hold abnormal return prior to the repurchase announcement

date. All variables used in this study are obtained from the TEJ database.

[Insert Table 2 here]

Table 2 describes the summary statistics for our sample. As shown in Panel A, the distribution for firm size is quite skewed; about three-fourths of the firms in the sample have capitalizations of below NT$ 6 billion. The average (median) firm size in terms of capitalization is NT$ 12 billion (NT$ 2.5 billion), indicating that there are few large firms in our sample. In addition, half of the firms in our sample have a book-to-market ratio of less than one. The average and median book-to-market ratios are 1.15 and 1.04, respectively.

The cross-sectional differences in terms of the stock pledge ratio and cash flow rights are quite significant in our sample. The average (median) stock pledge ratio is 12% (0%) and the average (median) cash flow rights is 21% (17%). Stocks in the fourth quantile are at least 20% higher than those in the first quantile. For example, one-fourth of the sample firms have cash flow rights of less than 11%, while one-fourth of the sample firms have cash flow rights of more than 30%. Similarly, even though more than half of the sample firms have zero stock pledge ratios, one-fourth of the sample firms still have stock pledge ratios of more than 20%.

Panel A of Table 2 also summarizes other firm characteristics for our sample, e.g. free cash flow, and prior returns. The measure of free cash is 8% (median is 7%). Finally, similar to previous studies, the prior return on average is negative with a magnitude of 9.7% (median is 13%).

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Panel B of Table 2 reports the correlation coefficients among the firm characteristic and ownership structure variables in our sample. Low correlation coefficients are found among the stock pledge ratio, cash flow rights, and free cash flow. The correlation coefficient between the firm size and book-to-market ratio, and the correlation coefficient between the firm size and cash flow right are -0.168 and -0.157, respectively. Except for these two correlation coefficients, the absolute values of the correlation coefficients are all below 0.15.

4. Short-term Market Reaction

To test whether the personal interest hypothesis or free cash flow hypothesis can better explain the motivation underlying share repurchases, we first examine the short-term market reaction to the repurchase announcement. Under the personal interest hypothesis, the short-term market reaction to repurchase announcements by misaligned companies should be worse than that in relation to incentive-aligned companies. On the other hand, the free cash flow hypothesis predicts that the market reaction for misaligned companies should be better than that for incentive-aligned companies since misaligned companies should benefit the most by distributing free cash flows through share repurchases.

4.1. Univariate analysis

Table 3 reports the result of short-term market reaction to repurchase announcement in our sample by grouping method. The repurchasing samples are sorted according to the stock pledge ratio and cash flow rights, respectively, into four groups. Group 1 (Low) is the group with the lowest value and group 4 (High) is the group with the highest value. For the stock pledge ratio, group 1 includes all observations that have a value of zero and the other

three groups equally divide the remaining observations. On the other hand, for cash flow rights, repurchasing samples are equally divided into four groups. We focus our attention on groups 1 and 4. Companies that have a high stock pledge ratio (group 4) or low cash flow rights (group 1) are defined as misaligned companies, while those having a low stock pledge ratio (group 1) or high cash flow rights (group 4) are defined as incentive-aligned companies.

The short-term market reaction is measured by three-day (five-day) cumulative abnormal return (CAR) surrounding repurchase announcement. From one day (two days) before the announcement date through one day (two days) after the announcement date, we first calculate the abnormal return (AR) across stocks for each day. The abnormal return is the market-adjusted return which is measured by the individual stock return minus the return on the Taiwan Stock Exchange Value-weighted Index. The three-day (five-day) CAR of each stock is then cumulated by summing these abnormal returns for the window of (-1, 1) and (-2, 2), respectively, while 0 is announcement date. The market reactions of the misaligned and incentive-aligned companies are the means of the three-day (five-day) CAR for the stocks belonging to each group. In addition, we also test the differences in market reaction between the misaligned and incentive-aligned companies by using paired t-tests.

[Insert Table 3 here]

The result of Table 3 is aligned with the prediction of the personal interest hypothesis. As reported in Table 3, the market reaction to share repurchases announced by misaligned companies is weaker. The differences in terms of the market reaction between misaligned

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and incentive-aligned companies, however, are significantly negative at the 1% significance level. For instance, the difference in the five-day CAR between misaligned and incentive-aligned companies is -1.4% in the measure of the stock pledge ratio and -2.0% in the measure of cash flow rights, while the five-day CAR for companies with high stock pledge (low cash flow rights) is insignificantly positive. Such evidence is consistent with the personal interest hypothesis rather than the free cash flow hypothesis.

Although the three-day CAR in companies with low cash flow rights is significantly positive, the statistical significance is at the marginal level and its scale is smaller than that of companies with high cash flow rights. While the difference in three-day CAR between companies with low cash flow rights and those with high cash flow rights remains economically significant negative, such evidence is aligned with the personal interest hypothesis.

On the other hand, as shown in Table 3, incentive-aligned companies indeed react more favorably to repurchase announcements. For example, the three-day CAR for companies with low stock pledge ratio (high cash flow right) is significantly positive, with a magnitude of 1.5% (2.1%) at the 1% significance level. Similar result is also reported in five-day CAR. This evidence is consistent with the signaling hypothesis whereby only share repurchases announced by incentive-aligned companies can be a credible signal to convey positive information to shareholders. On the contrary, investors, will not adjust their valuation as the controlling shareholders are more likely to pursue their personal interest.[11]

4.2. Cross-sectional regression

Since the univariate analysis only examines one dimension at a time, we also use

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[11] We also find a similar result in terms of the short-term market reaction when we examine the medians of the three-day (five-day) CAR.

multivariate analysis that allows us to control other factors known to affect short-term market reaction to the repurchase announcement. We regress the three-day CAR on various control variables, such as firm size, book-to-market ratio, free cash flow, percentage of announced buyback shares to the total outstanding shares or namely intended ratio, prior return, and dummy variables for ownership structure to examine how the ownership structure of a controlling shareholder affects the short-term market reaction.[12] The model specification is as follows:

$$CAR_i = \beta_0 + \beta_1 Size_i + \beta_2 B/M_i + \beta_3 FCF_i + \beta_4 Intended\ ratio_i + \beta_5 Prior\ Return_i \\ + \gamma_{11}D_i^{LP} + \gamma_{12}D_i^{HP} + \gamma_{21}D_i^{LC} + \gamma_{22}D_i^{HC} + \varepsilon_{it}$$

(1)

where *CAR* is the three-day cumulative abnormal return surrounding repurchase announcement. *Size* is the natural logarithm of firm size at the month-end prior to the repurchase announcement. *B/M* is the book-to-market ratio of equity at the month-end prior to the repurchase announcement. *FCF* is the free cash flow which is measured by Lehn and Poulson (1988). *Intended ratio* is the percentage of announced buyback shares to the total outstanding shares of a company. *Prior Return* is the 250-day (-252, -3) buy-and-hold abnormal return immediately preceding the repurchase announcement date. All continuous variables in regression model are winsorized at top and bottom 1% in distribution to avoid outliers affecting our empirical result. The D_i^j are the dummy variables for ownership structure at the month-end prior to the repurchase announcement, where D_i^j is equal to one if stock *i* at the month-end prior to the repurchase announcement belongs to the *j* group, otherwise it equals zero. The superscripts LP and LC (HP and HC) represent the groups

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[12] We include the free cash flow in our regression model since previous studies have documented that share repurchases might be motivated by the distribution of free cash flow (Dittmar, 2000; and Grullon and Michaely, 2004). Intended ratio and prior return are also incorporated into the regression model, since they are also the factors that affect stock return in prior literature, e.g. Kahle (2002).

with the lowest (highest) level of the stock pledge ratio and cash flow rights, respectively. In addition, we also include year dummies into our regression model but do not report in the table.

[Insert Table 4 here]

Table 4 reports the results of the cross-sectional regression of the short-term market reaction. The cross-sectional regression is estimated by using ordinary least squares (OLS). The parameters γ_{11}, γ_{12}, γ_{21}, and γ_{22} are the coefficients of the low stock pledge ratio, high stock pledge ratio, low cash flow right, and high cash flow right dummy variables, respectively. While the coefficients γ_{11} and γ_{22} (γ_{12} and γ_{21}) measure the differences in the short-term market reaction to repurchase announcements between incentive-aligned (misaligned) companies and those with a medium values, holding firm characteristics and other control variables constant. The coefficient γ_{11}, for example, measures the difference in the short-term market reaction between companies with a low stock pledge ratio and those with a medium stock pledge ratio, holding constant the control variables. In addition, we also test the differences in the short-term market reaction to repurchase announcements between misaligned and incentive-aligned companies for various ownership structure measures. For example, $\gamma_{12} - \gamma_{11}$ is the difference in the short-term market reaction to repurchase announcements between companies with high stock pledge ratios (misaligned companies) and those with low stock pledge ratios (incentive-aligned companies).

Table 4 also provides supporting evidence to the personal interest hypothesis. The market reaction to repurchase announcements in misaligned companies is worse than that in

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incentive-aligned companies even after controlling for other factors that influence returns. From Models 1 through 3, the differences in market reaction between misaligned and incentive-aligned companies are significantly negative at the 1% level, while only the coefficient for the high stock pledge ratio (low cash flow right) dummy is significantly negative. This is the evidence of the personal interest hypothesis that investors will interpret the repurchase from misaligned companies as a way to pursue their personal interest rather than shareholders' interest.

In order to check the consistency of our results, we also consider two continuous variables of ownership structure, namely the stock pledge ratio and the cash flow rights, instead of dummy variables for the ownership structure.[13] The findings indicate that, from Models 4 through 6, the coefficients for the stock pledge ratio and cash flow rights are significantly negative and positive, respectively. A negative (positive) coefficient for the stock pledge ratio (cash flow rights) indicates that the market reacts more favorably when the interest of the controlling shareholders is aligned with that of general shareholders, which is consistent with our prediction.

While incentive-aligned companies have a better market reaction compared with misaligned companies, our evidence is also in favor of the signaling hypothesis. This is because only share repurchases announced by incentive-aligned companies can convey favorable signal to shareholders. As a result, investors will react more favorable to repurchase announcement by incentive-aligned companies.

Furthermore, Table 4 also suggests the market reaction to repurchase announcement is greater when the firms have high book-to-market ratio, low prior return, and high intended

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[13] We use dummy variables first to test the relationship between ownership structure and short-term market reaction because it is easy to make a comparison with the univariate analysis.

ratio. Such evidence is consistent with prior literature and supports the signaling/undervaluation story (e.g. Ikenberry, Lakonishok, and Vermaelen, 1995, 2000; Stephens and Weisbach, 1998; Kahle, 2002; and Chan, Ikenberry, and Lee, 2004).[14]

4.3. Restrict sample to high control right companies

As a robustness check, Table 5 reexamines the cross-sectional regression of short-term market reactions in the sample that is limited to companies owned by a controlling shareholder who owns more than 10% of the control rights. The results of the short-term market reaction do not change when we focus on companies with more than 10% of the control rights. As shown in Model 1 and 3, for example, the differences in market reaction between companies with high stock pledge ratios and those with low stock pledge ratios are significantly negative at the 1% significance level.

[Insert Table 5 here]
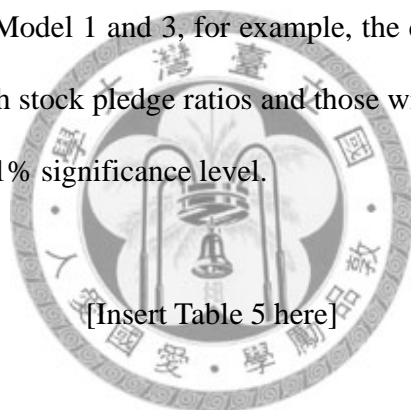
Similarly, our result does not change even we use the continuous variables instead of dummy variables for ownership structure. The market reaction to repurchase announcement is significantly negatively associated with stock pledge ratio and positively associated with cash flow right from Model 4 and 6. For all model specifications, the market reaction to repurchase announcement is also greater when the book-to-market ratio is high, the intended ratio is high and the prior return is low for all model specifications. In sum, the result in Table 5 is consistent with the personal interest hypothesis. The market reaction to the repurchase announcement in misaligned companies is worse than that in

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[14] The results retain consistency when we use five-day CAR instead of three-day CAR as the dependent variable in the regression analysis.

incentive-aligned companies even after controlling for other control variables and restricted in the firms with more than 10% of the control rights.

4.4. Prior return and short-term market reaction

The personal interest hypothesis predicts that the stock valuation will not change subsequent to repurchase announcement for companies with high stock pledge ratios. The difference between firms with high stock pledge ratios and those with low stock pledge ratios should be significantly negative. If the personal interest hypothesis is truth, such result should be stronger when the stock return before repurchase announcement (or prior return) is lower. This is because the controlling shareholders who pledge more share as collateral for their bank loan are more likely to face a pressure of liquidation of the pledged stocks when the value of collateral falls below the minimum requirement. Therefore, a lower return before repurchase announcement represents that the controlling shareholders are under stress to support share price through share repurchase.

In order to test this hypothesis, we divide the sample by the stock return before repurchase announcement (or prior return), while the prior return is measured by 250-day (-252, -3) buy-and-hold abnormal return immediately preceding the repurchase announcement date. More precisely, we focus on the sample that is restricted to the companies whose prior returns are below the mean, median, and 1st quantile of the whole sample, respectively. We then re-examine how stock pledge ratio affects the short-term market reaction to repurchase announcement. All the results are reported in Table 6.

[Insert Table 6 here]

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The results of Table 6 are very similar to our earlier findings in Table 4. In Panel A, except for Model 5 and 6, the differences in market reaction between companies with high and low stock pledge are significantly negative at 1% level. The coefficients for stock pledge ratios are also significantly negative at 1% level. In particular, the magnitudes of these coefficients become larger, compared with the result in Table 4. Such evidence is consistent with our prediction of the personal interest hypothesis. Although the results in Model 5 and 6 are weaker, the coefficients for stock pledge ratio is still negative and the difference in market reaction between companies with high and low stock pledge is significant at the marginal level.

The controlling shareholders who pledge more shares for bank loan may face a pressure of liquidation of the pledged stocks. Under the personal interest hypothesis, such pressure should be acute especially when the prior return is lower. In Panel B of Table 6, we examine whether firms with lower prior return will perform worse market reaction to repurchase announcement or not for firms with high stock pledge ratio. We focus on the interaction term between stock pledge ratio and dummy variables for prior return that represents the difference market reaction between those with lower prior return and those with higher return for firms with high stock pledge ratios. Whether the firms belong to the group of lower prior returns or that of higher prior returns depends on their one-year prior return. The dummy variable $D_i^{\text{Below the mean}}$ is equal to one if stock i's prior return is below the mean of prior return of the whole sample, otherwise it equals zero; $D_i^{\text{Below the median}}$ is equal to one if stock i's prior return is below the median of prior return of the whole sample, otherwise it equals zero; and $D_i^{\text{Below the 1st quantile}}$ is equal to one if stock i's prior return is below the 1$^{\text{st}}$ quantile of prior return of the whole sample, otherwise it equals zero.

Panel B of Table 6 shows that the coefficient for the interaction term between stock pledge ratio and dummy variable is significantly negative in Model 2. That is, for firms with high stock pledge ratios, those having prior return below the median experience a worse market reaction compared with those having prior return above the median.

4.5. Alternative model specifications in stock pledge ratio

This section considers alternative model specifications to examine the relationship between stock pledge ratio and short-term market reaction to repurchase announcement. All results are reported in Table 7.

[Insert Table 7 here]
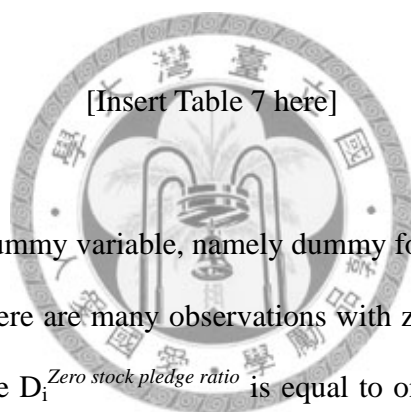
In Model 1, we add a dummy variable, namely dummy for zero stock pledge ratio, into regression model because there are many observations with zero stock pledge ratios in our sample. The dummy variable $D_i^{Zero\ stock\ pledge\ ratio}$ is equal to one if stock i's stock pledge is equal to zero, otherwise it equals zero. As a result, we find that, compared with our earlier findings in Table 4, the result does not change after we add a dummy variable for zero stock pledge ratio. The coefficients for stock pledge ratios are still significantly negative at 1% level, consistent with that in Table 4.

An increasing in stock pledge ratio may represent a fact that the controlling shareholders' wealth is more tied up with the firms. To avoid liquidation of pledged stock, the controlling shareholders will more intention to support share price through share repurchase. Therefore, if the personal interest hypothesis is truth, we expect to see that the change in stock pledge ratio should be negatively associated with the short-term market

reaction to repurchase announcement.

In Model 2, we use the change in stock pledge ratio instead of the level of stock pledge ratio. The change in stock pledge ratio is calculated by stock pledge ratio at the month immediately preceding the repurchase announcement minus its value one year before repurchase announcement. Similarly, we also add a dummy variable into regression model to control for that there are too many observations with zero change in stock pledge ratio. The dummy variable $D_i^{Zero\ change\ in\ stock\ pledge\ ratio}$ is equal to one if stock i's change in stock pledge ratio is equal to zero, otherwise it equals zero.

The result of Model 2 shows that the change in stock pledge ratio does affect the stock valuation. The coefficient for change in stock pledge ratio is significantly negative at 5% level even after control for other control variables. The short-term market reaction to repurchase announcement is lower for firms with an increasing in stock pledge ratios, consistent with the personal interest hypothesis.

Model 3 examines whether the change in stock pledge ratio is more important than the level of stock pledge ratio or not in explaining the short-term market reaction. We incorporate both the level of stock pledge ratio and the change in stock pledge ratio into the regression model. The result shows that the effect of level of stock pledge ratio indeed dominate the effect of change in stock pledge ratio. The coefficient for stock pledge ratios is significantly negative at 1% level, while the coefficient for change in stock pledge ratio is insignificantly negative only.

For firms with high stock pledge ratios, we test whether an increasing in stock pledge ratio affects stock valuation following share repurchase in Model 4. In order to test this issue, we add an interaction term between stock pledge ratio and dummy variable for

increase in stock pledge ratio. The dummy variable $D_i^{Increase\ in\ stock\ pledge\ ratio}$ is equal to one if the change in stock pledge ratio is larger than zero, otherwise it equals zero.

The result of Model 4 shows that the coefficients for stock pledge ratio become insignificant as we add the interaction term between stock pledge ratio and dummy for increase in stock pledge ratio. However, the coefficients for the interaction term are significantly negative. The result suggests that, for firms with high stock pledge ratios, those with an increasing in stock pledge ratio reported a worse market reaction compared with those without having an increasing in stock pledge ratio.

4.6. Relationship between the market reaction and free cash flow

The free cash flow hypothesis predicts that companies with free cash flow in excess of their investment opportunities are likely to spend money on value-destroying projects that reduce the firm's value (Jensen, 1986). This problem is acute especially when the conflict of interest of the controlling shareholders is not aligned with that of minor shareholders. Returning free cash flow via share repurchases will be more beneficial to misaligned companies. Therefore, if the free cash flow hypothesis holds, we expect to observe that, for misaligned companies, those with high free cash flow will have better market reaction than those with low free cash flow. By contrast, the relationship between free cash flow and market reaction should be weak for incentive-aligned companies since the conflicts of interest between the controlling shareholder and the general shareholders are minor.

As a robustness check, we examine the relationship between free cash flow and the market's reaction to repurchase announcements for both misaligned and incentive-aligned companies. To perform our test, the samples are sorted by free cash flow and then divided into four groups. Group 1 (Low) is the group with the lowest value and group 4 (High) is

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the group with the highest value. We then add the interaction terms of the ownership structure and free cash flow dummies into equation (1) to examine the joint effect of ownership structure and free cash flow on the market reaction. The model's specification is as follows:

$$
\begin{aligned}
CAR_i = {} & \beta_0 + \beta_1 Size_i + \beta_2 B/M_i + \beta_3 FCF_i + \beta_4 Intended\ ratio_i + \beta_5 Prior\ Return_i \\
& + \gamma_{11} D_i^{LP} + \gamma_{12} D_i^{HP} + \gamma_{13} D_i^{LP} * D_i^{FCF} + \gamma_{14} D_i^{HP} * D_i^{FCF} \\
& + \gamma_{21} D_i^{LC} + \gamma_{22} D_i^{HC} + \gamma_{23} D_i^{LC} * D_i^{FCF} + \gamma_{24} D_i^{HC} * D_i^{FCF} + \varepsilon_i
\end{aligned}
\tag{2}
$$

where the free cash flow dummy D_i^{FCF} equals one if stock *i's* free cash flow belongs to the lowest level of free cash flow, otherwise D_i^{FCF} equals zero.

In equation (2), parameters γ_{13} (γ_{14}) and γ_{24} (γ_{23}) are the coefficients for the interaction term of a low (high) stock pledge ratio and a low free cash flow dummy variable and the coefficient for the interaction term in the high (low) cash flow right and low free cash flow dummy variables, respectively. In addition, the coefficients γ_{14} and γ_{23} (γ_{13} and γ_{24}) represent the differences in market reaction between companies with low free cash flow and those with high cash flow for misaligned (incentive-aligned) companies, with other control variables and firm characteristics being held constant. If the free cash flow hypothesis holds, we expect that the coefficients γ_{14} and γ_{23} will be significantly negative, but the coefficients γ_{13} and γ_{24} will not be significant.

[Insert Table 8 here]

As shown in Table 8, we do not find any evidence to support the free cash flow hypothesis. The coefficients for the interaction terms between the ownership structure and free cash flow are all insignificant. That is, companies with more free cash flow do not

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perform better than those with less free cash flow when the interests between the controlling shareholders and general shareholders is misaligned, a finding that is inconsistent with the free cash flow hypothesis.

5. Long-run Performance

5.1. Operating performance

In this section, we directly focus on the change in the operating performance after the repurchase announcement. If the share repurchases announced by misaligned companies is in pursuit of controlling shareholders' personal interest and that announced by incentive-aligned companies is used to convey signal regarding better prospects, we will expect to observe that the operating performance of incentive-aligned companies will be a significant improvement in the years after the repurchase announcements but not misaligned companies.

Table 9 reports the results of the operating performance in our sample. Similar to the previous literature, we use the return on assets (ROA), the return on cash-adjusted assets (ROCAA), the return on sales (ROS), and the cash-flow return on assets (CFROA) as our measures of operating performance and focus on the unexpected change in operating performance (Barber and Lyon, 1996; Lie (2001); and Grullon and Michaely, 2004). In order to avoid overlapping during the same fiscal year, we exclude from our sample the repurchase programs announced by the companies that have made a repurchase announcement in the previous twenty-four months.

The ROA is the operating income before depreciation (EBITDA) scaled by the average of the beginning- and ending-period book values of assets. The ROCAA is the

EBITDA scaled by the average of the beginning- and ending-period book values of cash-adjusted assets, while the value of the cash-adjusted assets is equal to the book value of total assets minus cash and marketable securities. The ROS is the EBITDA scaled by the average of the beginning- and ending-period sales. The CFROA is the operating cash flow scaled by the average of the beginning- and ending-period book values of total assets, while operating cash flows are defined as the EBITDA plus the decrease in receivables, the decrease in inventory, the increase in accounts payable, the increase in other current liabilities, and the decrease in other current assets.

The unexpected change in operating performance is defined as the change in operating performance for a sample (repurchasing) firm minus that for a matching firm. The matching firms are non-repurchasing firms that closely correspond to the sample firms in terms of the industry classification, the ownership structure measure (the stock pledge ratio or cash flow rights) at the month-end prior to the repurchase announcement, the level of performance in year *t-1* (OP_{-1}), the change in performance in year *t-1* ($\triangle OP_{-1}$), and the market-to-book ratio in year *t-1* (M/B_{-1}). The market-to-book ratio (M/B) is the ratio of market value of total assets divided to book value total assets at the end of fiscal year *t-1*, while the market value of total assets is the sum of book value of total liability plus the market value of equity. More specifically, we identify matching firms with the following characteristics: (1) the same industry as the sample firm; (2) a level of stock pledge ratio (cash flow rights) that is between 50 percent and 150 percent of the sample firm's level of the stock pledge ratio (cash flow rights) at the month-end prior to the repurchase announcement; (3) a level of operating performance of between 50 percent and 150 percent of the sample firm's level of operating performance in year *t-1*; (4) a change in operating performance of between 50

percent and 150 percent of the sample firm's change in operating performance from year *t-2* to year *t-1*; and (5) a level of market-to-book ratio of between 50 percent and 150 percent of the sample firm's level of market-to-book ratio in year *t-1*. If there is more than one matching firm in these criteria, we choose the firm that minimizes the following function as our matching firm:

$$
\begin{aligned}
&\left| \text{Ownership structure}_{-1,\,\text{sample firm}} - \text{Ownership structure}_{-1,\,\text{matching firm}} \right| \\
&+ \left| \text{OP}_{-1,\,\text{sample firm}} - \text{OP}_{-1,\,\text{matching firm}} \right| + \left| \Delta \text{OP}_{-1,\,\text{sample firm}} - \Delta \text{OP}_{-1,\,\text{matching firm}} \right| \qquad (3) \\
&+ \left| \text{M/B}_{-1,\,\text{sample firm}} - \text{M/B}_{-1,\,\text{matching firm}} \right|
\end{aligned}
$$

If no firm meets these criteria, however, we repeat the matching process again, dropping the industry requirement. Finally, both the mean or median changes in operating performance measures are winsorized at top and bottom 1% in distribution.
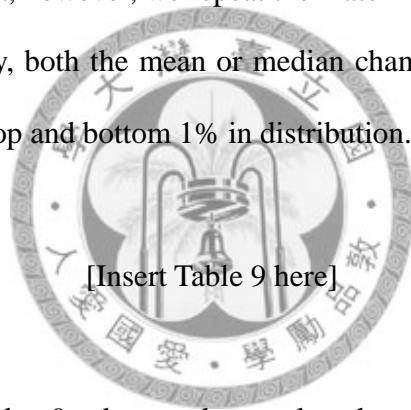
[Insert Table 9 here]

The evidence in Table 9 shows that only share repurchase announced by incentive-aligned companies will convey information regarding better prospects. As shown in Panel A, the operating performance of companies with high stock pledge ratio drops significantly in ROA, ROCAA, and ROS from year 1 to year 2. By contrast, there is evidence that the operating performance of low-stock-pledge-ratio companies deteriorates before the repurchase announcement (from year -1 to 0) but does not drop further after repurchase announcement. That is, although the operating performances of companies with low stock pledge ratio do not change, they at least do not perform a poor operating performance in the year after repurchase announcement as well as in the year prior to the

repurchase announcement year. Such results both support the personal interest hypothesis and signaling hypothesis.

The results in terms of the operating performance retain consistency when we use cash flow right to determine the alignment of interest. As shown in Panel B, from year 0 to year 1, companies with high cash flow rights on average exhibit a significantly improvement in terms of the ROA, ROCAA, ROS, and CFROA, with a magnitude of 1.85% to 4.91%. The operating performances in companies with low cash flow rights, however, do not change from year 0 to year 1, but significantly decline in terms of the ROS and CFROA from year 1 to year 2. These findings are consistent with the notion of a personal interest hypothesis in that the controlling shareholders tend to use share repurchase to pursue their own interest rather than constitutes a positive signal. On the other hand, only share repurchases announced by incentive-aligned companies will convey information regarding better prospects, consistent with the signaling hypothesis.

5.2. Long-run abnormal return

If the market is really efficient, stock price will fully react to the repurchase announcement in the short term. However, the literature has documented that the market might not be efficient, as there exists a positive long-run return drift after the repurchase announcement (Chan, Ikenberry, and Lee, 2004, 2007; Ikenberry, Lakonishok and Vermaelen, 1995, 2000, and Peyer and Vermaelen, 2009). Therefore, we further examine the two-year long-run abnormal return after the share repurchase. If investors react slowly to the repurchase announcement, we expect to find a similar result in regard to the short-term market reaction.

In this section, we first use the calendar-time portfolio approach which is

comprehensively used in the literature to detect long-run stock performance for various corporate events (Brav and Gompers, 1997; Chan, Ikenberry, and Lee, 2007; Ikenberry, Lakonishok, and Vermaelen, 1995, 2000; Ikenberry and Ramnath, 2002; Loughran and Ritter, 1995; and Peyer and Vermaelen, 2005, 2009). On the other hand, we also use Ibbotson's (1975) returns across time and securities (RATS) approach to examine two-year cumulative abnormal return (CAR) following repurchase announcement since the literature has clearly that the results of long-horizon return evidence are sensitive to the method used (Brav and Gompers, 1997; Brav, Geczy, and Gompers, 2000; Mitchell and Stafford, 2000). In particular, as Ibbotson's (1975) RATS can adjust for risk changes each month after the event, it also controls for the concern of Grullon and Michaely (2004) who suggest that the excess returns may reflect future risk changes (Peyer and Vermaelen, 2009).[15]

Table 10 reports the results of the long-run return drift. Panel A is the evidence for the two-year long-run abnormal return estimated by means of the calendar-time portfolio approach. Consistent with the results of the short-term market reaction, the two-year abnormal return in misaligned companies is worse than that in incentive-aligned companies. Only incentive-aligned companies exhibit a significantly positive abnormal return for two years after the repurchase announcement, while misaligned companies do not. For example, the difference in average return between companies with high stock pledge ratio and those with low stock pledge ratio is statistically significantly negative for two years, with a magnitude of 0.7% to 1% per month. All results are statistically significant, regardless of whether equal-weighted or log-value-weighted portfolios or OLS or WLS estimation methods are used. Companies with high cash flow rights, on the other hand, show a

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[15] Further detailed on the calendar-time portfolio approach and Ibbotson's (1975) RATS approach are summarized in Appendix I.

significantly positive two-year long-run abnormal return of between 0.7% and 0.9% per month after the repurchase announcement, whereas companies with low cash flow rights do not. These findings are consistent with the results of the short-term market reaction, suggesting that the market will have a delayed reaction to the repurchase announcement.

Similarly, the result retains consistency when we use the Ibbotson's RATS approach. The return drift in long-horizon observed in RATS cannot be explained as an underreaction to risk change. As reported in Panel B, we find that the two-year CAR is significantly positive at the 1% significance level in incentive-aligned companies but not in misaligned companies. There are 63% to 96% (38% to 46%) of event months with positive intercepts for incentive-aligned (misaligned) companies. The fractions of these intercepts which are significantly positive at the 10% significance level range from 17% to 29% for incentive-aligned companies but they are no more than 5% for misaligned companies. The differences in two-year CAR between misaligned and incentive-aligned companies are significantly negative, with a magnitude of 11% for the stock pledge ratio and 21% for the cash flow rights, respectively. This result is also consistent with that in terms of the short-term market reaction. We conclude that the market will underreact to repurchase announcement, regardless of the methodology used.

[Insert Table 10 here]

5.3. Cross-sectional regression

The calendar-time portfolio approach and Ibbotson's (1975) RATS can only examine one dimension at a time. Under multiple regressions, we take both time-series factor returns

(the market factor, size factor, and book-to-market factor) and related control variables, such as firm size, book-to-market ratio, free cash flow, prior return, discretionary accrual, and change in ROA, into account to examine the relationship between the ownership structure and long-run stock performance for two years after the share repurchase.[16]

[Insert Table 11 here]

Consistent with the calendar-time portfolio approach and Ibbotson's RATS approach in Table 10, Table 11 also confirms the evidence that the market underreacts to the repurchase announcement. The differences in abnormal returns between misaligned and incentive-aligned companies are significantly negative at the 1% significance levels from Models 1 through 3, even after controlling for other control variables. In addition, there is evidence that only the coefficient for the high stock pledge ratio (the low cash flow rights) dummy is significantly negative at the 1% significance level but the coefficient for the low stock pledge ratio (high cash flow rights) dummy is not. Such evidence is aligned with our previous results.

Finally, from Models 4 through 6, we incorporate two continuous variables of the ownership structure, stock pledge ratio and cash flow rights into the regression model instead of the dummy variables for ownership structure to check the consistency of the results for the long-horizon return evidence. The results also hold here. The coefficients for the stock pledge ratio and cash flow rights are significantly negative and positive,

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[16] We control the discretionary accrual (DA) in the regression model because Gong, Louis and Sun (2008) suggest that the repurchasing firm may deflate earnings around open-market repurchase announcements. Thus the positive post-repurchase abnormal return is driven by pre-repurchase downward earnings management. The detailed procedures for the cross-sectional regression are summarized in Appendix C, while the calculation of discretionary accrual is described in Appendix D.

respectively. These findings suggest that, after the repurchase announcement, there exists a significantly positive long-run return drift for incentive-aligned companies only. This evidence is consistent with the results for the short-term market reaction and is confirmation that the market underreacts to the repurchase announcement.

5.4. Prior return and subsequent long-run abnormal return

This section examines whether the result in Table 10 is stronger or not as we focus on the companies that have lower stock returns before repurchases announcements. All results are reported in Table 12. Similar to the method used in examining short-term market reaction, Panel A is a sub-sample analysis that is restricted to the companies whose prior returns are below the mean, median, and 1st quantile of the whole samples, respectively. In Panel B, we perform the test by dummy variables.
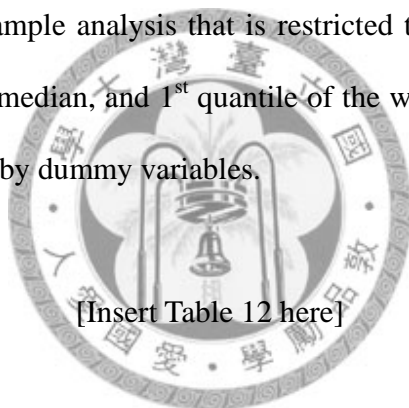
[Insert Table 12 here]

The results of Panel A (in Table 12) are quantitatively similar to our earlier findings in Table 11. The main result for stock pledge ratio does not change as we focus on the companies with lower prior returns. In particular, the magnitudes of these coefficients become larger, compared with the result in Table 11. For example, the magnitudes of the differences between firms with high stock pledge ratios and those with low stock pledge ratios are almost twice as big as those in Table 11 and are all significant at 1% level.

On the other hand, the results of Panel B (in Table 12) also indicates that, for firms with high stock pledge ratios, they will have worse long-run abnormal return as their one-year buy-and-hold abnormal returns prior to repurchase announcement are below the

mean (or median) of the whole sample.

5.5. Alternative model specifications in stock pledge ratio

This section also considers alternative model specifications to examine the relationship between stock pledge ratio and long-run abnormal return subsequent to repurchase announcement. All results are reported in Table 13.

[Insert Table 13 here]

The result of Model 1 shows that our main result in Table 11 does not change as we add a dummy variable, namely dummy for zero stock pledge ratio, into regression model. The coefficients for stock pledge ratios are still significantly negative at 1% level.

In Model 2, there is evidence that the relationship between the change in stock pledge ratio and long-run abnormal return subsequent to repurchase announcement is stronger. As shown in Model 2 of Table 13, the coefficient for change in stock pledge ratio is significantly negative at 1% level. On the other hand, the coefficients on dummy variable for zero change in stock pledge ratio is significantly positive at 1% level. Such result suggests that, compared with firms with change in stock pledge ratio, firms without change in stock pledge ratio perform better stock performance in long-horizon following the announcement of share repurchase.

As we incorporate both the level of stock pledge ratio and the change in stock pledge ratio into the regression model in Model 3, we find that both the coefficients for stock pledge ratios and change in stock pledge ratio are significantly negative at 1% level. Such evidence indicates that both the level of stock pledge ratio and the change in stock pledge

ratio affect long-run abnormal return.

Finally, the result of Model 4 also shows that the coefficients for stock pledge ratio, become insignificant as we add the interaction term between stock pledge ratio and dummy for increase in stock pledge ratio. The coefficient for the interaction term is significantly negative at 1% level, suggesting that, for firms with high stock pledge ratios, they will perform worse stock performance following repurchase announcement if their stock pledge ratio is increasing.

6. Summary and Conclusion

This paper studies how ownership structure of controlling shareholders affects the valuation effect of firms that repurchase shares. We use a sample of companies in Taiwan that are obliged to fill a report to the authority regarding controlling shareholders' pledged stocks. Such disclosure requirement enables us to identify a subset of repurchases that are used to serve for the controlling shareholders' personal interests but not those of the general shareholders. Accordingly, we provide new evidence that is different from the existing hypotheses, e.g., the signaling hypothesis and free cash flow hypothesis.

Our results support the notion that the alignment of interest between the controlling shareholders and general shareholders will affect the valuation effect of share repurchases. When the controlling shareholders heavily use their shareholdings as a pledge for their personal loan or when their cash flow rights is low, or namely misaligned companies; investors do not respond to the announcement of repurchases. As investors will not adjust their valuation to repurchase announcement for misaligned companies, this evidence is consistent with the personal interest hypothesis.

On the other hand, we find evidence suggesting that the market reaction to the

repurchase announcement is stronger among companies that are owned by the controlling shareholders with a low stock pledge ratio (high cash flow rights), or namely incentive-aligned companies. While investors interpret a repurchase from incentive-aligned companies as a positive signal, such evidence is in favor of the signaling hypothesis.

Finally, and in a way similar to the results for the short-term market reaction, we find evidence that incentive-aligned companies outperform misaligned companies for two years after the repurchase announcement. This evidence is consistent with the notion that the market underreacts to the repurchase announcement. On the other hand, the results in regard to operating performance also confirm the personal interest and signaling hypothesis. After the repurchase announcement, the operating performance of incentive-aligned companies either exhibit a significantly improvement or at least does not perform a poor performance as well as that in the year prior to repurchase announcement. By contrast, misaligned companies experience a significantly decline following a repurchase announcement.

In sum, our analysis allows us to understand that a subset of share repurchases is used to serve for the controlling shareholders' personal interest and a subset of buyback programs is used to convey their favorable signal. Given the market does not react to repurchase announcements for misaligned companies, there is no evidence that the general shareholders will find it more beneficial to distribute free cash flow through share repurchases.

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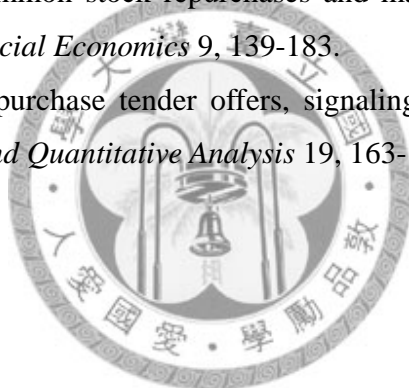
Appendix

A. Methodology of Examining Long-run Abnormal Return

A.1. Calendar-time portfolio approach

From November 2000 to December 2008, firms that announced share repurchases over the last twenty-four months are included in our sample.[17] According to the misaligned and incentive-aligned companies, we formed portfolios of firms for each calendar month. Moreover, we also calculated a portfolio return based on the incentive-aligned companies minus the misaligned companies to examine the difference in average returns between misaligned and incentive-aligned companies after the repurchase announcement. To reduce idiosyncratic noise, for each portfolio at calendar time, we require a minimum of 5 observations (Lyon, Barber, and Tsai, 1999).

For each calendar month, portfolio returns are calculated using an equal-weighted (EW) and log-value-weighted (LW) method to check the sensitivity of the results. While the equal-weighted method gives each stock the same weight in a given calendar month, the log-value-weighted portfolio return is the weighted return using the natural logarithm of the market value of equity as the weight. We use the log-value-weighted method instead of the value-weighted method because the value-weighted method attaches more weight to the large firms so that the results might be dominated by a few large-cap firms (Chan, Ikenberry, Lee, and Wang, 2009; Ikenberry and Ramnath, 2002; and Fama and French, 2008). As shown in Table 2, the distribution for firm size in our sample is significantly skewed. Using the log-value-weighted method, rather than the value-weighted approach, can mitigate the problem of a few extremely large firms dominating the results.

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[17] The repurchase sample used in the empirical work is until the year end of 2006. To ensure us having enough data to calculate two-year abnormal return, return data used in this study is until the year end of 2008.

Next, we measure the average abnormal return relative to Fama and French three-factor model (Fama and French, 1993). The model's specification is as follows:

$$R_{pt} - R_{ft} = \alpha + \beta_m (R_{mt} - R_{ft}) + \beta_{smb} SMB_t + \beta_{hml} HML_t + \varepsilon_t \qquad (A1)$$

where ($R_{pt} - R_{ft}$) is the monthly excess portfolio return in calendar month t, and R_{ft} is the return of the monthly discount rate of the Central Bank in calendar month t. The independent variables are the market factor return, which is the return on the Taiwan Stock Exchange Value-weighted Index R_{mt} minus R_{ft} in calendar month t, the size factor return (SMB), and the book-to-market factor return (HML). After regressing monthly excess portfolio returns on these three independent variables, the intercept, α (alpha), becomes our measure for the average abnormal return. The procedures for calculating the factor returns are summarized in the section B of Appendix.

We use both ordinary least squares (OLS) and weighted least squares (WLS) to estimate the time series regression as a robustness check. The OLS method gives each calendar month an equal impact in the analysis and the WLS method uses the number of firms in each calendar-time portfolio as the weight. Under the OLS method, none of the companies has an equal impact in the analysis, since the portfolio returns in the month with heavy repurchase announcements receive comparatively little weight. This problem will be very serious, especially when share repurchase programs are not uniformly distributed in calendar time. The WLS method, however, attaches more weight to the month with heavy repurchase announcements and ensures that each sample firm has an equal impact in the analysis (Ikenberry and Ramnath, 2002). Therefore, this weighted method is also adopted in many studies to detect the long-run abnormal return (Chan, Ikenberry, Lee, and Wang, 2009; Ikenberry and Ramnath, 2002; and Spiess and Affleck-Graves, 1999).

A.2. Ibbotson's (1975) RATS approach

Under the Ibbotson's RATS approach, the monthly returns of repurchasing samples are aligned in event time. From November 2000 to December 2008, which covers twenty-four event months following the share repurchase announcement, the following Fama-French three-factor pricing model is estimated for each event month according to the misaligned and incentive-aligned companies

$$R_{it} - R_{ft} = \alpha + \beta_m (R_{mt} - R_{ft}) + \beta_{smb} \text{SMB}_t + \beta_{hml} \text{HML}_t + \varepsilon_t \qquad (A2)$$

where R_{it} is the monthly return for stock i and R_{ft} is the return in terms of the monthly discount rate in the Central Bank in month t. The independent variables are the market factor return in month t ($R_{mt} - R_{ft}$), the size factor return in month t (SMB$_t$), and the book-to-market factor return in month t (HML$_t$). The intercept α (alpha) is our measure of the abnormal return (AR). The CAR for each group is cumulated by summing these abnormal returns over the relevant event-time month. We also calculate the abnormal return of the incentive-aligned companies minus the misaligned companies to examine the difference in average returns between misaligned and incentive-aligned companies for each event time t. The t-statistics of the CAR are calculated by using the standard errors of intercepts from monthly cross-sectional regressions for each group and event month. Finally, the percentage of monthly intercepts in each event-window with positive values and the fraction of these intercepts which are significantly positive at the 10% significance level are also calculated.

B. Estimation of Fama-French Three-factor Returns in Taiwan Stock Market

Following Fama and French (1993), we calculate the factor returns in Fama-French

three-factor model from June 1999 through December 2008, such as market, size, and book-to-market. The market factor return (MKRF), an excess return on the stock market, is the return of the Taiwan Stock Exchange Value-weighted index minus the risk free rate, while the risk free rate is measured by the annual rediscount rate of the Central Bank in Taiwan.

We next calculate size factor return and book-to-market factor return by using all stocks listed on the Taiwan Stock Exchange (TSEC), while only companies with ordinary common equity listed on the TSE are included in the calculation. Stocks that are no longer listed on the stock exchange are also included in our sample before they are removed from the stock exchange to avoid the survivor biases. To calculate the size factor return and the book-to-market factor return, we first construct six size/book-to-market benchmark portfolios from the intersection of the two sizes and three book-to-market ratios of equity portfolios in June of each year t from 1999 to 2007. In June of each year t, all stocks listed on the TSEC are ranked in terms of size, while the size is measured by market value of equity (ME) at the end of June of each year t. The median size is used to split all stocks into two groups, namely, small and big (S and B). In addition, we also divide all stocks listed on TSEC into three groups based on the breakpoints for the bottom 30% (Low), middle 40% (Medium), and top 30% (High) ranked values of the book-to-market ratio of equity (BE/ME), namely Low, Medium, and High (L, M, and H). The book-to-market ratio of equity is defined as the ratio of the book value of equity (BE) to its market value of equity at the end of year t. Since the financial statements are usually announced with a time lag, the book-to-market ratio of equity in fiscal year $t-1$ is used from July of t to June of $t+1$. Consequently, we have six size/book-to-market benchmark portfolios, namely S/L, S/M,

S/H, B/L, B/M, and B/H.

According to the portfolios formations on June of each year *t*, the monthly value-weighted returns on the six portfolios are calculated from July of year *t* to June of *t+1*, and the portfolios are reformed in June of year *t+1*. For each month, SMB (Small minus Big), the risk factor in returns related to firm size, is the difference between the simple average of the returns on the three small-cap stock portfolios (S/S, S/M, and S/H) and the simple average of the returns on the three big-cap stock portfolios (B/L, B/M, and B/H). Similarly, HML, the risk factor in the returns related to the book-to-market ratio of equity, is the difference between the simple average of the returns on the two high-BE/ME stock portfolios (S/H and B/H) and the average of the returns on the two low-BE/ME stock portfolios (S/L and B/L) for each month.

[Insert Table A1 here]

Table A1 summarized the descriptive statistics for the factor returns, while Panel A is the breakpoint for the book-to-market ratio and size from June 1999 to June 2007 for the Taiwan Stock Exchange; Panel B is summary statistics of factor returns in percentage terms; and Panel C is the correlation coefficients among the market factor, size factor, and book-to-market factor.

C. Cross-sectional Regression of Long-run Abnormal Return

In the analysis of cross-sectional regressions, companies that have announced share repurchases over the last twenty-four months are included in our sample. We exclude repurchases announced by the companies that have made a repurchase announcement

twenty-four months prior to our sample to avoid repeated calculations of stock performance.

The estimation method used in the cross-sectional regressions involves a two-step procedure. The first step is to filter out the factor components, thus allowing each company to have its own factor loadings. We estimate the Fama-French three-factor pricing model for each individual stock in our repurchasing sample.

$$R_{it} - R_{ft} = \alpha_0 + \alpha_{1i}(R_{mt} - R_{ft}) + \alpha_{2i}\text{SMB}_t + \alpha_{3i}\text{HML}_t + \varepsilon_{it} \qquad (A3)$$

where $(R_{it} - R_{ft})$ is the monthly excess return for stock i, $(R_{mt} - R_{ft})$ is the market factor return at month t, SMB_t is the size factor return at month t, and HML_t is the book-to-market factor return at month t. The second step is the standard Fama-MacBeth procedure that runs monthly cross-sectional regressions and estimates the time-series average of coefficients from the cross-sectional regression to test their significance. For each month t from November 2000 to December 2008, the following regression model is estimated for each month t:

$$\begin{aligned} \text{Idiosyncratic component}_{it} = {} & \alpha_0 + \beta_1 Size_{it} + \beta_2 B/M_{it} + \beta_3 FCF_{it} + \beta_4 Prior\ Return_{it} + \beta_5 DA_{it} \\ & + \beta_6 Change\ in\ ROA_{it+2} + \gamma_{11}\text{D}_{it}^{\text{LP}} + \gamma_{12}\text{D}_{it}^{\text{HP}} + \gamma_{21}\text{D}_{it}^{\text{LC}} + \gamma_{22}\text{D}_{it}^{\text{HC}} + \varepsilon_{it} \end{aligned} \qquad (A4)$$

where idiosyncratic component$_{it}$ is the estimated intercept plus the residual from equation (A3) for stock i, The independent variables are the natural logarithm of firm size at the month-end prior to the repurchase announcement (*Size*), the book-to-market ratio at the month-end prior to the repurchase announcement (*B/M*), the free cash flow at the end of the fiscal year prior to the year of the repurchase announcement (*FCF*), the 250-day (-252, -3) buy-and-hold abnormal return immediately preceding the repurchase announcement date

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(*Prior Return*), discretionary accrual measured by Gong, Louis and Sun (2008) (*DA*), the change in ROA from year 0 to year 2 (*Change in ROA*), and the dummy variables for ownership structure (D_{it}^j) at the month-end prior to the repurchase announcement, where D_{it}^j equals one if stock i at the month-end prior to the repurchase announcement belongs to the j group, otherwise it equals zero. The superscript LP and LC (HP and HC) represent the group with the lowest (highest) level of stock pledge ratios and cash flow rights, respectively. For more detail, please refer to Brennan, Chordia and Subrahmanyam (1998).

In equation (A4), the parameters γ_{11}, γ_{12}, γ_{21}, and γ_{22} are the coefficients for low stock pledge ratio, high stock pledge ratio, low cash flow right, and high cash flow right dummy variables, respectively, while the coefficients γ_{11} and γ_{22} (γ_{12} and γ_{21}) measure the difference in average returns between incentive-aligned (misaligned) companies and those with medium values, holding other control variables and firm characteristics constant. In addition, we also provide the test of differences in average returns between misaligned and incentive-aligned companies for different ownership structure measures. To check the consistency of the long-run return drift, we also incorporate two continuous variables of ownership structure, namely the stock pledge ratio and cash flow rights, into the regression model instead of the dummy variables for ownership structure.

D. Calculation of Discretionary Accrual

Similar to Gong, Louis and Sun (2008), the measure of earnings management, discretionary accrual (DA), is abnormal accrual that is measured as the average of the performance–matched abnormal total accruals for Quarter-1 and Quarter 0, where Quarter 0 is the repurchase announcement quarter. Specifically, for each calendar quarter and industry code, we regress the total accrual on deflated beginning total assets, property, plant, and

equipment, sales growth, and the lag of total accrual. The total accrual is defined as net income minus cash flows from operations (Teoh, Welch, and Wang, 1998). To mitigate the effect of outliers, all independent variables are truncated at top and bottom 1% before substitution into the accrual regression, while DA estimations with less than 20 observations in each regression are eliminated. Finally, following the argument of Kothari, Leone, and Wasley (2005), we adjust the estimated abnormal accruals (i.e., the regression residuals) for performance. For each quarter and each industry, we create five portfolios with at least four firms each by sorting the data into quantiles based on the return-on-assets from the same quarter in the previous year. The performance-matched abnormal accruals for a sample firm are the firm-specific abnormal accruals minus the median abnormal accruals for its respective industry-performance-matched.

Table 1
Sample Distribution

This table provides the distribution of share repurchase programs from October 13, 2000 through December 31, 2006. We include all share repurchase announcements that are reported in the Taiwan Economic Journal (TEJ) database except (1) repurchases that are announced by financial companies or state-owned enterprises, (2) repurchases from the companies that can not be defined a controlling shareholder, and (3) repurchases that lack the required data. Finally, there are 1,573 share repurchase programs in our sample. We report the actual buyback shares, actual buyback amount, intended ratio, percentage of actual buyback shares and complete ratio for each year. The intended ratio is the percentage of announced buyback shares to total outstanding shares immediately preceding the month of repurchase announcement. The percentage of actual buyback shares is the percentage of actual buyback shares to the total outstanding shares immediately preceding the month of repurchase announcement. The complete ratio is the ratio of actual buyback shares to announced buyback shares.

Year	N	Total		Mean of				
		Actual buyback shares (Million shares)	Actual buyback amount (NT$ Million)	Actual buyback shares (Thousand shares)	Actual buyback amount (NT$ Million)	Intended ratio (%)	% of actual buyback shares	Complete ratio (%)
2000	147	1,027	14,339	6,989	98	3.42	2.01	63.86
2001	228	1,818	25,769	7,972	113	2.64	1.75	70.49
2002	157	1,252	25,079	7,977	160	3.17	1.86	66.60
2003	183	1,370	27,685	7,489	151	2.92	1.93	69.62
2004	419	2,805	61,330	6,693	146	3.14	2.18	74.71
2005	266	2,615	39,814	9,829	150	3.28	2.06	68.79
2006	173	2,722	46,601	15,736	269	2.71	1.91	71.57
All years	1,573	13,609	240,617	8,652	153	3.05	1.99	70.34

Table 2
Descriptive Statistics

This table provides descriptive statistics for our samples. Panel A reports the summary statistics for firm size, book-to-market ratio, stock pledge ratio, cash flow right, cash flow rights, free cash flow, and 250-day buy-and-hold abnormal return which are available on repurchase announcement date. Firm size is the market value of common equity at the end of month immediately preceding repurchase announcement. Book-to-market ratio is the ratio of book value to the market value of common equity, while the value used for the book value of common equity is its value in fiscal year *t-1* when a share repurchase is announced from July in year *t* through June in year *t+2*. Free cash flow is measured by Lehn and Poulson (1988). Prior return is the 250-day (-252, -3) buy-and-hold abnormal return prior to the repurchase announcement date. Panel B reports the correlation coefficients among the variables which are reported in Panel A.

Panel A. Firm characteristics and ownership structure

	Firm size (NT$ Billion)	Book-to-market ratio	Stock pledge ratio (%)	Cash flow rights (%)	Free cash flow (%)	Prior return (%)
Mean	12.18	1.15	12.35	21.00	8.08	-9.72
Standard deviation	44.73	0.71	18.93	14.15	10.58	26.47
Minimum	0.08	0.08	0.00	0.04	-71.54	-75.43
1st Quantile	1.10	0.64	0.00	10.72	4.02	-26.44
Median	2.51	1.04	0.00	17.16	7.30	-13.23
3rd Quantile	6.27	1.52	20.18	29.25	12.12	1.90
Maximum	682.55	9.30	95.07	90.22	51.10	221.22

Panel B. Correlation coefficients among firms' characteristics and ownership structure variables

	Firm size	Book-to-market ratio	Stock pledge ratio	Cash flow rights	Free cash flow	Prior return
Firm size	1					
Book-to-market ratio	-0.168	1				
Stock pledge ratio	0.036	0.131	1			
Cash flow rights	-0.157	0.054	-0.045	1		
Free cash flow	0.018	-0.022	-0.014	-0.059	1	
Prior return	0.031	-0.066	0.106	0.115	-0.115	1

Table 3

Short-term Market Reaction surrounding Repurchase Announcements

This table reports the short-term market reaction (in percent) in our sample. The short-term market reaction is measured by three-day (five-day) cumulative abnormal return (CAR) surrounding repurchase announcement. From one day (two days) before the announcement date through one day (two days) after the announcement date, we first calculate the abnormal return (AR) across stocks for each day. The abnormal return is the market-adjusted return which is measured by the individual stock return minus the return of the Taiwan Stock Exchange Value-weighted Index. The three-day and five-day CAR of each stock is then cumulated by summing the abnormal returns of each stock for the windows of (-1, 1) and (-2, 2), respectively. The market reactions for misaligned and incentive-aligned companies are the means of the CAR for stocks belonging to each group. The significant levels of the means are based on the two-tailed t-test. In addition, we also test the difference in terms of the market reaction between misaligned and incentive-aligned companies by using paired t-tests. "Misaligned" is the three-day (five-day) CAR for companies with a high stock pledge ratio or low cash flow rights. "Incentive-aligned" is the three-day (five-day) CAR for companies with a low stock pledge ratio or high cash flow rights. "Difference" is the difference in terms of the three-day (five-day) CAR between misaligned and incentive-aligned companies. "*n*" is the number of sampled firms in each category. "t-stat" is the t-statistic to perform the test for the CAR. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

	Misaligned (1)		Incentive-aligned (2)		Difference (1) – (2)
	n	CAR (t-stat)	*n*	CAR (t-stat)	CAR (t-stat)
Panel A. Stock pledge ratio					
(-1, 1)	256	0.223	805	1.464	-1.241
		(0.64)		(7.42)***	(-3.09)***
(-2, 2)	256	0.097	805	1.51	-1.413
		(0.22)		(5.85)***	(-2.70)***
Panel B. Cash flow right					
(-1, 1)	393	0.550	393	2.061	-1.510
		(1.91)*		(7.55)***	(-3.81)***
(-2, 2)	393	0.308	393	2.321	-2.012
		(0.84)		(6.36)***	(-3.82)***

Table 4
Cross-sectional Regressions of Short-term Market Reaction

This table provides cross-sectional regressions of the short-term market reaction in our sample. We regress three-day cumulative abnormal returns on various control variables and dummy variables for ownership structures, where all continuous variables in regression model are winsorized at top and bottom 1% in distribution. *Size* is the natural logarithm of firm size. *B/M* is the book-to-market ratio. *FCF* is free cash flow measured by Lehn and Poulson (1988). *Intended ratio* is the ratio of announced buyback shares to the total outstanding shares of a company. *Prior Return* is the 250-day (-252, -3) buy-and-hold abnormal return immediately preceding the repurchase announcement date. The D_i^j are the dummy variables for ownership structure, while the superscripts LP and LC (HP and HC) represent the group with the lowest (highest) level for the stock pledge ratio and cash flow rights, respectively. In addition, we also test the differences in average returns between misaligned and incentive-aligned companies for different ownership structure measures in Model 1, 2, and 3. Finally, we incorporate into the regression model two continuous variables of ownership structure, namely the stock pledge ratio and cash flow rights, instead of dummy variables to check the consistency of the results in Model 4, 5, and 6. Year dummies are included but not reported. The t-statistics are in parentheses under the regression coefficients. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Indep. var. \ Model	1	2	3	4	5	6
Intercept	0.393	-0.738	-0.746	0.162	-1.000	-1.147
	(0.30)	(-0.59)	(-0.56)	(0.13)	(-0.76)	(-0.87)
Size	-0.041	0.028	0.073	-0.008	0.001	0.072
	(-0.35)	(0.24)	(0.60)	(-0.08)	(0.01)	(0.62)
B/M	0.934	0.872	0.981	0.955	0.860	0.984
	(3.89)***	(3.69)***	(4.08)***	(3.99)***	(3.63)***	(4.11)***
FCF	-0.471	-0.040	-0.293	-0.439	-0.096	-0.308
	(-0.33)	(-0.03)	(-0.20)	(-0.31)	(-0.07)	(-0.22)
Intended ratio	0.295	0.308	0.295	0.308	0.311	0.311
	(4.12)***	(4.30)***	(4.13)***	(4.31)***	(4.34)***	(4.35)***
Prior Return	-1.417	-1.735	-1.668	-1.306	-1.687	-1.514
	(-2.39)**	(-2.91)***	(-2.80)***	(-2.20)**	(-2.82)***	(-2.53)**
D^{LP}	-0.108		-0.060			
	(-0.33)		(-0.18)			
D^{HP}	-1.423		-1.393			
	(-3.49)***		(-3.42)***			
D^{LC}		-0.616	-0.622			
		(-1.80)*	(-1.80)*			
D^{HC}		0.696	0.682			
		(2.11)**	(2.07)**			
Stock pledge ratio				-0.025		-0.024
				(-3.23)***		(-3.20)***
Cash flow right					0.025	0.025
					(2.47)**	(2.43)**
Adj. R-squared	0.044	0.042	0.049	0.043	0.040	0.046
Test for the difference between misaligned and incentive-aligned companies						
Stock pledge ratio ($D^{HP} - D^{LP}$)	-1.315 (-3.27)***		-1.333 (-3.31)***			
Cash flow rights ($D^{LC} - D^{HC}$)		-1.312 (-3.26)***	-1.304 (-3.25)***			

Table 5
Cross-sectional Regressions of Short-term Market Reaction: High Control Right Firms

This table provides a cross-sectional regression of short-term market reaction in our sample, where the sample is restricted to companies owned by a controlling shareholder whose control right is more than 10%. We regress three-day cumulative abnormal returns on various control variables and dummy variables for ownership structures, where all continuous variables in regression model are winsorized at top and bottom 1% in distribution. The definitions of control variables, such as *Size*, *B/M*, *FCF*, *Intended ratio*, *Prior Return* and dummy variables for ownership structure are as the same as that of Table 4. In Model 1, 2, and 3, we also test the differences in average returns between misaligned and incentive-aligned companies for different ownership structure measures. Finally, we incorporate into the regression model two continuous variables of ownership structure, namely the stock pledge ratio and cash flow rights, instead of dummy variables to check the consistency of the results in Model 4, 5, and 6. Year dummies are included but not reported. T-statistics are in parentheses under the regression coefficients. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Indep. var. \ Model	1	2	3	4	5	6
Intercept	-0.942	-1.526	-1.710	-0.990	-1.824	-2.043
	(-0.66)	(-1.11)	(-1.17)	(-0.74)	(-1.26)	(-1.42)
Size	0.082	0.082	0.147	0.107	0.081	0.166
	(0.62)	(0.64)	(1.08)	(0.84)	(0.63)	(1.26)
B/M	1.115	1.019	1.135	1.140	1.022	1.160
	(4.30)***	(3.98)***	(4.38)***	(4.42)***	(3.99)***	(4.50)***
FCF	-0.148	0.335	0.048	-0.124	0.346	0.042
	(-0.10)	(0.22)	(0.03)	(-0.08)	(0.22)	(0.03)
Intended ratio	0.300	0.313	0.299	0.313	0.314	0.315
	(4.03)***	(4.20)***	(4.03)***	(4.22)***	(4.22)***	(4.25)***
Prior Return	-1.746	-1.977	-1.940	-1.637	-1.963	-1.806
	(-2.81)***	(-3.16)***	(-3.10)***	(-2.63)***	(-3.13)***	(-2.88)***
D^{LP}	0.087		0.095			
	(0.26)		(0.28)			
D^{HP}	-1.498		-1.525			
	(-3.37)***		(-3.43)***			
D^{LC}		-0.242	-0.373			
		(-0.60)	(-0.92)			
D^{HC}		0.725	0.698			
		(2.18)**	(2.10)**			
Stock pledge ratio				-0.030		-0.030
				(-3.57)***		(-3.61)***
Cash flow right					0.020	0.021
					(1.90)*	(1.96)*
Adj. R-squared	0.047	0.041	0.050	0.046	0.040	0.048
Test for the difference between misaligned and incentive-aligned companies						
Stock pledge ratio ($D^{HP} - D^{LP}$)	-1.586		-1.621			
	(-3.65)***		(-3.71)***			
Cash flow rights ($D^{LC} - D^{HC}$)		-0.966	-1.071			
		(-2.14)**	(-2.37)**			

Table 6

Cross-sectional Regression of Short-term Market Reaction and Long-run Abnormal Return: Firms with Lower Prior Returns

This table provides a cross-sectional regression of short-term market reaction based on the prior returns. Panel A is a sub-sample analysis that is restricted to companies whose one-year buy-and-hold abnormal return immediately preceding the repurchase announcement is lower than a specific benchmark. Model 1 and 2 are the samples that are below the mean of one-year prior return of the whole sample, Model 3 and 4 are the samples this are below the median of one-year prior return of the whole sample, and Model 5 and 6 are the samples that are below 1st quantile of one-year prior return of the whole sample. Panel B performs the test by dummy variables. The dummy variables $D_i^{Below\ the\ mean}$, $D_i^{Below\ the\ median}$, and $D_i^{Below\ the\ 1st\ quantile}$ are equal to one if tock i's prior return is below the mean, median, and 1st quantile of prior return of the whole sample, respectively, otherwise it equals zero. The definitions of control variables, such as *Size*, *B/M*, *FCF*, *Intended ratio*, *Prior Return*, and dummy variables for ownership structure, are as the same as those in Table 4, while all continuous regression variables are winsorized at top and bottom 1% in distribution. Year dummies are included but not reported. T-statistics are in parentheses under the regression coefficients. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Sub-sample analysis based on one-year prior return

Indep. var. \ Model	Below the Mean		Below the Median		Below the 1st Quantile	
	1	2	3	4	5	6
Intercept	-1.805	-2.489	-1.777	-2.736	-0.312	-0.821
	(-0.93)	(-1.30)	(-0.83)	(-1.31)	(-0.09)	(-0.24)
Size	0.141	0.138	0.110	0.143	0.177	0.169
	(0.83)	(0.87)	(0.59)	(0.81)	(0.63)	(0.61)
B/M	0.940	0.947	0.850	0.890	0.845	0.860
	(2.95)***	(2.99)***	(2.50)**	(2.64)***	(1.93)*	(1.96)*
FCF	-0.924	-0.931	-2.007	-1.896	-4.133	-3.892
	(-0.51)	(-0.52)	(-1.04)	(-0.99)	(-1.72)*	(-1.63)
Intended ratio	0.337	0.357	0.339	0.353	0.398	0.411
	(3.39)***	(3.59)***	(3.09)***	(3.22)***	(2.28)**	(2.35)**
Prior Return	-2.376	-2.263	-3.383	-3.265	-0.317	-0.112
	(-1.37)	(-1.31)	(-1.72)*	(-1.66)*	(-0.09)	(-0.03)
D^{LP}	0.099		0.112		-0.125	
	(0.22)		(0.23)		(-0.16)	
D^{HP}	-1.774		-1.761		-1.910	
	(-2.98)***		(-2.75)***		(-1.85)*	
D^{LC}	-0.983		-0.764		-0.571	
	(-2.14)**		(-1.55)		(-0.77)	
D^{HC}	1.021		1.250		1.439	
	(2.15)**		(2.45)**		(1.93)*	
Stock pledge ratio		-0.037		-0.039		-0.026
		(-3.20)***		(-3.16)***		(-1.44)
Cash flow right		0.044		0.050		0.037
		(3.01)***		(3.15)***		(1.60)
Adj. R-squared	0.070	0.067	0.072	0.073	0.075	0.066
Test for the difference between misaligned and incentive-aligned companies						
Stock pledge ratio	-1.873		-1.874		-1.786	
(D^{HP} – D^{LP})	(-3.22)***		(-3.02)***		(-1.86)*	
Cash flow rights	-2.004		-2.014		-2.010	
(D^{LC} – D^{HC})	(-3.65)***		(-3.41)***		(-2.34)**	

Table 6 (Continued)

Panel B. Alternative analysis based on one-year prior return

| Indep. var. \ Model	1	2	3
Intercept	-1.237 (-0.94)	-1.225 (-0.93)	-1.164 (-0.88)
Size	0.081 (0.70)	0.078 (0.68)	0.074 (0.64)
B/M	0.997 (4.17)***	1.004 (4.20)***	0.981 (4.10)***
FCF	-0.400 (-0.28)	-0.424 (-0.30)	-0.190 (-0.13)
Intended ratio	0.314 (4.39)***	0.312 (4.38)***	0.310 (4.35)***
Prior Return	-1.872 (-2.89)***	-1.945 (-3.01)***	-1.342 (-2.14)**
Stock pledge ratio	-0.016 (-1.65)*	-0.014 (-1.53)	-0.027 (-3.30)***
Stock pledge ratio*D$^{Below\ the\ mean}$	-0.019 (-1.44)		
Stock pledge ratio*D$^{Below\ the\ median}$		-0.023 (-1.77)*	
Stock pledge ratio*D$^{Below\ the\ 1st\ quantile}$			0.014 (0.93)
Cash flow right	0.025 (2.42)**	0.025 (2.42)**	0.025 (2.44)**
Adj. R-squared	0.046	0.047	0.046
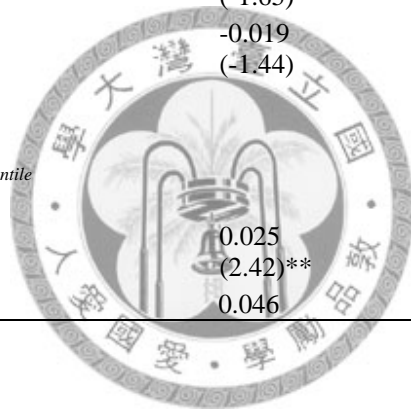
Table 7
Cross-sectional Regression of Short-term Market Reaction: Alternative Model Specifications in Stock Pledge Ratio

This table re-examines the cross-sectional regression of short-term market reaction by adopting alternative model specifications. The definitions of control variables, such as *Size*, *B/M*, *FCF*, *Intended ratio*, and *Prior Return*, are as the same as those in Table 4, while all continuous regression variables are winsorized at top and bottom 1% in distribution. The dummy variable $D_i^{Zero\ stock\ pledge\ ratio}$ is equal to one if stock *i*'s stock pledge ratio is equal to zero, otherwise it equals zero. Change in stock pledge ratio is calculated by stock pledge ratio at the month immediately preceding the repurchase announcement minus its value one year before repurchase announcement. The dummy variable $D_i^{Zero\ change\ in\ stock\ pledge\ ratio}$ is equal to one if stock *i*'s change in stock pledge ratio is zero, otherwise it equals zero. The dummy variable $D_i^{Increase\ in\ stock\ pledge\ ratio}$ is equal to one if stock *i*'s change in stock pledge ratio is positive, otherwise it equals zero. Year dummies are included but not reported. T-statistics are in parentheses under the regression coefficients. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Indep. var. \ Model	1	2	3	4
Intercept	-0.577 (-0.40)	-1.381 (-0.99)	-1.066 (-0.81)	-1.045 (-0.79)
Size	0.036 (0.30)	0.038 (0.31)	0.060 (0.52)	0.057 (0.49)
B/M	0.958 (3.98)***	0.892 (3.72)***	0.962 (4.02)***	0.950 (3.96)***
FCF	-0.222 (-0.15)	-0.196 (-0.14)	-0.285 (-0.20)	-0.314 (-0.22)
Intended ratio	0.309 (4.32)***	0.313 (4.37)***	0.311 (4.35)***	0.311 (4.35)***
Prior Return	-1.529 (-2.55)**	-1.635 (-2.74)***	-1.522 (-2.54)**	-1.571 (-2.62)***
Stock pledge ratio$_i$	-0.031 (-3.14)***		-0.021 (-2.74)***	-0.011 (-1.00)
$D^{Zero\ stock\ pledge\ ratio}$	-0.404 (-1.06)			
Change in stock pledge ratio		-0.031 (-2.14)**	-0.022 (-1.54)	
$D^{Zero\ change\ in\ stock\ pledge\ ratio}$		0.307 (1.05)		
Stock pledge ratio$*D^{Increase\ in\ stock\ pledge\ ratio}$				-0.021 (-1.74)*
Cash flow right	0.025 (2.41)**	0.024 (2.38)**	0.024 (2.36)**	0.025 (2.40)**
Adj. R-squared	0.046	0.043	0.047	0.047

Table 8
Cross-sectional Regressions of Short-term Market Reaction and Free Cash Flow

This table provides a cross-sectional regression of the short-term market reaction on the joint effects of ownership structure and free cash flow in our sample. We regress the three-day cumulative abnormal return on various control variables, dummy variables for ownership structure, and the interaction terms of the ownership structure dummy and the free cash flow dummy, where all continuous variables in regression model are winsorized at top and bottom 1% in distribution. The definitions of control variables, such as *Size*, *B/M*, *FCF*, *Intended ratio*, *Prior Return* and dummy variables for ownership structure, are as the same as that of Table 4. The free cash flow dummy D_i^{FCF} equals one if stock *i's* free cash flow belongs to the lowest level of free cash flow, otherwise D_i^{FCF} equals zero. Year dummies are included but not reported. The t-statistics appear in parentheses under the coefficient estimates. *, **, and *** represent the significance of the variables at the 10%, 5%, and 1% levels, respectively.

Indep. var. \ Model	1	2	3
Intercept	0.380 (0.29)	-0.693 (-0.55)	-0.752 (-0.56)
Size	-0.053 (-0.45)	0.028 (0.24)	0.064 (0.52)
B/M	0.945 (3.91)***	0.865 (3.65)***	0.979 (4.05)***
FCF	0.503 (0.30)	-0.384 (-0.23)	0.285 (0.16)
Intended ratio	0.299 (4.17)***	0.307 (4.28)***	0.301 (4.21)***
Prior Return	-1.511 (-2.52)**	-1.728 (-2.89)***	-1.765 (-2.93)***
D^{LP}	-0.360 (-0.89)		-0.393 (-0.94)
D^{HP}	-1.642 (-3.04)***		-1.761 (-3.24)***
$D^{LP}*D^{FCF}$	0.449 (1.04)		0.624 (1.29)
$D^{HP}*D^{FCF}$	0.428 (0.61)		0.761 (1.05)
D^{LC}		-0.466 (-1.04)	-0.377 (-0.81)
D^{HC}		0.722 (1.64)	0.920 (2.01)**
$D^{LC}*D^{FCF}$		-0.304 (-0.52)	-0.502 (-0.80)
$D^{HC}*D^{FCF}$		-0.052 (-0.09)	-0.451 (-0.72)
Adj. R-squared	0.044	0.041	0.048

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Table 9
Operating Performance

This table reports the unexpected changes in operating performance (in percent) for different measures in our sample. Year 0 is the year in which firms announce the share repurchase. The return on assets (ROA) is the operating income before depreciation (EBITDA) scaled by the averages of the beginning- and ending-period book values of assets. The return on cash-adjusted assets (ROCAA) is the operating income before depreciation scaled by the averages of the beginning- and ending-period book values of cash-adjusted assets, while the cash-adjusted assets are equal to the book value of total assets minus cash and marketable securities. The return on sales (ROS) is the operating income before depreciation scaled by the average of the beginning- and ending-period sales. The cash-flow return on assets (CFROA) is the operating cash flow scaled by the average of the beginning- and ending-period book values of total assets, while the operating cash flows are defined as the operating income before depreciation plus the decrease in receivables, the decrease in inventory, the increase in accounts payable, the increase in other current liabilities, and the decrease in other current assets. The unexpected change in operating performance is defined as the change in operating performance for a sample (repurchasing) firm minus the change in operating performance for a matching firm. The matching firms are non-repurchasing firms that closely correspond to the sample firms in terms of industry classification, the ownership structure measure (the stock pledge ratio or cash flow rights) at the month-end prior to the repurchase announcement, the level of performance in year *t-1* (OP_{-1}), the change in performance in year *t-1* ($\triangle OP_{-1}$), and the market-to-book ratio in year *t-1* (M/B_{-1}). "Incentive-aligned" is the unexpected change in operating performance for companies with a low stock pledge ratio or high cash flow rights. "Misaligned" is the unexpected change in operating performance for companies with a high stock pledge ratio or low cash flow rights. We then calculate the mean and median changes in different operating performance measures by using Winsorized observations at the 1st and 99th percentiles. For each operating performance measure, the first column is the unexpected change in operating performance from year -2 to -1, the second column is the unexpected change in operating performance from year -1 to 0, the third column is the unexpected change in operating performance from year 0 to 1, the fourth column is the unexpected change in operating performance from year 1 to 2, and the fifth column is the unexpected change in operating performance from year 0 to 2. The significance levels of the means (medians) are based on a two-tailed t-test (two-tailed Wilcoxon signed rank test). *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Table 9 (Continued)

		Misaligned					Incentive-aligned				
		-2 to -1	-1 to 0	0 to 1	1 to 2	0 to 2	-2 to -1	-1 to 0	0 to 1	1 to 2	0 to 2
Panel A. Stock pledge ratio											
ROA	Mean	0.816	-2.408*	0.158	-2.415**	-0.736	-0.495	-2.289***	-0.175	0.660	-0.059
	Median	0.985	-0.958	-0.453	-1.152*	-0.208	-0.672	-2.458***	0.406	1.102	-0.292
	N	72	71	66	65	65	209	209	207	186	185
ROCAA	Mean	0.726	-2.000	0.025	-1.608	-1.594	-1.375**	-3.409***	-0.333	0.648	0.675
	Median	0.798	1.160	-0.356	-1.481*	-1.528*	-0.696*	-2.456***	-0.004	1.301	-0.057
	N	73	70	67	68	68	205	210	207	184	185
ROS	Mean	-0.475	-3.622	5.029*	-10.46**	-2.863	-0.497	-2.534**	-0.247	-0.360	-1.948
	Median	0.228	-1.311	3.555**	-4.458***	-2.495	-0.741	-1.934**	0.084	0.494	-0.127
	N	70	70	66	67	66	211	209	205	187	185
CFROA	Mean	4.124*	-7.370**	-1.202	1.066	0.703	-1.707	-2.001	-2.242	0.479	-3.147
	Median	5.027**	-2.597	1.607	-0.407	2.624	-1.305	-1.464	-0.781	3.541	-0.612
	N	73	71	69	66	67	207	209	203	188	186
Panel B. Cash flow rights											
ROA	Mean	-0.093	-2.166**	-0.004	-1.52	-0.642	-0.307	0.681	1.848*	-0.152	1.568
	Median	-0.172	-2.050*	1.051	-0.343	-0.828	-0.766	0.890	0.647	-0.603	0.241
	N	103	103	94	79	83	127	127	126	120	117
ROCAA	Mean	-0.443	-3.193**	-2.098	-1.294	-1.325	-0.627	0.761	1.860*	-0.233	1.156
	Median	-0.992	-2.005**	-0.785	-0.419	-0.327	-0.701	1.179	0.182	0.019	0.192
	N	102	102	96	81	83	127	127	125	118	118
ROS	Mean	1.080	-1.197	-0.591	-6.759**	-3.840	-1.931	0.526	2.953*	1.52	3.893
	Median	-0.772	-1.196	0.084	0.694	0.935	-1.806*	0.708	0.565	-0.162	-0.044
	N	104	103	97	83	84	123	126	125	117	117
CFROA	Mean	0.252	-0.228	-2.388	-6.090*	-8.838***	2.010	-5.732**	4.914**	-3.434	-0.288
	Median	1.779	-1.416	-2.841	-2.939	-5.016***	0.719	-1.975*	4.649**	-1.397	0.651
	N	103	102	100	84	86	127	128	125	119	117

Table 10
Long-run Abnormal Return

This table reports the results of the long-run abnormal returns. Panel A reports the two-year long-run abnormal returns (in percent per month) estimated by using the calendar-time portfolio approach. "Misaligned" is the long-run abnormal return for companies with a high stock pledge ratio or low cash flow rights. "Incentive-aligned" is the long-run abnormal return for companies with a low stock pledge ratio or high cash flow rights. "Difference" is the difference in the long-run abnormal returns between misaligned and incentive-aligned companies. "EW" and "LW" mean that the monthly portfolio returns in calendar-time portfolio approach are estimated by the equal-weighted and log-value-weighted method, respectively. The "t-statistics" are in brackets under abnormal long-run performance. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively. Panel B reports two-year cumulative abnormal returns (in percent) estimated by Ibbotson's (1975) returns across time and securities approach. "Misaligned" is the two-year CAR for companies with a high stock pledge ratio or low cash flow rights. "Incentive-aligned" is the two-year CAR for companies with a low stock pledge ratio or high cash flow rights. "Difference" is the difference in the two-year CAR between misaligned and incentive-aligned companies. "%pos" is the percentage of monthly intercepts in each event-window with positive values, and "[% sig]" is the fraction of these intercepts which are significantly positive at the 10% significance level. The t-statistics (t-stat) are in brackets under the CAR.

Panel A. Long-run abnormal returns estimated by the calendar-time portfolio approach

		Misaligned (1)		Incentive-aligned (2)		Difference (1) – (2)	
		EW	LW	EW	LW	EW	LW
A1. Stock pledge ratio							
OLS	Alpha	-0.382	-0.264	0.510	0.475	-1.018	-0.858
	T-stat	(-1.07)	(-0.76)	(1.60)	(1.52)	(-3.15)***	(-2.71)***
WLS	Alpha	-0.027	0.074	0.339	0.305	-0.871	-0.741
	T-stat	(-0.09)	(0.25)	(1.19)	(1.09)	(-2.76)***	(-2.42)***
A2. Cash flow rights							
OLS	Alpha	0.160	0.127	0.745	0.711	-0.383	-0.381
	T-stat	(0.51)	(0.41)	(2.59)***	(2.58)***	(-1.16)	(-1.22)
WLS	Alpha	-0.007	-0.049	0.874	0.828	-0.627	-0.613
	T-stat	(-0.03)	(-0.17)	(3.50)***	(3.42)***	(-2.13)**	(-2.17)**

Panel B. Cumulative abnormal returns estimated by Ibbotson's (1975) RATS

	Misaligned (1)		Incentive-aligned (2)		Difference (1) – (2)
	CAR (t-stat)	% pos [% sig]	CAR (t-stat)	% pos [% sig]	CAR (t-stat)
B1. Stock pledge ratio					
	-3.442 (-0.77)	37.5% [4.2%]	7.876 (3.26)***	62.5% [16.7%]	-11.318 (-2.23)**
B2. Cash flow rights					
	-0.424 (-0.13)	45.8% [4.2%]	20.846 (6.05)***	95.8% [29.2%]	-21.270 (-4.49)***

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Table 11
Cross-sectional Regressions of Long-run Abnormal Return

This table reports cross-sectional regressions of long-run abnormal returns. We regress monthly excess returns on various dummy variables for ownership structures, where all continuous regression variables are winsorized at top and bottom 1% in distribution. The estimation method used in this table is a two-step procedure which is documented in Brennan, Chordia and Subrahmanyam (1998). *Size* is the natural logarithm of the market value. *B/M* is the book-to-market ratio. *FCF* is free cash flow measured by Lehn and Poulson (1988). *Change in ROA* is the change in the return on assets from year 0 to year 2, while year 0 is the year prior to the repurchase announcement. *Prior Return* is the 250-day (-252, -3) buy-and-hold abnormal return immediately preceding the repurchase announcement date. *DA* is discretionary accrual measured by Gong, Louis and Sun (2008). The D_{it}^{j} are dummy variables for ownership structure variables, while the superscripts LP and LC (HP and HC) represent the group with the lowest (highest) level of the stock pledge ratio and cash flow rights, respectively. We also test the differences in average returns between misaligned and incentive-aligned companies for different ownership structure measures. Furthermore, we incorporate two continuous variables for the ownership structure, namely, the stock pledge ratio and cash flow rights, into the regression model instead of dummy variables to check the consistency of the results. The t-statistics are in parentheses under coefficient estimates. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Indep. var. \ Model	1	2	3	4	5	6
Intercept	1.240	1.269	0.374	1.578	0.710	0.297
	(1.03)	(1.07)	(0.30)	(1.38)	(0.55)	(0.24)
Size	-0.085	-0.109	-0.008	-0.100	-0.101	-0.026
	(-0.73)	(-0.92)	(-0.07)	(-0.88)	(-0.84)	(-0.22)
B/M	-0.215	-0.275	-0.177	-0.243	-0.300	-0.229
	(-0.94)	(-1.15)	(-0.77)	(-1.05)	(-1.25)	(-0.99)
FCF	0.603	0.821	0.664	0.817	0.965	0.938
	(0.42)	(0.57)	(0.46)	(0.57)	(0.68)	(0.65)
Prior Return	-0.927	-1.191	-1.283	-0.723	-1.148	-1.014
	(-1.03)	(-1.31)	(-1.40)	(-0.81)	(-1.28)	(-1.14)
DA	0.035	0.044	0.043	0.030	0.046	0.040
	(1.31)	(1.57)	(1.58)	(1.10)	(1.70)*	(1.51)
Change in ROA	0.068	0.070	0.070	0.070	0.069	0.070
	(5.81)***	(5.93)***	(5.97)***	(5.88)***	(5.84)***	(5.93)***
D^{LP}	0.200		0.289			
	(0.83)		(1.18)			
D^{HP}	-1.218		-1.205			
	(-2.93)***		(-2.92)***			
D^{LC}		-0.461	-0.492			
		(-1.64)	(-1.75)*			
D^{HC}		0.877	0.876			
		(3.25)***	(3.29)***			
Stock pledge ratio				-0.024		-0.025
				(-3.09)***		(-3.17)***
Cash flow rights					0.030	0.029
					(3.08)***	(3.07)***
Testing the difference between misaligned and incentive-aligned companies						
Stock pledge ratio ($D^{HP} - D^{LP}$)	-1.418		-1.494			
	(-3.46)***		(-3.70)***			
Cash flow rights ($D^{LC} - D^{HC}$)		-1.338	-1.368			
		(-3.43)***	(-3.49)***			

Table 12
Cross-sectional Regression of Long-run Abnormal Return: Firms with Lower Prior Returns

This table provides a cross-sectional regression of long-run abnormal return. The definitions of control variables, such as *Size*, *B/M*, *FCF*, *Prior Return*, *DA*, *Change in ROA*, and dummy variables for ownership structure, are as the same as those in Table 11, while all continuous regression variables are winsorized at top and bottom 1% in distribution. Panel A is a sub-sample analysis that is restricted to companies whose one-year buy-and-hold abnormal return immediately preceding the repurchase announcement is lower than a specific benchmark. Model 1 and 2 are the samples that are below the mean of one-year prior return of the whole sample, Model 3 and 4 are the samples this are below the median of one-year prior return of the whole sample, and Model 5 and 6 are the samples that are below 1st quantile of one-year prior return of the whole sample. Panel B performs the test by dummy variables. The dummy variables $D_i^{Below\ the\ mean}$, $D_i^{Below\ the\ median}$, and $D_i^{Below\ the\ 1st\ quantile}$ are equal to one if tock *i*'s prior return is below the mean, median, and 1st quantile of prior return of the whole sample, respectively, otherwise it equals zero. T-statistics are in parentheses under the regression coefficients. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Sub-sample analysis based on one-year prior return

Indep. var. \ Model	Below the Mean		Below the Median		Below the 1st Quantile	
	1	2	3	4	5	6
Intercept	0.192	-0.251	0.686	-0.333	0.245	-2.361
	(0.11)	(-0.14)	(0.33)	(-0.16)	(0.07)	(-0.68)
Size	-0.019	0.017	-0.079	0.009	0.159	0.416
	(-0.11)	(0.10)	(-0.39)	(0.05)	(0.49)	(1.35)
B/M	-0.266	-0.324	-0.148	-0.102	-0.492	-0.409
	(-0.93)	(-1.09)	(-0.45)	(-0.31)	(-1.17)	(-0.94)
FCF	-0.265	0.953	-1.437	-0.082	-1.103	1.021
	(-0.14)	(0.51)	(-0.69)	(-0.04)	(-0.46)	(0.43)
Prior Return	-2.739	-2.656	-3.517	-2.967	-2.364	-1.822
	(-1.71)*	(-1.70)*	(-2.00)**	(-1.66)*	(-0.49)	(-0.40)
DA	0.033	0.023	0.051	0.033	0.213	0.226
	(1.00)	(0.70)	(1.48)	(0.94)	(3.15)***	(3.54)***
Change in ROA	0.069	0.071	0.061	0.061	0.063	0.070
	(4.86)***	(4.81)***	(3.41)***	(3.41)***	(1.39)	(1.61)
D^{LP}	0.215		-0.246		-1.195	
	(0.67)		(-0.63)		(-1.55)	
D^{HP}	-2.311		-2.655		-4.864	
	(-4.12)***		(-4.17)***		(-4.33)***	
D^{LC}	-0.120		0.086		0.850	
	(-0.31)		(0.22)		(1.16)	
D^{HC}	0.949		0.885		1.835	
	(2.68)***		(2.18)**		(2.76)***	
Stock pledge ratio		-0.045		-0.047		-0.056
		(-4.54)***		(-4.72)***		(-3.61)***
Cash flow rights		0.027		0.021		0.024
		(2.39)***		(1.64)		(1.14)
Testing the difference between misaligned and incentive-aligned companies						
Stock pledge ratio (D^{HP} – D^{LP})	-2.526		-2.408		-3.669	
	(-4.58)***		(-4.11)***		(-3.24)***	
Cash flow rights (D^{LC} – D^{HC})	-1.068		-0.799		-0.985	
	(-2.44)***		(-1.70)*		(-1.17)	

Table 12 (Continued)

Panel B. Alternative analysis based on one-year prior return

Indep. var. \ Model	1	2	3
Intercept	0.128 (0.10)	0.139 (0.11)	0.272 (0.22)
Size	-0.017 (-0.14)	-0.019 (-0.16)	-0.022 (-0.19)
B/M	-0.205 (-0.87)	-0.201 (-0.85)	-0.204 (-0.87)
FCF	0.715 (0.50)	0.689 (0.48)	1.002 (0.69)
Prior Return	-1.396 (-1.69)*	-1.401 (-1.69)*	-0.857 (-0.90)
DA	0.043 (1.62)	0.045 (1.69)*	0.037 (1.37)
Change in ROA	0.070 (5.85)***	0.069 (5.78)***	0.070 (5.79)***
Stock pledge ratio	-0.001 (-0.09)	-0.003 (-0.25)	-0.028 (-3.59)***
Stock pledge ratio*$D^{Below\ the\ mean}$	-0.039 (-3.02)***		
Stock pledge ratio*$D^{Below\ the\ median}$		-0.037 (-3.01)***	
Stock pledge ratio*$D^{Below\ the\ 1st\ quantile}$			0.003 (0.28)
Cash flow right	0.030 (3.11)***	0.030 (3.11)***	0.030 (3.09)***

Table 13
Cross-sectional Regression of Long-run Abnormal Return: Alternative Model Specifications in Stock Pledge Ratio

This table re-examines the cross-sectional regression of long-run abnormal return by adopting alternative model specifications. The definitions of control variables, such as *Size*, *B/M*, *FCF*, *Prior Return*, *DA*, and *Change in ROA*, are as the same as those in Table 11, while all continuous regression variables are winsorized at top and bottom 1% in distribution. The dummy variable $D_i^{Zero\ stock\ pledge\ ratio}$ is equal to one if stock *i*'s stock pledge ratio is equal to zero, otherwise it equals zero. Change in stock pledge ratio is calculated by stock pledge ratio at the month immediately preceding the repurchase announcement minus its value one year before repurchase announcement. The dummy variable $D_i^{Zero\ change\ in\ stock\ pledge\ ratio}$ is equal to one if stock *i*'s change in stock pledge ratio is zero, otherwise it equals zero. The dummy variable $D_i^{Increase\ in\ stock\ pledge\ ratio}$ is equal to one if stock *i*'s change in stock pledge ratio is positive, otherwise it equals zero. Year dummies are included but not reported. T-statistics are in parentheses under the regression coefficients. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Indep. var. \ Model	1	2	3	4
Intercept	0.277 (0.21)	-0.349 (-0.27)	0.643 (0.51)	0.649 (0.52)
Size	-0.015 (-0.12)	-0.024 (-0.19)	-0.066 (-0.56)	-0.058 (-0.49)
B/M	-0.209 (-0.90)	-0.309 (-1.33)	-0.329 (-1.42)	-0.324 (-1.38)
FCF	0.918 (0.63)	0.967 (0.68)	0.970 (0.68)	0.777 (0.54)
Prior Return	-1.084 (-1.21)	0.071 (6.05)***	0.072 (6.06)***	-0.820 (-0.93)
DA	0.044 (1.65)*	-1.101 (-1.20)	-1.025 (-1.15)	0.037 (1.32)
Change in ROA	0.070 (5.89)***	0.037 (1.37)	0.036 (1.33)	0.066 (5.63)***
Stock pledge ratio	-0.029 (-2.83)***		-0.021 (-2.56)***	0.007 (0.77)
$D^{Zero\ stock\ pledge\ ratio}$	-0.055 (-0.19)			
Change in stock pledge ratio		-0.050 (-4.40)***	-0.041 (-3.52)***	
$D^{Zero\ change\ in\ stock\ pledge\ ratio}$		0.825 (3.78)***		
Stock pledge ratio$*D^{Increaseon\ in\ stock\ pledge\ ratio}$				-0.054 (-5.10)***
Cash flow right	0.030 (3.08)***	0.032 (3.25)***	0.029 (3.07)***	0.028 (2.92)***

Table A1.

Market, Size, and Book-to-market Factor Returns for the Taiwan Stock Exchange

This table reports summary statistics for market, size, and book-to-market factor returns in Taiwan Stock Exchange.

Panel A. Breakpoints for the book-to-market ratio and size

Date	Book-to-market		Size (NT$ Million)
	Thirtieth Percentile	Seventieth Percentile	Fiftieth Percentile
June 1999	0.49	0.88	7,320
June 2000	0.58	1.21	5,694
June 2001	1.00	2.08	3,261
June 2002	0.81	1.92	3,669
June 2003	0.76	1.46	3,437
June 2004	0.61	1.12	4,078
June 2005	0.65	1.11	4,037
June 2006	0.65	1.20	4,448
June 2007	0.52	0.93	7,286
June 2008	0.56	1.01	5,311

Panel B. Summary statistics of factor returns

	Market factor (%)	Size factor (%)	Book-to-market factor (%)
Period: July 1999 to December 2008 (N = 114)			
Mean	-0.45	-0.07	0.75
Std.	7.91	4.22	7.19
Min	-19.58	-10.94	-13.62
Median	-0.45	-0.07	0.17
Max	24.87	11.65	37.36

Panel C. Summary of correlation coefficients

	Market factor	Size factor	Book-to-market factor
Period: July 1999 to December 2008			
Market factor	1		
Size factor	-0.076	1	
Book-to-market factor	0.315	0.208	1