

TWO ESSAYS ON SHARE REPURCHASES

By

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To my husband, who never doubted me

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Abstract of Dissertation Presented to the Graduate School  
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Though open market repurchase announcements are generally viewed as positive signals and are associated with positive abnormal returns, they are not binding commitments and investors are not guaranteed positive returns. My first study examined whether the market incorporates a firm's reputation when evaluating the credibility of an announcement to buy back stock. Empirical results support the theory that announcements made by firms that consistently meet or beat analysts' expectations are viewed as more credible. While short-run buyback announcement returns are unrelated to prior completion rates, high prior repurchase plan completion rates are associated with greater abnormal *long-run* returns. For the subset of firms in the lowest quintile of returns after the prior announcement, I identified three-year cumulative abnormal buy-and-hold returns of 29.8% on average for firms whose prior completion rates were high. My second study examined the general direction of insider transaction around share repurchase and the relationship between insider trading and long-run returns after share repurchase. Net insider buying and net insider selling are observed more frequently in quarters during which firms are repurchasing non-trivial amounts of stock than in non-repurchasing quarters, and the probability of simultaneous insider sales and company-level buybacks is greatest for firms with higher levels of option exercise, higher industry-adjusted market-to-book

ratios, and weaker shareholder rights. These results suggest that in certain cases managers may use share repurchases to advance their own agendas, as opposed to shareholder agendas. This study also investigates long run abnormal returns for repurchasing firms by direction of net insider trades. The findings are consistent with insider trades either validating or negating the undervaluation signal of the share repurchase: Repurchasing firms with concurrent net insider buying experience average buy and hold abnormal returns of 4.95, 2.13, 1.72 percent during years one, two, and three, respectively, after the repurchasing quarter compared to 0.41, -0.88, -1.85 percent for repurchasing firms with simultaneous net insider selling.

# CHAPTER 1

## REPURCHASES, REPUTATION, AND RETURNS

### Introduction

Firms buy back their own stock for a multitude of reasons: to increase their leverage ratio (Bagwell and Shoven (1988)), to fund employee and management stock options (Fenn and Liang (2001), Kahle (2002)), to fend off unwanted takeover attempts (Bagwell (1991), Billett and Xue (2007)), to mimic competitors (Massa, Rehman, and Vermaelen (2007)), to distribute excess cash flow (Jensen (1986)), and to signal undervaluation due to asymmetric information between managers and shareholders (Stephens and Weisbach (1998), Vermaelen (1981)). While these motivations are not mutually exclusive, some are arguably more important to management and to investors than others. Grullon and Michaely (2004) identify reducing agency problems associated with free cash flow and signaling undervaluation as the two major theoretical reasons for buying back stock, and Brav, Graham, Harvey, and Michaely (2005) provide empirical evidence in support of these motivations.<sup>1</sup>

Though announcements of open market share repurchase programs are not firm commitments to buy back stock, they are generally viewed favorably by the market (Stephens and Weisbach (1998), Jagannathan and Stephens (2003), Chan, Ikenberry, and Lee (2004), Chan,

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<sup>1</sup> In their survey of financial executives, the authors found that 86.4 percent of managers consider the market price of their stock (“if the stock is a good investment, relative to its true value”) as important or very important to the decision of whether or not to repurchase, and 84.5 percent agree or strongly agree that repurchase decisions convey information about their company to investors. These percentages are higher than any other survey rationale cited by managers and support the notion that managers use repurchases to signal undervaluation. The two next highest scores provide evidence in support of the free cash flow hypothesis: 80.3 percent of respondents consider the availability of good investment opportunities important or very important to their repurchasing decision, and 78.8 percent agree or strongly agree that repurchasing decisions are made after investment plans are determined. If good investments are nonexistent, then cash should be removed from the control of managers. The level of cash on hand also influenced repurchasing decisions: 61.9 percent believe that having extra cash or liquid assets, relative to their desired cash holdings, is important or very important to the company’s repurchase decision. This falls in 8th place behind the four mentioned above, merger and acquisition activity (#5, 72.3%), the stability of future earnings (#6, 65.5%), and a sustainable change in earnings (#7, 65.2%).

Ikenberry, Lee, and Wang (2006)). If cash distribution and signaling undervaluation are the primary motives for announcing a repurchase, then announcement returns should be positively related to the amount of stock that the firm is likely to repurchase and to the extent to which the firm's stock is perceived to be undervalued. Consistent with this conjecture, previous studies have found that share repurchase announcement returns are positive and increasing in the announced fraction of firm shares to be repurchased (Comment and Jarrell (1991), Raad and Wu (1995)). Additionally, Stephen and Weisbach (1998) and Chan, Ikenberry, and Lee (2004) find that announcement returns are generally higher for firms with low prior returns, a common proxy for undervaluation.

This paper asks a broader question: To what extent do capital market participants consider a firm's *past* behavior when assessing the validity of a *current* announcement to buy back a specified number of shares? Since it is a nonbinding commitment, the announcement of an open market share repurchase has been labeled by some as "cheap talk" (Bhattacharya and Dittmar (2004), Almazan, Banerji, and De Motta (2008)). A firm's managers may engage in cheap talk in order to temporarily inflate the price of the stock for their personal benefit. For example, if insiders are planning to sell stock in their personal accounts, they will want to obtain the highest possible price. Since the announcement of an open market share repurchase is generally associated with positive returns, management could easily announce a buyback then sell their shares at the new inflated price. Another motivation for cheap talk would be to avoid a takeover bid or proxy contest by temporarily increasing the stock price. The cheap talk problem may be alleviated if investors can *ex ante* identify which firms are likely to follow through on repurchases in a fashion consistent with their stock being undervalued. Hence, market

participants will want to assess management's behavior in the past, especially with regards to past repurchase programs, when responding to a new repurchase announcement.

A related literature has found that reputation is used to certify the accuracy of new information: investors are more responsive to forecasts provided by managers and analysts who have provided accurate predictions in the past. Hutton and Stocken (2007) find that when firms have a reputation for precise forecasting, the information content of voluntary disclosures is impounded in stock prices sooner. In a similar study, Ng, Tuna, and Verdi (2008) identify forecasting credibility as a cross-sectional determinant of the market reaction to news. They find that investors underreact less (i.e. the post-earning-announcement drift is lower) when the disclosing firm has issued credible forecasts in the past.<sup>2</sup> Chen, Francis, and Jiang (2005) develop a model of Bayesian learning in which investors update their prior beliefs as the accuracy of analysts' forecast is revealed. Their empirical results are consistent with stock market reactions to analyst forecasts increasing in the accuracy and length of the forecasting period.

I develop a number of proxies for credibility relating to buyback announcements. In the case of buybacks, metrics of firm reputation include how management behaved following previous share repurchase announcements: whether shares were actually repurchased in the amount suggested in the original repurchase announcement. The credibility and market revaluation of a repurchase announcement might be undercut if management has not followed through on *past* repurchases, particularly if the stock being repurchased underperformed in the post-announcement period. If management was signaling undervaluation, the lagging stock price performance should provide additional motivation to repurchase stock. Insider trading activity in

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<sup>2</sup> Ng, Tuna, and Verdi (2008) use multiple proxies for credibility, including the precision (range) of the forecast, the accuracy of prior forecast, and whether or not the firm has provided forecasts in the past.

the immediate aftermath of prior share repurchase announcements also proxies for credibility. Net insider purchases (sales) in the period following past repurchase announcements suggest a strong (weak) conviction in the undervaluation signal implied by the repurchase announcement. Stock sales may also imply an attempt to manage stock prices upward.

Additional factors may relate to the credibility of managerial signaling via share repurchases. First, I examine whether the firm's actual earnings have met or beat expectations over the past four quarters. The ability to meet or beat expectations influences a firm's overall reputation. For instance, when General Electric missed earnings expectations in April of 2008, a spokesman for Goldman Sachs stated, "We believe the miss and cut to guidance raises credibility concerns for GE over the near-term."<sup>3</sup> A management team known for consistently meeting or exceeding (missing) expectations may be viewed as less (more) inclined to engage in cheap talk. Second, I control for discretionary accruals, which may proxy for managerial intent to mislead investors. Chan, Ikenberry, Lee, and Wang (2006) find that repurchasing firms with low earnings quality experience poor operating performance and lower long-run returns than other "high-earnings quality" repurchasing firms. Thus, higher levels of discretionary accruals may suggest an attempt by management to artificially increase earnings and share price.

Finally, I examine whether the market reaction to buyback announcements complements or contrasts with other recent indicators of the attractiveness of the repurchasing company's stock. In particular, are announcement returns influenced by insider trading prior to the announcement or by the average analyst opinion at the time of the announcement? Using a sample of share repurchases from 1982 to 1990, Raad and Wu (1995) identify a positive relationship between net insider buying and subsequent repurchase announcement returns, and John and Lang (1991)

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<sup>3</sup> Moore, Heidi N., The GE Earnings Grenade, *The Wall Street Journal*, April 11, 2008.

document that returns surrounding dividend announcements are significantly lower for firms with insider selling leading up to the announcement. These studies suggest that recent optimistic signals may validate the information implied by a share repurchase, leading to a stronger market reaction. Nonetheless, it is possible that insider trading and analyst recommendations act as a substitute signal, that the market has already taken note of management's and analysts' opinions of the stock. In this case, repurchase announcement returns may be lower for firms with recent insider buying or better analysts' recommendations because the buyback announcement has less of a "surprise effect." I study how the market prices these items at the time of the announcement and if they can be used to predict post-announcement returns.

For a sample of repurchase announcements made from 1990 to 2004, my results suggest that announcements made by firms that consistently meet or beat analysts' expectations are viewed as more credible. Announcement returns for a firm that met or beat analysts' forecasts for all of the past four quarters are at least 93 basis points higher on average than returns for a firm that did not meet or beat any forecasts during the past four quarters.

Also, I test the completeness of this initial market reaction. I find evidence that past repurchasing outcomes are predictive of future long-run abnormal returns, suggesting that the market does not fully inspect information related to management credibility at the time of the share repurchase announcement. Univariate and multivariate results imply that firms with higher completion rates regarding their prior repurchase plan have higher abnormal buy-and-hold returns. The results are most pronounced for the subset of firms whose abnormal long-run returns after the prior announcement fall into the lowest quintile. In this case, firms with high levels of repurchases in their prior repurchase program have cumulative abnormal returns equal to 16.5 percent and 28.4 percent in years one and two, respectively, statistically different from 3.0

percent and 7.1 percent for firms with low completion rates after their prior repurchase announcement.

## **Hypothesis Development**

### **Management Behavior after Prior Share Repurchase**

Consider the following simple example (Figure 1-1), where a firm announces a repurchase program which it will either complete ( $R_1 = 1$ ) or fail to complete ( $R_1 = 0$ ). Assume that the market places positive value on the distribution of cash in the form of share repurchases in such a way that the expected initial market reaction to the announcement ( $r_1^{ANN}$ ) is increasing in the probability that the firm will repurchase.

$$dE(r_1^{ANN}) / dP(R_1 = 1) > 0 \quad (1-1)$$

Suppose that in the near future this same firm announces a second share repurchase program and that the previously observed behavior of the firm can be used to evaluate the probability that the firm will complete the second repurchase.

$$P(R_2 = 1 | R_1 = 1) > P(R_2 = 1 | R_1 = 0). \quad (1-2)$$

In other words, if the firm completed the prior buyback, then it is more likely to complete the subsequent buyback. Thus, since actual share repurchases are valuable to market participants, the market reaction to a share repurchase announcement ( $r_2^{ANN}$ ) will be stronger if the firm completed the prior repurchase. Taken together, equations (1) and (2) imply the following:

$$E(r_2^{ANN} | R_1 = 1) > E(r_2^{ANN} | R_1 = 0). \quad (1-3)$$

The above example can be extended to formulate empirical tests concerning the relationship between firm behavior surrounding the *prior* share repurchase announcement and returns associated with the *current* announcement. First, I will verify the postulate that share repurchase completion rates are positively related to prior completion rates. Next, I will test the following hypothesis:

- **Hypothesis 1a:** Returns surrounding share repurchase announcements are increasing with prior completion rates.

The difference between the left-hand and right hand side of inequality (3) can be viewed as the discount factor for completion failure. This value, which I label the “reputational effect,” represents the difference in expected returns if the firm repurchases versus if the firm fails to repurchase:

$$\text{Reputational effect} = E(r_2^{ANN} | R_1 = 1) - E(r_2^{ANN} | R_1 = 0). \quad (1-4)$$

Actual repurchases and long-run stock returns should be negatively correlated given that the value added by repurchasing stock is decreasing in stock price. Thus, I now consider the two possible scenarios where the post-announcement stock returns following the first announcement are either high ( $r_1^P = H$ ) or low ( $r_1^P = L$ ). In the former case, low completion rates may be more acceptable to investors for two reasons. First, the firm may have failed to complete its share repurchase plan because the primary motive for announcing a repurchase was to signal undervaluation and this objective was accomplished (e.g. the share price jumped without a repurchase). Stated differently, the actual buyback becomes unnecessary if a firm’s stock price adjusts to reflect its fundamental value and perhaps undesirable if the stock moves enough to become overvalued.<sup>4</sup> Second, investors are unlikely to punish management teams for shirking responsibilities if they simultaneously experience a significant increase in wealth. In the case of low returns, I argue that actual share repurchases become more salient. Shareholders who have recently experienced a decline in wealth probably question the credibility of the current management team and hence monitor management more closely. Thus, the penalty associated

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<sup>4</sup> Erin Callan, former Chief Financial Officer of Lehman Brothers Holdings Inc., received criticism for repurchasing stock at a time when it was likely overvalued. A June 13, 2008 article in *The Wall Street Journal* reports that “during her 6 ½ month tenure as Lehman’s CFO, the firm spent hundreds of millions of dollars to repurchase its own shares, at prices that turn out to be wildly high,” which “might have led investors to question her financial leadership.”

with a past failure to repurchase may be greater when the firm experienced low returns, leading to a larger reputational effect when returns are low than when returns are high.

$$\begin{aligned} E(r_2^{ANN} | R_1 = 1 \text{ and } r_1^P = L) - E(r_2^{ANN} | R_1 = 0 \text{ and } r_1^P = L) > \\ E(r_2^{ANN} | R_1 = 1 \text{ and } r_1^P = H) - E(r_2^{ANN} | R_1 = 0 \text{ and } r_1^P = H) \end{aligned} \quad (1-5)$$

This inequality leads to the following empirically testable hypothesis:

- **Hypothesis 1b:** The relationship between announcement returns and prior completion rates is strongest when prior post-announcement stock returns are low.

### Other Credibility Factors

Now suppose that following a share repurchase announcement insiders choose to either buy ( $IT_1 = Buy$ ), hold ( $IT_1 = Hold$ ), or sell ( $IT_1 = Sell$ ) company stock. Since one possibility is that managers announce a repurchase plan in order to temporarily boost their company's stock price and unload a portion of their holdings at this inflated price, the market may consider how insiders behaved following the most recent prior repurchase plan. In this case, announcement returns should be positively related to the extent to which managerial trades following the prior share repurchase concurred with company-level signals:

$$E(r_2^{ANN} | IT_1^{POST} = Buy) > E(r_2^{ANN} | IT_1^{POST} = Hold) > E(r_2^{ANN} | IT_1^{POST} = Sell). \quad (1-6)$$

- **Hypothesis 2:** Returns surrounding repurchase announcements are increasing (decreasing) with prior ex post insider buying (selling).

When reacting to a share repurchase announcement, the market may factor in indicators of firm credibility that are unrelated to share repurchases. For example, if a firm consistently meets the expectations of analysts, then the market may view this company as more reputable and their announcements as more credible. On the other hand, if a firm has developed a reputation for inflating stock prices or earnings through the use of discretionary accruals, then the credibility of the current announcement may be dubious. If firms can be classified as either a good reputation firms ( $Rep_1 = Good$ ) or a bad reputation firms ( $Rep_1 = Bad$ ) based on factors unrelated to share

repurchases, then the market might react more positively to repurchase announcements made by the former group as opposed to the latter:

$$E(r_i^{ANN} | Rep_i = Good) > E(r_i^{ANN} | Rep_i = Bad). \quad (1-7)$$

This example leads to two empirically testable hypotheses:

- **Hypothesis 3a:** Returns surrounding repurchasing announcements are increasing in the portion analysts' earnings forecasts that were met or exceeded in the past year.
- **Hypothesis 3b:** Returns surrounding repurchasing announcements are decreasing in the amount of discretionary accruals.

### Outside Signals

Finally, investors may look to the actions of insiders as well as the opinions of informed outsiders to validate the undervaluation signal inherent in a repurchase announcement. Consider a case where other signals about the value of the stock, such as insider trades and analyst recommendations, are either optimistic ( $S_i = O$ ) or pessimistic ( $S_i = P$ ). Optimistic (pessimistic) signals include recent insider buying (selling) and “buy” (“sell”) recommendations on the part of analysts. If these observable signals suggest that the company's stock may be trading below its fundamental value, then they may give credence to the undervaluation signal implied by a share repurchase announcement and thus lead to higher announcement returns.

$$E(r_i^{ANN} | S_i = O) > E(r_i^{ANN} | S_i = P). \quad (1-8)$$

However, it is also possible that the positive news implied by the announcement of a share repurchase is redundant in the case where the market has already observed other recent optimistic signals. In this instance, returns around share repurchase announcements viewed as redundant might be lower.

$$E(r_i^{ANN} | S_i = O) < E(r_i^{ANN} | S_i = P). \quad (1-9)$$

The theoretical ambiguity of the relationship between announcement returns surrounding share repurchases and other prior undervaluation signals leads to two mutually exclusive hypotheses for the cases where repurchase announcements are either complementary or redundant signals:

- **Hypothesis 4a:** (Complementary signal hypothesis). Returns surrounding repurchase announcements are increasing (decreasing) with pre-announcement insider buying (selling). Returns surrounding repurchase announcements are higher (lower) for firms with optimistic (pessimistic) analyst ratings.
- **Hypothesis 4b:** (Redundant signal hypothesis). Returns surrounding repurchase announcements are decreasing (increasing) with pre-announcement insider buying (selling). Returns surrounding repurchase announcements are lower (higher) for firms with optimistic (pessimistic) analyst ratings.

### **Long-Run Price Effects**

The underlying assumption behind the hypotheses outlined above is that investors price these reputation proxies *at the time of the buyback announcement*. Nonetheless, extant literature documents that investors often fail to incorporate information into stock prices in a timely manner. For instance, the post-announcement drift theory (Ball and Brown, 1968; Foster, Olsen and Shevlin, 1984; and Bernard and Thomas, 1989, 1990) suggests that the market initially underreacts to unexpected earnings announcements and that stock prices thus continue to “drift” in the same direction long-term. More recently, Cohen and Frazzini (2008) find evidence that investors fail to incorporate information on economically linked firms into stock prices. This investor inattention leads to the predictability of long-run returns. Applied to buybacks, this “drift hypothesis” implies that investors may not factor in past information concerning repurchases, returns, other credibility factors, and outside signals at the time of the announcement. If not, the above hypotheses concerning announcement returns can be extended to post-announcement long-run returns.

## Data and Sample

### Sample Selection

My initial sample of open market repurchase announcements reported in the Securities Data Corporation (SDC) database begins on January 1, 1986 and, in order to calculate three-year post-announcement returns, ends on December 31, 2004. Firms not reporting either the percent of shares outstanding sought in the repurchase program or the intended dollar value of the repurchase program are omitted. Following prior studies, I delete announcements made in the fourth quarter of 1987, announcements made by financial firms and utilities, and announcements made by firms whose stock price was less than five dollars two days prior to the announcement.<sup>5</sup> In the rare case in which a firm announces two share repurchase plans in the same fiscal quarter, only the first repurchase announcement is retained.<sup>6</sup> For each announcing company I gather daily and monthly stock price data from CRSP, quarterly accounting data from Compustat, analyst forecasts and actual earnings information from I/B/E/S, and insider trading data from Thomson Financial. Finally, the analysis requires at least four years of data prior to each announcement to calculate lagged variables.<sup>7</sup> I establish a cutoff of four years to account for possible changes in management. In addition, the market may have limited memory and, therefore, only consider

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<sup>5</sup> The excessive quantity of share repurchase announcements during this quarter suggests that they are likely to be fundamentally different from announcements made during other time periods (Ikenberry et al. (1995), Stephens and Weisbach (1998)). Billett and Xue (2006) also delete financial firms and utilities due to increased regulation in those industries. Low priced stocks are omitted because calculating their returns is problematic due to bid-ask bounce. Billett and Xue (2007) also delete stocks trading at below five dollars.

<sup>6</sup> A second repurchase announcement in the same quarter may indicate that the SDC reported the same announcement twice because it appeared in two separate news sources. It is also possible that a firm announces two separate repurchase programs in the same fiscal quarter; however, since my estimate of actual repurchases is based on quarterly data, calculating the actual repurchases between announcements is unfeasible.

<sup>7</sup> Results are unchanged if a three or five year cutoff is used instead.

recent events. Because my analysis requires four years of pre-announcement data, my final sample contains 5,519 announcements made between January 1, 1990 and December 31, 2004.

### **Proxies for Reputation and Signaling Credibility**

My variables of interest measure firm reputation and returns around share repurchase announcements. Summary statistics for all variables are presented in Table 1-1, and detailed variable definitions are given in the Appendix.

My principle proxy for firm reputation in the context of share repurchases is the portion of the announced amount that the firm actually repurchased during the prior share repurchase plan. I begin with *percent sought*, the announced percentage of shares outstanding that the firm intends to buy back during the repurchase program. If this value is missing but the dollar value of the program is reported, then I calculate *percent sought* as the dollar value of the repurchase program divided by the market capitalization of the firm one quarter prior to the announcement. The sample mean (median) of *percent sought* is 7.1 percent (5.2 percent) of shares outstanding. These repurchases are large investments: a firm in the 90<sup>th</sup> percentile of market capitalization that announces a plan of average size is intending to repurchase over one half of a billion dollars worth of its shares. There is also wide variation in this variable. The 10<sup>th</sup> percentile of *percent sought* is only 2.2 percent while the 90<sup>th</sup> percentile is 13.1 percent.

Following Stephens and Weisbach (1998) and Dittmar (2000), I calculate *actual percent repurchased* as spending on the repurchase of common and preferred stock reported in Compustat quarterly minus any decrease in redeemable preferred stock, scaled by the minimum price each quarter.<sup>8</sup> Banyl, Dyl, and Kahle (2005) identify this measure as the most accurate

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<sup>8</sup> Scaling by the minimum price assumes that management possesses private information that allows firms to time the market when they repurchase shares. The results of this paper are robust to relaxing this assumption and using average quarterly price instead.

proxy for actual shares repurchases, especially for firms with high levels of employee stock option exercises. I sum this figure over two years or until the quarter before following share repurchase announcement.<sup>9</sup> The average firm repurchases approximately 4.4 percent of shares outstanding. This value is substantially less than the mean of *percent sought*, implying that the average firm buys back less than announced.

I then calculate *percent completed* as *actual percent repurchased* divided by *percent sought*, truncated at 100 percent.<sup>10</sup> While the average firm buys back 66.5 percent of the announced amount, this variable is highly skewed. The median value of *percent completed* is 80.5 percent, and the 75<sup>th</sup> percentile is 100 percent. These results are similar to those of Stephens and Weisbach (1998), who find that firms on average acquire between 74 and 82 percent of the shares announced. *Lagged percent completed*, the *percent completed* associated with the most recent prior deal, is available for 2,720 firm announcements. The mean (median) value of *lagged percent completed* is 70.1 percent (86.8 percent), suggesting that the unconditional completion rate is comparable to the completion rate conditional on announcing a second repurchase.

The relationship between past completion rates and market reactions to current announcements is likely dependent upon past stock price performance. When returns are low, actual repurchases become more salient, and market reactions are more likely to be positively

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<sup>9</sup> By stopping calculations before the next repurchase announcement, this estimation may be biased downwards for cases where the next announcement happens before two years. Nonetheless, the mean completion rate conditional on an announcement within two years (71.8 percent) is greater than the unconditional mean.

<sup>10</sup> While the SDC database is considered the most comprehensive source of share repurchase data, it is incomplete. I truncate *percent completed* at 100 percent to control for potentially missing subsequent share repurchase announcements. It is also possible that data is missing for the most recent *prior* share repurchase announcement. If there is no reported announcement during the four years prior to the current announcement, then the observation will not be included in analysis that depends upon past data. The case in which the most recent announcement is not reported in the SDC database but there was another announcement within four years will bias my results against finding a relationship between past repurchasing outcome and future repurchases and returns.

related to *percent completed*. To measure stock performance, I calculate *two-year abnormal returns*, defined as the annualized size and book-to-market adjusted returns on the stock of the repurchasing firm from the month following the most recent prior announcement until 24 months following the most recent prior announcement. If the next share repurchase announcement occurs within this 24-month period, then returns calculations end the month before the current announcement. The annualized mean abnormal return equals 4.6 percent, but this variable varies considerably: the 10<sup>th</sup> percentile is -46.9 percent while the 90<sup>th</sup> percentile is 54.3 percent.

A complete representation of firm reputation should include proxies for whether management *intentionally* misled investors. *Lagged post-announcement insider trading* measures aggregate trades following the prior repurchase announcements. Similar to John and Lang (1991), insider trading variables are the dollar value of shares purchased minus the dollar value of shares sold, scaled by the sum of the value of shares bought and sold. In order to be included in this measure, the transaction must have taken place during the three months following the prior repurchase announcement and must have been reported to the Securities and Exchange Commission (SEC) before the current announcement. This variable is set equal to zero if no trading took place.

The market may view a company as more reputable if other non-repurchase related factors reflect credible behavior. Therefore, I estimate *percent of forecasts met*, the percentage of the last four quarterly mean earnings forecasts that the firm has either met or exceeded. If a firm's management uses a repurchase announcement to inflate stock prices or earnings, then they may employ other methods of manipulation as well. Therefore, I include discretionary accruals to proxy for an alternative way in which managers could attempt to manipulate earnings and stock prices. Similar to the methodologies presented in Dechow, Sloan, and Sweeney (1995) and used

by Bergstresser and Philippon (2006) and Louis and Robinson (2005), accruals are calculated using the Jones model with quarter and industry dummies, where industry is defined by the first two digits of a firm's SIC code.<sup>11</sup>

Finally, I include a measure of insider trading and analyst recommendations. *Pre-announcement insider trading*, calculated as the dollar value of shares purchased minus the dollar value of shares sold, scaled by the sum of the value of shares bought and sold, proxies for the aggregate trading behavior of insiders prior to the announcement and reveals whether insiders personally exhibit behavior consistent with an undervaluation signal. Analysts' recommendations, which proxy for the outside opinion of the firm, range from 1 to 5, with 1 being a "Strong Buy." *Mean analyst recommendation*, the mean recommendation of the repurchasing firms at the time of the announcement, is 2.1 on average, indicating that the average repurchasing firm still holds a "Buy" recommendation. The number of "Buy" and "Strong Buy" recommendations fell dramatically in 2002 and 2003 due to investor sentiment and SEC sanctions in 2003.<sup>12</sup> To account for time variation in recommendations, I scale *mean analyst recommendation* by the yearly average consensus for all firms in I/B/E/S to create *net mean analyst recommendation*. In addition to the level of outside opinion, I consider the extent to which a firm is able to guide market participations and consistently meet expectations.

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<sup>11</sup> Bergstresser and Philippon (2006) analyze yearly data and thus include year dummies to account for time variation. Louis and Robinson (2005) use quarterly data and include calendar quarter dummies to control for seasonality (e.g. all regressions using data from the same quarter are assigned the same dummy variable, regardless of the year). My approach accounts for both the time variation and the seasonality of discretionary accruals by assigning a dummy variable to each individual quarter. Both papers include industry dummies. The correlation among each possible pair of these variables is 0.99.

<sup>12</sup> The Securities and Exchange Commission reached an agreement with the ten largest investment banks on April 28, 2003 which required them to separate their investment banking and research departments to avoid conflicts of interest (Barber, Lehavy, and Trueman (2007)).

## Returns Calculations

I hypothesize that prior post-announcement behavior influences the credibility of future repurchase announcements, and that announcement returns measure the market's assessment of whether the repurchase will be completed. *Announcement returns* are cumulative returns calculated from two days prior to the announcement until two days following the announcement minus cumulative equally-weighted market returns. Consistent with the prior literature, I find that abnormal returns surrounding repurchase announcements are positive (1.2 percent) on average and significantly different from zero at the one percent level. This confirms prior research that the market views these announcements as good news.

Additionally, I test the completeness of the initial market reaction by examining long-run returns. Chan, Ikenberry, and Lee (2004) document abnormal buy-and-hold returns of 23.6 percent during the four years following a repurchase announcement, and Ikenberry, Lakonishok, and Vermaelen (1995) find positive and significant abnormal returns of 2.04 percent, 2.31 percent, and 4.59 percent during the first, second, and third years, respectively, following an announcement. *Abnormal returns* are calculated for years one through three as the buy-and-hold return on the repurchasing firm minus the buy-and-hold return on a portfolio of firms matched on size and book-to-market. Consistent with prior studies, *abnormal returns* are positive and significant following the announcement. I identify significant abnormal returns of 5.4 percent on average during the first year after the announcement and an additional 3.7 percent during the second year. Unlike prior studies that provide evidence of abnormal returns for three years, my results indicate that abnormal returns are insignificant after the second post-announcement year. If announcement returns fail to incorporate the effect of reputation, then I expect higher long-run abnormal returns for firms that are more credible based on the empirical proxies presented in this paper.

## Control Variables

I construct control variables that might influence share repurchase outcomes or market reactions to share repurchase announcements: recent stock returns, investment opportunities, information asymmetry, agency problems associated with excess cash on hand, capital structure, concurrent earnings and dividend announcements, and frequency of share repurchases.

Comment and Jarrell (1991) and Stephens and Weisbach (1998) identify a negative relationship between pre-announcement excess returns and announcement returns. Thus, I create the variable *pre-announcement returns*, the buy-and-hold returns on the stock of the repurchasing firm from 40 to 6 trading days prior to the announcement minus the buy-and-hold returns on the market during the same time period. Following Dittmar (2000), I control for investment opportunities, information asymmetry, agency problems, and capital structure. The ratio of market equity to book equity is a standard proxy for investment opportunities, where low market-to-book firms have more investment opportunities available. If market price setters fear that firms tend to overinvest instead of distributing cash, then a repurchase announcement made by a firm with few other opportunities may be viewed positively. Since market-to-book ratio varies widely by industry and time period, *net market-to-book* is the repurchasing firm's market-to-book ratio minus the industry median ratio at the time of the announcement, where industry is defined by the first two digits of Compustat's industry classification code. Next, firm size is often used as a proxy for information asymmetry since more information is generally available for large firms than small firms. *Size decile*, the firm's market capitalization decile (with 1 being the smallest and 10 the largest) during the calendar quarter prior to the repurchase announcement, captures the surprise effect of the announcement since more information may be conveyed in announcements made by firms with higher information asymmetry. If firms repurchase stock to mitigate agency problems associated with excess cash, then the amount of

cash on hand is likely to affect the level of repurchasing activity. I control for this effect by including *cash*, which is scaled by market capitalization. Finally, firms may use share repurchases to bring their capital structure closer to their target level. To account for this, I use *net leverage*, the firm's debt to assets ratio minus the industry average leverage ratio. All of the above variables are calculated at the end of the fiscal quarter prior to the announcement.

Despite the fact that simultaneous earnings and dividend announcements may significantly drive announcement returns, few share repurchase studies control for these concurrent events. I control for earnings or dividend announcements made within two days of the share repurchase announcement. *Positive surprise* and *negative surprise* equal one if the announcing firm released quarterly earnings results above or below, respectively, the consensus mean of analysts' forecasts. I also include a dummy variable, *no surprise*, to account the effect of the presence of an earnings announcement, even if earnings were equal to their forecasted value. *Increase*, *decrease*, and *no change* equal one if the firm announced an increase in dividends, a decrease in dividends, or a continuation of current dividends, respectively, within two days of the share repurchase announcement. *Special dividend* equals one if the firm announced a special dividend within two days of the buyback announcement. A surprisingly large portion of repurchase announcements coincide with other announcements: 16.4 percent of open market share repurchases are contemporaneous with earnings announcements and 25.4 percent with dividend announcements. While repurchases are considered good news, they do not necessarily cluster with other good news events. Just as many negative earnings surprises are associated with repurchase announcements as positive earnings surprises, and a portion of the concurrent dividend announcements are for reductions in dividends.

Jagannathan and Stephens (2003) find that announcements made by infrequent repurchasers are viewed more favorably by the market than those made by frequent repurchasers. To account for this effect, I create dummy variables to measure frequency. Following their methodology, *occasional repurchaser* equals one if the current repurchase announcement is the second announcement in the past five years, and zero otherwise. *Frequent repurchaser* equals one if the announcement is at least the third announcement in the past five years.

## Results

I estimate three primary sets of results. First, I verify that there exists a positive relationship between past and future repurchasing outcomes through univariate statistics and Tobit models. Second, I estimate announcement returns to examine market reactions to share repurchase announcements and, more precisely, if the market considers past repurchasing outcomes and other related credibility variables. Finally, I investigate the completeness of the initial market reaction by studying the relationship between firm reputation and long-run returns.

### **Prior Repurchasing Behavior as a Predictor of Future Repurchasing Behavior**

Figure 1-2 shows a positive relationship between future share repurchase outcomes and past share repurchase outcomes, and the magnitude and significance of the differences in the heights of the bars in this figure are presented in Table 1-2. For example, the average difference in *percent completed* for a firm that repurchased between zero and 25 percent of the announced amount following the prior share repurchase and a firm that repurchased between 75 and 100 percent is 16.071 (77.450 minus 60.479) percent and is significant at the 1 percent level. Among firms with a history of buybacks, repurchasing outcomes are significantly positively related to past performance. These results are economically important as well: a firm in the 0-25% *lagged percent completed* group buys back 15 percent less of their current announced amount on average than a firm that bought back at least 75 percent last time (i.e. in the 75-100% or 100%

*lagged percent completed* group). I also compare firms with a history of share repurchases to those that lack a recent prior repurchase. I find that firms with no recent prior announcements buy back significantly less than firms that repurchased at least 25 percent during their last share repurchase program. On average, a firm that has not established a reputation related to repurchases buys back at least 15.5 percent less of their announced amount than a firm that repurchased 75 percent or more during its last repurchase program.

In Table 1-3 I estimate a Tobit model of completion rates on prior completion rates and other factors that influence buy backs. The two-tailed Tobit model accounts for the censored nature of *percent completed*, which is naturally bounded by zero and manually truncated at 100.<sup>13</sup> The coefficient on *lagged percent completed* is positive and statistically different from zero in all specifications. This finding supports the theory that past repurchasing outcomes are positively related to future behavior. Using estimates from Model (5), a one standard deviation increase in *lagged percent completed* is associated with a 10.1 percentage point increase in *percent completed*.

Other firm-specific characteristics may influence actual repurchasing behavior. *Percent sought* should be negatively related to *percent completed* while *cash* may be positively related to actual repurchases. Firms with less information asymmetry and heavier monitoring, i.e. greater *size decile*, may be more likely to follow through on their share repurchase (Bhattacharya and Dittmar (2004)). Furthermore, share repurchase outcomes may also be related to other investment opportunities, capital structure (Dittmar (2000)), and the frequency of repurchasing activity (Jagannathan and Stephens (2003)). Empirical results imply a negative relationship between the announced percent sought and the subsequent completion rate. In other words, the

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<sup>13</sup> This controls for subsequent repurchase announcements that are potentially missing from the sample.

larger the announced share repurchase plan, the less likely the announcing firm is to complete the plan. Completion rates are also negatively related to net leverage and pre-announcement insider buying.

Consistent with Chan, Ikenberry, and Lee (2004), Models (4) and (5) estimate regressions including lagged long-run returns variables and future long-run returns variables, though future returns are clearly unavailable at the time of the announcement. *Percent completed* is negatively related to prior long-run returns, though this relationship is only marginally significant.

Additionally, completion rates are negatively correlated with one-year abnormal returns, suggesting that firms repurchase less if their stock returns are higher during the year prior to or during the year following the announcement. The negative correlation between repurchases and returns is potentially due to companies no longer considering their own stock undervalued. After controlling for long-run returns, regression results continue to provide justification for the assumption that share repurchase completion rates are positively related to prior completion rates.<sup>14</sup>

### **Announcement Returns**

I am interested in how the market responds to share repurchase announcements and, specifically, if investors incorporate past repurchasing outcomes into their reactions to current announcements. Model (1) of Table 1-4 examines announcement returns around all share repurchase announcements in the sample and includes the four reputation proxies that are not conditional upon having a recent past history of repurchasing. The coefficient on *percent of forecasts met* is positive and significant, indicating that firms that have established a reputation

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<sup>14</sup> There may be concern about having *percent sought* as an independent variable since it is the divisor of the dependent variable, *percent completed*. When Models (3) and (4) are estimated without *percent sought*, the coefficients on *lagged percent completed* remain almost identical (0.270 and 0.275, respectively, and significant at the 1% level). All other coefficients also remain similar in magnitude and significance.

of communicating with market participants and meeting expectations are viewed as more credible at future announcements. *Pre-announcement insider trading* is negatively related to announcement returns, consistent with the theory that increased insider buying has previously signaled that the firm was undervalued. A one standard deviation increase in this variable, which implies more insider buying relative to selling, is associated with a 58 basis point decrease in announcement returns. Since a higher analyst recommendation implies a more pessimistic one, the positive coefficient on *net mean analyst recommendation* suggests that firms that are considered in favor (out of favor) receive lower (higher) announcement returns. An increase of one standard deviation in *net mean analyst recommendation*, indicating a decline in analyst optimism, suggests a 70 basis point increase in announcement returns. Hence, for both insider trading and analyst recommendations, results suggest that the information content of the repurchase announcement is redundant for firms already viewed as undervalued by insiders and analysts. The amount of discretionary accruals does not significantly affect returns in this model.

Consistent with prior literature, the results suggest that announcement returns are increasing in the size of the repurchase program and decreasing in pre-announcement returns. Also, market price setters respond more positively to announcements made by value firms, which have low market-to-book ratios and generally have less investment opportunities, and by smaller firms, whose higher levels of information asymmetry may lead to more of a surprise effect at the time of the repurchase announcements. I include dummy variables to account for contemporaneous earnings and dividend announcements but exclude coefficient estimates for brevity. As one might expect, announcement returns are significantly higher (lower) when the repurchase announcement coincides with a positive (negative) earnings surprise.

Models (2), (3) and (4) of Table 1-4 are restricted to repeat announcements, defined as at least the second announcement made by a firm in the past four years. I interact *lagged percent completed* with a binary variable equal to one if the firm's *two-year abnormal returns* fall into the lowest quintile. I calculate *two-year abnormal returns* as the annualized returns on the repurchasing firm's stock minus the annualized return on a portfolio of control firms matched on size and book-to-market ratio from one month following the prior repurchase announcement until 24 months following the prior announcement. (See Appendices A and B for further discussion of control firms.) If the current share repurchase announcement occurs within this 24-month period, then abnormal returns calculations are stopped the month before the current announcement. The coefficient on the interaction term measures the difference in the extent to which investors incorporate prior repurchasing outcomes when returns are in the lowest quintile versus when they are not. It is positive, but fails to achieve statistical significance, leading me to question to completeness of the initial market reaction. All other coefficients are similar in magnitude and significance to those in Model (1). Model (4) excludes the 586 observations concurrent with earnings or dividend announcements to control for the confounding effects of these contemporaneous events. These results are robust to this alternative sample of share repurchase announcements.

### **Post-Announcement Returns**

It is possible that the market's reaction at the time of the announcement is incomplete and that prior repurchasing outcomes influence returns long-term. To test this hypothesis, I regress two-year abnormal buy-and-hold returns on *lagged percent completed* as well as other reputation and control variables that may affect stock price performance in Table 1-5. Abnormal buy-and-hold returns are the annual return on the repurchasing firm's stock minus the annual return on a portfolio of control firms over the 24 months beginning the month following the repurchase

announcement. To construct control portfolios, I select the twenty firms in the same size decile as the repurchasing firm at the time of the announcement that are closest in market-to-book to the repurchasing firm. If a matched firm delists during that year, then I assume that the proceeds from that investment are invested in a market portfolio with returns equal to the returns on the value-weighted CRSP index. Control portfolios are rebalanced on an annual basis.

Model (1) of Table 1-5 includes *lagged percent completed*, other variables related to reputation and variables potentially related to long-run returns. Consistent with the findings of Chan, Ikenberry, and Lee (2004) and Chan, Ikenberry, Lee and Wang (2006), the ratio of market value to book value is negatively related to long-run abnormal returns. Net leverage is positively related to long-run returns, but this coefficient is only marginally significant. Pre-announcement insider trading is negatively related to two-year abnormal returns, indicating that insiders do not appear to time the market well.

In Model (2) I condition upon low returns between the prior share repurchase announcement and the current announcement to identify a positive and significant relationship between *lagged percent completed* and announcement returns. The coefficient on the interaction term measures the difference in the extent to which prior repurchasing outcomes can predict two-year abnormal returns when returns are in the lowest quintile versus when they are not. It is positive and statistically significant, implying that past repurchasing outcomes are more informative when prior returns are low. Conditional upon low returns, a one standard deviation increase in *lagged percent completed* is associated with a 13.1 percentage point increase in two-year abnormal returns in Model (2). The results are consistent with the predictions that long-run returns and prior completions rates are positively correlated and that the strength of the correlation is stronger when stock returns after prior repurchase announcements are low.

I verify the robustness of these results using two alternative samples. First, Model (3) excludes the two variables that require analyst coverage data, increasing the sample size by 435 observations. Next, Model (4) uses the subset of repurchase announcements that occurred independently of dividend and earnings announcements. In both cases, I find that on average firms with low returns following the prior repurchase plan continue to be associated with low returns following the next repurchase announcement. However, empirical findings are consistent with the theory that firms whose returns were low following the previous announcement but that repurchased more stock will outperform firms with low returns that repurchased less shares, confirming prior results.

Table 1-6 presents cumulative buy-and-hold abnormal returns for the first, second and third years following the repurchase announcement using the entire sample of 5,419 repurchase announcements. Bootstrapping is used to infer the statistical significance of long-run returns. Specifically, I replace each firm in my repurchasing sample with a randomly selected non-repurchasing firm in the same size and book-to-market quintiles at the time of the buyback announcement. This process is repeated for a total of 1,000 random samples. The *p*-values reported in this papers reflect the percentage of the 1,000 random samples that have mean abnormal returns higher than the mean abnormal return for the repurchasing sample. A similar procedure is used to infer the statistical significance of the difference in means in abnormal returns. (See Appendix B for more details on the empirical bootstrapping procedure used in this paper.) Abnormal returns are positive and significant for the first three years: 5.4 percent, 10.3 percent and 7.9 percent for years one, two, and three, respectively. Abnormal long-run returns on firms that have announced a share repurchase in the past four years are similar in magnitude and significance to those of the entire sample. I test whether prior repurchase activity is marginally

predictive of future stock returns. Firms that repurchased above the median *lagged percent completed* have higher CARs than those that repurchased less than the median amount, and these results are significant at the 10 percent level for years one and two.

Next, I segment on returns following the prior share repurchase announcement to find that cumulative abnormal buy-and-hold returns are highest and most significant for firms whose returns fell into the lowest quintile following the prior share repurchase. Three-year abnormal returns for the group of firms in the lowest returns quintile after the last share repurchase are 23.8 percent on average, over three times as large as the abnormal returns for any other returns quintile. The firms with high levels of past repurchases help to drive these results: I identify three-year cumulative abnormal buy-and-hold returns of 29.8 percent for the subset of firms in the lowest returns quintile with high levels of repurchases. Of the 1,000 random samples used to construct *p*-values, none had long-run returns that surpassed this group. My findings suggest that prior share repurchase activity is positively related to long-run abnormal returns, particularly in the case where returns were low after the prior repurchase.

### **Conclusions**

My study examined short-run and long-run stock returns for a sample of 5,519 open market repurchase announcements made between January 1, 1990 and December 31, 2004. Since this type of share repurchase is a non-binding commitment, market participants may look to external signals to determine the likelihood that a firm will follow through with the repurchase plan and/or the probability that the announcing firm is undervalued, one of the principle reasons for which a company might announce a buyback. A logical starting point for evaluating the credibility of an announcement is how the company behaved following the *last* repurchase announcement. Did the management team complete the repurchase program, in particular in the case where returns are low?

About half (2,720) of the announcements in my sample were made by firms that had announced a open market share repurchase in the recent past. I use repurchase plan completion rates and long-run returns following the *first* announcement to explain market reactions to and long-run returns following the *second* announcement. After verifying that a link exists between prior and future repurchasing activity, I find that a firm's reputation for meeting or exceeding analysts' forecasts is positively related to share repurchase announcement returns.

Next, I examine the completeness of the market's initial reaction. Univariate and multivariate results suggest that lagged share repurchases explain long-run cumulative abnormal buy-and-hold returns, particularly in the case where returns were low between announcements. Firms whose *prior* completion rate fell above the median level experience greater abnormal returns than their low completion rate counterparts for two years following the *current* announcement. This discrepancy is most pronounced for the subset of firms whose lagged stock price performance fell into the lowest quintile, perhaps implying that the undervaluation signal sent through the first repurchase announcement was ignored.

My study adds to the extant literature on market responses, both short-term and long-term, to announcements of open market share repurchases, and it also questions whether market participants incorporate a firm's reputation when formulating a reaction to corporate announcements. I identify persistence in repurchasing behavior, but find that the market only partially incorporates this relationship in the short-term, leading to long-run price effects.

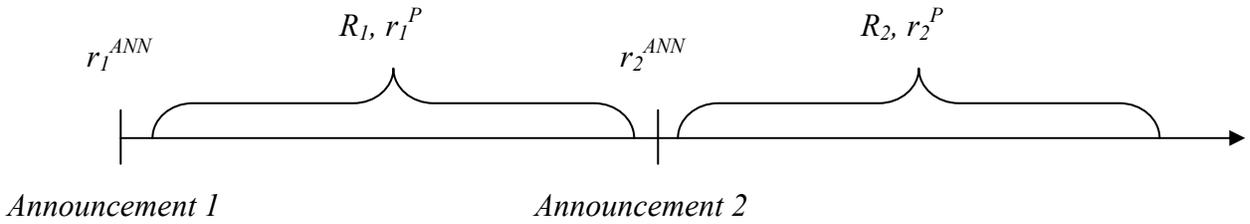


Figure 1-1. Timeline of repurchase announcements. This figure presents a timeline of a simple example of repurchase announcements.  $r_t^{ANN}$  and  $r_t^P$  are announcement returns and post-announcement returns, respectively.  $R_t$  represents a binary variable equal to one if the firm completes its share repurchase plan and zero otherwise.

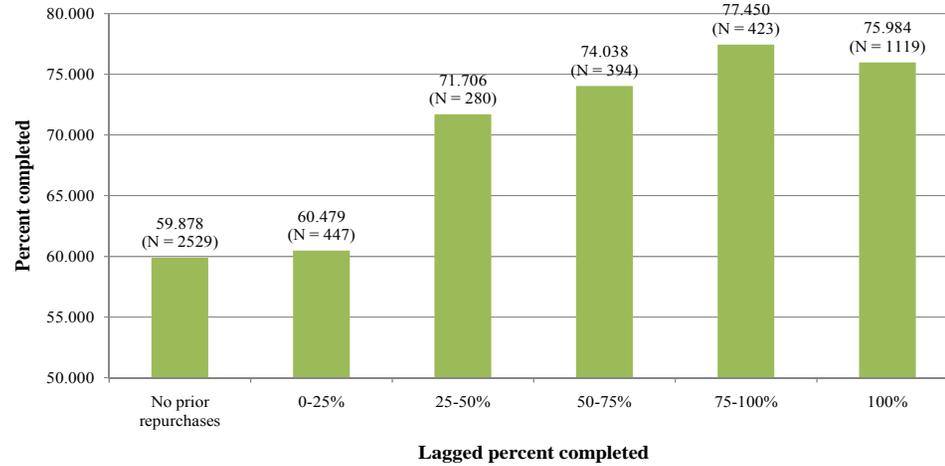


Figure 1-2. Percent completed by lagged percent completed. This figure depicts the relationship between prior share repurchase outcomes and future repurchases. The horizontal axis represents the portion of the announced amount that the firm repurchased following the prior announcement (lagged percent completed), while the vertical axis represents the mean completion rate for the subsequent announcement (percent completed).

Table 1-1. Summary Statistics. This table presents summary data from the sample of open market repurchase announcements made between January 1, 1990 and December 31, 2004. All variables except for long-run returns variables, dummy variables, and insider trading variables are winsorized at the 1st and 99th percentiles.

Category	Variable	N	Mean	Standard Deviation	Percentiles		
					10th	50th	90th
Repurchasing	Percent sought (%)	5519	7.099	5.218	2.200	5.606	13.095
	Actual repurchases (%)	5193	4.413	4.104	0.270	3.528	9.622
	Percent completed (%)	5192	66.545	36.403	5.336	80.519	100
	Lagged percent completed (%)	2720	70.168	35.194	7.641	86.831	100
	Occasional repurchaser dummy	5519	0.196	0.397	0	0	1
	Frequent repurchaser dummy	5519	0.360	0.480	0	0	1
Returns	Announcement returns (%)	5518	1.220	8.546	-7.688	1.081	11.173
	Pre-announcement returns (%)	5505	-8.298	15.123	-27.777	-7.506	9.425
	Abnormal returns - year 1 (%)	5419	5.404	65.027	-53.553	-1.322	63.841
	Abnormal returns - year 2 (%)	5419	3.734	60.071	-50.760	-1.873	59.007
	Abnormal returns - year 3 (%)	5419	0.604	58.061	-52.714	-4.258	52.740
	Two-year abnormal returns (after last repurchase) (%)	2808	4.595	80.342	-46.921	-1.227	54.311
Firm-specific characteristics	Mean analyst recommendation	4279	2.068	0.565	1.33	2	2.91
	Scaled mean analyst recommendation	4279	-0.071	0.559	-0.760	-0.087	0.700
	Percent of analyst forecasts met (out of 4 quarters)	4977	0.682	0.312	0.25	0.75	1
	Net leverage	5481	-0.062	0.312	-0.487	-0.038	0.317
	Net market-to-book	5479	0.889	2.394	-1.032	0.235	3.450
	Discretionary accruals	4574	-0.011	0.127	-0.053	0.001	0.057
	Market capitalization (millions of \$)	5374	4437	18731	52	427	7344
	Size decile	5519	7.714	2.068	5	8	10
	Cash	5355	0.212	2.906	0.007	0.071	0.340
	Pre-announcement insider trading	5519	-0.088	0.356	-0.953	0	0
	Lagged post-announcement insider trading	3329	-0.184	0.485	-1.000	0	0
Dividend announcement dummies	Increase	5519	0.066	0.248	0	0	0
	Decrease	5519	0.013	0.114	0	0	0
	No change	5519	0.172	0.377	0	0	1
	Special dividend	5519	0.003	0.057	0	0	0
Earnings announcements dummies	Positive surprise	5223	0.069	0.254	0	0	0
	Negative surprise	5223	0.080	0.271	0	0	0
	No surprise	5223	0.015	0.121	0	0	0

Table 1-2. Difference in means of percent completed by lagged percent completed group. This table presents the magnitude and significance of differences in mean percent completed by lagged percent completed. The values represent the differences in the heights of the bars depicted in Figure 1-2. The header row and column represent the range of values of lagged percent completed. The values within the table are calculated as the mean percent completed of the group represented in that column minus the mean percent completed of the row. T-statistics are in parentheses below the estimates. \*, \*\*, and \*\*\* represent significance at the 10%, 5% and 1% levels.

	0-25%	25-50%	50-75%	75-100%	100%
No prior repurchases	0.601 (0.31)	11.828 (5.40) ***	14.159 (7.77) ***	17.571 (10.84) ***	16.106 (13.28) ***
0-25%		11.227 (4.06) ***	13.558 (5.45) ***	16.970 (7.24) ***	15.505 (7.45) ***
25-50%			2.331 (0.89)	5.743 (2.29) **	4.2782 (1.98) **
50-75%				3.412 (1.55)	1.947 (1.04)
75-100%					-1.465 (0.82)

Table 1-3. Repurchases regressions. This table provides estimates of future share repurchases based on prior repurchasing outcomes. The equations estimated in this table are based on a two-tailed Tobit model where the dependent variable is percent completed, the portion of the announced amount that the firm subsequently repurchases, defined as actual percent repurchased divided by percent sought, truncated at 100 percent. Z-statistics are shown in italics below the estimated coefficients. \*, \*\*, and \*\*\* represent significance at the 10%, 5% and 1% levels.

	(1)	(2)	(3)	(4)	(5)
Lagged percent completed	0.270 <i>7.71 ***</i>	0.266 <i>7.84 ***</i>	0.271 <i>7.88 ***</i>	0.283 <i>8.21 ***</i>	0.286 <i>8.29 ***</i>
Percent sought		-2.494 <i>-11.48 ***</i>	-2.430 <i>-10.82 ***</i>	-2.425 <i>-10.81 ***</i>	-2.364 <i>-10.48 ***</i>
Pre-announcement returns			0.013 <i>0.15</i>	0.033 <i>0.37</i>	0.040 <i>0.45</i>
Net market-to-book			0.752 <i>1.47</i>	0.750 <i>1.42</i>	0.620 <i>1.16</i>
Size decile			0.106 <i>0.16</i>	0.154 <i>0.22</i>	0.218 <i>0.32</i>
Cash			0.140 <i>0.39</i>	0.164 <i>0.46</i>	0.113 <i>0.32</i>
Net leverage			-6.565 <i>-1.56</i>	-8.033 <i>-1.89 *</i>	-8.087 <i>-1.90 *</i>
Pre-announcement insider trading			-5.646 <i>-1.84 *</i>	-6.352 <i>-2.06 **</i>	-6.478 <i>-2.11 **</i>
Lagged two-year abnormal returns				-0.028 <i>-1.90 *</i>	-0.028 <i>-1.91 *</i>
Abnormal returns - year 1					-0.064 <i>-2.94 ***</i>
Abnormal returns - year 2					0.010 <i>0.46</i>
Constant	72.895 <i>26.63 ***</i>	90.417 <i>29.16 ***</i>	86.850 <i>13.66 ***</i>	85.541 <i>13.46 ***</i>	84.796 <i>13.33 ***</i>
N	2663	2663	2587	2548	2535
Pseudo R-squared	0.0035	0.0113	0.0121	0.0128	0.013

Table 1-4. Announcement returns. This table presents coefficient estimates from ordinary least squares regressions of announcement returns. The dependent variable in both regressions is announcement returns. Model (1) includes the full sample of share repurchase announcements. Models (2) and (3) include announcements made by firms that have announced a share repurchase program in the past 4 years. Model (4) is estimated with the sample of repeat announcements that were not made concurrently with earnings or dividend announcements. T-statistics are shown in italics below the estimated coefficients. \*, \*\*, and \*\*\* represent significance at the 10%, 5% and 1% levels.

	(1)	(2)	(3)	(4)
Percent sought	0.073 <i>2.47 **</i>	0.127 <i>3.56 ***</i>	0.125 <i>3.52 ***</i>	0.112 <i>2.52 **</i>
Pre-announcement returns	-0.047 <i>-4.64 ***</i>	-0.041 <i>-3.24 ***</i>	-0.039 <i>-3.07 ***</i>	-0.043 <i>-2.78 ***</i>
Net market-to-book	-0.278 <i>-4.28 ***</i>	-0.158 <i>-2.19 **</i>	-0.119 <i>-1.61</i>	-0.134 <i>-1.45</i>
Size decile	-0.034 <i>-0.37</i>	0.017 <i>0.14</i>	0.014 <i>0.11</i>	0.031 <i>0.22</i>
Cash	-0.061 <i>-1.47</i>	-0.090 <i>-2.09 **</i>	-0.090 <i>-2.11 **</i>	-0.090 <i>-2.05 **</i>
Net leverage	0.805 <i>1.57</i>	-0.331 <i>-0.50</i>	-0.302 <i>-0.46</i>	-0.307 <i>-0.37</i>
Occasional repurchaser dummy	0.061 <i>0.15</i>			
Frequent repurchaser dummy	0.382 <i>1.08</i>	0.245 <i>0.59</i>	0.257 <i>0.61</i>	0.472 <i>0.90</i>
Pre-announcement insider trading	-1.339 <i>-3.47 ***</i>	-1.194 <i>-2.86 ***</i>	-1.161 <i>-2.78 ***</i>	-0.783 <i>-1.45</i>
Mean analyst recommendation	1.243 <i>4.28 ***</i>	1.353 <i>3.68 ***</i>	1.278 <i>3.48 ***</i>	1.618 <i>3.55 ***</i>
Discretionary accruals	1.106 <i>0.91</i>	2.341 <i>1.62</i>	2.224 <i>1.55</i>	3.962 <i>2.01 **</i>
Percent of forecasts met	0.927 <i>1.73 *</i>	1.270 <i>1.98 **</i>	1.504 <i>2.34 **</i>	1.443 <i>1.80 *</i>
Lagged post-announcement insider trading		0.127 <i>0.35</i>	0.298 <i>0.82</i>	0.616 <i>1.32</i>
Lagged percent completed		0.003 <i>0.57</i>	0.001 <i>0.09</i>	0.002 <i>0.22</i>
Lagged percent completed			0.016 <i>1.24</i>	0.021 <i>1.38</i>
* Low returns dummy			-0.306 <i>-0.30</i>	-0.403 <i>-0.33</i>
Low returns dummy				
Intercept	-0.156 <i>-0.19</i>	-1.377 <i>-1.26</i>	-1.474 <i>-1.31</i>	-1.602 <i>-1.20</i>
Concurrent earnings and dividends dummies	YES	YES	YES	NO
N	3416	1698	1675	1089
Adjusted R-squared	0.0262	0.0269	0.0286	0.0346

Table 1-5. Long-run returns. This table presents coefficient estimates from ordinary least squares regressions of two-year abnormal returns. Models (1)-(3) include announcement made by firms that have announced a share repurchase program in the past 4 years. Model (4) is estimated with the sample of repeat announcements that were not made concurrently with earnings or dividend announcements. T-statistics are shown in parentheses below the estimated coefficients. \*, \*\*, and \*\*\* represent significance at the 10%, 5% and 1% levels.

	(1)	(2)	(3)	(4)
<i>Percent sought</i>	0.791 <i>1.73 *</i>	0.863 <i>1.88 *</i>	0.850 <i>2.26 **</i>	0.998 <i>1.60</i>
<i>Pre-announcement returns</i>	0.112 <i>0.69</i>	0.145 <i>0.88</i>	0.157 <i>1.12</i>	0.307 <i>1.39</i>
<i>Net market-to-book</i>	-3.481 <i>-3.71 ***</i>	-3.195 <i>-3.31 ***</i>	-3.560 <i>-4.20 ***</i>	-2.825 <i>-2.12 **</i>
<i>Size decile</i>	0.424 <i>0.29</i>	0.365 <i>0.24</i>	0.845 <i>0.74</i>	0.875 <i>0.44</i>
<i>Cash</i>	-0.608 <i>-1.11</i>	-0.597 <i>-1.09</i>	-0.596 <i>-1.16</i>	-0.625 <i>-1.02</i>
<i>Net leverage</i>	-13.796 <i>-1.66 *</i>	-11.428 <i>-1.36</i>	-10.129 <i>-1.46</i>	-14.329 <i>-1.22</i>
<i>Pre-announcement insider trading</i>	-12.464 <i>-2.34 **</i>	-12.618 <i>-2.35 **</i>	-12.407 <i>-2.53 **</i>	-20.691 <i>-2.73 ***</i>
<i>Mean analyst recommendation</i>	1.437 <i>0.31</i>	0.584 <i>0.12</i>		0.011 <i>0.00</i>
<i>Discretionary accruals</i>	-4.800 <i>-0.26</i>	-5.587 <i>-0.30</i>	-9.036 <i>-0.61</i>	-12.386 <i>-0.45</i>
<i>Percent of forecasts met</i>	-11.783 <i>-1.45</i>	-11.183 <i>-1.36</i>		-15.308 <i>-1.35</i>
<i>Lagged post-announcement insider trading</i>	-8.636 <i>-1.86 *</i>	-8.074 <i>-1.72 *</i>	-6.136 <i>-1.53</i>	-10.432 <i>-1.59</i>
<i>Lagged percent completed</i>	0.001 <i>0.01</i>	-0.081 <i>-1.06</i>	-0.071 <i>-1.13</i>	-0.121 <i>-1.18</i>
<i>Lagged percent completed</i>		0.371	0.337	0.603
<i>* Low returns dummy</i>		2.27 **	2.52 **	2.82 ***
<i>Low returns dummy</i>		-22.242 <i>-1.69 *</i>	-19.816 <i>-1.89 *</i>	-35.643 <i>-2.10 **</i>
Constant	10.616 <i>0.77</i>	15.242 <i>1.06</i>	3.499 <i>0.32</i>	16.922 <i>0.90</i>
N	1684	1664	2099	1083
Adjusted R-squared	0.0142	0.0143	0.0158	0.0178

Table 1-6. Univariate results for long-run returns. This table presents returns during the first, second and third year following a share repurchase announcement. Repeat announcers refers to firms that have announced another share repurchase in the past four years. High (low) refers to firms whose lagged percent completed is above (below) the 50th percentile. Q1 – Q5 denotes the quintile of two-year abnormal returns following the prior repurchase program. Raw returns are the returns on the repurchasing firm, control returns are the returns on a size and book-to-market matched portfolio, and abnormal returns are the difference between raw returns and control returns. P-values correspond to the abnormal returns measure and are obtained through bootstrapping. See Appendix B for further explanations of abnormal returns and p-value calculations.

Sample	N	Year 1				Year 1-2				Year 1-3			
		Raw	Control	Abnormal	P-value	Raw	Control	Abnormal	P-value	Raw	Control	Abnormal	P-value
All firms	5419	21.573	16.168	5.404	0.000 ***	41.073	30.817	10.255	0.000 ***	55.530	47.613	7.917	0.000 ***
Repeat announcers	2695	20.862	15.040	5.822	0.000 ***	39.460	28.609	10.851	0.000 ***	53.699	45.552	8.147	0.000 ***
High repurchases	1344	22.068	14.393	7.675	0.000 ***	41.032	27.365	13.666	0.000 ***	54.221	44.578	9.643	0.001 ***
Low repurchases	1351	19.662	15.683	3.978	0.023 **	37.896	29.845	8.051	0.010 **	53.179	46.521	6.658	0.003 ***
High - Low	2695	2.407	-1.290	3.697	0.078 *	3.136	-2.480	5.615	0.085 *	1.042	-1.943	2.985	0.296
Q1	535	21.729	11.947	9.782	0.002 ***	41.854	24.106	17.748	0.002 ***	61.350	37.576	23.774	0.000 ***
Q2	533	20.061	15.404	4.657	0.067 *	40.815	28.620	12.196	0.023 **	50.475	44.484	5.992	0.053 *
Q3	530	17.752	14.252	3.500	0.082 *	35.015	27.990	7.025	0.045 **	46.339	46.074	0.265	0.217
Q4	534	25.329	17.895	7.434	0.008 ***	41.749	32.744	9.004	0.075 *	58.075	50.415	7.660	0.031 **
Q5	527	19.646	14.748	4.898	0.065 *	38.521	28.678	9.842	0.018 **	53.291	48.437	4.854	0.062 *
Q1 & High	267	28.249	11.701	16.547	0.002 ***	49.721	21.320	28.401	0.000 ***	66.166	36.411	29.755	0.000 ***
Q1 & Low	268	15.234	12.192	3.041	0.213	34.016	26.881	7.135	0.113	56.551	38.737	17.815	0.110
High - Low	535	13.015	-0.491	13.506	0.010 **	15.705	-5.562	21.266	0.012 **	9.614	-2.326	11.940	0.205
Q2 & High	289	18.994	14.092	4.902	0.083 *	37.211	28.539	8.671	0.092 *	48.220	43.058	5.161	0.105
Q2 & Low	244	21.324	16.958	4.366	0.168	45.084	28.714	16.370	0.037 **	53.147	46.172	6.975	0.011 **
High - Low	533	-2.331	-2.866	0.535	0.456	-7.873	-0.175	-7.698	0.770	-4.927	-3.113	-1.814	0.552
Q3 & High	258	17.260	12.214	5.045	0.085 *	34.064	24.502	9.562	0.043 **	44.555	43.028	1.526	0.216
Q3 & Low	272	18.218	16.184	2.034	0.274	35.918	31.299	4.619	0.208	48.031	48.962	-0.931	0.101
High - Low	530	-0.958	-3.970	3.011	0.303	-1.854	-6.796	4.943	0.243	-3.476	-5.934	2.458	0.391
Q4 & High	268	23.672	17.370	6.302	0.061 *	42.145	32.356	9.789	0.105	56.279	48.975	7.303	0.216
Q4 & Low	266	26.999	18.424	8.575	0.029 **	41.349	33.135	8.214	0.150	59.884	51.865	8.020	0.344
High - Low	534	-3.327	-1.055	-2.273	0.669	0.797	-0.779	1.576	0.411	-3.606	-2.889	-0.716	0.516
Q5 & High	247	23.067	15.835	7.232	0.054 *	43.485	29.409	14.076	0.027 **	56.893	51.978	4.914	0.100
Q5 & Low	280	16.628	13.789	2.839	0.248	34.141	28.033	6.107	0.134	50.114	45.312	4.801	0.075 *
High - Low	527	6.439	2.046	4.393	0.224	9.344	1.376	7.968	0.208	6.779	6.666	0.113	0.461

CHAPTER 2  
INSIDER TRADING AND SHARE REPURCHASES: DO INSIDERS AND FIRMS TRADE  
IN THE SAME DIRECTION?

**Introduction**

Share repurchases have long been viewed in the finance literature as a means to signal firm undervaluation (see e.g., Vermaelen (1981)). The signaling story entails managers initiating corporate share repurchases while retaining their own stock. If the firm is not actually undervalued when a repurchase is executed, managers suffer a disproportionate loss on the shares they retain. Consistent with the signaling story, share repurchases are greeted with positive abnormal stock returns on average both at the time of their announcement (Stephens and Weisbach (1998), Jagannathan and Stephens (2003), Chan, Ikenberry, and Lee (2004), Chan, Ikenberry, Lee and Wang (2006)) and in the three years after the announcement (Chan, Ikenberry, and Lee (2004), and Ikenberry, Lakonishok, and Vermaelen (1995)).

Some have noted, however, that share repurchases might not convey positive information if management has an alternative agenda to give the false impression of undervaluation so as to sell their stock at inflated values and/or prevent a hostile takeover (see e.g., Fried (2001)). Fried (2001) notes that in most repurchase programs there is no prohibition on insider stock sales during the period it is in progress or shortly thereafter. A number of studies have examined insider trading around the announcement of major share repurchases. For instance, Lee, Mikkelson, and Partch (1992) find that for a sample of self tender offers, on average, managers sell fewer and buy more shares prior to a repurchase. Insider trading returns to normal levels after the tender offer. Louis, Sun, and White (2008) identify abnormally high net insider selling during the quarter of fixed-price and Dutch auction tender offer announcements. They also report a negative relationship between concurrent insider selling and both future operating performance and stock price performance.

While these studies are illuminating, most repurchases are not executed via tender offers, and for the most part, little attention has been paid to the frequency and nature of insider trading in conjunction with share repurchases. Additionally, we know little about the nature of firms where managers engage in insider selling while in the midst of a share repurchase program and to the subsequent share price performance of firms repurchasing shares conditional on insider trading behavior.

This study employs a simple empirical design. Each quarter we identify firms that have engaged in a non-trivial repurchase (at least 0.25% of the firm's market capitalization) and those that did not. We document firms where net insider trading (dollar buys less dollar sells), exceeds a threshold level of firm equity value in either the buy or sell direction. Insider trading is classified as net buying, neutral or net selling. We ask three fundamental questions. First, do insiders tend to trade in the same direction as their companies? One might expect that if stocks are deemed undervalued, then insiders will tend to be net buyers more frequently in quarters when corporate shares are being repurchased. We find that in quarters where companies are repurchasing stock, the frequency of net buying *and* net selling tends to be higher than during periods where there are no or minimal repurchases. An alternative way of framing the data is that, conditional on the presence of insider selling *or* insider buying, share repurchases are more frequently observed relative to the case where insider trading is neutral. Curiously, repurchasing activity seems to pick up more in quarter with net selling versus those with net buying.

While increased repurchases make sense in quarters with insider buying, the selling is more perplexing. We find that the results are primarily driven by cases where insiders are exercising large amounts of stock options and by larger firms. Hence, this result is consistent with the claim that firms repurchase stock to combat the dilutive impact of options (see Kahle (2002)). We also

find some evidence that firms with higher market to book ratios are more likely to repurchase in conjunction with insider selling. This result also is with repurchases taking place at high valuations as insiders reduce their own stock exposure.

Our second goal is to ascertain if the share repurchasing patterns are related to a firm's corporate governance. One view of repurchases that coincide with insider selling is that this is an attempt to aid certain insiders with their stock sales by keeping prices high. Alternatively, these might be firms that are overly conscious of the dilutive impact of options and fixated on short term earnings measures. Under these views, firms that repurchase when insiders are selling are not shareholder friendly. Using the G-index of corporate governance (Gompers, Ishii, and Metrick (2003)), we find that the unconditional probability of a firm repurchasing stock and insider selling in the same quarter is higher for firms with weaker shareholder rights. Conditional on the presence of insider selling, we also find more share repurchase activity. This suggests that more entrenched managers may use share repurchases to maximize their own wealth, rather than shareholder wealth.

Third, we investigate stock market return patterns for firms' stocks based on their insider trading/repurchasing classification. Prior research has generally found that stocks perform well after open market share repurchase announcements (see e.g., Ikenberry, Lakonishok and Vermaelen (1995) and Chan, Ikenberry and Lee (2004)) or after self tender offer (see Lakonishok and Vermaelen (1990)). Seyhun (2000) summarizes evidence that historically stock returns are also abnormally high (low) in the year after insider buying (selling). We find that when insiders and corporations are both buying, stock returns are abnormally high in the quarter of the actual repurchase, the subsequent quarter and in the three years after the subsequent quarter. During the quarter of the share repurchase with net insider buying, firms experience

statistically significant abnormal return of 2.59 percent and another 0.97 percent in the subsequent quarter. At the end of the quarter subsequent to the repurchase/net buying quarter, investors would have the information, in most cases, to implement a trading strategy of buying these stocks.<sup>1</sup> The abnormal returns to this strategy are statistically significant with abnormal returns of 4.95 in year 1, 2.13 percent in year 2 and 1.72 percent in year 3. The cumulative three year return is 9.03 percent. For firms that have repurchases and insider selling we find much smaller abnormal returns of 0.34 percent during the repurchase quarter and 0.28 percent in the subsequent quarter. Investing in stocks of these firms one quarter after the combined net insider selling and repurchase quarter, the returns are 0.41 percent in year 1, -0.88 percent in year 2 and -1.85 percent in year 3. The cumulative three year tradable return is -2.33 percent. When we further segment our results for repurchasing firms based on the G-index and insider trading status, we find the weakest cumulative abnormal returns for the quarter of repurchase through nine quarters after repurchase for firms with net selling and a high G-Index (low shareholder protections). The highest abnormal returns among repurchase firms are for those with net buying and a low G-Index.

We conduct two robustness checks on our results. First, we alter the definition of a repurchasing firm in any given quarter to a firm that has repurchases that exceed median repurchase levels in the prior eight quarters by 0.25% of the firm's shares outstanding. We obtain similar results for insider trading frequency (not reported), logit models explaining which firms have net insider selling in conjunction with share repurchases, and the abnormal returns. We also provide a check on our results by examining a sample of open market share repurchase

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<sup>1</sup> In virtually all cases, except extremely late reporting, the insider trading data would be available. The repurchase data should be available in most cases within three months of the end of a fiscal quarter. Current SEC rules require 10-Q and 10-K filings within three months of the end of a quarter, though some firms seek extensions.

announcements. Again, we examine whether in the 3 months after the repurchase announcements, there is abnormal insider buying and/or selling. We find less convincing evidence that the selling (conditional on repurchasing) is coming from higher G-index firms<sup>2</sup> and we find higher long run abnormal stock returns for repurchases in conjunction with insider buying versus repurchases in conjunction with insider selling.

Overall, our evidence suggests that repurchases in conjunction with insider selling are not consistent with undervaluation as a motive for repurchasing and that the practice is associated with firms possessing lower levels of shareholder rights. Those considering long term investing strategies based on repurchases as a signal of undervaluation that is not fully priced in capital markets should take note that this result does not obtain when insiders are selling their stock at or about at the time that firms are repurchasing their stock.

The paper proceeds as follows. Section II lays out the data employed in the study. Section III examines repurchase/insider trading frequencies. Section IV examines the determinants of repurchasing/insider trading frequencies. Section V examines long run stock returns. Section VI offers our conclusions.

### **Sample and Variable Construction**

In devising a sample, we use data from Compustat Quarterly spanning the period from 1987 to 2007. We first eliminate firms that have only been in the database for two years. This eliminates firms that have just raised capital via a public offering and allows for the calculation of lagged variables. We next eliminate firms with a negative book value at the beginning of the quarter since a firm's market-to-book ratio is used in both univariate and multivariate analyses. Since part of our analysis is devoted to stock returns, we delete firms whose stock price at the

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<sup>2</sup> Given the nature of the announcement event, the empirical design does not lend itself well to the probability of announcing a share repurchase conditional on insider trading.

beginning of the quarter less than one dollar because calculating returns may be problematic due to bid-ask bounce. This sample is used to examine how insider trading correlates with share repurchases for a broad set of firms over time.

Our variables of interest include actual share repurchases and insider transactions. We calculate share repurchases as the spending on the repurchase of common and preferred stock reported in Compustat quarterly minus any decrease in redeemable preferred stock. Banyai, Dyl, and Kahle (2005) identify this measure as the most accurate proxy for actual shares repurchases, especially for firms with high levels of employee stock option exercises. We modify this proxy slightly by considering any increase in treasury stock as a lower bound for share repurchases. Therefore, if our initial proxy is less than the change in the value of treasury stock, we set share repurchases equal to the change in treasury stock. To report this measure as a percentage of shares outstanding, we divide our final proxy by the firm's market capitalization, defined as the number of shares outstanding at the beginning of the fiscal quarter times the minimum monthly closing price during the current quarter.

We obtain data on insider transactions reported in SEC form 4 from the Thomson Financial Insider Filing Data Files. For each firm fiscal quarter, we calculate the total dollar values of insider purchases, which are restricted to open market purchases (SEC code "P") and sales, which include open market sales and sales to the company (SEC codes "S" and "D"). For the cases in which total insider sales exceed total insider purchases by at least 0.005 percent of the firm's market capitalization at the end of the prior fiscal quarter, we label the behavior of these insiders as "net selling." On the other hand, if total insider purchases surpass total insider sales by the same cutoff, then we say that these insiders are "net buying." When the difference between insider purchases and sales is trivial or if no insider transactions occur during the

quarter, then these cases are classified as “neutral.”<sup>3</sup> Finally, we are interested in the determinants of the relationship between share repurchases and insider trading, which potentially include firm size, market-to-book ratio, option exercise, and corporate governance. Firm size is measured as market capitalization, and size deciles are calculated each calendar quarter to control for inflation and market fluctuation. Second, since market-to-book ratios potentially vary with time and across industry, we calculate net market-to-book as the ratio of market capitalization to the book value of common equity of the firm minus the industry median market-to-book ratio for that calendar quarter. Industry is defined by the first two digits of a firm’s SIC code. These variables are calculated using data from the fiscal quarter prior to the repurchase measurement quarter. Third, option exercise is the quarterly sum of the number of options exercised times the market price on the day of exercise.

Fourth, we use the corporate governance index developed by Gompers, Ishii, and Metrick (2003) available through the IRRC governance database. The database covers firms included in the S&P 1500 index as well as other publicly traded firms with high market capitalization and/or high institutional ownership levels. The governance index (G-index) is updated every two to three years and number of included firms varies over time.<sup>4</sup> This index measures the balance of power between managers and shareholders by counting the number of provisions that reduce shareholders rights, implying that stronger shareholder rights are associated with low scores. Firms in the bottom decile of governance index ( $G\text{-index} < 6$ ) are classified as “democracies” and those in the top decile ( $G\text{-index} > 12$ ) as “dictatorships.” For our study these classifications are based on the most recent G-index score. To the extent one believes that firms with weak

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<sup>3</sup> We also used an alternative definition of net insider trading based on dollar values, with positive \$100,000 being a net buyer and negative \$100,000 being a net seller. The results were basically the same.

<sup>4</sup> The most recent number of firms with a G-index is 1,896 total in 2006. Results for subsamples including the G-index are smaller by construction.

governance may use repurchase programs to aid insiders in disposing of their shares at good prices or to manage earnings up in the face of option exercises, we would expect higher levels of the G-index to be associated with greater paired frequencies of insider selling and share repurchases.

In addition, when examining the probability that a firm conducts a repurchase, we also include variables that have been shown to affect the unconditional odds of doing a share repurchase (see Dittmar (2000)). These include stock returns in the prior quarter, cash divided by total assets, cash flow scaled by total assets, and financial leverage defined as the industry-adjusted debt to assets ratio.

### **Repurchase/Insider Trading Frequencies**

Our first empirical question is whether or not insiders tend to trade in the same direction as their firm. Panel A of Figure 2-1 presents univariate statistics that describe the general direction of insider trades conditional on whether or not a firm is participating in a non-trivial share repurchase. In our sample firms are repurchasing non-trivial amounts of stock in 14.33 percent of our 365,118 firm-quarter observations. We find that insiders are net sellers (buyers) for 33.40 percent (18.64 percent) of our sample. This is roughly a 1.79 ratio of net selling firms to net buying firms for the entire sample.

Panel B compares the frequency of observed insider trading activity for firms that repurchase in a quarter versus those that do not, and we find significant differences. Both insider purchasing *and* insider selling occur with greater frequency during the quarter in which the firm buys back shares. Conditional on repurchasing, 41.29 percent of firms have net insider selling, while only 32.08 percent of insiders are net sellers when no repurchasing is done in a quarter. Conditional on repurchasing, 19.98 percent of firms have net insider buying, while only 18.42 percent of insiders have net buying when the firm is not repurchasing shares. The ratio of sellers to buyers

is 2.07 conditional on repurchasing, which is not all that different from the unconditional sample. The obvious inference is that the amount of neutral insider trading activity takes a big drop when the firm is repurchasing stock. It falls from 49.50 percent conditional on no repurchases to 38.73 percent conditional on repurchasing.

In Panel C, conditional on insider trading behavior, we find that firms with net insider selling are the most likely to repurchase shares, followed by firms with net insider buying. Firms with net selling have repurchase activity 17.72 percent of the time, firms whose insiders are net buyers have repurchase activity 15.36 percent of the time, and firms with neutral insider activity have repurchase activity only 11.57 percent of the time.

While ex-ante we expected to find more frequent insider buying in conjunction with repurchasing, the surprising result is the increased frequency of insider selling in conjunction with repurchasing. Developing a better understanding of these patterns is undertaken in the next section.

### **Determinants of Repurchasing/Insider Trading Frequencies**

Next, we examine which factors influence insider trading and repurchasing decisions. We segment our sample on four variables: size, market-to-book ratio, option exercise, and corporate governance. Assuming that smaller firms are monitored less closely and that the level of information asymmetry is higher for this group of firms, their managers may be more willing than managers of large firms to engage in the arguably suspicious behavior of selling stock in their personal accounts while the company is buying back its stock. On the other hand, perhaps large corporations are more likely to initiate a share repurchase in the first place and to compensate their employees with stock options. In this case, one would observe more simultaneous insider selling and corporate repurchases in larger firms.

Another factor that could influence insider and corporate transactions is the perceived attractiveness of the company's current stock price, specifically the market value of the firm relative to its book value. Assuming that the market-to-book ratio is an appropriate proxy for undervaluation, companies and individuals are likely to buy more and sell less stock (sell more and buy less stock) when market-to-book ratios are low (high).

Next, option exercise may affect the intersection of share repurchases and insider transactions. Companies may choose to repurchase shares in order to counter the dilutive effect of stock options being exercised (Dittmar (2000), Kahle (2002)). In our investigation we do not examine whether the firm has a large number of options outstanding, but rather whether the options are actually being exercised. Actual exercises give companies extra cash to repurchase shares and a greater amount of diluted shares outstanding for purposes of calculating earnings per share (if the shares are not repurchased).

Finally, we examine the possibility that managers use share repurchases as a means to maintain higher stock prices so that they can sell shares at a higher price, particularly in the case where managers are given more discretion and shareholders are less empowered. Therefore, we partition our repurchasing and announcing samples on the Gompers, Ishii, and Metrick (2003) corporate governance index, a proxy for the balance of manager versus shareholder power.

### **Univariate Tests**

Figure 2-2 presents univariate statistics describing the determinants of insider trading and actual share repurchase frequencies. Panel A segments the sample on size decile, where size is defined as the product of the share price and the number of shares outstanding and deciles are calculated quarterly to account for inflation. Results are consistent with size being positively related to the probability that a firm will simultaneously repurchase and experience net insider selling. Only 1.43 percent of firms in the lowest size decile engage in repurchasing and insider

selling while 15.93 percent of firms in the largest size decile demonstrate this behavior. These probabilities are statistically different at the 1 percent level. To better understand the dynamics of this interaction, we also examine conditional probabilities, i.e. the probability that a firm repurchases conditional on net insider selling/buying and the probability that insiders are net sellers/buyers conditional on the firm repurchasing. We find that, conditional on net insider selling or buying, large firms are more likely to repurchase. Additionally, for repurchasing firms, net insider selling increases with size while net insider buying decreases with size.

Panel B of Figure 2-2 segments our actual repurchase sample on net market-to-book ratio. To the extent that a low level of this ratio is suggestive of stock undervaluation, we might expect to find more repurchases and net buying at lower levels of the ratio (Dittmar (2000)). We find that insiders of firms with higher net market-to-book ratios are 35.42 percentage points more likely to be net sellers while the company is repurchasing, but 11.41 percentage points less likely to be net buyers. Furthermore, conditional on repurchasing, firms in the top net market-to-book decile are almost twice as likely as those in the bottom decile to have net insider selling (6.57 percent versus 3.44 percent), but less likely to have net insider buying. As insiders appear to take advantage of potential mispricings in their personal accounts, there is also evidence that company level trades are related to net market-to-book. Conditional on net insider selling or buying, companies in the lowest net market-to-book decile are more likely to repurchase shares than those in the highest decile.

In Panel C we examine how option exercises relate to insider and company transactions. A firm is identified as having a high level of option exercises if the total quarterly dollar value of options exercised (the number of shares exercised time the market price the day of exercise) is greater than 0.005 percent the market value of the firm at the end of the prior fiscal quarter.

Otherwise, the firm's option exercise level is considered low. Our results suggest that option exercise is highly correlated with repurchases and insider trades. Firms categorized as having high levels of option exercise are more likely to have simultaneous net selling and repurchasing and are less likely to have simultaneous net buying and repurchasing. Conditional on net insider selling or buying, high option exercise firms are more likely to repurchase, and, conditional on repurchasing, high option exercise firms are more likely to be net sellers and less likely to be net buyers.

Finally, in Figure 2-3, we calculate the relationship between corporate governance and the intersection of insider transactions and share repurchases. We find that corporate governance is a determinant of simultaneous insider net selling and repurchasing. Dictatorships (firms with a G-Index greater than or equal to 13) are 4.84 percent more likely to buy back stock and have net insider sales than democracies (firms with a G-Index less than or equal to 5), a result significant at the 1 percent level. In addition, conditional on net selling, dictatorships are 7.28 percent more likely to repurchase. Similarly, conditional on repurchasing, dictatorships are 8.14 percent more likely to have net insider selling.

### **Logit Regressions**

In Figure 2-4 we conduct logit regressions which evaluate the probability of simultaneous insider selling and company-level repurchasing. We are most interested in this group of firms because insiders are behaving in a fashion inconsistent with the undervaluation signal sent by the company. A potential explanation is that insiders are using share repurchases as a means to sustain high stock prices. Panel A includes the full sample and evaluates the probability that a firm has concurrent net insider selling and repurchasing. The dependent variable equals one if the firm simultaneously has (i) non-trivial repurchasing activity (at least 0.25% of its shares outstanding) and (ii) insiders who are net sellers (the difference of total insider sales and total

insider purchases is greater than 0.005% of last quarter's market capitalization), otherwise zero. All models include fixed effects for the calendar quarter since repurchasing and insider trading may depend on general time trends. Firm-level fixed effects are included for some models, but by construction these estimates must exclude firms with no within-firm variation, i.e., firms in the sample that never have simultaneous repurchases and insider selling. While the loss of these firms is a cost of firm fixed effects, the firm fixed effects model may capture idiosyncratic firm preferences and helps us to better understand those firms that sometimes repurchase stock and sometimes do not. If firm-level firm effects are not present, then standard errors are clustered at the firm level.

We find results consistent with the notion that the G-index of corporate governance is positively related to the probability of concurrent insider sales and firm-level buybacks, implying that firms with stronger shareholder protection are less likely to have this occur. Using estimates from Model (6), a one standard deviation increase from the mean value of the natural log of the G-index implies a 18.85 percent increase in the odds ratio of simultaneous repurchasing and net insider selling (defined as the probability of this event divided by one minus the probability of this event). Positive coefficients on size decile and option exercise provide evidence consistent with the prior results that large firms and firms with high levels of option exercise are more likely to engage in simultaneous net insider selling and share repurchases. Using estimates from Model (6), a one standard deviation increase from the mean value of size decile (natural log of options exercised) implies a 78.05 percent (100.03 percent) increase in the odds ratio of concurrent repurchases and insider selling. As control variables, I include other factors that influence a firm's decision to repurchase: cash to total assets, cashflow to total assets, leverage (total liabilities divided by total assets minus the industry median leverage ratio for the same

calendar quarter), and lagged returns (the buy and hold stock returns for the prior quarter minus the value-weighted returns on the market during the same time period). Cash and cashflow, which are measured during the fiscal quarter prior to the repurchase measurement quarter, are positively related to the probability of repurchasing and insider selling while lagged returns are negatively related to this probability. The coefficient on the industry-adjusted leverage ratio is negative and significant for models that include firm-level fixed effects.

An alternative approach is to explain conditional probabilities of repurchasing given insider selling and the conditional probability of insider selling given repurchases. In a sense, we don't know if the "idea" to repurchase came first or the "idea" of insiders to sell came first. Panel B presents logit regressions using only the subset of firms whose insiders are characterized as net sellers. The dependent variable equals one if the firm is conducting non-trivial share repurchases and zero otherwise. Our results are consistent with firms whose shareholders have less power being more likely to buy back stock at the time when insiders are selling. Conditional on net insider sales, a one standard deviation increase from the mean value of the natural log of the G-index implies a 17.89 percent increase in the odds ratio of repurchasing using estimates from marginal effects from Model (6). Size and cashflow are both positively related to the probability of repurchasing while lagged returns are negatively correlated with actual repurchases. Option exercise is positively related to the probability of repurchasing for models without firm fixed effects whereas, for models with firm fixed effects, the coefficient on cash is positive and significant while the coefficient on leverage is negative and significant.

Panel C presents the probability of a firm having net insider sales, conditional on conducting a share repurchase. The sample only includes firms conducting non-trivial buybacks and the dependent variable is a binary variable equal to one if the firm's insiders are net sellers. In this

case, our proxy for governance is not significantly related to the probability of insiders selling. However, the likelihood of net insider selling conditional on a firm repurchasing is positively related to firm size and option exercise.

### **Robustness of Results to Definition of Repurchasing Firm**

#### **Abnormal repurchases**

The possibility exists that many firms engage in ongoing repurchase activity which would bring into question the validity of the test statistics due to correlated error terms. We redefine a repurchase quarter as a quarter in which the percentage of shares repurchased exceeds the median level of shares repurchased in the last eight quarters by 0.25% of shares outstanding. In this situation, we are arguably looking at more “opportunistic” share repurchases.

In Panel A of Figure 2-5, we continue to find results consistent with the notion that firms with stronger shareholder rights are associated with a lower probability of concurrent insider sales and firm-level buybacks. Coefficients on market-to-book ratio, size decile, option exercise, cash, leverage, lagged returns, and cashflow are similar to those in prior logit models. Panel B presents logit regressions using only the subset of firms with net insider selling. The dependent variable equals one if the firm is repurchased at least 0.25 percent more than the median value of shares repurchased over the prior 8 quarters. The result that firms with shareholders having more power are less likely to buy back stock at the time when insiders are selling continues to hold. Size, option exercise, cash, and cashflow continue to be positively related to the probability of repurchasing while leverage and lagged returns are still negatively correlated with actual repurchases. Panel C presents the probability of a firm having net insider sales, conditional on conducting an abnormally large share repurchase. Again, the relationship between corporate governance and the likelihood of having net insider selling is ambiguous. We continue to find a positive relationship between net insider selling and both size and option exercise.

## Repurchase announcements

To further verify the robustness of our results, we examine insider transactions surrounding *announcements* of a share repurchase programs. We might expect results to differ between actual share repurchases and repurchase announcements due to issues involving timing and level of commitment. The announcement of a repurchase program gives us an exact date at which the company reveals its plan to buy back stock, and, if a firm believes that its stock is undervalued, this sentiment may be strongest at the time of the announcement. Therefore, measuring insider transactions during the 90-day period during and immediately after the announcement should give us insight into how insiders behave at a time when the firm is publicly claiming that investing in their company is a wise decision. On the other hand, because the announcement of an open market share repurchase plan is not a firm commitment,<sup>5</sup> *actual* repurchases could offer a stronger undervaluation signal than *announced* repurchases. In any event, firms that may wish to falsely signal undervaluation to benefit insiders would exhibit selling activity in the period after the announcement.

The sample used in Figure 2-6 consists of firms that announced an open market share repurchase program between January 1, 1987 and December 31, 2007 and whose announcement was reported in the Securities Data Corporation Mergers and Acquisitions Database. Firms must have quarterly data available from Compustat and monthly stock price data available from CRSP in order to remain in the sample. We examine insider sales during the 90-day period beginning 2 days prior to each repurchase announcement. Hence, the dependent variable takes on a value of one when insiders of these firms are net sellers. Results are similar to those for the sample of actual repurchasers in that we identify an ambiguous relationship between proxies for corporate

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<sup>5</sup> Firms have no legal obligations to repurchase stock after the announcement of an open market repurchase plan, and Stephens and Weisbach (1998) find that firms acquire on average only 74 to 82 percent of the announced amount.

governance and the probability of insider selling. The natural log of the G-index is not significantly related to the net insider selling, but size and option exercise are again positively related to insider selling.

### **Long Run Stock Returns**

Calculating long run stock returns following repurchase activity is a natural empirical test for if and how much a company's stock was actually undervalued at the time that the actual buyback took place. Some argue that the undervaluation signal inherent in a share repurchase is invalid unless insiders retain their stock (Fried (2001)). At a minimum, insider purchases give some credence to an undervaluation signal while insider sales potentially detract from it. We further explore this idea by segmenting long run post-repurchase abnormal returns on the direction of insider trades.

### **Methodology**

Quarterly and annual buy-and-hold abnormal returns are calculated using monthly returns from CRSP. Abnormal returns are the difference in buy-and-hold returns on the repurchasing firm's stock and a size and book-to-market matched portfolio. Size and book-to-market are two important factors that explain long-run returns (Fama and French (1992), (1993)). The portfolio of control firms is constructed by identifying all firms in the same size decile as the repurchasing firm during the quarter of the repurchase. We then select the 20 firms that are closest in book-to-market to the repurchasing firm, and equal weights are assigned to each firm at the beginning of the investment period. If a firm delists during the investment period, we assume that all proceeds from that investment are placed in a market portfolio with returns equal to the value-weighted CRSP index. The control portfolio is rebalanced at the beginning of each investment year. Quarter 0 is the fiscal quarter in which share repurchase and insider trading proxies were

evaluated. Annual abnormal returns begin at quarters 2, 6, and 10 for years 1, 2, and 3, respectively.

Bootstrapping is used to infer the statistical significance of long-run returns. Specifically, we replace each firm in our sample with a randomly selected firm not in that particular subset of firms, but in the same size and book-to-market quintiles at quarter 0. Using the procedure described in the paragraph above, we calculate the abnormal returns for years 1, 2, and 3 for each firm in our new random sample as well as the mean abnormal returns for the entire sample. This process is repeated for a total of 1000 random samples so that the simulated  $p$ -values reported in this paper reflect the percentage of the 1000 random samples that have mean abnormal returns higher than the mean abnormal return for the our sample.

### **Abnormal Returns Results**

Figure 2-7 presents abnormal returns for firms that repurchased more than 0.25 percent of their shares outstanding or abnormally high amounts of stock during quarter 0. We find that abnormal returns for the repurchasing quarter, for the following quarter, and for the three years after the repurchasing quarter are correlated with the direction of insider trading. During the quarter of and the quarter immediately after the repurchasing activity we document abnormal buy-and-hold returns that are greater for firms with net insider buying than those with net insider selling. Furthermore, these results are stronger in the long term: annual abnormal buy-and-hold returns for years 1, 2, and 3 are 0.41, -0.88, and -1.85 percent for firms with net insider selling compared to 4.95, 2.13, and 1.72 percent for firms with net insider buying. Long run returns for firms whose insiders' transactions are considered neutral consistently fall between those of net sellers and buyers, implying that abnormal returns are increasing in the extent to which insider trades are consistent with undervaluation.

These results hold for firms repurchasing abnormally high amounts of stock as well. In this case, annual abnormal buy-and-hold returns for firms with net sales are positive and significant during year 1, but negative during years 2 and 3. On the other hand, firms with net insider purchases experienced positive and significant returns of 5.36 and 2.52 percent during years 1 and 2. Firms whose insiders are classified as neutral traders obtain positive and significant abnormal returns for two years as well, though the magnitude of these returns is less than that of firms with net insider buying.

Panel B of Figure 2-7 further segments the sample on the extremes of the corporate governance measure: dictatorships ( $G\text{-index} > 12$ ) and democracies ( $G\text{-index} < 6$ ). We find that democracies generally outperform dictatorships during the two years after the share repurchase. These results are consistent with the finding of Gompers, Ishii, and Metrick (2003) that firms with stronger shareholder power generally have better long run stock performance than firm with weaker shareholder rights. For the group of firms that have net insider buying, we find that democracies have positive and marginally significant abnormal returns to the order of 5.22 percent in year one and an additional 6.55 percent in year two. We also find that democracies experience lower stock returns during the quarter before the share repurchase quarter, implying that democracies may try to time the market more than dictatorships in order to buy shares that appear to be undervalued.

### **Post-Announcement Abnormal Returns**

We test the robustness of our long run returns results using a sample of open market repurchase announcements as opposed to actual share repurchases. Figure 2-8 presents abnormal returns for announcing firms, partitioned on insider trading and corporate governance. Insider trading data is from quarter 0, the three calendar months immediately following the month of the

announcement. Returns calculations for year 1 begin at month 4 after the announcement, for year 2 at month 16, and for year 3 at month 28.

We arrive at results similar to our previous findings, though in this case returns tend to be higher across the board. On average, firms announcing an open market share repurchase experience positive and significant abnormal returns during the year after the announcement, regardless of the direction of insider trading immediately after the announcement. However, the magnitude of these 12-month returns is lowest for the group of firms with net insider selling at 3.49 percent compared to 8.56 percent for neutral insiders and 4.05 percent for net buyers. Firms with net insider selling continue to have the lowest abnormal returns in year two at 2.84 percent, while firms with neutral insiders and net buying insiders have abnormal returns of 3.60 percent and 5.26 percent, respectively. In the third year after the repurchase announcement, firms with net insider buying are the only group to have positive and significant abnormal returns while firms with net insider selling have negative abnormal returns. These results are consistent with our previous findings that net insider selling appears to detract from the undervaluation signal inherent in a share repurchase; however, for announcing firms we do not necessarily find that insider buying strengthens an undervaluation signal.

Finally, we look at how corporate governance measures affect long run returns for announcing firms. Similar to firms actually repurchasing stock, announcing firms that are democracies outperform announcing dictatorships during the first two years following the announcement. Again, the lowest returns are observed for dictatorships with negative cumulative returns from year 1 through year 3. Again, the signal seems least credible (after the fact) when insiders in dictatorships are the net sellers. Consistent with our prior findings, democracies with net insider buying immediately following the repurchase announcement have extremely high

abnormal returns during the first two years, 8.85 percent during year one and 39.22 percent during year two. The results for year one are economically important, but fail to achieve statistical significance. On the other hand, the results for year two are highly significant. Only 3 of the 1,000 random matched samples had mean returns higher than the net buying/democracy group in year two. Announcing firms with neutral insider trading also perform extremely well, but only during the first year after the announcement. Abnormal buy and hold returns are 23.59 percent for this group and significant at the 0.5 percent level.

### **Interaction Regressions**

A potential question that remains is whether the effect of repurchasing and insider trading on long run returns is additive or interactive. For example, repurchasing firms tend to outperform non-repurchasing firms and firms with net insider buying tend to outperform firms with neutral trading or net insider selling. Hence, is the effect of concurrent repurchasing and insider buying stronger than the sum of the two individual effects?

We test this question using regression analysis on long run buy and hold abnormal returns, presented in Figure 2-9.<sup>6</sup> We confirm that repurchasing and net insider buying positively affect long run returns, while net insider selling is negatively related to returns. Using estimates based on two-year abnormal returns from Model (2), we find that repurchasing firms have abnormal returns of 3.1 percent and firms with net insider buying outperform size and book-to-market matched firms by 3.7 percent. On the other hand, abnormal returns for firms with net selling are -1.6 percent on average for two years.

However, we find no evidence that the effect of repurchasing and insider buying is interactive and only weak evidence in support of an interactive effect of repurchasing and insider

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<sup>6</sup> The t-statistics are likely overstated in these regressions due to data overlap. For example, a firm that is in our sample for two consecutive quarters would have two long-run returns observations that are highly correlated. Hence, one must be cautious in interpreting the results.

selling. Using estimates based on one-year returns, we identify marginally significant abnormal returns of an additional -1.8 percent for firms that simultaneously repurchased and had insider selling. The combined effect of this interaction term and of insider selling negates the positive effect of repurchasing. Though repurchasing and net selling interaction coefficients on models based on two and three-year returns fail to achieve statistical significance, they remain economically important.

### **Conclusion**

Though share repurchases are generally viewed as a signal that a firm's stock is trading below its fundamental value, the validity of the undervaluation signal is questionable when firm insiders are simultaneously selling significant amounts of stock. This study adds to the extant literature by examining the general direction of insider trades during actual share repurchasing, the determinants of insider trading around share repurchases, and the effect of insider trading on the strength of the undervaluation signal implied by a buyback.

We find that both net insider buying *and* net insider selling increase during the quarter of a share repurchase. Similarly, we find stock repurchases are more likely in quarters where insiders are selling and least likely when insider trading activity is neutral. While insider buying during a share repurchase is consistent with expectations, net insider selling during a share repurchase is more puzzling. We find that the likelihood of concurrent insider sales and firm-level buybacks increases with size, market-to-book ratio, and option exercise. These results are not only consistent with firms repurchasing stock to counter the dilution associated with stock options, but they also suggest that repurchases are taking place as insiders reduce their personal exposure to the firm's stock.

A potential view of firms that engage in both repurchasing and insider selling is that this is an attempt to sustain or artificially inflate stock prices while certain insiders sell stock. Furthermore,

these firms may be overly concerned about the dilutive impact of options on standard performance measures such as earnings per share. Assuming that these firms can be characterized as less shareholder friendly, the frequency of simultaneous repurchasing and insider net selling is likely related to proxies for corporate governance. Using the Gompers, Ishii, and Metrick (2003) governance index, we find results consistent with the probability of concurrent repurchases and net insider selling being higher for firms with weaker shareholder protection. We also find that the probability of a firm repurchasing conditional on net insider selling is higher for firms with lower shareholder rights.

Finally, we investigate the relationship between insider trading around share repurchases and the strength of the undervaluation signal implied by the repurchase. We find that insider buying reinforces this signal while insider selling weakens it. During the quarter of the repurchase, firms with net insider buying have abnormal returns of 2.59 percent, while firms with net selling have abnormal returns of only 0.34 percent. The trend continues in the long run: during the three years beginning two quarters after the repurchasing quarter, firms with net insider buying have abnormal stock returns of 4.95, 2.13, and 1.72 percent in years 1, 2, and 3, respectively, while firms with net selling have abnormal returns of 0.41, -0.88, and -1.85 percent. Abnormal returns for firms whose insider trades are characterized as neutral fall between the returns of net buyers and net sellers, suggesting that the strength of the undervaluation signal is directly related to contemporaneous insider transactions.

We verify the robustness of our results to alternative definitions of repurchasing firms. One might argue that a subset of firms will consistently repurchase stock as a means of distributing cash to shareholders. Therefore, we perform similar tests which segment firms on *abnormal* repurchases, defined as repurchasing at least 0.25 percent of share outstanding more than the

median value of share repurchases over the prior 8 quarters. Additionally, we examine a sample of firms that *announce* a share repurchase. We find that the previously identified factors influencing the intersection of repurchases and insider trading continue to be contributing factors for these alternative definitions of repurchasing firms. Long run returns results are also similar.

Taken together, our findings suggest that insider selling during a share repurchase is not consistent with undervaluation as a motive for repurchasing and that the practice is associated with weaker shareholder rights. Long term investing strategies based on repurchases as a signal of undervaluation should incorporate simultaneous insider transactions, which help to clarify the validity of the signal.

Insider trading	Share repurchases		Row total
	$\leq 0.25\%$	$> 0.25\%$	
Net selling	100349 27.48%	21604 5.92%	121953 33.40%
Neutral	154835 42.41%	20264 5.55%	175099 47.96%
Net buying	57611 15.78%	10455 2.86%	68066 18.64%
Column total	312795 85.67%	52323 14.33%	365118 100.00%

A

Figure 2-1: Insider trading and repurchase frequencies. This figure presents summary statistics on the interaction of actual and announced share repurchases with insider transactions using quarterly share repurchase and insider trading data from 1987 until 2007. Actual share repurchases are calculated as the dollar value of purchases of common and preferred stock reported in Compustat quarterly minus any decrease in preferred stock. In the rare case that this figure is less than the quarterly increase in treasury stock, then share repurchases equal the increase in treasury stock. Share repurchases are expressed as a percentage of shares outstanding. Net selling implies that the difference in total insider sales and total insider purchases is at least 0.005% of last quarter's market capitalization. Net buying indicates that total insider purchases exceed total insider sales by at least 0.005% of the firm's market capitalization at the end of the prior quarter. If the absolute value of the difference between insider purchases and insider sales is less than 0.005% of the firm's lagged market capitalization, then the firm's insider trading is considered neutral. (A) Proportion of total sample Each box in this panel presents (1) the frequency of the intersection of the events represented in each row and each column and (2) the percentage of total firm-quarter observations that this intersection represents. (B) Conditional probability of insider trading Panel B presents (1) the frequency of the intersection of the events represented in each row and each column and (2) the probability of observing the denoted insider trading behavior conditional on the repurchasing activity presented in that column. (C) Conditional probability of share repurchases This panel presents (1) the frequency of the intersection of the events represented in each row and each column and (2) the probability of repurchasing the amount indicated in the column heading, conditional on the observed direction of insider trading.

Insider trading	Share repurchases	
	$\leq 0.25\%$	$> 0.25\%$
Net selling	100349 32.08%	21604 41.29%
Neutral	154835 49.50%	20264 38.73%
Net buying	57611 18.42%	10455 19.98%
Column total	312795 100.00%	52323 100.00%

**B**

Insider trading	Share repurchases		Row total
	$\leq 0.25\%$	$> 0.25\%$	
Net selling	100349 82.28%	21604 17.72%	121953 100.00%
Neutral	154835 88.43%	20264 11.57%	175099 100.00%
Net buying	57611 84.64%	10455 15.36%	68066 100.00%

**C**

Figure 2-1. Continued

Figure 2-2: Repurchases and insider trading by size, market-to-book, and option exercise. This figure reports statistics on the intersection of share repurchases with insider buying and selling, using quarterly data from 1987 until 2007. Net selling implies that the difference in total insider sales and total insider purchases is greater than 0.005% of last quarter's market capitalization. Net buying indicates that total insider purchases exceed total insider sales by at least 0.005% of the firm's market capitalization at the end of the prior quarter. Repurchasing firms buy back at least 0.25% of shares outstanding during the fiscal quarter. Values in bold represent the magnitude and significance (p-values) of tests of difference in means for the highest and lowest decile/group. Panel A: Size decile This panel segments firms on size, where size is defined as market capitalization and deciles are calculated each calendar quarter. Panel B: Net market-to-book. Panel B examines the effect of net market-to-book decile, where net market-to-book is the ratio of market capitalization to the book value of common equity of the firm minus the industry median market-to-book ratio for that calendar quarter. Panel C: Option exercise. Panel C partitions the data on the level of option exercise. A firm is identified as having a high level of option exercise if the total dollar value of options exercised (the sum of the number of shares times the stock price on the day of exercise) over the past 3 months is greater than 0.005% of the lagged market value of the firm.

Insider trading	Frequency	% Net selling/ buying and repurchasing	% Repurchasing conditional on net selling/buying	% Net selling/ buying conditional on repurchasing	Size decile
Net selling	523	1.431	12.660	15.098	1
	880	2.411	13.955	22.518	2
	1044	2.859	13.180	24.623	3
	1272	3.484	13.361	28.681	4
	1446	3.962	12.616	32.789	5
	1774	4.857	13.334	37.882	6
	2240	6.134	15.063	44.103	7
	2774	7.599	16.900	49.019	8
	3841	10.520	21.663	53.362	9
	5810	15.928	28.631	62.831	10
		<b>14.498</b>	<b>15.970</b>	<b>47.733</b>	<b>10-1</b>
		( <b>&lt; 0.0001</b> )	( <b>&lt; 0.0001</b> )	( <b>&lt; 0.0001</b> )	
Net buying	707	1.934	10.314	20.410	1
	918	2.515	11.720	23.490	2
	1076	2.946	13.475	25.377	3
	1150	3.150	14.219	25.930	4
	1093	2.994	14.601	24.785	5
	1041	2.850	15.208	22.229	6
	1034	2.832	16.061	20.358	7
	1049	2.873	17.174	18.537	8
	1263	3.459	21.627	17.547	9
	1124	3.081	24.499	12.155	10
		<b>1.148</b>	<b>14.185</b>	<b>-8.255</b>	<b>10-1</b>
		( <b>&lt; 0.0001</b> )	( <b>&lt; 0.0001</b> )	( <b>&lt; 0.0001</b> )	

A

Figure 2-2

Insider trading	Frequency	% Net selling/ buying and repurchasing	% Repurchasing conditional on net selling/buying	% Net selling/ buying conditional on repurchasing	Net M/B decile
Net selling	1256	3.436	17.882	25.165	1
	1449	3.968	17.731	28.412	2
	1816	4.973	20.151	31.256	3
	1920	5.259	18.628	33.672	4
	2084	5.532	17.637	37.631	5
	2127	6.018	17.119	41.837	6
	2572	7.044	17.802	47.958	7
	2913	7.980	18.193	51.971	8
	3072	8.414	17.855	59.339	9
	2395	6.566	15.420	60.587	10
		<b>3.130</b> <b>(&lt; 0.0001)</b>	<b>-2.462</b> <b>(&lt; 0.0001)</b>	<b>35.422</b> <b>(&lt; 0.0001)</b>	<b>10-1</b>
Net buying	1163	3.181	15.636	23.302	1
	1128	3.089	15.291	22.118	2
	1368	3.746	17.514	23.546	3
	1328	3.637	17.050	23.290	4
	1182	3.138	14.831	21.343	5
	1110	3.141	14.770	21.833	6
	992	2.717	14.222	18.497	7
	986	2.701	16.809	17.591	8
	728	1.994	15.430	14.062	9
	470	1.289	10.202	11.890	10
		<b>-1.893</b> <b>(&lt; 0.0001)</b>	<b>-5.434</b> <b>(&lt; 0.0001)</b>	<b>-11.412</b> <b>(&lt; 0.0001)</b>	<b>10-1</b>

B

Figure 2-2. Continued

Insider trading	Frequency	% Net selling/ buying and repurchasing	% Repurchasing conditional on net selling/buying	% Net selling/ buying conditional on repurchasing	Option exercise
Net selling	7467	2.825	14.457	22.687	Low
	14137	14.020	20.109	72.834	High
		<b>11.195</b> <b>(&lt;0.0001)</b>	<b>5.652</b> <b>(&lt;0.0001)</b>	<b>50.147</b> <b>(&lt;0.0001)</b>	<b>High - Low</b>
Net buying	7891	2.986	14.357	23.975	Low
	2564	2.543	19.568	13.210	High
		<b>-0.443</b> <b>(&lt;0.0001)</b>	<b>5.211</b> <b>(&lt;0.0001)</b>	<b>-10.766</b> <b>(&lt;0.0001)</b>	<b>High - Low</b>

C

Figure 2-2. Continued

	Governance	Frequency	% Net selling/buying and repurchasing	% Repurchasing conditional on net selling/buying	% Net selling/buying conditional on repurchasing
Net selling	Democracy ( $G \leq 5$ )	993	10.054	21.083	51.080
	Other ( $5 < G < 13$ )	9766	12.981	25.442	58.874
	Dictatorship ( $G \geq 13$ )	1635	14.897	28.361	59.218
	<b>Dictatorship - Democracy</b>		<b>4.844</b>	<b>7.278</b>	<b>8.137</b>
			<b>(&lt;0.0001)</b>	<b>(&lt;0.0001)</b>	<b>(&lt;0.0001)</b>
Net buying	Democracy ( $G \leq 5$ )	348	3.523	21.429	17.901
	Other ( $5 < G < 13$ )	2620	3.483	21.728	15.795
	Dictatorship ( $G \geq 13$ )	469	4.273	24.881	16.987
	<b>Dictatorship - Democracy</b>		<b>0.750</b>	<b>3.452</b>	<b>-0.915</b>
			<b>(0.0053)</b>	<b>(0.0158)</b>	<b>(0.4149)</b>

Figure 2-3: Corporate governance. This figure examines the interaction of share repurchases and insider trading, partitioned on corporate governance factors. The measure of corporate governance is the G-index from Gompers, Ishii, and Metrick (2003). The sample analyzed in this figure is restricted to firms that repurchase at least 0.25% of their shares outstanding and whose insiders are net sellers (the difference of total insider sales and total insider purchases is greater than 0.005% of last quarter's market capitalization) or net buyers (the difference of total insider purchases and total insider sales is greater than 0.005% of last quarter's market capitalization). Values in bold represent the magnitude and significance (p-values) of tests of difference in means for dictatorships and democracies.

Figure 2-4: Logit models. This figure presents estimates from logit regressions that examine the intersection of insider transactions and firm-level share repurchases. Ln(G-index) is the natural log of the Gompers, Ishii, and Metrick (2003) corporate governance index, for which larger values indicate more lenient governance. Net M/B is the ratio of market capitalization to the book value of common equity of the firm minus the industry median market-to-book ratio for that calendar quarter. Size is defined as market capitalization and deciles are calculated each calendar quarter. Ln(Options) is the natural log of the total dollar value of options exercised (the number of shares times the stock price on the day of exercise). Cash is cash and short-term investments, scaled by total assets. Cashflow is cashflow from operations, scaled by total assets. Leverage is total liabilities scaled by total assets minus the industry median leverage ratio for the same calendar quarter. Lagged returns are the buy and hold stock returns for the prior quarter minus the value-weighted returns on the market during the same time period. Z-statistics are reported below the coefficient estimates in parentheses. When firm-level fixed effects are not present, standard errors are clustered at the firm level. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively. (A) Simultaneous share repurchases and insider selling. This panel includes the full sample of firms from Compustat quarterly. The dependent variable is a binary variable equal to one if the firm simultaneously has (i) non-trivial repurchasing activity (at least 0.25% of its shares outstanding) and (ii) insiders who are net sellers (the difference of total insider sales and total insider purchases is greater than 0.005% of last quarter's market capitalization), otherwise zero. (B) Repurchasing conditional on insider selling. This panel includes the subset of firms whose insiders are net sellers (the difference of total insider sales and total insider purchases is greater than 0.005% of last quarter's market capitalization). The dependent variable is a binary variable equal to one if the firm has non-trivial repurchasing activity (at least 0.25% of its shares outstanding) and zero, otherwise. (C) Insider selling conditional on repurchasing. This panel includes the subset of firms conducting non-trivial share repurchasing (at least 0.25% of shares outstanding). The dependent variable is a binary variable equal to one if the firm's insiders are net sellers (the difference of total insider sales and total insider purchases is greater than 0.005% of last quarter's market capitalization) and zero, otherwise.

	(1)	(2)	(3)	(4)	(5)	(6)
Ln(G-index)	0.275** (2.574)	0.235** (2.212)	0.187 (1.604)	0.610*** (4.514)	0.500*** (3.602)	0.590*** (3.522)
Net M/B	0.000 (0.521)	0.000 (0.443)	0.000 (0.828)	0.000 (1.104)	0.000 (0.895)	0.000 (0.737)
Size decile	0.363*** (19.270)	0.228*** (12.060)	0.217*** (10.633)	0.497*** (22.180)	0.369*** (15.832)	0.370*** (13.579)
Ln(options)		0.096*** (29.001)	0.101*** (28.627)		0.093*** (43.223)	0.097*** (37.855)
Cash	0.717*** (4.383)	0.425** (2.565)	0.297* (1.689)	1.206*** (6.657)	1.108*** (5.944)	1.059*** (4.904)
Leverage	-0.023 (-0.142)	0.043 (0.260)	-0.065 (-0.385)	-2.059*** (-13.620)	-1.977*** (-12.720)	-2.040*** (-11.435)
Lagged returns	-0.138*** (-2.725)	-0.513*** (-9.159)	-0.529*** (-8.354)	-0.171** (-2.568)	-0.511*** (-7.270)	-0.486*** (-6.114)
Cashflow			3.164*** (11.643)			1.179*** (5.039)
N	92,089	92,029	67,546	65,163	65,014	46,591
Adjusted R2	0.085	0.134	0.149	0.090	0.135	0.144
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	No	No	No	Yes	Yes	Yes

A

Figure 2-4.

	(1)	(2)	(3)	(4)	(5)	(6)
Ln(G-index)	0.319*** (2.853)	0.314*** (2.808)	0.282** (2.278)	0.480*** (3.068)	0.482*** (3.082)	0.562*** (2.970)
Net M/B	-0.000 (-0.609)	-0.000 (-0.563)	-0.000 (-0.385)	-0.000 (-0.115)	-0.000 (-0.121)	-0.000 (-0.154)
Size decile	0.214*** (10.675)	0.199*** (9.699)	0.191*** (8.451)	0.351*** (12.936)	0.355*** (12.978)	0.374*** (11.711)
Ln(options)		0.013*** (3.918)	0.014*** (3.942)		-0.003 (-1.157)	-0.004 (-1.226)
Cash	0.294* (1.658)	0.260 (1.464)	0.171 (0.904)	1.302*** (6.177)	1.299*** (6.161)	1.285*** (5.259)
Leverage	0.178 (1.009)	0.185 (1.049)	0.092 (0.507)	-2.438*** (-13.543)	-2.446*** (-13.573)	-2.567*** (-12.439)
Lagged returns	-0.976*** (-15.070)	-1.016*** (-15.678)	-1.003*** (-13.870)	-1.163*** (-14.296)	-1.153*** (-14.116)	-1.127*** (-12.211)
Cashflow			3.249*** (10.403)			1.241*** (4.559)
N	46,908	46,874	34,150	36,977	36,918	26,605
Adjusted R2	0.063	0.064	0.074	0.117	0.117	0.127
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	No	No	No	Yes	Yes	Yes

B

Figure 2-4. Continued

	(1)	(2)	(3)	(4)
Ln(G-index)	0.017 (0.177)	-0.082 (-0.783)	0.533** (2.496)	0.197 (0.801)
Net M/B	0.001 (0.853)	0.001 (1.092)	0.004* (1.956)	0.002 (1.056)
Size decile	0.305*** (17.598)	0.129*** (6.829)	0.363*** (10.694)	0.120*** (3.155)
Ln(options)		0.159*** (40.138)		0.174*** (51.593)
N	21,374	21,357	18,850	18,827
Adjusted R2	0.095	0.259	0.066	0.260
Time fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	No	No	Yes	Yes

C  
Figure 2-4. Continued

Figure 2-5: Abnormally high repurchasing logit models. This figure presents estimates from logit regressions that examine the intersection of insider transactions and abnormally large share repurchases. The level of repurchasing is classified as abnormally high if the current value exceeds the median value of repurchases over the prior 8 quarters by at least 0.25% of share outstanding. Ln(G-index) is the natural log of the Gompers, Ishii, and Metrick (2003) corporate governance index, for which larger values indicate more lenient governance. Net M/B is the ratio of market capitalization to the book value of common equity of the firm minus the industry median market-to-book ratio for that calendar quarter. Size is defined as market capitalization and deciles are calculated each calendar quarter. Ln(Options) is the natural log of the total dollar value of options exercised (the number of shares times the stock price on the day of exercise). Cash is cash and short-term investments, scaled by total assets. Cashflow is cashflow from operations, scaled by total assets. Leverage is total liabilities scaled by total assets minus the industry median leverage ratio for the same calendar quarter. Lagged returns are the buy and hold stock returns for the prior quarter minus the value-weighted returns on the market during the same time period. Z-statistics are reported below coefficient estimates in parentheses. When the firm-level fixed effects are not present, standard errors are clustered at the firm level. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively. (A): Simultaneous abnormally high levels of repurchases and insider selling. This panel includes the full sample of firms from Compustat quarterly. The dependent variable is a binary variable equal to one if the firm simultaneously has (i) abnormally high repurchases (the median value of repurchases over the prior 8 quarters by at least 0.25%) and (ii) insiders who are net sellers (the difference of total insider sales and total insider purchases is greater than 0.005% of last quarter's market capitalization), otherwise zero. (B): Abnormally high repurchasing conditional on insider selling. This panel includes the subset of firms whose insiders are net sellers (the difference of total insider sales and total insider purchases is greater than 0.005% of last quarter's market capitalization). The dependent variable is a binary variable equal to one if the firm repurchases an abnormally high amount of stock. (C) Insider selling conditional on abnormally high repurchasing. This panel includes the subset of firms conducting abnormally high levels of share repurchases. The dependent variable is a binary variable equal to one if the firm's insiders are net sellers (the difference of total insider sales and total insider purchases is greater than 0.005% of last quarter's market capitalization) and zero, otherwise.

	(1)	(2)	(3)	(4)	(5)	(6)
Ln(G-index)	0.223*** (2.585)	0.181** (2.156)	0.106 (1.123)	0.578*** (3.795)	0.522*** (3.362)	0.541*** (2.925)
Net M/B	0.000 (0.195)	0.000 (0.013)	0.000 (0.295)	0.000 (0.839)	0.000 (0.677)	0.000 (0.993)
Size decile	0.288*** (18.780)	0.161*** (10.273)	0.156*** (9.254)	0.426*** (17.313)	0.312*** (12.300)	0.318*** (10.771)
Ln(options)		0.088*** (28.354)	0.093*** (26.797)		0.079*** (32.680)	0.080*** (28.504)
Cash	0.816*** (6.061)	0.558*** (4.152)	0.383*** (2.658)	1.641*** (8.313)	1.566*** (7.783)	1.446*** (6.259)
Leverage	-0.344*** (-2.608)	-0.299** (-2.304)	-0.402*** (-2.989)	-2.571*** (-15.082)	-2.491*** (-14.359)	-2.626*** (-13.253)
Lagged returns	-0.200*** (-3.212)	-0.550*** (-8.116)	-0.557*** (-7.496)	-0.282*** (-3.744)	-0.567*** (-7.243)	-0.537*** (-6.112)
Cashflow			2.560*** (9.129)			0.785*** (3.087)
N	92,089	92,029	67,546	63,377	63,229	45,304
Adjusted R2	0.066	0.104	0.117	0.071	0.103	0.109
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	No	No	No	Yes	Yes	Yes

**A**  
Figure 2-5.

	(1)	(2)	(3)	(4)	(5)	(6)
Ln(G-index)	0.245*** (2.872)	0.241*** (2.832)	0.178* (1.833)	0.512*** (3.085)	0.516*** (3.110)	0.490** (2.454)
Net M/B	-0.000 (-0.606)	-0.000 (-0.580)	-0.000 (-0.447)	0.000 (0.139)	0.000 (0.131)	0.000 (0.541)
Size decile	0.129*** (8.195)	0.120*** (7.313)	0.120*** (6.674)	0.265*** (9.425)	0.273*** (9.627)	0.295*** (8.983)
Ln(options)		0.008*** (2.762)	0.009*** (2.627)		-0.006** (-2.288)	-0.009*** (-2.912)
Cash	0.439*** (3.143)	0.419*** (2.984)	0.274* (1.808)	1.717*** (7.871)	1.717*** (7.873)	1.615*** (6.451)
Leverage	-0.195 (-1.454)	-0.190 (-1.420)	-0.282** (-1.997)	-2.887*** (-15.175)	-2.900*** (-15.236)	-3.083*** (-14.149)
Lagged returns	-0.979*** (-12.825)	-1.006*** (-13.138)	-0.988*** (-11.843)	-1.078*** (-12.480)	-1.062*** (-12.247)	-1.027*** (-10.545)
Cashflow			2.456*** (8.013)			0.686** (2.475)
N	46,908	46,874	34,150	36,374	36,315	26,198
Adjusted R2	0.048	0.049	0.057	0.083	0.083	0.092
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	No	No	No	Yes	Yes	Yes

B  
Figure 2-5. Continued

	(1)	(2)	(3)	(4)
Ln(G-index)	0.029 (0.318)	-0.101 (-1.013)	0.452* (1.774)	0.051 (0.170)
Net M/B	0.001 (0.981)	0.000 (0.962)	0.003 (1.541)	0.002 (0.810)
Size decile	0.285*** (16.480)	0.117*** (6.080)	0.362*** (9.233)	0.118*** (2.649)
Ln(options)		0.162*** (41.537)		0.176*** (41.973)
N	14,864	14,853	12,332	12,315
Adjusted R2	0.096	0.264	0.081	0.287
Time fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	No	No	Yes	Yes

C  
Figure 2-5. Continued

	(1)	(2)	(3)	(4)
Ln(G-index)	0.041 (0.262)	-0.126 (-0.731)	0.166 (0.284)	0.210 (0.296)
Net M/B	0.015 (1.127)	0.013 (1.480)	0.006 (0.600)	0.003 (0.388)
Size decile	0.248*** (9.828)	0.115*** (4.180)	0.134* (1.793)	0.003 (0.037)
Ln(options)		0.155*** (21.293)		0.175*** (13.600)
N	2,907	2,905	1,547	1,546
Adjusted R2	0.087	0.239	0.090	0.317
Time fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	No	No	Yes	Yes

Figure 2-6: Repurchase announcement logit models. This figure presents estimates from logit regressions using the subset of firms that announced a share repurchase program. The dependent variable is a binary variable equal to one if, during the 90-day period beginning 2 days prior to the announcement, the firm's insiders are net sellers (the difference of total insider sales and total insider purchases is greater than 0.005% of last quarter's market capitalization) and zero, otherwise. Ln(G-index) is the natural log of the Gompers, Ishii, and Metrick (2003) corporate governance index, for which larger values indicate more lenient governance. Net M/B is the ratio of market capitalization to the book value of common equity of the firm minus the industry median market-to-book ratio for that calendar quarter. Size is defined as market capitalization and deciles are calculated each calendar quarter. Ln(Options) is the natural log of the total dollar value of options exercised (the number of shares times the stock price on the day of exercise). Cash is cash and short-term investments, scaled by total assets. Cashflow is cashflow from operations, scaled by total assets. Leverage is total liabilities scaled by total assets minus the industry median leverage ratio for the same calendar quarter. Lagged returns are the buy and hold stock returns for the prior quarter minus the value-weighted returns on the market during the same time period. Z-statistics are reported below coefficient estimates in parentheses. When firm-level fixed effects are not present, standard errors are clustered at the firm level. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively.

Frequency	Repurchases	Abnormal repurchases	Insider trading	Quarter -1	Quarter 0	Quarter 1	Year 1	Year 2	Year 3
21681	> 0.25%		Net selling	-1.241%	0.341%	0.282%	0.410%	-0.879%	-1.848%
				<i>1.000</i>	<i>0.029</i>	<i>0.069</i>	<i>0.168</i>	<i>0.944</i>	<i>0.998</i>
20404	> 0.25%		Neutral	-2.086%	1.034%	0.971%	3.028%	0.582%	0.953%
				<i>1.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>	<i>0.071</i>	<i>0.017</i>
10509	> 0.25%		Net buying	-3.913%	2.591%	0.971%	4.946%	2.133%	1.723%
				<i>1.000</i>	<i>0.000</i>	<i>0.003</i>	<i>0.000</i>	<i>0.009</i>	<i>0.030</i>
15226		High	Net selling	-1.534%	0.602%	0.564%	1.203%	-0.569%	-2.343%
				<i>1.000</i>	<i>0.004</i>	<i>0.011</i>	<i>0.023</i>	<i>0.717</i>	<i>0.998</i>
15586		High	Neutral	-2.387%	0.909%	1.125%	3.074%	1.054%	0.633%
				<i>1.000</i>	<i>0.000</i>	<i>0.001</i>	<i>0.000</i>	<i>0.042</i>	<i>0.152</i>
8188		High	Net buying	-4.229%	2.557%	1.083%	5.364%	2.519%	0.488%
				<i>1.000</i>	<i>0.000</i>	<i>0.005</i>	<i>0.000</i>	<i>0.008</i>	<i>0.303</i>

## A

Figure 2-7: Abnormal returns. Figure 2-7 presents quarterly and annual buy-and-hold abnormal returns. Panel A presents returns segmented on the level of repurchases and the direction of insider trading. Panel B partitions the sample on repurchases, insider trading, and governance characteristics. Repurchase and insider trading data are from quarter 0. Year 1 begins at quarter 2, year 2 at quarter 6, and year 3 at quarter 10. Repurchases are expressed as a percentage of shares outstanding. Repurchases are abnormally high if the current value is at least 0.25% greater than the median value of repurchases over the prior 8 quarters. Net selling implies that the difference of total insider sales and total insider purchases during the current quarter is greater than 0.005% of last quarter's market capitalization. Net buying indicates that total insider purchases exceed total insider sales by at least 0.005% of the firm's market capitalization at the end of the prior quarter. If the absolute value of the difference between insider purchases and insider sales is less than 0.005% of the firm's lagged market capitalization, then the firm's insider trading is considered neutral. Dictatorship is a dummy variable equal to one if the corporate governance index is greater than 12 while democracy corresponds to a G-index of less than 6. (A): Returns by repurchasing activity and insider trading. (B) Returns by repurchasing activity, insider trading, and corporate governance

Frequency	Repurchases	Insider trading	Governance	Quarter -1	Quarter 0	Quarter 1	Year 1	Year 2	Year 3
1635	> 0.25%	Net selling	Dictatorship	-1.279%	0.138%	1.488%	2.914%	-1.489%	-2.242%
				<i>0.97</i>	<i>0.376</i>	<i>0.007</i>	<i>0.023</i>	<i>0.786</i>	<i>0.9</i>
993	> 0.25%	Net selling	Democracy	-2.013%	0.210%	0.996%	4.168%	-1.670%	-4.242%
				<i>0.982</i>	<i>0.359</i>	<i>0.121</i>	<i>0.02</i>	<i>0.733</i>	<i>0.96</i>
657	> 0.25%	Neutral	Dictatorship	-2.997%	2.097%	1.039%	2.122%	0.215%	-5.398%
				<i>0.996</i>	<i>0.034</i>	<i>0.159</i>	<i>0.171</i>	<i>0.403</i>	<i>0.95</i>
603	> 0.25%	Neutral	Democracy	-6.708%	1.674%	3.308%	7.234%	0.882%	0.561%
				<i>1.000</i>	<i>0.033</i>	<i>0.001</i>	<i>0.01</i>	<i>0.313</i>	<i>0.405</i>
469	> 0.25%	Net buying	Dictatorship	-5.020%	1.690%	0.327%	2.592%	3.419%	-1.563%
				<i>1.000</i>	<i>0.004</i>	<i>0.252</i>	<i>0.043</i>	<i>0.029</i>	<i>0.795</i>
348	> 0.25%	Net buying	Democracy	-7.105%	0.651%	1.626%	5.215%	6.554%	-0.471%
				<i>1.000</i>	<i>0.366</i>	<i>0.201</i>	<i>0.144</i>	<i>0.056</i>	<i>0.479</i>

**B**

Figure 2-7. Continued

Frequency	Insider trading	Governance	Quarter -1	Quarter 0	Quarter 1	Year 1	Year 2	Year 3
2991	Net selling		-0.495%	-0.201%	0.869%	3.491%	2.839%	-1.336%
			<i>0.779</i>	<i>0.620</i>	<i>0.082</i>	<i>0.011</i>	<i>0.041</i>	<i>0.801</i>
3115	Neutral		0.535%	0.568%	1.944%	8.559%	3.602%	1.424%
			<i>0.194</i>	<i>0.225</i>	<i>0.002</i>	<i>0.000</i>	<i>0.006</i>	<i>0.162</i>
1688	Net buying		0.275%	0.155%	1.192%	4.050%	5.264%	2.560%
			<i>0.351</i>	<i>0.389</i>	<i>0.056</i>	<i>0.044</i>	<i>0.007</i>	<i>0.081</i>
193	Net selling	Dictatorship	-2.722%	-0.069%	0.086%	-0.682%	1.855%	-6.218%
			<i>0.882</i>	<i>0.513</i>	<i>0.472</i>	<i>0.519</i>	<i>0.325</i>	<i>0.867</i>
141	Net selling	Democracy	0.406%	-0.980%	3.778%	10.422%	3.396%	-5.282%
			<i>0.430</i>	<i>0.665</i>	<i>0.046</i>	<i>0.047</i>	<i>0.252</i>	<i>0.854</i>
92	Neutral	Dictatorship	2.448%	1.193%	2.492%	7.395%	-3.956%	-1.939%
			<i>0.214</i>	<i>0.336</i>	<i>0.169</i>	<i>0.148</i>	<i>0.713</i>	<i>0.556</i>
94	Neutral	Democracy	-2.093%	1.900%	12.621%	23.588%	-3.176%	3.595%
			<i>0.655</i>	<i>0.243</i>	<i>0.001</i>	<i>0.005</i>	<i>0.667</i>	<i>0.290</i>
89	Net buying	Dictatorship	3.818%	-2.605%	3.621%	3.299%	-0.222%	6.740%
			<i>0.131</i>	<i>0.765</i>	<i>0.125</i>	<i>0.322</i>	<i>0.458</i>	<i>0.191</i>
62	Net buying	Democracy	-3.161%	0.260%	0.260%	8.851%	39.220%	-3.470%
			<i>0.719</i>	<i>0.476</i>	<i>0.456</i>	<i>0.199</i>	<i>0.003</i>	<i>0.552</i>

Figure 2-8: Post-announcement abnormal returns. Figure 8 presents quarterly and annual buy-and-hold abnormal returns, partitioned the sample on insider trading and governance characteristics, for firms that have announced an open market share repurchase plan. Insider trading data is from quarter 0, the three calendar months immediately following the month of the announcement. Returns calculations for year 1 begin at month 4 following the announcement, for year 2 at month 16 and for year 3 at month 28. Net selling implies that the difference of total insider sales and total insider purchases during the quarter is greater than 0.005% of last quarter's market capitalization. Net buying indicates that total insider purchases exceed total insider sales by at least 0.005% of the firm's market capitalization at the end of the prior quarter. If the absolute value of the difference between insider purchases and insider sales is less than 0.005% of the firm's lagged market capitalization, then the firm's insider trading is considered neutral. Dictatorship is a dummy variable equal to one if the corporate governance index is greater than 12 while democracy corresponds to a G-index of less than 6.

	<b>Year 1</b>	<b>Years 1-2</b>	<b>Years 1-3</b>
	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
Repurchasing	0.025*** (3.169)	0.031** (2.338)	0.035* (1.871)
Net insider buying	0.027*** (3.989)	0.037*** (3.085)	0.032** (2.009)
Net insider selling	-0.008* (-1.773)	-0.016* (-1.661)	-0.018 (-1.223)
Repurchasing*Net insider buying	-0.007 (-0.563)	-0.007 (-0.328)	0.021 (0.758)
Repurchasing*Net insider selling	-0.018* (-1.941)	-0.025 (-1.576)	-0.036 (-1.547)
Constant	0.005 (1.361)	0.001 (0.090)	-0.025** (-2.261)
Number of observations	251,557	243,381	231,210
Adjusted R2	0.0003	0.0002	0.0002

Figure 2-9: Interaction regressions. Figure 9 presents OLS regressions on long run buy-and-hold abnormal returns. The dependent variables are one-year abnormal returns, two-year cumulative abnormal returns, and three-year cumulative abnormal returns. Repurchase and insider trading data are from quarter 0. Year 1 begins at quarter 2, year 2 at quarter 6, and year 3 at quarter 10. Repurchasing is a binary variable equal to one if the firm repurchases greater than 0.25% of share outstanding during quarter 0. Net insider selling implies that the difference of total insider sales and total insider purchases during the current quarter is greater than 0.005% of last quarter's market capitalization. Net insider buying indicates that total insider purchases exceed total insider sales by at least 0.005% of the firm's market capitalization at the end of the prior quarter. T-statistics calculated using firm-level clustered standard errors are reported below coefficient estimates in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively.

APPENDIX A  
VARIABLE DEFINITIONS

Table A-1. Repurchasing variables

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Percent sought	The announced percentage of shares outstanding reported by the Securities Data Corporation (SDC) that the firm intends to buy back during the repurchase program. If this value is missing but the dollar value of the program is reported, then I calculate percent sought as the dollar value of the repurchase program divided by the market capitalization of the firm one quarter prior to the announcement.
Actual percent repurchased	The spending on the repurchase of common and preferred stock minus decreases in redeemable preferred stock, scaled by the minimum price each quarter, summed over the two years following the announcement or until a subsequent announcement is made.
Percent completed	The portion of the announced amount that the firm subsequently repurchases, defined as actual percent repurchased divided by percent sought. The SDC database, while considered the most comprehensive source of share repurchase data, occasionally fails to report share repurchases. Hence, I truncate percent completed at 100 percent to control for potentially missing subsequent share repurchase announcements
Lagged percent completed	The percent completed associated with the most recent prior announcement.
Occasional repurchaser	A dummy variable equal to one if the current repurchase announcement is the second announcement in the past five years. This definition is identical to the definition of “occasional repurchases” presented by Jagannathan and Stephens (2003).
Frequent repurchaser	A dummy variable equal to one if this announcement is at least the third announcement in the past five years. This definition is identical to the definition of “frequent repurchases” presented by Jagannathan and Stephens (2003).

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Table A-2. Returns variables

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Announcement returns	The cumulative stock returns from two days prior to the announcement until two days following the announcement minus cumulative equally weighted returns on the market for the same time period.
Pre-announcement returns	The cumulative stock returns from 40 days prior to the announcement until 6 days prior to the announcement minus cumulative equally weighted returns on the market for the same time period.
Abnormal returns	The annual return on the repurchasing firm's stock minus the annual return on a portfolio of control firms over 12 months. Year 1 begins the month following the repurchase announcement. To construct control portfolios, I select the twenty firms in the same size decile as the repurchasing firm at the time of the announcement that are closest in market-to-book to the repurchasing firm. If a matched firm delists during that year, then I assume that the proceeds from that investment are invested in a market portfolio with returns equal to the returns on the value-weighted CRSP index. Control portfolios are rebalanced on an annual basis.
Two-year abnormal returns	The annualized returns on the repurchasing firm's stock minus the annualized return on a portfolio of control firms from one month following the prior repurchase announcement until 24 months following the prior announcement. If the current share repurchase announcement occurs within this 24-month period, then abnormal returns calculations are stopped the month before the current announcement. To construct control portfolios, I select the twenty firms in the same size decile as the repurchasing firm at the time of the past announcement that are closest in market-to-book to the repurchasing firm. If a matched firm delists during that year, then I assume that the proceeds from that investment are invested in a market portfolio with returns equal to the returns on the value-weighted CRSP index. Control portfolio are rebalanced on an annual basis.

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Table A-3. Firm-specific characteristics

Pre-announcement insider trading	The dollar value of shares purchased during the three months prior to the announcement minus the dollar value of shares sold during the same time period, scaled by the sum of the value of shares bought and sold. If no trading took place during the time period, then I set this variable equal to zero. To ensure that all information concerning insider transactions is publically available, I only use trades for which the report date with the Securities and Exchange Commission precedes the repurchase announcement date by at least two days.
Lagged post-announcement insider trading	The dollar value of shares purchased minus the dollar value of shares sold during the 3 months following the prior announcement, scaled by the sum of the value of shares bought and sold. This variable equals zero if no trading took place. To ensure that all information concerning insider transactions is publically available, I only use trades in which the report date with the Securities and Exchange Commission precedes the repurchase announcement date by at least two days.
Discretionary accruals	<p>I use the modified version of the Jones model from Louis and White (2007). Dechow et al. (1995) find that the modified-Jones model of discretionary accruals provides the most powerful tests of earnings management among existing models. I calculate quarterly total accruals as the change in current assets (data item 40 in Compustat quarterly) minus the change in current liabilities (data item 49) minus the change in cash (data item 36) plus the change in debt in current liabilities (data item 45) minus depreciation (data item 5). If data item 5 is missing, then I calculate depreciation using data item 77 from the statement of cash flow. Using all firms with Compustat quarterly data, I estimate the following model for each calendar quarter and each two-digit SIC-code industry:</p> $Total\ Accruals_{i,t} / Assets_{i,t-1} = \alpha_1(Assets_{i,t-1}) + \alpha_2(\Delta Sales_{i,t} / Assets_{i,t-1}) + \alpha_3(PPE_{i,t} / Assets_{i,t-1}) + \varepsilon_{i,t}$ <p>with dummy variables for each fiscal quarter. The predicted value represents non-discretionary accruals and the residual term represents discretionary accruals. Discretionary accruals correspond to the fiscal quarter prior to the share repurchase announcement unless the earnings announcement follows the share repurchase announcement. In that case, discretionary accruals correspond to two fiscal quarters prior to the share repurchase announcement.</p>
Mean analyst recommendation	The average of analysts' recommendations reported in I/B/E/S at the time of the repurchase announcement where 1 = Strong Buy, 2 = Buy, 3 = Hold, 4 = Underperform, and 5 = Sell.
Net mean analyst recommendation	The mean analyst recommendation scaled by the average mean analyst recommendation of all firms listed in I/B/E/S during the calendar year of the repurchase announcement.
Percent of forecasts met	the percentage of the last four quarterly earnings forecasts reported prior to the repurchase announcement that the firm has either met or exceeded. Earning data comes from I/B/E/S.

Table A-3. Continued

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Cash	Cash and short-term investments, scaled by market capitalization, at the end of the fiscal quarter prior to the announcement.
Size decile	The market capitalization decile in which the firm falls during the calendar quarter prior to the share repurchase announcement. Deciles are calculated quarterly using the entire database of Compustat quarterly. Decile 1 is the smallest.
Net leverage	The leverage ratio (total liabilities minus cash and short-term investments, scaled by total assets) minus the industry average leverage ratio at the end of the fiscal quarter prior to the announcement. Industry is defined using the first two digits of a firm's SIC code.
Net market-to-book	Net market-to-book is the market-to-book (market value of equity divided by the book value of equity divided) minus the industry average market-to-book ratio at the end of the fiscal quarter prior to the announcement. Industry is defined using the first two digits of a firm's SIC code.

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Table A-4. Dividend announcement dummies and earnings announcement dummies

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Positive surprise	A dummy variable equal to one if the announcing firm releases quarterly earnings results are above the mean of analysts' forecasts between the time period beginning two days prior to the repurchase announcement and ending two days after the announcement. Analyst forecast data is from I/B/E/S.
Negative surprise	A dummy variable equal to one if the announcing firm releases quarterly earnings results are below the mean of analysts' forecasts between the time period beginning two days prior to the repurchase announcement and ending two days after the announcement. Analyst forecast data is from I/B/E/S.
No surprise	A dummy variable equal to one if the announcing firm releases quarterly earnings results are at the mean of analysts' forecasts between the time period beginning two days prior to the repurchase announcement and ending two days after the announcement. Analyst forecast data is from I/B/E/S.
Increase	A dummy variable equal to one if the firm announced an increase in dividends between the time period beginning two days prior to the repurchase announcement and ending two days after the announcement.
Decrease	A dummy variable equal to one if the firm announced an decrease in dividends between the time period beginning two days prior to the repurchase announcement and ending two days after the announcement.
No change	A dummy variable equal to one if the firm announced a continuation in current dividends between the time period beginning two days prior to the repurchase announcement and ending two days after the announcement.
Special dividend	A dummy variable equal to one if the firm announced a special dividend between the time period beginning two days prior to the repurchase announcement and ending two days after the announcement.

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## APPENDIX B LONG-RUN BUY-AND-HOLD RETURNS CALCULATIONS

All long-run returns are calculated using monthly returns from CRSP. The investment period begins the month following the buyback announcement; hence, one-year returns span from month 1 to 12, two-year returns from month 13 to 24, and three-year returns from month 25 to 36. Abnormal returns are the difference in buy-and-hold returns on the repurchasing firm's stock and a size and book-to-market matched portfolio. Size and book-to-market are two important factors that explain long-run returns (Fama and French (1992), (1993)). The portfolio of control firms is constructed by identifying all firms in the same size decile as the repurchasing firm during the month of the announcement. I then select the 20 firms that are closest in book-to-market to the repurchasing firm, and equal weights are assigned to each firm at the beginning of the investment period. If a firm delists during the investment period, then I assume that all proceeds from that investment are placed in a market portfolio with returns equal to the value-weighted CRSP index. The control portfolio is rebalanced at the beginning of each investment year.

Bootstrapping is used to infer the statistical significance of long-run returns. Specifically, I replace each firm in my repurchasing sample with a randomly selected non-repurchasing firm in the same size and book-to-market quintiles at the time of the buyback announcement. Using the procedure described in the paragraph above, I calculate the abnormal returns for years 1 through 3 for each firm in my new random sample as well as the mean abnormal returns for the entire sample. This process is repeated for a total of 1,000 random samples. The  $p$ -values reported in this paper reflect the percentage of the 1,000 random samples that have mean abnormal returns higher than the mean abnormal return for the repurchasing sample.

A similar procedure is used to infer the statistical significance of the difference in means in abnormal returns. For example, to calculate  $p$ -values associated with means returns of Group A and Group B, I pair the mean abnormal returns calculated using 1,000 random samples of firms that correspond to Group A in time periods, size quintiles, and book-to-market quintiles with the mean abnormal returns calculated using 1,000 random samples of firms that correspond to Group B. I then calculate the difference for each 1,000 pairs of averages. The  $p$ -value represents the percentage of the 1,000 differences in means that exceed the sample difference in means.

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