Disentangling the share buyback puzzle: post-event insider trades

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Abstract

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JEL codes: G30, G32, G35

Key words: Insider trading, repurchase announcements, signaling, market timing

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Abstract

Open market share repurchase announcements are viewed as a signal of firm undervaluation but these can be employed opportunistically. Insiders can potentially time the disclosure of, and their trades around, a repurchase announcement to trade more profitably. We investigate insider trading behavior and find that insiders significantly reduce their sales before, but sell more heavily in the month after, a repurchase announcement. Such a trading pattern is more pronounced in firms that are less likely to be undervalued. We also find that post-buyback announcement insider trades have incremental informativeness, and greater equity retention by insiders following a buyback announcement is associated with greater undervaluation, leading to higher long-run returns. Moreover, post-buyback announcement insider trades better predict firms' *actual* repurchase completion rates than pre-announcement insider trades.

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1 Introduction

> "….buybacks give executives an opportunity to take significant cash off the table, breaking the pay-performance link. SEC rules do nothing to discourage executives from using buybacks in this way. It's time for that to change."
>
> [Robert J. Jackson Jr., June 11, 2018, Commissioner SEC]

Open market share repurchase (OMSR) announcements are generally associated with positive stock price movements. The corporate finance literature typically views such events as a managerial signal of equity undervaluation (e.g., Dann (1981), Vermaelen (1981), Comment and Jarrell (1991), Persons (1997), and Brav *et al.* (2005)). This asymmetric-information-based "signaling" explanation of repurchase announcements assumes no or minimal agency problems. However, investors may not see an OMSR announcement as a credible signal of undervaluation.[1] In complete contrast to this signaling explanation of OMSR announcements, Fried (2001; 2005) claims that managers use these programs in their self-interest, and that the empirical evidence on repurchases is more consistent with his "managerial opportunism" theory. He suggests that managers might time their trades around repurchase announcements to realize higher personal gains.

We test these competing explanations by exploring insider trading behavior around the repurchase announcement event. In an effort to identify OMSR announcements signaling stock undervaluation, Babenko *et al.* (2012) suggest that investors should react to a repurchase signal only if insiders also trade in the direction of their signal in advance of the repurchase announcement, i.e., they increase their shareholdings.[2] However, this also creates an

[1] This is partly because firms are increasingly relying on share repurchases as an alternative to dividends to distribute excess cash (see, e.g., Fama and French (2001), Grullon and Michaely (2002), and Skinner (2008)) and partly because open market repurchase announcements only represent managerial commitment to repurchase shares but are not a binding obligation on their part to complete the announced repurchase (Stephens and Weisbach (1998) and Chan *et al.* (2010)).

[2] Holding additional firm equity is not only costly but also exposes already under-diversified insiders to considerable risk. Buying more equity in their firm will be particularly expensive for insiders when the stock is overpriced. Thus, it increases the cost of false signaling for insiders and hence adds credibility to their repurchase announcement as a signal of undervaluation.

opportunity for insiders to "game" the market around the repurchase announcement. As insiders are not barred from trading around the event, they can potentially time the repurchase announcement to dispose of their shares at the higher post-announcement prices as suggested by Fried (2005).[3] We contend that insiders aiming to game the market by timing their trades around a repurchase announcement will sell more shares after a repurchase announcement event. These post-announcement sales will be more profitable for insiders when the stock is less likely to be undervalued and when it appreciates sharply on the repurchase "signal". We therefore expect post-announcement insider sales to be positively related to repurchase announcement returns and negatively related to the degree of firm undervaluation.

We next investigate the incremental informativeness of insiders' equity trades following a repurchase announcement. We argue that insider trading behavior immediately after a repurchase announcement provides a cleaner and more precise signal of insiders' perception of firm value than pre-announcement insider trades, and hence should be correlated with long-term returns.[4] Higher insider equity sales signal that such firms are either overvalued or fairly valued, or at the very least not significantly undervalued, and hence such repurchase-announcing firms should not exhibit higher abnormal returns in the long-run. In contrast, when the initial market reaction to a repurchase signal is incomplete and insiders continue to hold their firm's equity, then such firms should earn higher long-run returns. We particularly expect greater long-run returns for repurchase-announcing firms when the direction of insiders' pre- and post-announcement trades consistently suggest that the stock is undervalued.

[3] Section 16 (b) of the Securities and Exchange Act contains a "short-swing" profit rule that prohibits insiders from profitably trading their firm's shares in the short term, as it requires them to hold any purchased shares for at least 6 months. However, insiders who already own significant stock in their firm can still profit by trading these and/or other acquired shares.

[4] The post-announcement insider trade signal is not only unbiased, as the risk of disclosure (repurchase announcement) timing by insiders is eliminated, but also reflects insiders' updated views of firm value following the market reaction to the repurchase announcement "signal".

Finally, we investigate the relationship between post-announcement insider trades and firms' *actual* repurchase decisions. Firms repurchase their own shares for a variety of reasons apart from undervaluation.[5] Higher insiders' equity retention following a repurchase announcement signals firm undervaluation, leading to higher firm repurchases to take advantage of the potential stock undervaluation. However, higher firm repurchases when insiders are net sellers suggest that firm repurchases are for other corporate reasons apart from undervaluation.

We test these predictions by employing a sample of 8,945 open market share repurchase announcements between 1990 and 2012. Consistent with Fried's (2001; 2005) arguments, we find empirical evidence that insiders sell significantly more shares after a stock price increase associated with repurchase announcement. Also, in an effort to reduce the litigation risk associated with informed trading, insiders trade more passively and significantly reduce their sales before, but sell more heavily after, a repurchase announcement. In line with our prediction, we find that insider sales are substantially greater when the stock is less likely to be undervalued, and when stock price rises sharply on the repurchase announcement. Although higher stock sales can be attributed to insiders' liquidity or diversification needs, our evidence generally seems more consistent with insiders adjusting their trades around the repurchase announcement to trade more profitably.

Both our univariate and multivariate analyses highlight that post-announcement insider trades have incremental information for investors. We find that firms in which insiders retain more equity post-buyback announcement earn 3.9% (4.9%) higher abnormal returns over the

[5] Other potential reasons for repurchases mentioned in the literature include, for example: i) to distribute excess cash (Jensen (1986), Guay and Harford (2000), Jagannathan *et al.* (2000), Fatemi and Bildik (2012)), ii) as a takeover defense (Denis (1990), Brown and Ryngaert (1991)), iii) capital structure adjustments (Lie (2002), Dittmar (2000)), iv) to fund employee stock options, and to avoid dilution (Kahle (2002)). We term these "other corporate reasons" for repurchases.

next two (three) year compared to firms in which insiders sell down more equity. In further analyses, we find that firms with insider purchase-only transactions earn 5.2% (9%) higher abnormal returns in the two (three) year period following the repurchase announcement than firms with insider sales-only transactions.[6] Additionally, we find that repurchase-announcing firms in which both pre- and post-announcement insider trades consistently suggest that the stock is undervalued earn significantly higher long-term returns. These findings confirm that insider trades after a repurchase announcement have incremental informativeness and accurately signal insiders' beliefs regarding firm value. In summary, our results demonstrate that it is necessary to go beyond pre-announcement trades alone and augment the analysis with post-announcement insider trades to properly assess the motive for a repurchase announcement and the underlying firm value.

Finally, we investigate the relationship between post-announcement insider trades and firms' *actual* repurchase decisions. Our analysis suggests that post-announcement insider trades are better predictors of firms' *actual* repurchase behavior compared with pre-announcement insider trades. Interestingly, we find that insiders trade contrary to their firm, i.e., higher insider sales are associated with higher firm repurchases. Although this does not provide direct support for the stock undervaluation motive for repurchases per se, our analysis of insider trades by insiders' position/role in the firm shows that CEO and CFO net sales are in fact negatively related to *actual* firm share repurchases, whereas net sales by other insiders are positively related to *actual* repurchases by firm. Because top executives have better information on firm value compared to other insiders, higher sales by them indicate that the stock is unlikely to be undervalued, and hence the firm also repurchases fewer shares. Overall, this novel finding indicates that firms repurchase fewer shares when the top executives (CEO

[6] This result is consistent with earlier empirical evidence on insider trading showing that insider purchases are a more informative signal than sales (e.g., Lakonishok and Lee (2001)).

and CFO) are net sellers. However, firms repurchase more shares when other insiders are net sellers, possibly for other corporate reasons.

This paper contributes to the growing literature addressing the credibility of share repurchase program announcements as a signal of equity undervaluation. To the best of our knowledge, this is the first paper that simultaneously examines insider trades before, and after, an OMSR announcement. Lee *et al.* (1992) and Louis *et al.* (2010) observe insider trades around the repurchase tender offer (RTO) and find that insiders increase their purchases before, but sell more after, an RTO. However, unlike RTOs that offer a higher premium and are actually completed within a month, OMSR are conventionally viewed as a less effective signaling tool with lower announcement returns and also actual repurchase completion is not binding (Vermaelen (1981) and Comment and Jarrell (1991)). Fried (2001; 2005) and Chan *et al.* (2010) suggest that OMSR announcements are, in fact, opportunistically used by managers rather than to convey value-relevant information to investors. Similarly, Fenn and Liang (2001) suggest that managers with more stock options employ repurchase announcements to artificially increase stock prices. We add to this literature by empirically documenting that insiders time the disclosure of, and their trades around, repurchase announcements to trade more profitably and hence not all OMSR announcements can be uniformly viewed as value signaling.

This paper also adds to the literature on insider trading. Seyhun (1998), Lakonishok and Lee (2001), and Agrawal and Nasser (2012) among others show that insider trades have value-relevant information for investors. Our research provides further evidence on this topic. In particular, we contribute by demonstrating that post-buyback announcement insider trades provide value-relevant information to investors in assessing the credibility of the repurchase announcement as a signal of undervaluation and are associated with firms' long-term returns as well as with firms' *actual* repurchase decisions.

The remainder of the paper is organized as follows. Section 2 provides some background to the hypotheses explored in this study. In section 3, we describe our methodology, data and sample selection criteria, and also report summary statistics. In section 4, we present and discuss our empirical results. Finally, we conclude in section 5.

2 Background and hypotheses

The corporate finance literature mainly follows a signaling theory argument to explain positive share repurchase announcement returns. This theory views the repurchase announcement as a managerial signal of equity undervaluation (e.g., Vermaelen (1981); Comment and Jarrell (1991)). Corporate executives also regard stock undervaluation as the primary motive behind the decision to repurchase their own firm's stock (Brav *et al.* (2005)). However, the flexibility and non-binding commitment of open market repurchase programs also affords managers the possibility to employ these opportunistically. For example, managers may intentionally mislead the market by announcing repurchase programs for their own personal gain (Fenn and Liang (2001), and Chan *et al.* (2010)).

To address this credibility puzzle of open market repurchase announcements, Babenko *et al.* (2012) borrow from the insider trading literature and suggest that investors should respond to a stock buyback signal only if insiders trade in the direction of their signal.[7] Specifically, they argue that by buying more equity in their own firm in advance of a repurchase announcement, insiders signal that they view their firm as undervalued, and investors should react more positively to such repurchase announcements.[8] The authors find evidence consistent

[7] Insider trades are often viewed as a window into management's beliefs. For example, Lakonishok and Lee (2001), Jenter (2005), Fidrmuc *et al.* (2006) and Agrawal and Nasser (2012), among others, show that insider trades provide value-relevant information to market participants about insiders' beliefs regarding firm value and its future prospects.

[8] Buying additional equity in one's own firm is a costly and risk-increasing investment for under-diversified insiders, especially when the stock is overvalued.

with this proposition. Likewise, Cziraki *et al.* (2017) also show that pre-announcement insider trades are a good predictor of repurchase announcement returns.[9]

However, because insiders are not legally restricted from trading their firm's shares after a share buyback announcement, they can potentially time the repurchase announcement as well as their personal trades to "game" the market around the event (Fried (2005)). As such, Fried (2005) terms buyback announcements a "false signaling device" and claims that the empirical evidence on repurchases is more consistent with his "managerial opportunism" theory – managers use repurchase programs in their self-interest rather than as a signal of equity undervaluation. Managers in undervalued firms may announce and carry out repurchases to transfer wealth from selling shareholders to themselves and the remaining shareholders. In cases where managers intend to sell their equity, they can announce a buyback to dispose of their shares at higher prices.

A significant body of literature documents that managers engage in opportunistic behavior and informed trading.[10] Brockman *et al.* (2008) show that managers manipulate the flow of information around share repurchases. Managers increase the frequency and magnitude of bad news in the month before, and increase the frequency and magnitude of good news in the month after, share repurchases. The authors also show that the probability of changing the information flow in this way increases with managerial ownership stake in the firm. In a recent paper, Edmans *et al.* (2018) show that managers strategically disclose significantly more positive discretionary news in months in which their equity vests, thereby allowing them to sell

[9] Consistent with this proposition, we confirm in our sample that greater equity retention by insiders prior to a repurchase announcement is positively associated with repurchase announcement returns.

[10] For example, Gosnell *et al.* (1992) find that corporate insiders sell down most of their stake in their firm in the five months preceding a bankruptcy announcement. Kim and Varaiya (2003) find that managers sell more heavily in quarters in which their firms are repurchasing shares. Yermack (2009) shows that CEOs gift stocks before significant declines in their stock prices, thereby allowing them to benefit from increased personal income tax savings.

their stock and/or exercise options more profitably.[11] Such a behavior is consistent with management timing share repurchase disclosures in their self-interest.

Therefore, we explore how insiders trade not only before but also after a stock buyback announcement. Insiders announcing a buyback program to game the market will sell more (less) of their stock after (before) the announcement. We also expect insider sales to be especially high when the firm is either overvalued or fairly valued, or at the very least not significantly undervalued, and when the market reaction to the repurchase announcement is stronger. Thus, we expect post-announcement insider sales to be negatively related to the degree of firm undervaluation and positively related to repurchase announcement returns. We test these propositions formally in hypotheses 1a and 1b:

Hypothesis 1a (H1a): Insiders sell more heavily in the month following a repurchase announcement event than before it.

Hypothesis 1b (H1b): Post-announcement insider sales are negatively related to firm undervaluation and positively related to repurchase announcement returns.

The extant insider trading literature suggests that the informativeness of an insider trades signal depends on the direction/nature of the transaction. For example, Fidrmuc *et al.* (2006) and Agrawal and Nasser (2012) argue that insider purchases serve as a more informative signal because purchases are more costly. In line with this argument, Seyhun (1998) and Lakonishok and Lee (2001) provide evidence that the market reacts more strongly to insider purchases compared to insider sales, which can be driven by other factors, such as insiders'

[11] A closer look at the distribution of share repurchase-related corporate news disclosures in their data shows that more than half of all share buyback announcements and related updates are made in the months in which managers' equity vests.

liquidity or diversification needs rather than changes in their expectations about the firm's future cash flows.

In this paper, we analyze both insider purchase and sale transactions around the repurchase announcement event, as insiders can use both active and passive trading strategies to achieve the same economic effects. Insiders can increase their ownership stake in their firm either by trading more actively, i.e., buying additional own firm shares in their personal account, or by trading more passively, i.e., reducing own firm share sales from their personal account. Similarly, we argue that uni-directional trades – where all firm insiders trade in the same direction – provide a stronger signal compared to mixed or bi-directional trades – where firm insiders engage in both sale and purchase transactions. This is because uni-directional trades suggest consensus, whereas mixed trades may suggest disagreements, among firm insiders regarding their firm's true value.[12]

Next, we investigate whether post-announcement insider trades have incremental information. Prior studies document a positive long-term drift in returns of repurchase-announcing firms. However, Louis *et al.* (2010) document that nearly half of repurchasing firms in their sample experience negative long-run abnormal returns, suggesting that not all repurchasing firms outperform in the long-run. We propose that insider trades following a repurchase announcement may serve as value relevant signals to predict firms' future performance. In theory, the long-run returns of repurchase-announcing firms should depend on three factors: the degree of undervaluation before the repurchase announcement, the initial market reaction to the repurchase "signal", and finally, the deviation of firm value from its fair value after the price adjustment. For example, the stock of an undervalued firm whose market price adjusts fully to fair value on a repurchase signal should not subsequently outperform.

[12] In unreported results, we find that the market does react more strongly to insider purchases and when all insiders trade in the same direction (uni-directional trades).

Similarly, no positive abnormal long-run returns should be expected for a fairly valued firm where managers announce a stock repurchase to sell their shares at a more favorable price. Post-announcement insider trades can therefore reveal insiders' true and/or updated beliefs regarding firm value and hence may help predict long-run returns. Higher insider sales following a stock repurchase announcement suggest that the firm is less likely to be undervalued, and therefore such firms should underperform those in which insiders retain a greater equity stake in the firm indicating undervaluation. Therefore, we expect higher post-announcement insider sales to be either unrelated or negatively related to the long-term returns of repurchase-announcing firms. Hypothesis 2 thus follows:

Hypothesis 2 (H2): The long-term returns of repurchase announcing firms are unrelated or negatively related to post-announcement insider sales.

Finally, we explore the relationship between insider trades and firms' actual repurchase decisions. Open market repurchase announcements represent a non-binding commitment on behalf of firm management to repurchase its shares (Fenn and Liang (2001), Louis and White (2007) and Chan *et al.* (2010)). In fact, Bhattacharya and Jacobsen (2016) note that 27% of the repurchase-announcing firms in their sample do not repurchase a single share in the first fiscal year following stock buyback announcement. Vermaelen (1981) and Ikenberry *et al.* (1995) argue that managers repurchase shares in their firm's account to take advantage of its potential stock undervaluation. However, if the firm and its insiders trade in opposite directions, then firm stock repurchases are less likely to be driven by stock undervaluation motive and more likely to be for other corporate reasons such as funding employee stock option exercises and/or to avoid equity dilution (e.g., Kahle (2002)).[13] Therefore, a negative (positive) relationship between post-announcement net insider sales and firms' *actual* repurchases is consistent with

[13] See footnote 5.

a stock undervaluation motive (other corporate motives) for repurchases. This is an empirical question, and we add to this stream of literature by highlighting the important role played by post-announcement insider trades in determining firms' *actual* repurchase decisions and its motives. Hypothesis 3 is thus:

Hypothesis 3 (H3): Post-announcement insider trades are related to firms' *actual* stock repurchase decisions.

3 Methodology, data, and summary statistics

Share repurchase announcement data between January 1, 1990, and December 31, 2012, are extracted from the Thomson Financial Security Data Company (SDC) Mergers and Acquisition database. The repurchase announcement data are restricted to open market share repurchases only. To address the duplicate announcement problem, we follow Chen and Wang (2012) and delete multiple repurchase announcements made by a firm within a period of two years, keeping only the first announcement in such cases.[14]

Insider trading data are obtained from the Thomson Financials Insider Trading database. Insider trades are obtained from Form 4, which is filed with the Securities and Exchange Commission (SEC) whenever insiders make a stock sale or purchase transaction.[15] Like Louis *et al.* (2010), we include trades by all insiders in our main analysis instead of focusing only on the top executives trades as any insider with private information and potentially benefit from it. Follow Babenko *et al.* (2012) we only consider open market stock purchases and sales with stock accumulated via option exercises and stock grants excluded. In order to focus on economically significant trades, we delete all trades involving exchanges of fewer than 100 shares. Babenko *et al.* (2012) also provide anecdotal evidence on executive

[14] Banyi *et al.* (2008) highlight that an announcement may appear more than once in the SDC data if the same announcement appears in different news sources on different dates.
[15] The SEC requires insiders to file this form within two business days of the transaction.

litigation suggesting that insiders are more likely to be prosecuted for their sales transactions because insiders with negative private information may dispose of their shares before it becomes public knowledge and stock prices drop.

Since insiders can exploit both active and passive trading strategies to achieve their desired economic outcome, we examine both their purchase and sale transactions around an OMSR announcement event.[16] Following the prior literature, we calculate the number of shares sold (bought) by insiders as the sum of the shares sold (bought) by all insiders in a given time window and scale it by the total number of outstanding shares.[17] If no sales or purchase data are available due to a lack of trading activity, we set insider trades (sales and purchases) equal to 0. We define net sales as the difference between insider sales and purchases.

In addition to aggregate insider sales, purchases and net sales, we also derive measures of abnormal sales, abnormal purchases and abnormal net sales. We use two methods to calculate abnormal trades. First, in line with Kahle (2000), we calculate normal trades as the average monthly trades in the prior three-year period commencing 6 months before the buyback announcement. Abnormal trades are then defined as the difference between actual insider trades and the normal/expected insider trades. It is possible that insiders have equity vesting plans or need more cash at certain times of a year, so their trading activity might be more concentrated in these periods. Thus, following Agrawal and Nasser (2012), our second measure of abnormal trades controls for this time series effect where we use last year's insider trades for the same time period as normal/benchmark trades.

We estimate the market reaction to a repurchase announcement using stock return data from the CRSP database. We calculate event firm abnormal return as the difference between

[16] For example, an insider can generate a similar economic effect by selling fewer shares prior to a repurchase announcement rather than actively buying additional shares in the firm.
[17] Our definition of insiders is similar to one used in the Thomson Financial Insider Trading database.

the 3-day (-1,1) buy-and-hold return of repurchase announcing firms and the buy-and-hold return of the market. We use the daily value-weighted CRSP index return as the benchmark market return.[18] For long-term abnormal returns, we follow Barber and Lyon (1997) and use the buy-and-hold abnormal return (BHAR) approach. The authors favor the BHAR methodology because it accurately captures investor experience. The buy-and-hold abnormal return of the event firm is the difference between the buy-and-hold return of the firm and that of the market over the two-year period following the repurchase announcement, where a year is defined as 252 trading days or 12 months.

We measure the intended size of a repurchase program as the percentage of stated dollar value to be spent on repurchase activity over the total market value of the firm at the beginning of the year. Our measure of stock price run-up is the 40-days buy-and-hold return of the event firm starting four days prior to the repurchase announcement date. For other accounting data we rely on the COMPUSTAT database. All variables in the final dataset are winsorized at the 1st and 99th percentiles to mitigate the effect of extreme observations.

Table 1 presents the frequency and averages of market value, book-to-market ratio, and size of announced repurchase program for our sample firms by year. Our final dataset contains 8,945 unique OMSR announcements. The highest number of announcements are made in the years 1998 and 1999. The average size of a repurchase program is slightly higher than that reported in earlier studies; this is mainly due to the larger size of the repurchase programs announced after the Global Financial Crisis of 2007-2008. The mean book-to-market ratio of firms in our sample is 0.64, which is similar to other studies. The average nominal market value of repurchase-announcing firms in our sample is approximately $3,845 million.

[18] As an alternative, we use the 3-day cumulative abnormal return (CAR) around the event date (-1,1), which is defined as the sum of the difference between the event firm return on each day and the respective daily return of the market. The results are of course qualitatively similar.

Panel B of table 1 shows the number of share repurchase announcements by industry classification. Manufacturing industry accounts for nearly 39% of all the repurchase announcements in our dataset. Repurchase announcements made by finance and insurance companies represent nearly one-quarter of all repurchase announcements. Given their frequency, and following earlier studies such as Chan *et al.* (2004) and Peyer and Vermaelen (2009), we include these firms in our analysis.

Insert table 1 here

Table 2 presents summary statistics of returns, insider trades, and other firm characteristics for our sample firms. Panel A of the table presents short-term and long-term returns. The mean 3-day buy-and-hold abnormal return (BHAR) around the buyback announcement date (-1,1) is 2.3%, which is similar to the announcement returns reported in earlier studies such as Ikenberry *et al.* (1995) and Peyer and Vermaelen (2009) but slightly higher than those reported in later studies such as Bonaimé (2012). The mean two-year buy-and-hold abnormal return following a repurchase announcement is 10%, which supports the finding of a positive drift in the returns of repurchase-announcing firms documented in earlier studies (see e.g., Ikenberry *et al.* (1995) and Peyer and Vermaelen (2009)). On average, repurchase announcing firms experience a decline in their share value before the announcement with a mean stock price run-up of -6.7%. This suggests that managers are more likely to announce a share repurchase program after a significant decline in stock price, which is consistent with the signaling motive for a share repurchase announcement.

Panel B of table 2 provides summary statistics on insider trades for three-month windows before, and after, a repurchase announcement.[19] As expected, insider sales are

[19] The average one-month insider trades around a repurchase announcement are not reported in the table but show a similar trading pattern.

generally higher than purchases. For example, in the three-month trading window before a repurchase announcement insiders sell 0.154% of their firm's outstanding equity, while they purchase only 0.054%. Net insider sales for the window are thus 0.098%. This difference increases to 0.127% of the total number of shares outstanding in the three-month period following an announcement, suggesting that insiders sell more heavily after the event. However, using either measure of benchmark trades described above, abnormal net insider sales are negative in the three-month trading windows surrounding a repurchase announcement. This result is consistent with insiders exercising caution and trading more passively, potentially to minimize litigation risk.

Panels C and D provide descriptive statistics of insider trades by insiders' position in the firm. Panel C relates to the CEO and CFO trades only, whereas panel D summarizes trades by all firm insiders other than the CEO and CFO. The pattern of insider trades in these panels (C and D), in general, is very similar to that of panel B. Firm characteristics are reported in panel E of table 2. Firm size is measured as the log of total firm assets, and both the mean and median values are very similar. Leverage is the ratio of total debt to total firm assets. Cash, cash flow, capital expenditures and research and development expenses are defined as the percentage of cash, operating cash flows, capital expenditures, and research and development expenses over total firm assets, respectively. Tobin's Q is the ratio of market-to-book value, and volatility is the standard deviation of daily stock returns in the one-year period before a repurchase announcement. All accounting variables are derived from the fiscal year prior to a buyback announcement. The mean values are comparable to those reported in Babenko *et al.* (2012).

Insert table 2 here

4 Results

In this section, we formally test our hypotheses using the methodology and data described above in section 3. We report the results of both univariate and multivariate analyses. The first subsection examines insider trades around a repurchase announcement.

4.1 Pre-announcement trades and short-term returns

We begin our analysis by confirming the earlier empirical evidence on the association between pre-announcement insider trades and the market reaction to repurchase announcements. In unreported results, we confirm Babenko *et al.* (2012)'s finding in our sample that the initial market reaction to a buyback announcement is more positive for firms in which insiders retain more equity in their firm prior to announcing a repurchase program.[20] Consistent with the signaling argument, this suggests that the market takes into account pre-announcement insider trades in evaluating the credibility of a buyback announcement as a signal of undervaluation.

In additional analysis, we split insider trades by direction of their trade. Fidrmuc *et al.* (2015) argue that insiders are eager to sell due to their diversification or liquidity needs and hence sell even on small mispricing. Insider purchases, on the other hand, require additional investment and are risk increasing; thus, insiders are likely to buy only after significant price drops. Consistent with earlier studies, we find that insider sales are less informative compared to insider purchases and are associated with smaller abnormal returns. In addition, we test whether uni-directional trades by all firm insiders serves as a stronger market signal -

[20] The average 3-day BHAR for firms in which net insider sales in the three-months before a repurchase announcement are below the sample mean is 0.8% higher than firms in which net insider sales are above the mean and the difference is highly significant. However, the mean difference in the long-term returns between the two subgroups is statistically insignificant. These findings suggest that pre-announcement insider trades mainly affect the short-term market reaction to a repurchase announcement.

highlighting that all insiders hold a unanimous view regarding firm value - and are associated with stronger market reaction. We also find evidence consistent with this proposition.[21]

4.2 Market timing and post-announcement insider trades

Next, we explore the possibility that managers may time repurchase announcements to sell their shareholdings at higher post-announcement prices. In panel A of table 3, we compare pre- and post-announcement insider trades around a repurchase announcement. Consistent with our hypothesis 1a that insiders can potentially time a repurchase announcement to game the market around the event, we find that insiders sell significantly more shares in the month following a repurchase announcement compared with their sales in the month preceding it.[22] The mean difference between one-month pre- and post-announcement insider sales is 3.47 basis points (0.0347% of outstanding equity) and is highly significant at the 1 percent level.

Insert table 3 here

In contrast, insiders also seem to purchase slightly more, on average, post-announcement. However, the difference between pre- and post-announcement insider purchases, although statistically significant, is only 0.49 basis points.[23] The net sales difference between the two periods, which is mainly due to differences in insider selling, is -2.93 basis points, which is again highly significant at the 1 percent level. This finding supports our hypothesis 1a and suggests that insiders time their trades around the repurchase announcement

[21] In unreported results, we find that the market reacts much more positively to firms with insider purchase-only transactions compared to firms with sale-only and mixed transactions. Repurchase-announcing firms with pre-announcement purchase-only transactions earn a 3-day buy-and-hold abnormal return of 3.3%, which is highly significant and 2% higher compared to firms with insider sales-only transactions. Similarly, the 3-day BHAR of insider purchase-only firms is 0.8% higher compared to firms in which insiders trade in both directions.

[22] We find a similar trading pattern when we compare three-month insider trades before, and after, a repurchase announcement. These results are not reported for brevity.

[23] Higher post-announcement insider purchases are not in line with our opportunistic timing of repurchase announcement hypothesis, but such purchases can be driven by insiders in firms where the market reacts insufficiently to the buyback "signal". Contractual or control reasons can also motivate insiders to purchase more shares post-repurchase announcement.

and sell down more equity following a repurchase announcement when stock price, on average, increases for such firms.

It is interesting to note that both abnormal net sales measures are significantly negative in the pre- and post-announcement periods, highlighting that insiders reduce their trades around share repurchase announcements. Even though the aggregate level of net insider sales declines, the difference between pre- and post-announcement abnormal net insider sales measures is still negative and highly significant. This suggests that insiders, on average, withhold stock sales more before a repurchase announcement and as a result still end up selling relatively more shares after the announcement. This result also highlights that insiders adopt a more passive trading strategy and sell fewer shares before a repurchase announcement. Such a passive trading strategy is consistent with insiders being aware of the potential litigation risk associated with their trading activity, which they therefore aim to minimize by reducing the volume of their trades.

The subsequent panels, B and C, of table 3 show the dollar values and frequency of insider trades around the repurchase announcement, respectively. The insider trading pattern in these panels seems generally consistent with insiders taking advantage of higher post-announcement prices to sell more shares by adopting a passive trading strategy. For example, the average dollar value of insider sales in the one-month period after a repurchase announcement is $2.75 million compared to insider sales worth only $0.35 million in the one-month preceding a repurchase announcement. In panel D, we consider trades by top insiders only, i.e., the CEO and CFO. We find a similar trading pattern to that reported in panel A. CEOs and CFOs also, on average, sell down more of their shareholdings following a repurchase announcement. Like other insiders, they significantly reduce their net sales before a repurchase

announcement and sell more shares after the market has had a chance to respond to the announcement.

4.3 Determinants of post-announcement insider sales

Prima facie, insiders are more likely to sell post-announcement when their firm's stock is either overvalued or at least not significantly undervalued. In other words, post-announcement insider sales will be especially high in firms that are less likely to be undervalued in the first place, or when any undervaluation has been eliminated as a result of a strong market reaction to the buyback "signal".[24] To test these predictions laid out formally in hypotheses 1a and 1b, table 4 compares mean insider trades for subsamples of firms sorted by different proxies of firm undervaluation and repurchase announcement returns.

Peyer and Vermaelen (2009), among others, rely on the book-to-market ratio as a measure of firm undervaluation. Following earlier studies, we classify firms with book-to-market ratios above (below) the sample mean as value (growth) firms. Panel A of table 4 presents the mean insider trades for the two subgroups of firms and reports their differences. These univariate results clearly show that insiders in growth firms, in fact, sell more and buy fewer shares in the month following a buyback announcement. The difference between the net insider sales of the two groups of firms is also highly significant. A similar pattern is observed when we compare three-month insider trades around an announcement. These findings are consistent with our hypothesis 1b that insiders sell more shares following a share buyback announcement, especially when their firm is less likely to be undervalued. Panel B shows a similar trend in insider trades when repurchase-announcing firms are sorted into subsamples by stock price run-up. Firms that experience a significant decline in their share price prior to a

[24] Fried (2005) also suggests that managers may use repurchase announcements to artificially boost the share price so that they can sell their equity holdings at a higher price.

repurchase announcement are more likely to be undervalued. We classify firms with a stock price run-up below the sample mean as undervalued. The results are again consistent with our hypothesis 1b.

To further test the robustness of our findings, we partition our sample data by 6-month pre-announcement insider trades following Babenko *et al.* (2012) who suggest that such trades may serve as a good proxy of firm undervaluation. Firms in which insiders retain more equity in the firm, i.e., with net insider sales below the sample mean, are classified as undervalued firms. Similar to panels A and B we find support for our hypothesis 1b that insiders sell more heavily in firms that are less likely to be undervalued.

In panel D of table 4, we partition our sample data on the basis of repurchase announcement returns i.e., 3-day buy-and-hold abnormal returns. Firms with 3-day BHAR values above (below) the sample mean are classified to the high (low) return subgroup. Consistent with Fried's (2005) argument that insiders can potentially time repurchase announcement to cash out at higher stock prices, we find that insiders sell more shares when the stock price rises sharply on repurchase announcement. Overall, the findings in table 4 support our hypothesis 1b and suggest that insiders sell more shares following a repurchase announcement. This is especially true for firms that are less likely to be undervalued and when the market responds more favorably to the buyback "signal".

Insert table 4 here

The analysis in table 4 above highlights that post-announcement insider sales depend upon both the degree of firm undervaluation and the market response to the share buyback undervaluation signal.[25] In table 5, we control for the market reaction to a repurchase signal

[25] For undervalued firms, post-announcement insider sales partly depend upon how quickly and accurately the market adjusts to firms' fair value in response to the buyback (undervaluation) signal. Any undervaluation is more

and analyze the effect of firm characteristics on post-announcement insider sales. Table 5 reports the mean net insider sales for two-way sorted subsamples of firms. First, every year we divide repurchase-announcing firms into two subgroups by short-term repurchase announcement return. Firms with high repurchase announcement returns are classified into the high rank subgroup and those with low announcement returns into the low rank subgroup. Firms in each subgroup are then split into two subgroups by book-to-market ratio, size, and volatility in panels A, B and C, respectively.[26] Panel A of table 5 shows that the insiders of growth firms sell significantly more shares post-announcement compared to value firms, even after controlling for repurchase announcement returns. This result provides further evidence on our hypothesis 1b that insiders sell more shares in firms that are less likely to be undervalued in the first place.

To test whether insiders' private information is more valuable and can lead to greater gains in firms that suffer from a higher degree of information asymmetry we follow Corwin (2003) and Zhang (2006) and use firm size proxy for the degree of information asymmetry between insiders and investors. These papers argue that small firms suffer from a higher degree of information asymmetry because they receive little media coverage and are followed by fewer analysts. Lakonishok and Lee (2001) also show that potential profits from insider trading in the case of smaller firms are higher than in larger firms because such firms are less efficiently priced due to higher information asymmetry. These findings lead to the speculation that insiders in small firms are more likely to trade opportunistically around repurchase announcements and will sell down more of their stock holdings after a repurchase announcement compared to insiders in large firms. Panel B of table 5 provides supportive

likely to have been eliminated or significantly reduced when the initial market reaction is more positive, and therefore, insiders in such firms sell more shares post-announcement, as evidenced in panel D of table 4.

[26] Sorting on these firm characteristics is based on mean values. For example, firms with size above (below) the sample mean are classified as large (small) firms.

evidence for this. We find that insiders in small firms sell significantly more shares after a repurchase announcement, especially in firms with higher repurchase announcement returns. For such firms, the mean difference in one-month (three-month) net insider sales between small and large firms is 1.95 (4.94) basis points and is statistically significant at the 5 percent level.

Babenko *et al.* (2012) argue that it is riskier for undiversified insiders to hold more equity in their firm when stock volatility is high. Therefore, insiders in risky firms may sell more of their stock holdings in the firm to diversify risk. However, as shown in panel C, we do not find any significant difference in net insider sales between high and low volatility firms. This result suggests that stock volatility may not be the most important factor for insiders in their stock sell-down decisions and insiders may not be motivated to sell simply for diversification reasons and that firm value is a more important consideration in determining their stock sell-down decisions.

Insert table 5 here

In table 6, we test hypothesis 1b using a multivariate approach. We regress net insider sales in the one-month period post-buyback announcement on short-term announcement returns, pre-announcement insider trades, and their interactions in different model specifications. We control for variables employed in earlier studies and also include year and industry fixed effects in our regression models. Consistent with our hypothesis we find that insiders sell more when the market reacts more positively to a repurchase announcement, and when the firm is unlikely to be undervalued. For example, a one-percentage-point increase in the 3-day BHAR is associated with a 0.28% increase in net insider sales in the month following a repurchase announcement. Similarly, a positive association between pre- and post-announcement net insider sales variables suggests that insiders sell more shares after a

repurchase announcement when the stock is unlikely to be significantly undervalued as signaled by higher pre-announcement insider sales.

In column 2, we regress post-announcement net insider sales on the interaction term between repurchase announcement returns and pre-announcement net insider sales. The positive coefficient on the interaction term signifies that insiders are further motivated to sell-down more of their stock when the share price increases sharply on the repurchase announcement, and when the firm is unlikely to be undervalued before the announcement event. However, the coefficient on the interaction term between repurchase announcement returns and pre-announcement purchase-only transactions is negative, although insignificant (column 3). This result suggests that the market reacts insufficiently to an OMSR announcement signal of a stock in which pre-announcement insider trades suggest significant undervaluation, even though the short-term returns are higher for such firms, on average. As a result, insiders continue to hold their shares in these firms post-announcement.

Insert table 6 here

The regression model in column 4 includes the interaction term between repurchase announcement returns and firms with pre-announcement insider sales-only transactions. The positive and highly significant coefficient on this interaction term provides further evidence that when insiders have a unanimous view that the stock is unlikely to be undervalued and the market reaction to the repurchase announcement is also stronger, then the insiders in such firms sell significantly more equity to take advantage of the price increase on the repurchase announcement. This result suggests that investors can sometimes misinterpret nonsignaling repurchase announcements as positive signals thereby allowing insiders to sell-down their equity at higher post-announcement prices. In column 5, the negative coefficient on the interaction term between repurchase announcement returns and firms with mixed transactions

in the pre-announcement period suggests that insiders sell fewer shares post-announcement when insiders disagree on firm valuation, as suggested by their bi-directional trades before the repurchase announcement. The evidence presented above thus highlights that managers can potentially time a repurchase announcement in their self-interest and cash out at higher stock prices instead of using this to convey their optimism about a firm's future performance, as suggested by Fried (2001; 2005).

4.4 Post-announcement insider trades and long-term returns

Next, we explore the relationship between post-announcement insider trades and the long-run returns of repurchase-announcing firms, more formally stated in our hypothesis 2. Higher equity retention by insiders following a repurchase announcement signals that the firm's stock remains underpriced and should earn higher long-run returns and vice versa. In table 7, we explore this relationship in a univariate setting. Average long-term returns are presented for different subsamples of repurchase-announcing firms ranked by the magnitude of insider trades in the month post-announcement. In line with hypothesis 2, we find that firms with lower net insider sales post-announcement tend to do better in the longer-term. The mean two- and three-year BHARs for such firms are 3.7% and 4.7% higher, respectively, compared to firms in which insiders sell more of their firm's stock. We find similar results when we compare the mean long-run returns of the two subgroups formed while considering only CEO and CFO trades, except that the effect is stronger and lasts only in the first two years following the announcement.

Insert table 7 here

In table 8, we investigate the effect of the direction of post-announcement insider trades on the long-term returns of repurchase-announcing firms. Consistent with earlier studies, we find that insider purchases are more informative, and firms with insider purchase-only

transactions earn higher long-term returns compared to firms with insider sales-only transactions. For example, the mean two- (three-) year buy-and-hold abnormal return for firms in which insiders purchase more equity (purchase-only transactions) is 5.2% (9%) higher than firms in which they only sell (sales-only transactions) following the repurchase announcement. Although there is no significant difference in the mean returns between firms with purchase-only transactions and firms with mixed (both buy and sell) transactions, we find that firms with mixed transactions outperform firms with sales-only transactions in the long-run, as expected.

Insert table 8 here

A further contribution of this paper to the insider trading literature is that we also analyze the combined effect of the signals conveyed by both pre- and post-announcement insider trades. The post-announcement insider trades signal can either complement or contradict the pre-announcement insider trades signal. We expect longer-term returns to be higher for repurchase-announcing firms when pre-announcement insider trades signal stock undervaluation and the post-announcement insider trades confirm this signal, i.e., the stock remains undervalued even after taking into account the price adjustment on the repurchase announcement.

To test this expectation, table 9 compares the mean buy-and-hold abnormal returns for subgroups of firms in which insiders trade in the same direction in the one-month period before, and after, the repurchase announcement. High (Low) subgroups represent firms with high (low) levels of net insider sales in both the pre- and post-announcement periods. As expected, table 9 shows that when the trading behavior of insiders consistently suggests that the stock is undervalued, such firms earn a higher long-term return, specifically an average return of 11.2% (17.4%) above the market return in the next two- (three-) years following the buyback

announcement. This is approximately 7% (10%) more than the BHAR for firms in the high net-insider-sales subgroup.

Insert table 9 here

To explore these reults in more detail, we conduct multivariate analysis in table 10. Specifically, we regress the two-year BHAR of repurchase-announcing firms on post-announcement insider trades (columns 1 and 2) and the consistency of insider trades signal in the pre- and post-announcement periods (columns 3 and 4). We include control variables and industry and year fixed effects in our regression models. In order to remove the effect of outliers, we use dummy variables to represent insider trades. For example, our high net sales dummy variable takes the value of 1 for firms in the high net insider sales subgroup and 0 otherwise. The net insider sales subgroups are formed based on three-month (columns 1 and 3) and one-month insider trades (columns 2 and 4).

Insert table 10 here

As table 10 shows, three-month post-announcement insider trades are not significantly related to long-term returns. However, higher insider sales immediately after a repurchase announcement are significantly negatively related at the 10% level. Columns 3 and 4, take into account insider trades both before and after a repurchase announcement. Here, the dummy variable takes the value of 1 when net insider sales are higher than sample mean both before and after the repurchase announcement, consistently suggesting that the stock is less likely to be undervalued, and 0 otherwise. A negative and significant coefficient on these dummy variables, particularly in the one-month trading window case, suggests that firms with higher net insider sales around the repurchase announcement earn lower longer-term returns. In fact, such information contained in insider trades appears to be incremental to, and not captured by, the other proxies of undervaluation in our regression models.

4.5 Post-announcement insider trades and actual repurchases

Finally, we explore the value relevance of post-announcement insider trades in explaining the *actual* repurchase behavior of firms that announce OMSRs. Because such repurchase announcements only represent the managerial intention to repurchase shares and are not binding obligations, completion rates vary greatly among firms. Managers may repurchase shares on their firm's account either to take advantage of stock undervaluation (Vermaelen (1981); Ikenberry *et al.* (1995)) or for other corporate objectives. Babenko *et al.* (2012) show that pre-announcement insider purchases increase repurchase completion rates, which is consistent with such purchases signaling firm undervaluation. However, it is also necessary to take into account what insider trades suggest about firm value *after* the market has had the opportunity to react to the repurchase signal.

Specifically, we test whether post-announcement insider trades are related to and can explain repurchase program completion rates, as stated in hypothesis 3. Similar in spirit to Babenko *et al.* (2012), we expect higher post-announcement net insider sales to be negatively related to repurchase completion rates, which would suggest that the firm is unlikely to be undervalued, and hence the firm should repurchase fewer shares as well. However, managers in such firms may still repurchase shares for reasons other than undervaluation, such as to avoid dilution, to fund employee stock option exercises or for other corporate purposes. Table 11 tests this undervaluation argument and competing explanations for *actual* share repurchases in different regression model specifications. The dependent variable is the actual repurchase program completion rate. Following Stephens and Weisbach (1998) and Babenko *et al.* (2012) we define this as the sum of monthly reductions in the number of shares outstanding (without offsetting them with monthly increases) in the 12-month period after a repurchase announcement. Next, we divide this sum by the number of shares outstanding at the time of share buyback announcement. Finally, the percentage completion rate is derived as the ratio of

actual repurchases to the intended repurchase program size. We controls for other determinants of actual repurchases in our regression specifications and include industry and year fixed effects.

Insert table 11 here

Columns 1 and 3 of table 11 regress actual program completion rate on net insider sales in the one- and three-month periods after a repurchase announcement, respectively. The positive and highly significant coefficient on the net insider sales variable in both specifications indicates that *actual* repurchase completion rates are higher in firms in which insiders sell more shares. For example, a one-standard-deviation change in three-month net insider sales increases the repurchase completion rate by 3.23%. This positive relationship suggests that insiders often trade in the opposite direction to their firm, and such evidence, though consistent with the findings of Bonaimé and Ryngaert (2013), is puzzling in a signaling context.

However, upon further analysis, an interesting finding emerges when we split insider trades by their role in the firm. Arguably, top executives (the CEO and CFO) have better information and can value their firm more accurately compared to other firm insiders. Thus, it is reasonable to assume that CEO and CFO trades are more likely to be driven by firm undervaluation reasons. To test this proposition, columns 2 and 4 of table 11 regress repurchase completion rates on CEO and CFO net sales and net sales by other insiders in the one-month and three-month trading windows, respectively. The coefficient on CEO and CFO net sales is negative and highly significant, whereas the coefficient on other insiders' net sales is positive and highly significant. These results highlight that when top executives are net sellers after a repurchase announcement, then repurchase completion rates decline for such firms. This result, firms repurchasing fewer shares while top executives sell down their equity, is consistent with the signaling explanation for share repurchases.

In contrast, higher net sales by other insiders increase firms' repurchase completion rates. Managers in such firms may repurchase more on their firms' behalf for other business purposes while they are selling down their personal stock holdings in their own firm.[27] Incremental to Bonaimé and Ryngaert (2013), our findings suggest that to understand the objective of firms' actual repurchases, investors should take into account not only the net post-announcement insider sales but also who is selling.

Finally, to assess the relative incremental power of insider trades around repurchase announcements to predict *actual* repurchase completion rates, columns 5 and 6 of table 11 include both pre- and post-announcement insider trades in the regression model. Highly significant coefficients on the post-announcement insider trades variables in both models suggest that post-announcement insider trades are better at predicting firms' *actual* repurchase behavior compared to pre-announcement insider trades.

5 Conclusion

Open market share repurchase programs lack the characteristics of a credible signal. Babenko *et al*. (2012) assess the credibility of such buyback announcements by analyzing the trading behavior of firm insiders prior to the event. However, insiders can also potentially use repurchase announcements to game the market around the event for personal gain. Therefore, in this paper, we argue that in addition to pre-announcement insider trades, it is important to analyze the trading behavior of firm insiders *post* the repurchase announcement, not just before. Compared with pre-announcement trades, post-announcement insider trades can provide a cleaner measure of insiders' views on firm value. In particular, the post-announcement insider trades signal is not biased by insiders' timing of the repurchase announcement, and also takes

[27] It is also possible that managers repurchase more shares on their firms' account to provide additional price and liquidity support while they are selling down their own shares to allow them to trade more profitably.

into account changes to insiders' views on firm value following the market reaction to the repurchase announcement signal.

In this paper, we find that the market does react more favorably to repurchase announcements when insiders retain more equity in the firm prior to the repurchase announcement. However, consistent with insiders potentially "gaming" the market around a repurchase announcement, we find that on average, insiders sell more shares after a repurchase announcement. Insiders sell down considerably more when the market reaction to the repurchase announcement is more positive and when all insiders appear uniformly to believe that the firm is unlikely to be undervalued. Most importantly, our findings indicate that post-announcement insider trades can predict the longer-term returns of repurchase-announcing firms, an issue not explored in the literature to date to our knowledge. We empirically document higher long-term returns for firms in which both pre- and post-announcement insider trades consistently suggest that the firm is undervalued.

Finally, we provide evidence that insider trades after a repurchase announcement can also better explain the *actual* repurchase behavior of repurchase-announcing firms compared with pre-announcement insider trades. The market can thus benefit by processing the information content of insider trades around a repurchase announcement when assessing the credibility of the repurchase signal to better understand the motive(s) behind open market share repurchases.

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Table 1: Distribution of repurchase announcements by year and industry

The table reports the distribution of repurchase announcements by year and industry. Panel A reports the distribution by year. Year is the fiscal year in which the repurchase announcement is made. Frequency counts the number of open market repurchase programs announced in a given year. Book-to-market is the ratio of the book value of assets to the market value at the beginning of the fiscal year. Market value is the average market value of firms in millions of dollars. Intended percentage is the percentage of outstanding shares that management intends to repurchase at the time of the announcement.
Panel B reports the distribution of repurchase announcements by industry. Industries are classified based on two-digit Standard Industrial Classification (SIC) codes in COMPUSTAT.

Panel A: Distribution of repurchase announcements by year.

Year	Frequency	Book-to-market	Market value ($M)	Intended percentage
1990	433	0.84	898.85	7.32
1991	114	0.86	1223.93	8.59
1992	215	0.61	1498.94	7.35
1993	240	0.59	1651.03	5.85
1994	446	0.65	1378.79	6.14
1995	421	0.68	1384.05	6.99
1996	559	0.58	2264.09	6.46
1997	488	0.54	1787.50	7.23
1998	866	0.65	1803.72	8.34
1999	635	0.73	1819.54	8.02
2000	372	0.78	3837.12	9.03
2001	361	0.67	6959.89	8.37
2002	250	0.74	3917.20	8.77
2003	253	0.60	4313.64	7.94
2004	311	0.48	6314.72	8.51
2005	360	0.47	6983.02	8.02
2006	354	0.47	9137.10	8.48
2007	522	0.57	7084.00	9.21
2008	556	0.74	3543.54	9.90
2009	182	0.77	5204.74	9.73
2010	300	0.62	6745.56	10.00
2011	426	0.62	5842.62	10.08
2012	281	0.69	8051.59	11.18
All	8945	0.64	3854.37	8.26

Panel B: Distribution of repurchase announcements by industry

Industry	Frequency	Percent	Cumulative frequency	Cumulative percentage
Agriculture, forestry, and fishing	21	0.23	21	0.23
Construction	100	1.12	121	1.35
Finance and insurance	2205	24.65	2326	26.00
Manufacturing	3486	38.97	5812	64.97
Mining	200	2.24	6012	67.21
Public administration	28	0.31	6040	67.52
Retail trade	644	7.2	6684	74.72
Services	1419	15.86	8103	90.59
Transportation and communication	537	6	8640	96.59
Wholesale trade	305	3.41	8945	100.00

Table 2: Summary statistics of sample firms

The table reports summary statistics of different variables for firms that announced an open market share repurchase program during the sample period. The table presents the number of observations (N), mean, standard deviation (SD) and 1st, 50th and 99th percentiles of different variables. Panel A reports announcement and longer-term post-announcement return statistics (in percentages). 3-day CAR (BHAR) is the 3-day (-1,1) cumulative (buy-and-hold) abnormal return around the announcement date (day 0) using the value-weighted market return as the benchmark. 2-year BHAR is the two years (24 months) buy-and-hold abnormal return of repurchase-announcing firms using the CRSP value-weighted index return as the benchmark. Stock price run-up is the 40-day buy-and-hold return of event firms starting 4 days prior to the repurchase announcement to -44 days.

Panel B reports summary statistics on insider trades around the repurchase announcement. (-3) +3-month sales (purchases) is the number of shares sold (bought) by insiders in the 3-month period (before) after the repurchase announcement normalized by the number of shares outstanding and multiplied by 10,000. +3-month (-3-month) net sales is the difference between the number of shares sold and the number of shares bought by insiders in the 3-month period post- (pre-) announcement normalized by the number of outstanding shares and multiplied by 10,000. +3-month (-3-month) abnormal net sales is the difference between net insider sales in the 3-month window before (after) the announcement and the net insider sales in the same time period last year based on Agrawal and Nasser (2012). +3-month (-3-month) abnormal net sales 2 is the difference between net insider sales in the 3-month window before (after) the repurchase announcement and the normal net insider sales for the firm during the same time window (number of months), where the normal net insider sales are measured as the average monthly difference in the number of shares sold and the number of shares bought by firms' insiders in the previous three-year period starting six months before the repurchase announcement, following a methodology similar to Kahle (2000). All trades are normalized by the number of outstanding shares and multiplied by 10,000. +3-month (-3-month) $ purchases (sales) is the dollar value of insider purchases (sales) in millions in the 3-month window before (after) the repurchase announcement.

Panels C and D differentiate insider trades by insiders' position in the firm. Summary statistics on the CEO & CFO trades are reported in Panel C, and Panel D has summary statistics on other insiders' trades (i.e., trades by insiders other than the CEO & CFO). The insider trade variables in both panels C and D are defined as in panel B. Panel E provides summary statistics on other firm characteristics for our sample firms. Firm size is the log of the book value of assets. Leverage is the ratio of total debt to total firm assets. Book-to-market is the ratio of the book value of firms' assets to its market value. Cash (Cash flow) is the cash (operating income before depreciation) divided by the book value of assets. Capital expenditures (R&D expense) is the capital expenditures (research and development expenditures) scaled by the book value of assets. Cash, cash flow, capital expenditures and R&D expense are shown as percentages. Tobin's Q is the ratio of the market-to-book value of assets. Return volatility is the standard deviation of daily stock returns measured over the one-year period prior to the repurchase announcement.

				Percentiles		
Variables	**N**	**Mean**	**SD**	**1st**	**50th**	**99th**
Panel A: Returns (percentages)						
CAR	8945	2.4	7.9	-23.0	1.8	31.0
3-day BHAR	8945	2.3	7.7	-22.6	1.6	30.3
5-day BHAR	8945	2.2	8.8	-25.1	1.6	33.1
2-year BHAR	8945	10.0	74.8	-124.6	-0.1	338.8
Stock price run-up	8942	-6.7	17.8	-57.5	-4.9	41.2
Panel B: Insider trades						
-3-month Sales	8945	15.413	54.35	0	0	426.71
-3-month Purchases	8945	5.369	22.558	0	0	169.36
-3-month Net Sales	8945	9.787	56.338	-156.83	0	409.12
-3-month Abnormal Net Sales	8945	-10.462	104.305	-677.34	0	292.21
-3-month Abnormal Net Sales 2	8945	-8.821	77.636	-383.19	-0.576	265.17
-3-month $ Purchases (millions)	8945	0.3155	4.78711	0	0	3.8821
-3-month $ Sales (millions)	8945	4.0627	54.4533	0	0	53.584
+3-month Sales	8945	18.808	69.422	0	0	562.55
+3-month Purchases	8945	5.301	22.033	0	0	172.72
+3-month Net Sales	8945	12.716	65.577	-144.33	0	492.51
+3-month Abnormal Net Sales	8945	-11.764	124.573	-785.1	0	372.82
+3-month Abnormal Net Sales 2	8945	-5.892	86.078	-375.48	-0.415	360.56
+3-month $ Purchases (millions)	8945	0.477	8.12652	0	0	5.0223
+3-month $ Sales (millions)	8945	4.385	53.4177	0	0	55.165
Panel C: CEO & CFO trades						
-3-month Sales	8945	1.919	8.215	0	0	59.787
-3-month Purchases	8945	0.479	2.661	0	0	21.614
-3-month Net Sales	8945	1.399	8.373	-20.482	0	57.121
-3-month Abnormal Net Sales 2	8945	-0.32	9.019	-34.067	0	41.992
+3-month Sales	8945	1.849	7.764	0	0	56.761
+3-month Purchases	8945	0.356	1.886	0	0	15.06
+3-month Net Sales	8945	1.468	7.779	-13.39	0	55.125
+3-month Abnormal Net Sales 2	8945	-0.251	8.943	-34.53	0	43.043
Panel D: Other Insider trades						
-3-month Sales	8945	12.294	45.827	0	0	367.02
-3-month Purchases	8945	4.298	18.909	0	0	146.25
-3-month Net Sales	8945	7.845	47.286	-130.9	0	348.87
-3-month Abnormal Net Sales 2	8945	-8.837	70.662	-369.68	-0.462	213.63
+3-month Sales	8945	15.765	60.902	0	0	489.49
+3-month Purchases	8945	4.359	18.636	0	0	145.92
+3-month Net Sales	8945	11.024	59.457	-121.42	0	456.82
+3-month Abnormal Net Sales 2	8945	-5.659	80.341	-363.83	-0.353	327.36
Panel E: Firm Characteristics						
Firm size	8945	2.783	0.871	0.979	2.742	5.088
Leverage	8919	0.538	0.258	0.068	0.532	0.973
Book-to-Market	8900	0.644	0.44	0.058	0.546	2.511
Cash	8945	16.153	18.339	0.091	8.282	77.274
Cash flow	8859	12.119	11.055	-25.717	12.05	47.745
Capital expenditures	8945	4.576	5.438	0	3.017	29.964
R&D expense	8945	2.646	5.089	0	0	24.361
Tobin's Q	8900	2.607	2.567	0.398	1.833	17.371
Return volatility	8942	0.029	0.015	0.009	0.025	0.087

Table 3: Insider trades around repurchase announcement

The table compares post-announcement insider trades with pre-announcement insider trades. 1-month trades refer to average insider trades in the month before (Pre), and after (Post), the repurchase announcement. Insider trade variables are as defined in table 2. The diff column reports the mean difference in pre- and post-announcement trades. Significance of the difference in means is tested using t-statistics, and the associated p-values are reported in the table.

	1-Month trades			
Shares traded	Pre	Post	Diff	P-value
Panel A: Insider trades				
Sales	2.93	6.40	-3.47***	0.00
Purchases	1.52	2.00	-0.49***	0.00
Net sales	1.37	4.33	-2.96***	0.00
Abnormal net sales	-3.39	-1.92	-1.47***	0.00
p-value	0.001	0.001		
Abnormal net sales2	-4.84	-1.88	-2.96***	0.00
p-value	0.001	0.001		
Panel B: Dollar value of trades				
Sales value	0.35	2.75	-2.39***	0.00
Purchases value	0.03	0.18	-0.15***	0.00
Abnormal sales value	-0.36	0.20	-0.56	0.29
p-value	0.00	0.70		
Abnormal purchase value	0.007	0.039	-0.03	0.53
p-value	0.00	0.44		
Panel C: Trade frequency				
Sale frequency	1.11	2.86	-1.75***	0.00
Purchase frequency	0.44	0.83	-0.39***	0.00
Abnormal sales freq.	-0.51	-0.83	0.32	0.34
	0.00	0.02		
Abnormal purchase freq.	0.157	0.358	-0.2**	0.02
	0.00	0.00		
Panel D: CEO and CFO trades				
Sales	0.29	0.59	-0.3***	0.00
Purchases	0.13	0.16	-0.03**	0.02
Net sales	0.15	0.43	-0.28***	0.00
	-			
Abnormal net sales	0.420	-0.145	-0.28***	0.00
p-value	0.001	0.001		

Significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Table 4: Post-announcement insider trades of repurchasing firms in subsamples

The table reports post-announcement one-month and three-month mean insider trades for different subsamples. Panels A, B and C divide the sample firms into high and low subgroups based on book-to-market ratio, stock price run-up and 6-month pre-announcement net sales, respectively. High (low) subgroups in panels A, B and C include firms with a book-to-market ratio, stock price run-up and 6-month pre-announcement net sales above (below) the sample mean, respectively. Finally, Panel D distributes the sample firms based on three-day (-1, 1) repurchase announcement return into high and low announcement return subgroups. Firms with three-day BHARs above (below) the sample mean are included in High (Low) announcement return subgroup. Insider trade variables are as defined in tables 2 and 3. The difference in means between subgroups for each panel is reported in the Diff column. The significance of difference in mean insider trades between subgroups is tested using t-test. P-values associated with t-statistic are also reported in the table.

	Panel A: Book-to-Market ratio				Panel B: Stock price run-up			
Variables	low	high	Diff	P-value	high	low	Diff	P-value
1-month Sales	7.43	4.83	2.60***	0.0001	7.45	5.14	2.31***	0.0001
1-month Purchases	1.66	2.52	-0.86***	0.0001	1.43	2.69	-1.26***	0.0001
1-month Net sales	5.69	2.26	3.43***	0.0001	5.96	2.37	3.59***	0.0001
3-month Sales	21.32	15.00	6.32***	0.0001	20.41	16.89	3.52**	0.017
3-month Purchases	4.32	6.79	-2.47***	0.0001	3.89	6.99	-3.1***	0.0001
3-month Net sales	15.95	7.81	8.14***	0.0001	15.66	9.2	6.46***	0.0001
	Panel C: Net sales 6m Pre-announcement				Panel D: Ann. Return (3-day BHAR)			
Variables	high	low	Diff	P-value	high	low	Diff	P-value
1-month Sales	15.61	4.4	11.21***	0.0001	7.44	5.57	1.87***	0.0001
1-month Purchases	1.61	2.09	-0.48**	0.0313	1.97	2.03	-0.06	0.778
1-month Net sales	13.85	2.27	11.58***	0.0001	5.43	3.45	1.98***	0.000
3-month Sales	43.58	13.45	30.13***	0.0001	20.82	17.21	3.61**	0.015
3-month Purchases	4.81	5.41	-0.60	0.3225	5.46	5.17	0.29	0.537
3-month Net sales	36.98	7.47	29.51***	0.0001	14.3	11.46	2.84**	0.041

Significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Table 5: Two-way sorted subsamples of repurchasing firms

The table reports average post-announcement net insider sales in the one-month and three-month periods for subsamples sorted on two variables. Vertically, every year sample firms are ranked into two subgroups based on repurchase announcement return. Low (high) rank refers to subgroup of firms that have lower (higher) announcement returns. Horizontally, within each announcement return subgroup, firms are further sorted into two subgroups based on book-to-market ratio, firm size and return volatility in panels A, B and C, respectively. High (low) subgroups include firms with book-to-market ratio above (below) the sample mean. In panel B, Small (large) refers to subgroup of firms with firm size below (above) the sample mean. In panel C, high (low) subgroup include firms with stock return volatility above (below) the sample mean. Insider trade variables are as defined in tables 2 and 3. The Diff column reports mean differences between subgroups. One sample t-test tests for the mean difference to be statistically different from zero. P-values associated with t-statistic are reported in the table.

Ann. Return Rank	Panel A: Book-to-market				
	Variable	low	high	Diff	P-value
Low	1-month Net sales	4.47	1.65	2.82***	0.0004
	3-month Net sales	14.76	6.32	8.44***	0.0001
high	1-month Net sales	7.02	2.79	4.22***	0.0001
	3-month Net sales	17.25	9.13	8.11***	0.0001
Ann. Return Rank	Panel B: Firm size				
	Variable	small	large	Diff	P-value
Low	1-month Net sales	3.45	3.38	0.06	0.9332
	3-month Net sales	14.12	9.39	4.73**	0.0147
high	1-month Net sales	6.07	4.12	1.95**	0.0234
	3-month Net sales	15.95	11.00	4.94**	0.0138
Ann. Return Rank	Panel C: Return volatility				
	Variable	high	low	Diff	P-value
Low	1-month Net sales	3.37	3.43	-0.06	0.9378
	3-month Net sales	13.13	10.82	2.30	0.2598
high	1-month Net sales	5.16	5.30	-0.15	0.8639
	3-month Net sales	15.29	12.65	2.65	0.1851

Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

Table 6: Determinants of post-announcement trades

The table reports regression results of post-announcement insider sales on repurchase announcement returns, pre-announcement insider trades and other control variables. The dependent variable in models 1-5 is net insider sales in the 1-month window post-announcement. Model 2 includes interaction term between repurchase announcement returns and 3-month net insider sales in the pre-announcement period. Model 3 includes interaction term between repurchase announcement returns and 3-month purchase-only transactions in the pre-announcement period. Model 4 includes interaction term between repurchase announcement returns and 3-month sale-only transactions in the pre-announcement period. Model 5 includes interaction term between repurchase announcement returns and 3-month mix transactions in the pre-announcement period. T-statistics are in parenthesis. Regression models also include year and industry fixed effects along with other control variables. Announcement return is the 3-day (1,1) buy-and-hold abnormal return around the repurchase announcement date. The other variables are as defined in table 2.

Variables	1	2	3	4	5
Intercept	5.89	5.89	5.74	5.91	6.13
	(-0.91)	(-0.91)	(-0.88)	(-0.91)	(-0.94)
Announcement return (AR)	28.54***	27.21***	31.20***	17.95***	38.78***
	(-7.57)	(-7.15)	(-7.5)	(-4.09)	(-7.42)
net sales -3m	0.08***	0.08***	0.08***	0.08***	0.08***
	(-16.03)	(-14.76)	(-15.78)	(-15.6)	(-16.08)
AR x net sales-3m		0.13**			
		(-2.46)			
AR x pur only -3m			-13.06		
			(-1.52)		
AR x sale only -3m				37.69***	
				(-4.68)	
AR x mix -3m					-19.90***
					(-2.83)
Stock price run-up	16.02***	16.07***	16.02***	16.21***	16.13***
	(-9.23)	(-9.26)	(-9.23)	(-9.35)	(-9.3)
Book to-market ratio	-1.23	-1.21	-1.2	-1.12	-1.21
	(-1.35)	(-1.34)	(-1.33)	(-1.24)	(-1.33)
Size	-0.47	-0.49	-0.48	-0.56	-0.5
	(-1.06)	(-1.09)	(-1.08)	(-1.25)	(-1.12)
Intended percentage	0.03	0.03	0.03	0.04	0.04
	(-1.04)	(-1.06)	(-1.04)	(-1.11)	(-1.07)
Leverage	-2.77	-2.75	-2.74	-2.53	-2.68
	(-1.49)	(-1.48)	(-1.47)	(-1.36)	(-1.44)
Tobin's Q	0.32**	0.32**	0.32**	0.32**	0.32**
	(-2.13)	(-2.14)	(-2.11)	(-2.11)	(-2.14)
Cash	0.04**	0.04**	0.04**	0.04**	0.04**
	(-1.96)	(-2)	(-1.96)	(-2.05)	(-2.01)
Cash flow	0.06*	0.06*	0.06*	0.07*	0.06*
	(-1.88)	(-1.85)	(-1.89)	(-1.91)	(-1.89)
Research & Dev. Expense	0.03	0.03	0.03	0.02	0.02
	(-0.37)	(-0.37)	(-0.36)	(-0.27)	(-0.33)

CAPEX	-0.01	-0.01	-0.01	-0.01	-0.01
	(-0.23)	(-0.21)	(-0.23)	(-0.17)	(-0.21)
Return volatility	-9.34	-8.62	-8.15	-4.19	-8.43
	(-0.35)	(-0.33)	(-0.31)	(-0.16)	(-0.32)
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES
R-squared	0.06	0.06	0.06	0.07	0.06
Observations	8786	8786	8786	8786	8786

Significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Table 7: Post-announcement trades and longer-term returns

The table reports mean long-term returns for subgroups of repurchase-announcing firms by post-announcement net insider sales. Firms are ranked based on 1-month net insider sales after the repurchase announcement. The difference (Diff) column reports the difference in mean returns between firms in high and low subgroups. T-test is used to test whether the difference in means is statistically different from zero. 2 (3)-year BHAR is the two- (three-) year buy-and-hold abnormal return of repurchase-announcing firms using value weighted market return as the benchmark. The lower panel sorts firms into subgroups by considering the CEO and CFO trades only.

	Post 1-Month net insider sales			
Variables	high	low	Diff	P-value
2 year BHAR	0.073	0.110	-0.037**	0.024
3 year BHAR	0.124	0.170	-0.047**	0.034
CEO&CFO trades				
2 year BHAR	0.044	0.104	-0.06**	0.022
3 year BHAR	0.114	0.161	-0.047	0.205

Significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Table 8: Direction of post-announcement insider trades and longer-term returns

Table 8 reports mean long-term returns for subsamples of firms based on the direction of insider trade in the one-month period following the repurchase announcement. P-only, Mix and S-only subsamples include firms with insider purchase-only, mix (bi-directional) and sales-only transactions, respectively. Firms with no insider trades are included in the mix subgroup. P-S reports mean difference in returns between firms in purchase-only and sale-only subgroups. P-M reports mean difference in returns between firms in purchase-only and mix subgroups. M-S reports mean difference in returns between firms in mix and sale-only subgroups. T-test is used to test whether the difference in means is statistically different from zero.

Variables	P-only	Mix	S-only	P-S	P-M	M-S
2 year BHAR	0.116	0.109	0.064	0.052**	0.007	0.045**
3 year BHAR	0.2	0.165	0.11	0.09**	0.035	0.055**

Significance at the 1%, 5%, and 10% level is denoted by ***, **, and * respectively.

Table 9: Pre- and post-announcement insider trades and longer-term returns

The table reports mean long-term returns for subgroups of repurchase-announcing firms by net insider sales around the repurchase announcement. High (Low) subgroup includes firms with high (low) net insider sales in the pre-announcement as well as high (low) net insider sales in the post-announcement period. Firm are ranked into high and low groups based on 1-month net insider sales around the repurchase announcement. The difference (Diff) column reports the mean differences in returns between high and low subgroups. T-test is used to test whether the difference in means is statistically different from zero. P-values associated with the t-statistic are reported in the table. The variables are as defined in tables 2 and 7.

	1-Month net sales around repurchase ann.			
Variables	High	Low	Diff	P-value
2-year BHAR	0.043	0.112	-0.069**	0.004
3-year BHAR	0.078	0.174	-0.096**	0.003

Significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Table 10: Longer-term returns and insider trades

The table reports regression results of longer-term returns of repurchase-announcing firms on insider trades around the repurchase announcement. The dependent variable is the two-year buy-and-hold abnormal return after the repurchase announcement. Column 1 (2) regresses 2-year BHAR on High net insider sales dummy (3 (1) -month), which is equal to 1 when the firm is in the high net insider sales subgroup based on 3 (1) -month insider trades and 0 otherwise. High net sales dummy (pre&post) is a dummy variable equal to 1 when the repurchase announcing firm is in the high net insider sales subgroup in both the pre- and post-announcement periods and 0 otherwise. Dummy variable in columns 1 and 3 is based on net insider trades in the 3-month period around the repurchase announcement, whereas in columns 2 and 4 it is based on 1-month net insider trades around the repurchase announcement. T-statistics are reported in parenthesis after adjusting standard errors for heteroskedasticity as suggested by White (1980). Year and industry fixed-effects are included in regression models. The other control variables are as defined in table 2.

	Post-ann		Pre and post	
	3m	1m	3m	1m
Intercept	-0.54***	-0.54***	-0.54***	-0.54***
	(-3.13)	(-3.14)	(-3.13)	(-3.12)
high net sales dummy (3-month)	-0.02			
	(-1.15)			
high net sales dummy (1-month)		-0.04*		
		(-1.92)		
high net sales dummy (pre&post)			-0.02*	
			(-1.7)	
high net sales dummy (pre&post)				-0.03**
				(-2.41)
Announcement return	0.16	0.17	0.15	0.16
	(1.48)	(1.56)	(1.44)	(1.5)
Stock price run-up	0.02	0.03	0.02	0.03
	(0.44)	(0.55)	(0.43)	(0.64)
Book to-market ratio	0.11***	0.11***	0.11***	0.11***
	(4.49)	(4.47)	(4.36)	(4.42)
Size	0.05***	0.05***	0.05***	0.05***
	(3.78)	(3.9)	(3.94)	(4.04)
Intended percentage	0.00	0.00	0.00	0.00
	(0.31)	(0.33)	(0.32)	(0.32)
Leverage	0.27***	0.26***	0.26***	0.26***
	(5.1)	(5.07)	(5.01)	(4.99)
Tobin's Q	-0.01***	-0.01***	-0.01***	-0.01***
	(-3.47)	(-3.43)	(-3.42)	(-3.34)
Cash	0.21***	0.21***	0.21***	0.21***
	(3.48)	(3.5)	(3.5)	(3.52)
Cash flow	0.85***	0.84***	0.85***	0.01***
	(8.93)	(8.93)	(8.98)	(8.97)
Research & Dev. Expense	1.61***	1.61***	1.62***	1.62***
	(7.9)	(7.91)	(7.93)	(7.92)

CAPEX	-0.8***	-0.8***	-0.8***	-0.8***
	(-4.61)	(-4.63)	(-4.62)	(-4.63)
Return volatility	4.69***	4.67***	4.69***	4.7***
	(6.85)	(6.82)	(6.84)	(6.87)
Year FE	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y
R-squared	0.0295	0.0298	0.0297	0.030

Significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.

Table 11: Actual repurchases and insider trades

The table reports regression results of *actual* firm repurchases post-announcement on insider trades around the repurchase announcement. The dependent variable is the actual repurchase completion rate, defined as the percentage of outstanding shares actually repurchased by the firm in the one year period following the repurchase announcement scaled by the intended repurchase program size (in percentage) at the time of repurchase announcement. Pre- (post-) ann. refers to insider trades in the pre- (post-) announcement periods respectively. 3m and 1m refer to 3-month and 1-month trading windows around the repurchase announcement respectively. Net sales is the net sales by all firm insiders for a given time window around the repurchase announcement. The CEO & CFO net sales indicate net sales by the CEO and CFO only. Other insiders' net sales measure net sales by all firm insiders except the CEO and CFO. Other variables are as defined in table 2. T-statistics are reported in parenthesis after adjusting standard errors for heteroskedasticity as suggested by White (1980). Regression models include industry and year fixed-effects.

		post-ann.				pre and post ann.	
		1m		3m		3m	
	Intercept	1.05*** (6.64)	1.05*** (6.63)	1.05*** (6.61)	1.06*** (6.69)	1.05*** (6.61)	1.06*** (6.7)
Pre-ann.	Net sales					0.62 (0.47)	
Pre-ann.	CEO&CFO net sales						5.64 (0.62)
Pre-ann.	Other Insiders' net sales						0.65 (0.4)
Post-ann.	Net sales	9*** (3.32)		5.74*** (5.08)		5.64*** (4.91)	
Post-ann.	CEO&CFO net sales		-82.67*** (-3.54)		-28.81*** (-3.01)		-30.29*** (-3.1)
Post-ann.	Other Insiders' net sales		14*** (4.51)		7.66*** (6.09)		7.56*** (5.9)
	Stock price run-up	-0.12*** (-2.78)	-0.11*** (-2.59)	-0.12*** (-2.86)	-0.12*** (-2.66)	-0.12*** (-2.84)	-0.11*** (-2.63)
	BHAR 1 year	-0.08***	-0.08***	-0.08***	-0.08***	-0.08***	-0.08***

	(-4.92)	(-4.99)	(-5.01)	(-5.04)	(-5)	(-5.01)
Return volatility	-2.78*** (-4.45)	-2.78*** (-4.45)	-2.81*** (-4.51)	-2.8*** (-4.48)	-2.82*** (-4.51)	-2.8*** (-4.49)
Cash	0.15*** (2.67)	0.15*** (2.74)	0.15*** (2.67)	0.15*** (2.74)	0.15*** (2.64)	0.15*** (2.68)
Cash Flow	0.10 (1.1)	0.11 (1.22)	0.09 (1)	0.10 (1.12)	0.08 (0.96)	0.09 (1.04)
CAPEX	-0.54*** (-3.42)	-0.55*** (-3.5)	-0.53*** (-3.37)	-0.55*** (-3.45)	-0.53*** (-3.37)	-0.55*** (-3.44)
Research & Dev. Expense	-0.51*** (-2.72)	-0.5*** (-2.69)	-0.53*** (-2.81)	-0.53*** (-2.82)	-0.53*** (-2.8)	-0.53*** (-2.81)
Intended percentage	-0.02*** (-17.75)	-0.02*** (-17.77)	-0.02*** (-17.85)	-0.02*** (-17.77)	-0.02*** (-17.85)	-0.02*** (-17.78)
Leverage	-0.08 (-1.64)	-0.08* (-1.67)	-0.07 (-1.62)	-0.08 (-1.65)	-0.07 (-1.62)	-0.08 (-1.65)
Tobin's Q	0.01** (1.99)	0.01** (2.04)	0.01** (1.99)	0.01** (2.03)	0.01** (1.98)	0.01** (2.03)
Size	0.01 (1.21)	0.01 (1.32)	0.01 (1.28)	0.01 (1.35)	0.01 (1.28)	0.01 (1.32)
Book to-market ratio	0.13*** (5.47)	0.13*** (5.39)	0.13*** (5.54)	0.13*** (5.39)	0.13*** (5.55)	0.13*** (5.42)
Year FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
R-squared	0.052	0.054	0.053	0.055	0.053	0.055

Significance at the 1%, 5%, and 10% level is denoted by ***, **, and *, respectively.