

The Role of Management Incentives in the Choice of Stock Repurchase Methods

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ABSTRACT

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This study employs conditional event study methodology to analyze how managers' personal motives affect the method by which firms repurchase their shares. To address this question, we examine insider trading activities around the announcement date of a stock repurchase. We find that firms are more likely to choose tender offers rather than an open market repurchases when the respective announcements are followed by heightened net insider sales. The results are most significant in the two months subsequent to the announcement. Our findings remain robust when examining the relationship between net insiders sales and stock repurchase methods in a sample that includes matched firms. We do not find any significant correlation between pre-announcement insider trading and the type of repurchase method a firm employs. Similarly, there are no differences between the long-term accounting or stock price returns of our sample firms when comparing the two repurchase methods. Our findings support Fried (2000) who proposes that tender offer repurchases are used by insiders to directly or indirectly transfer value among shareholders with insiders emerging ahead of the average public shareholder. As such, they should be of interest to investors and policymakers involved in the regulation of insider financial transactions.

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1. Introduction and Hypotheses Development

Stock repurchases and agency theory are two widely researched topics in the finance literature with both subjects having a direct impact on corporate decisions. In regards to research on stock repurchases, a small portion focuses on the different methods of performing stock repurchases and a few of those have examined these two topics simultaneously.

Agency costs that arise from the differing interests of firm executives and shareholders have been an important subject in the corporate governance literature. One important branch of the literature examines the impact of top-management compensation on agency costs. The relation between the interests of shareholders and executives has been assessed the subject of academic research for many decades. In one of the earlier studies, Jensen and Murphy (1990) estimate that over the period 1977 to 1986, CEO wealth changes by approximately \$3 for every \$1000 change in shareholder wealth. To increase the correlation between these figures and thus better align the interests of executives and shareholders, stock options have become a popular and important part of executive compensation packages. Over the last two decades, there has been a large increase in equity-based compensation with Bebchuk and Grinstein (2005) reporting an increase of over 600% in equity-based compensation for the top five executives from 1993 to 2000. However, studies such as Yermack (1995) have found no clear link between agency costs and equity-based compensation.

Similarly to agency theory, the empirical research regarding stock repurchases is vast. However, to date, few studies have examined the differences between different types of repurchase methods. Moreover, they typically focus on the signaling effect of a given repurchase method. Researchers frequently argue that signaling theory explains a firm's decision to conduct a tender offer repurchase rather than an open market repurchase because open market repurchases tend to be cheaper. The argument states that a signal must be costly in order to be credible. The substantial costs associated with tender offers allow firms to send a strong signal of underpricing to the market. It is important to note that this signal indicates that the firm's shares are perceived as being underpriced by the firm's executives without the necessary presence of actual underpricing. Comment and Jarrell's (1991) results show that following a repurchase

announcement, the market reacts more positively to tender offers than to open market repurchases. This effect is consistent with the signaling hypothesis.

There are two sets of empirical research that have examined equity-based executive compensation and stock repurchase programs simultaneously. First, some studies relate dividend policy, often considered a substitute to a stock repurchase, to executive compensation. They have consistently shown a strong negative relation between dividends and the number of stock options held by managers, and a positive relation between repurchases and managerial stock options (See, e.g., Jolls, 1998, and Fenn and Liang, 2001). These studies differentiate between different methods of distributing cash to shareholders, but do so only by comparing dividends to share buybacks.

A second set of studies has examined the relation between stock repurchase programs and insider trading prior to the respective repurchase announcements. In an attempt to understand the role of mispricing in motivating buybacks, Chan et al. (2012) find significant insider-trading behavior prior to the announcement, particularly when the firm's stock appears to be underpriced. Lee, Mikkelson, and Partch (1992) find increased insider buying and reduced insider selling activity prior to fixed price repurchases. Our paper provides new insights into the managerial decision-making process regarding different repurchase methods by investigating insider-trading behavior prior and following the announcement.

In order to understand a firm's decision between these two main repurchase methods, it is important to understand a firm's motives for repurchasing its shares. There are several reasons for stock repurchases, each supported by a large amount of empirical evidence. Jensen (1986) provides evidence for stock repurchases as a method to distribute excess capital to shareholders. Dann (1981) shows that management initiates stock repurchase programs when they perceive that the firm's stock is undervalued in the financial market. Mitchell and Dharmawan (2007) find a greater likelihood of stock repurchases when leverage ratios are below their optimal value. Bagwell (1991) argues and provides supporting evidence that a repurchase can be used as a takeover deterrence technique. He theorizes that shareholders who are willing to accept the repurchase offer are the ones with the lowest valuation for the firm, therefore, the repurchase will skew the distribution of the shareholders towards a more expensive pool. Finally, Jolls (1998)

provides supporting evidence for a relationship between management incentives and stock repurchase programs. Most of these studies have examined the reasons for repurchasing separately but the results are consistent in the few articles that have examined the motives concurrently. Dittmar (2000) examines these motives simultaneously and finds evidence in support of all motives during the period from 1977 to 1996. Among the different motives for stock repurchases, takeover deterrence and management incentives are the only two that benefit from the quick price adjustments in the stock market offered by tender offer repurchases. With a large proportion of tender offer repurchases not being initiated due to takeover deterrence, Fried (2000) proposes that tender offer repurchases are used by insiders to directly or indirectly transfer value among shareholders with insiders emerging ahead of the average public shareholder. In addition, he offers explanations as to why signaling theory is not a probable reason behind the choice of management to initiate tender offers in lieu of open market repurchases. He argues that in the majority of tender offer programs, insiders decline to announce their intentions. In other words, insiders are reluctant to commit to a non-tender. However, if insiders who initiated the stock repurchase believe that the stock is undervalued, then they should keep their stocks and not tender. Additionally, he argues that the large abnormal stock returns one can typically observe following a tender offer announcement are at least partially due to price pressure effects. It is also important to note that, assuming market efficiency, there is no reason for the firm to conduct non-defensive tender offer repurchases.

Other evidence not in line with the signaling theory has been found in the long-term performance of firms following a stock repurchase. Ikenberry, Lakonishok, and Vermaelen (1995) find a significant 12.14 percent four year average abnormal returns for firms following an open-market share repurchase. In addition, the signaling theory argues that tender offers send a stronger signal of the positive expectations of management. Therefore, we should expect larger changes in earnings following a tender offer repurchase announcement than an open market repurchase announcement. Inconsistent with the signaling theory, Lie and McConnell (1998) find no significant difference in earnings after the announcement of different repurchase programs although other researchers document an increase in earnings following fixed price repurchase programs. The results in regards to future earnings and future stock valuation suggest that the increase in prices following a tender offer repurchase announcement compared to the

price changes following open market repurchase announcements are not due to investors' new expectations regarding the firm's future earnings and growth.

In this paper, we extend Comment and Jarrell's (1991) and Vermaelen's (1981) work by comparing stock repurchase methods in two ways. First, we do not make the same assumption as Vermaelen (1981) and subsequent authors who argue that managers do not tender their own shares. Descriptive statistics presented by Fried (2000) indicate that this basic assumption is not always accurate for tender offers. Therefore, it becomes necessary to look at management incentives when analyzing the differences between stock repurchase methods. Second, we examine the long-term performance of the firm following a stock repurchase announcement while the previous literature has typically focused on short-term stock performance. Considering that the information asymmetry between insiders and public shareholders allows insiders to more accurately predict the future performance of the firm, long-term stock performance should be a better proxy for stock price undervaluation. The objective of this study is to examine whether signaling theory or the hypothesis put forward by Fried (2000) in regards to management incentives better describes the decision of management to choose tender offer repurchases over open-market repurchases. These findings are of great importance to investors as well as the Securities and Exchange Commission and other market regulators as they may reveal a need for new regulations regarding repurchase programs and executive trading.

2. Sample and Data Description

We employ several different databases for our study including the Securities Data Company (SDC) Platinum database and the Insider Filing Data Feed (IFDF) provided by Thomson Financial. These two databases provide a list of all U.S. stock repurchases and information regarding transactions in derivative and non-derivative securities by executives and other corporate insiders. Stock repurchase announcement dates and other attributes of the repurchase programs are obtained from the SDC. Table 1 provides a descriptive summary of U.S. stock repurchases from January 1, 1995, to December 31, 2007. We choose this end date to allow for the calculation of the long-term stock performance of our sample firms and to avoid any undue biases that may affect our results from the 2008 financial crisis.

Insider holdings and trading activities are captured through Forms 3, 4, and 5 which corporate insiders file with the U.S. Securities and Exchange Commission (SEC). Corporate insiders are defined as a company's officers and directors and any beneficial owners of more than ten percent of a class of the company's equity securities. Initial filings are performed using Form 3 and any changes in ownership are reported on Form 4. Finally, Form 5 is used to report any transactions that should have been reported earlier on Form 4. We obtain this data from the IFDF. In addition, we make use of Thomson Reuters cleansing process and remove any observations that appear unreasonable or inconsistent. This process is achieved by comparing figures reported by insiders on Forms 3, 4, and 5 with external sources. For the purpose of this paper, trades with numerous missing or invalid data elements and those that do not meet the collection requirements are removed. Figure 1 isolates the insider trading data for firms that perform a stock repurchase and plots the net insider sales around the stock repurchase announcement dates for both types of repurchase methods.

Comparing the post-event trading of each type of repurchase to its pre-event trading reveals that for both types of repurchases, the number of net sales by insiders following stock repurchase announcements tends to increase. The change is more apparent for tender offer repurchases. The next two figures focus on insider trading activities following repurchase announcements. Figure 2 plots the cumulative insider trading from day 0 to day 62. Figure 3 presents the distribution of total insider trading activities in the two months following the repurchase announcement.

Figure 2 shows that the net number of shares sold by insiders is larger in firms that announce tender offer repurchases than in firms that announce open market repurchases. This is surprising given that a large proportion of repurchases use the open market method. As we can see in Figure 3, for both types of repurchases, a majority of the announcements in our sample are followed by zero to minimal insider trading. Net purchases are less frequent than net sales for both types of repurchases with only a small percentage of open market repurchases being followed by relatively large net share purchases. This appears to be inconsistent with the signaling theory since the stronger signal provided by tender offer repurchases predicts that executives should be more likely to purchase shares. However, the difference is likely to be insignificant. For both types of repurchases, a large percentage of the announcements are

followed by net sales. The difference between the two methods is apparent for net sales of over \$1,000,000. These figures are 11.5 percent for tender offer repurchases and 5.5 percent for open market repurchases. This is consistent with the hypothesis put forward by Fried (2000) that suggests that executives who look to offload a large amount of their shares choose tender offers over the otherwise more common open market repurchase method. The primary source of accounting information are Capital IQ Compustat and SDC. Daily and monthly stock returns are obtained from The Center for Research in Security Prices (CRSP). Table 2 provides the results for an event study calculating abnormal returns for a period of 60 days prior to and following the stock repurchase announcement. These results are consistent with those reported by Comment and Jarrell (1991).

3. Methodology

The choice regarding which method of repurchase to use lies with the firm's executives, with many factors influencing their final decision. This section of the paper is divided into two main subsections. In subsection 3.1 we employ univariate equality tests and multivariable regressions to evaluate the effect of various variables, including actual net insider sales and abnormal returns, on the likelihood that a firm uses a given repurchase method. Subsection 3.2 adds to the previous section by taking into account normal insider trading levels. This is achieved by the use of control group test and substituting actual net insider sales with abnormal net insider sales within our regression models.

3.1. Insider sales around repurchase announcements

The first section of this paper, follows a methodology similar to that of Bergstresser and Philippon (2006) who investigate the effect of CEO incentives on earnings management. They employ five regression models with total accruals as the dependent variable and two definitions of insider sales as an independent variable. These variables include total gross insider sales as a percentage of firm value and total net sales as a percentage of firm value using data from both Thomson Financial and Compustat Execucomp. Their sample includes over 40,000 observations and the control variables used include log market capitalization, industry dummies and leverage ratios. In this paper, we examine the validity of the two leading hypotheses regarding management's choice of tender offers and open-market repurchases. To test these hypotheses we

employ a regression analysis with an independent variable related to each hypothesis in addition to various control variables. We use a logistic regression model to estimate the effect of signaling and management incentives on the probability of choosing a tender offer over an open market repurchase. The independent variables in the regression are defined in Table 3.

The first set of factors emphasized in our regression model is linked to the signaling effect or the undervaluation perceived by management. Contrary to Comment and Jarrell (1991) who focus on short-term performance effects, we examine the long-term performance of firms in terms of stock returns and accounting performance measures. Short term price changes following a repurchase are not only affected by the new information regarding management's future expectations for the firm but also by price pressures resulting from changes in supply and demand. The larger the percentage of shares to be repurchased, the larger the premium paid. Moreover, an increased likelihood of repurchase completion will likely influence the stock supply and demand equilibrium. The second set of factors used in our regression is related to management incentives and more precisely, the direct transfer of value from public shareholders. This direct transfer of value occurs when tender offer repurchases are used by management to increase the value of their personal portfolios in a short period of time. Therefore, we are interested in the trading activities of insiders shortly after the two types of stock repurchase programs. The final set of factors consists of our control variables that influence the choice of repurchase method. Two examples of such variables are the percentage of shares repurchased by the firm and the amount of cash available at the time of repurchase. The amount of cash at the time of repurchase may limit the use of tender offer repurchases as this method requires more resources. On the other hand, if the firm wants to repurchase a large percentage of shares in a short period of time, there are legal implications if they choose to use an open-market repurchase.

We measure the long-term stock performance of our sample firms by calculating each firm's four year buy-and-hold abnormal return (BHAR). The BHARs following the announcement are measured using standard event study methodology. Using monthly returns obtained from CRSP, the expected returns are computed as follows:

$$r_{et} = r_{ft} + (\alpha_i + \beta 1_i (r_{mt} - r_{ft}) + \beta 2_i \text{SMB}_t + \beta 3_i \text{HML}_t) \quad (1)$$

The Fama-French model parameter estimates, α_i and β_i , are based on a period of 12 months ending three months prior to the event date. r_{it} is the return of firm i at time t and r_{ft} is the risk free return at time t . The cumulative abnormal return is then calculated as $BHAR_{iT} = \Pi_T(1 + r_{it}) - \Pi_T(1 + r_{ft})$, where T is the length of the event window. Firms that have insufficient stock price data to calculate the parameter estimates for a minimum three month period are excluded from the analysis.

In addition, we proxy for the long-term performance of the firms by considering the firm's change in net income in the years following the stock repurchase announcement. More precisely, we measure the average change in net income scaled by total assets during the four fiscal year ends following the announcement.

$$\text{Average change in net income} = \frac{\sum_{t=1}^4 \left(\frac{\text{Net Income}_{\text{year}-1}}{\text{Total assets}_{\text{year}-1}} - \frac{\text{Net Income}_t}{\text{Total assets}_{\text{year}-1}} \right)}{4} \quad (2)$$

$\text{Net Income}_{\text{year}-1}$ and $\text{Total assets}_{\text{year}-1}$ represent net income before extraordinary items and total assets for the fiscal year ending prior to the repurchase announcement. Net Income_t is equal to net income before extraordinary items in the years following the repurchase announcement. Three sets of variables are used to capture the effect of management incentives regarding the choice of repurchase method. All of these measures pertain to the amount of insider trading surrounding the repurchase announcement date. These variables are the same as those used by Bergstresser and Philippon (2006) and are normalized based on the number of shares outstanding or the firm's size. The first two variables are the net dollar amount sold by insiders as a percentage of the market capitalization of the firm in the days surrounding the stock repurchase announcement, with one variable for the period prior to the announcement and one for the period following the announcement. The second two variables focus on the net units sold by insiders as a percentage of total common shares outstanding for the firm in the days surrounding the stock repurchase announcement, with one variable for the period prior to the announcement and one for the period after the announcement. The last variable identifies firms with the largest amount of insider trading defined using a dummy variable which equals one if insider sales following the announcement for the firm are among the largest among the sample firms (top decile). Management incentives are likely to influence some but not all repurchase

method decisions. Subsequently, insider trading around the stock repurchase announcement is not expected to be a predictive variable for all repurchase method decisions. The use of this dummy variable will allow us to capture effects of management incentives by comparing firms with large insider sales following the announcement to firms without large insider sales. The variables used to capture the effect of management incentives are measured during periods of 60, 180 and 390 days surrounding the announcement. We choose to look at a period that goes beyond one year prior to and following the event date in order to capture any insider trading activities that are purposely planned outside a one year time frame.

In our estimation, we control for cash and short-term investments, the firm's book to market decile, leverage, the size of the firm and the year of repurchase announcement. These variables are computed at the fiscal year end prior to the stock repurchase announcement. Cash and short-term investments are calculated as a percentage of total assets. The firm's book to market decile is based on the yearly book to market percentiles of NYSE-listed firms. We measure firm size as the natural logarithm of market capitalization. In addition, two other variables, the percentage of total shares outstanding that is announced to be repurchased and a dummy variable representing the completion status of the repurchase program are included as control variables in the logistic regression model. The firm's management is expected to have a know whether a repurchase will be executed and is thus less likely to choose a tender offer repurchase if it is unable or not fully interested in carrying out the repurchase program. In addition, if the firm is interested in purchasing a large percentage of shares in a short period of time, it might be legally obliged to use a tender offer program due to restrictions on the use of open-market repurchases. Lastly, we control for year and industry effects by using a series of year and industry dummies based on two digit SIC codes as summarized in Table 4. This classification follows Kahle and Walking (1996) who argue against the use of one digit SICs and provide ten homogeneous groups using two digit SICs.

In addition to estimating our logistic regression models, we employ five ordinary least squares regression models with net insider sales as the independent variable. These regression models test for the effect of different repurchase methods on insider sales following the announcement. Specifically, we employ a dummy variable that equals one when the firm announces a tender offer, which allows us to evaluate the management incentive theory. Other

independent variables used in this regression consist of previous period net insider sales, completion status, year of the announcement, and size of the announcement. Seyhun (1986) finds that, on average, insiders in small firms are less likely to have net sales compared to insiders in large firms. In addition, Jenter (2005) finds that insiders are more likely to sell their holdings at higher market valuations. Aboody and Lev (2000) find a significant relationship between insiders sales and whether the firm had research and development (R&D) expenses. Specifically, firms with R&D expenses have more insider sales. We measure a firm's R&D expenditure as R&D expenses divided by sales for the fiscal year ending prior to the announcement. Agrawal and Cooper (2014) argue that the greater the potential effect of an event on stock prices, the greater is an insider's incentive to trade. We use the firm's cumulative abnormal return over days -5 to +5 relative to the announcement to measure this effect. Multiple studies including Meulbroek (2000) and Jin (2002) argue and find that high levels of equity risk and increases in equity risk encourage managers to sell their stocks. We measure equity risk as the standard deviation of stock returns for the period 310 to 186 days before the announcement date. Change in equity risk is calculated as the difference between the standard deviation of stock returns for the period 185 to 60 days before and the standard deviation of stock returns for the period 310 to 186 days before the announcement date.

3.2. Abnormal insider trading around repurchase announcements

To test the robustness of our results, it is important to account for normal insider trading levels. Therefore, we investigate the abnormal insider trading in addition to the actual amount of insider trading. There are two main techniques that have been used in the previous literature to establish the abnormal level of insider trading. The first technique uses time series data where the firm's insider trading behavior during the event period is compared to itself in a prior period (see Karpoff and Lee, 1991). Niehaus and Roth (1999) follow this method and use the ratio of the number of shares sold by insiders divided by the total number of shares traded by insiders when comparing their actual and expected insider trading. As insider trading activity is infrequent and non-normal, the use of ratios may help in achieving non skewed abnormal trading results. A major disadvantage of using these ratios in our study is that they fail to capture the economic size of the repurchase. The second technique employed in the previous literature, uses control firms to test the statistical significance of the insider sales. Gosnell et al. (1992) examine abnormal

insider trading activity around bankruptcies and identify firms within the same industry that are closest in terms of market capitalization to the bankrupt firm and compare their insider trading activity during the same periods. To compare our two groups of firms with different stock repurchase methods we modify this methodology by selecting our control firms from our sub-sample of firms with open market repurchases. The control firms, which performed an open market repurchase, are linked to those with a tender offer repurchase program on the basis of industry and firm size. We use two-digit SIC codes to match on industry. Next we select the firm with the smallest difference in market capitalization at the fiscal year end prior to the repurchase announcement. Firms from the tender offer sub-sample are removed from our analysis if no matching firm in terms of two-digit SIC code or decile of market capitalization are present within the open market repurchase sample. In addition, we take into account the number of days between stock repurchase announcement dates of the two groups and require that the tender offer and open market repurchase announcements occur not more than a given number of days apart.

Furthermore, we implement another set of logistic regressions which uses abnormal insider trading instead of the actual amount of insider trading. In this context, abnormal insider trading is calculated using the same methodology used by Gosnell et al. (1992). Under this method, the control firms consist of those with no repurchase announcement during our sample period. These firms are then grouped according to industry using the one-digit SIC code and size using deciles of market capitalization. These control firms are then matched to those with a repurchase announcement and the average insider trading activity for firms within each group is calculated for 60, 180, and 390 days prior to and following every repurchase announcement. Finally, the abnormal insider activity is calculated as follows:

$$Abnormal\ Net\ Insider\ Sales_{it} = Net\ Insider\ Sales_{it} - \frac{\sum_{c=1}^n Net\ Insider\ Sales_{ct}}{n} \quad (3)$$

where $net\ insider\ sales_{it}$ measures the net trading by insiders in firm i during month t , $net\ insider\ sales_{ct}$ equals the net trading by insiders in control firm c during month t and n is the number of control firms in the same one-digit SIC industry and market capitalization decile as firm i .

4. Empirical Results

Similar to the previous section, the results of this paper are presented in two subsections.

4.1. Insider sales around repurchase announcements

To improve our understanding of why management may choose a tender offer repurchase over an open-market repurchase we use a logistic regression. The regression results for our sample of 1,006 repurchase announcement are presented in Table 5, 6, and 7.

The three tables differ in terms of the length of the trading window with Table 5 showing the net amount of insider sales for a period of 60 days prior to and following repurchase announcements. The trading windows for the following two tables are 180 and 390 days. The first model presented in Tables 5, 6, and 7 provides the results for a regression with no control variables. Models 2 to 5 present the regression results for a different combination of variables from each effect discussed previously and shown in Table 3 and include the control variables.

4.1.1. Management incentive variables

The results for the 60 and 180 days trading windows show a significantly positive estimate for Net sales (\$ - Following). The variables representing net sales following the announcement have significantly positive parameter estimates. In addition, the dummy variable representing the top ten percent of firms in terms of net dollar sold as a percentage of the firm's market capitalization is significantly positive. These results indicate that tender offer repurchase announcements are more likely to be followed by higher net insider sales as a percentage of the firms' total value. Also, the repurchase announcements followed by the highest percentage of net sales as a percentage of the firms' total value are more likely to have been a tender offer. These results support the management incentive theory. Prior to the announcement, tender offer repurchases have a lower amount of net insider sales. However, this is not significant outside of the model with no control variables. When we shift to the 390 days trading window, the signs of these variables remain constant and are no longer significant. This indicates that the difference between the net insider sales is only existent within the first 180 days of the repurchase announcement.

4.1.2. Signaling effect variables

The regression results for the variables representing the long-term performance of the firms are similar for all three tables. The abnormal returns based on four year BHARs are higher

for tender offer repurchase announcements. These results suggest that there is validity behind the signaling theory when evaluating the long-term performance of the firms. However, the estimate are statistically insignificant in all of the models and trading windows. In unreported robustness tests, we also calculate the cumulative abnormal returns (CARs) for our sample firms and employed them another regression model. The results are not provided in this paper as the coefficients remain insignificant and are similar to the BHAR methodology. The change in net income is negative and also insignificant across all trading windows. Overall, the results presented in Tables 5, 6 and 7 are not supportive of the signaling hypothesis as there appears to be no significant differences between future performance of firms initiating a tender offer and open market repurchase programs.

4.1.3. Control variables

The second model is similar to the first model with the addition of control variables: Cash and investments available prior to the repurchase announcement, leverage as total liabilities to total shareholders' equity, firm's valuation as the book to market ratio, firm size as the log of market capitalization, completion status, and size of the repurchase as a percentage of common shares standing. In the last four models, we employ combinations of two variables: one that represents the long-term performance of the firm and another that captures the amount of insider trading. Across all three trading windows program completion and size of the repurchase announcement are significantly positive. The book to market decile parameter estimates are significantly positive. These results indicate that firms within the larger book to market deciles are more likely to initiate a tender offer repurchase. Finally, the log of the firms' market capitalization is negative but only statistically significant for the 390 days trading window. These results are in line with the summary characteristics of U.S. stock repurchases in Table 1 and our expectations summarized in Section 2.

4.1.4. Multiple trading windows

In addition to these three tables, Table 8 reports regression results for models that separates the trading window into the following six windows: (-390, -181), (-180, -61), (-60, -1), (0, 60), (61, 180) and (181, 390). The two trading periods after the repurchase announcement, (0, 60) and (61, 180), both have a positive coefficient with the (0, 60) window result being

significant across all models. The coefficients for the (-61, -1) and (-180,-61) windows are negative, indicating that it is more likely that positive net purchases are followed by tender offer repurchase announcements. However, this coefficient is insignificant. These results indicate that the significant results observed in Table 8 for the 180 day trading window are likely due to strong differences in net sales for the first 60 day portion of the 180 days trading window. As expected, the results for the control variables and those capturing the future performance of the firm are similar to the results reported in the three previous tables.

4.1.5. Robustness tests

To assess whether extreme observations (e.g., firms with large repurchases) are driving our results, we divide our sample into two groups based on the size of the repurchase announcement. Looking back at the potential objectives behind repurchase announcements (see our discussion in section 1), it is likely that the goal for firms with very large repurchases is to defend themselves against tender offers. In this case, the logistic regression coefficient will not be representative of management incentives and could skew the results for the total sample. Panel A of Table 9 provides the results for our sample of firms which announce that they will repurchase less than 10% of their common shares outstanding. This subgroup contains 787 firms, with 25 tender offer announcements. The results for our insider trading variables remain positively significant indicating that our results in the previous regressions are not driven by extreme observations as they apply to "common" repurchase announcements. The book to market decile remains positive but is no longer significant. This suggests that this variable is correlated with the size of the repurchase. The completion status dummy also remains significantly positive.

The second part of the table provides the results for our sample of firms with larger repurchase programs, i.e. firms that plan to repurchase more than 10% of their outstanding shares. For these large repurchase programs, the amount of insider trading following the event date is no longer significant. This result remains consistent with the management incentive hypothesis as for very large repurchases, the personal incentives of insiders can no longer play a role in the repurchase method decision. When the goal of the repurchase is to discourage a takeover, insiders are expected to sell back their stocks for both tender offer and open market

repurchases. Similarly, if a takeover does occur, insiders will be once again selling back their stocks for both tender offer and open market repurchases. Interestingly, the net sales prior to the repurchase announcement remain negative and is statistically significant for the 390 days trading window. Although Fried's (2000) management incentive hypothesis only focuses on insider trading following the repurchase announcement, the significantly negative results for insider net sales prior to the announcement are also in support of the management incentive hypothesis. The book to market decile is again positive but insignificant. The completion status dummy remains significantly positive and the log of the firms' market capitalization is negative and statistically significant.

Our next two set of robustness analyses control for effects associated with stock options grants. In 2002, the Financial Accounting Standards Board (FASB) ruled that companies must show the fair value of their stock option given to employees as part of compensation packages on their income statements effective the first annual reporting period after June 15, 2005. The value can be determined using lattice models, the Black-Scholes-Merton model, Bulow-Shoven model, and Monte Carlo simulation models to put a dollar value on their unvested equity awards. This ruling resulted in a large number of stock repurchase programs prior to 2005 where firms attempted to offset the dramatic dilution effect of their executive stock option exercise. As the motive behind these repurchase programs is unique, we evaluate their effect in our results. We incorporate into our regression model a dummy variable which equals one if the repurchase announcement occurred in or subsequent to 2005. The results, which are not reported, for net insider sales in the 60 days following the announcement date remain positive and significant. Additionally, we include in our regression model stock options outstanding prior to the stock repurchase announcement as an additional control variable. This variable is used as a proxy for the number of options owned by management at the time the repurchase occurs. The regression coefficient for this variable is positive but not significant. This supports the management incentive theory. The insiders benefit from the resulting increase in the share price, which is why insiders with a large number of options are more likely to use a tender offer repurchase. The results for net insider sales following the announcement remain significant.

4.1.6. Cross-sectional regression models

We complete our insider trading analysis by reviewing the results for a regression model with net insider sales as the dependent variable. The results for a series of five regression models are reported in Table 10. The dependent variables are net sales by insiders during the trading window (0, 60) in Model 1, (61, 180) in Models 2 and 3, and (181, 390) in the last two models. For all models, net insider sales in the immediately prior periods are significantly positive. For Models 4 and 5 where the independent variable is net sales during the (181, 390) window, net sales during the (0, 180) window are significantly positive but net sales in the 390 days prior to the repurchase announcement are not significant. The dummy variable representing the repurchase method is significantly positive in Models 1, 2 and 3 where the trading windows are (0, 60) and (61, 180). Consistent with Jenter (2005), firms with larger book to market ratios sell significantly less stock. The parameter estimate for the firms' market capitalization is negative. This is consistent with Seyhun (1986), however the coefficient is only significant in two models. The cumulative abnormal return for the 10 days surrounding the repurchase announcement is significantly positive for Model 1. Our year and industry dummies as well as our other control variables are not significant.

4.2. Abnormal insider trading around repurchase announcements

The following section consists of the results for a test of the relationship between insider trades and method of repurchase and logistic regressions explaining the likelihood of a tender offer repurchase over an open market repurchase.

4.2.1. Relationship between insider trades and method of repurchase

To account for normal insider trading levels when examining the insider trading within repurchasing firms, we employ a modified version of the test employed by Gosnell et al. (1992) in Table 11. Specifically, we present results for net insider sales as a percentage of a firms' total value for the periods of 60 days prior and following the announcement.

The mean net insider sales following the announcement date remain consistently higher for tender offers than for open market repurchases across all three panels when matching either at the 365, 90 or 30 day thresholds. The differences are significant in panel A and B but become

insignificant in panel C. In panel C, there is a high probability of a type II error as the number of firms used in the analysis is very small. The mean net insider sales prior to the announcement are not statistically different and appear to be similar in size except in Panel A. However, when we look at the standard deviation, the results are likely to be driven by extreme observations.

4.2.2. Logistic regression

Our logistic regression results based on abnormal insider trading are presented in Table 12. In this table, we calculate abnormal net insider sales as the difference between the repurchasing firm's net insider sales and the average net insider sales for a group of firms with the same one-digit SIC code and within the same market capitalization decile. The coefficient representing abnormal net insider sales remains significantly positive across all three models with all other non-control variables statistically insignificant. The control variables for book to market decile, the completion status of the repurchase, and the size of the repurchase announcement are significantly positive. Table 13 provides regression results for a model in which we add insider trading variables for the remaining trading windows within the 390 days prior to and following the announcement. Insider sales during the periods (0, 60) and (61, 180) after the repurchase announcement both have a positive coefficient and are significant at the 10% confidence level across the two models with control variables. For the (-60, -1) and (-180, -61) trading windows the coefficient is negative but insignificant.

5. Summary and Conclusions

To date, there are only few studies that have examined the reasons and the consequences of different types of repurchase methods. Among these, most studies examine the short term stock performance of repurchasing firms. The results are generally consistent and indicate a larger abnormal stock return for tender offers than for open market repurchases. With the assumption that insiders do not tender their own shares, these studies conclude that tender offer repurchases send a stronger signal of the firm's management evaluation of the stock price. This paper empirically examines the signaling theory concurrently with the hypothesis proposed by Fried (2000) who argues that tender offer repurchases are used by insiders to directly or indirectly transfer value among shareholders with insiders emerging ahead of the average public shareholder. We analyze the long-term stock performance and short-term insider trading

activities in a sample of 1,006 publicly traded companies that announced stock repurchase programs between January 1, 1995, and December 31, 2007. We employ logistic regressions, control group tests, and cross-sectional regressions to compare the two main methods of stock repurchase and determine the effects of insider trading and future management expectations for the value of the firm on the choice of stock repurchase method. We report statistically larger net insider sales following the announcement of tender offer repurchases compared to a control group of open market repurchases. In addition, we report statistically larger net insider sales for firms performing a tender offer repurchase in our logistic regression analysis. Provided that executives have knowledge of their short-term stock trading plans and have an understanding of the outcome of the repurchase method on the firm's stock price, our results indicate that management incentives may play an important role when managers decide which repurchase method they should use. We proxy for the public's misvaluation of the firm relative to the management's valuation using the firm's four year abnormal return. This measure shows no significant difference between firms choosing open market repurchases and tender offers. This finding does not support the signaling hypothesis. As the long-term abnormal returns are difficult to accurately estimate, we also examine the firm's net income. The results are similar for the change in the firm's net income for the four year following the repurchase. Furthermore, our cross-sectional regression results indicate that the method of repurchase has predictive power regarding the amount of insider trading in the 180 days following the repurchase announcement. Tender offers produce on average larger net insiders sales of 0.5 to 1 percent of the firm's market value. Our results thus provide support for Fried (2000) who proposes management incentives as a motive behind the choice of stock repurchase.

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Table I

Summary characteristics of U.S. stock repurchases

This table provides summary statistics for stock repurchases by publicly traded U.S. firms between January 1, 1996 and December 31, 2007. Panel A provides summary statistics for all stock repurchase announcements. Panel B reproduces the summary statistics presented in A by year. Panel C provides summary statistics for our sample of 1,006 stock repurchases for which insider trading took place within thirteen months prior to or after the announcement. This panel also excludes any repurchase announcements with missing data. Stock repurchase announcements is the number of all unique repurchase announcements. Stock repurchase programs completed is the percentage of stock repurchases that are completed within each repurchase category. The size of repurchase announcement is calculated as the average of the number of shares announced to be repurchased divided by the total number of shares outstanding. The book to market ratio, net income per share, and market capitalization are computed at the firm's fiscal year end prior to the stock repurchase announcement. t value represents the test-statistic of a Satterthwaite t- test of the null hypothesis that the means of two populations are equal. Median Z reports the Mood's median two-sample test statistic for the null hypothesis that the medians are identical. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

Panel A: Number of stock repurchase announcements, stock repurchase size and completion rate

	Mean		t value	Median		Median Z
	Fixed Price	Open-Market		Fixed Price	Open-Market	
Panel A: All stock repurchase announcements						
Stock repurchase announcements	628	6,545	N/A	628	6,545	N/A
Stock repurchase programs completed	88.70%	43.42%	-32.22***	N/A	N/A	N/A
Size of repurchase announcement	19.15%	6.91%	-15.35***	13.5%	5.01%	17.09***

Panel B: Stock repurchase announcements by year

Year	Stock repurchase announcements		Size of repurchase announcement		Stock repurchase programs completed	
	Fixed Price	Open-Market	Fixed Price	Open-Market	Fixed Price	Open-Market
1996	47	727	19.47%	6.86%	95.74%	61.62%
1997	61	684	16.06%	6.63%	93.44%	53.07%
1998	48	1047	21.61%	7.16%	93.75%	47.09%
1999	54	798	23.26%	7.17%	96.30%	46.49%
2000	60	619	32.70%	7.04%	93.33%	39.74%
2001	52	339	17.46%	6.53%	88.46%	38.64%
2002	39	433	27.85%	6.88%	66.67%	28.64%
2003	59	274	20.52%	6.73%	83.05%	33.94%
2004	42	366	11.40%	5.94%	88.10%	34.70%
2005	51	439	16.43%	6.71%	98.04%	41.46%

2006	64	385	12.57%	6.97%	92.19%	37.66%
2007	51	434	11.20%	7.61%	68.63%	27.42%

Panel C: Stock repurchase announcements with insider trading within thirteen months prior to or following the announcement

	Fixed Price	Open-Market	t value	Fixed Price	Open-Market	Median Z
Stock repurchase announcements	76	930	N/A	76	930	N/A
Stock repurchase programs completed	88.61%	39.67%	-12.47***	N/A	N/A	N/A
Size of repurchase announcement	18.95%	6.76%	-3.80***	13.33%	5.32%	8.30***
Book to market ratio	0.53	0.45	-2.42***	0.51	0.42	1.75*
Net income on assets	0.05	0.06	0.88	0.04	0.05	-2.14**
Market capitalization	\$ 6,840 m	\$ 9,742 m	0.88	\$ 623 m	\$ 1,236 m	-1.75*
Leverage	2.93	6.07	1.99**	1.95	2.33	-3.34***
Cash on assets	0.1716	0.1548	-0.75	0.10	0.08	1.67*

Table 2

Abnormal return statistics for multiple event windows

This table reports the abnormal returns for multiple event windows surrounding the stock repurchase announcement. The mean cumulative abnormal returns are calculated using equally weighted market adjusted returns with an estimation period of 365 trading days ending 365 days before the stock repurchase announcement. A Patell Z test is performed to test the hypothesis that the mean cumulative abnormal return is statistically different from 0. In addition, we perform a Generalized Sign Z test to test for the significance of the difference between positive and negative returns during the even window. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.

Tender Offer Repurchases n=76

Event Window	Mean Cumulative Abnormal Return	Patell Z	Positive/Negative	Generalized Sign Z
(-60,-1)	1.71%	0.881	45:32	2.041*
(-30,-1)	0.78%	0.631	44:33	1.812*
(-10,-1)	0.46%	0.755	40:37	0.899
(-5,-1)	0.57%	1.108	44:33	1.812*
(-2,-1)	0.47%	1.574\$	37:40	0.214
(-1,0)	4.61%	14.772***	59:18	5.238***
(-1,+1)	6.42%	17.148***	69:8	7.522***
(0,+1)	6.26%	20.386***	72:5	8.207***
(0,+2)	6.01%	15.907***	69:8	7.522***
(0,+5)	6.05%	11.269***	64:13	6.380***
(0,+30)	5.28%	4.152***	58:19	5.010***
(0,+60)	5.03%	2.210*	45:32	2.041*

Open Market Repurchases n=930

Event Window	Mean Cumulative Abnormal Return	Patell Z	Positive/Negative	Generalized Sign Z
(-60,-1)	-5.01%	-9.404***	338:605	-7.353***
(-30,-1)	-3.03%	-7.691***	366:577	-5.528***
(-10,-1)	-1.11%	-4.844***	417:526	-2.203*
(-5,-1)	-0.31%	-1.601\$	461:482	0.666
(-2,-1)	-0.01%	0.614	477:466	1.709*
(-1,0)	0.52%	6.091***	535:408	5.490***
(-1,+1)	1.13%	10.880***	584:359	8.684***
(0,+1)	1.12%	13.025***	602:341	9.858***
(0,+2)	1.14%	11.069***	589:354	9.010***
(0,+5)	1.21%	8.727***	585:358	8.750***
(0,+30)	1.29%	3.813***	522:421	4.642***
(0,+60)	1.47%	2.901**	513:430	4.056***

Table 3
Variable definitions

This table provides an overview of the variables used in our logistic regression, the effect that the variable aims to capture, and the definition of the variable.

Effect	Variable	Definition
Signaling Hypothesis	Long-term stock returns	Four year buy-and-hold abnormal returns (BHAR) following the announcement
	Long-term earnings	Average improvement in net income as a percentage of total assets for the four fiscal year ends following the repurchase announcement
Management Incentives	Net sales (dollars)	Net dollar amount sold by insiders in the months surrounding the stock repurchase announcement
	Net sales (units)	Net units sold by insiders in the months surrounding the stock repurchase announcement
	Largest sales	Dummy variable, equal to one if insider sales for the firm are among the largest among our sample firms (top decile)
Control Variables	Cash on assets	Cash and short-term investments as a percentage of total assets of the firm at the fiscal year end prior to the stock repurchase announcement
	Leverage	Total debt to shareholder's equity at the fiscal year end prior to the stock repurchase announcement
	Book to market ratio	Book to market ratio of the firm at the fiscal year end prior to the stock repurchase announcement
	Size of firm	Log of the market capitalization of the firm at the fiscal year end prior to the stock repurchase announcement
	Completed	Dummy variable, equal to one if the stock repurchase is completed partially or with the full number of shares announced
	Size of repurchase	Percentage of total shares outstanding announced to be repurchased

Table 4
Industry classification

This table provides the industry breakdown of our sample firms based on two-digit Standard Industry Classification (SIC) codes. (see Kahle and Walking 1996)

Group	Description	Two Digit Major Code
A	Agriculture, Forestry and Fishing	01-09
B	Mining	10-14
C	Construction	15-17
D	Manufacturing	20-39
E	Transportation, Communication, Electric, Gas and Sanitary Services	40-49
F	Wholesale Trade	50-51
G	Retail Trade	52-59
H	Finance, Insurance and Real Estate	60-67
I	Services	70-89
J	Public Administration	91-97

Table 5

Logistic regression of tender offer repurchase likelihood (390 days insider trading window)

This table presents the results of six logistic regressions that explain the likelihood of a tender offer repurchase over an open market repurchase announcement. The dependent variable is a binomial variable that equals one if the firm announced a tender offer repurchase and zero if the firm announced an open market repurchase. Net sales (\$ - Prior) is the net amount of insider sales as a percentage of the market capitalization of the firm in the 390 days prior to the announcement. Net sales (\$ - Following) is the net amount of insider trading as a percentage of the market capitalization of the firm in the 390 days following the announcement. Net sales (Units - Prior) is the net number of units sold by insiders as a percentage of the total number of common shares outstanding of the firm in the 390 days prior to the announcement. Net sales (Units - Following) is the net number of units sold by insider as a percentage of the total number of common shares outstanding of the firm in the 390 days following the announcement. Largest sales is a dummy variable equal to one if insider unit sales for the firm following the repurchase announcement are among the largest among the sample firms (top decile). The four year abnormal return is calculated as the four year BHAR using the Fama-French three factor model. Change in net income is calculated as the average change in income as a percentage of total assets for the four fiscal year ends following the announcement. Cash and investments, book to market ratios and the size of the firm are computed at the fiscal year end prior to the stock repurchase announcement. The size of repurchase measures the proportion of shares to be repurchased relative to total shares outstanding. Completed is a dummy variable that equals to one if the stock repurchase is completed partially or with the full number of shares announced. P-values are listed in parentheses below the regression coefficients. * indicates significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	-2.4925***	-26.4812	-26.1750	-26.4735	-25.9511
	(<.0001)	(0.9360)	(0.9374)	0.9356	0.9394
Net sales (\$ - Prior)	0.00952	0.0198		0.0185	0.0212
	(0.7014)	(0.5084)		(0.5407)	(0.3439)
Net sales (\$ - Following)	0.0440	0.0608		0.0638	
	(0.3072)	(0.1851)		(0.2647)	
Net sales (Units - Prior)			0.0210		
			(0.3467)		
Net sales (Units - Following)			0.0492		
			(0.4386)		
Largest sales					0.2770
					(0.5581)
Four year abnormal return	0.0181	0.0434	0.0435		0.0434
	(0.3950)	(0.1851)	(0.1856)		(0.1846)

Change in net income				-0.0633 (0.3053)	
Cash on assets		-0.9149 (0.4165)	-0.8715 (0.4421)	-1.0486 (0.3394)	-0.8692 (0.4372)
Leverage		-0.0531 (0.2438)	-0.0559 (0.2186)	-0.0559 (0.2426)	-0.0584 (0.1980)
Book to market decile		0.1258* (0.0575)	0.1243* (0.0589)	0.1253* (0.0572)	0.1214* (0.0635)
Size of firm		-0.1808* (0.0664)	-0.1837* (0.0617)	-0.1497 (0.1285)	-0.1844* (0.0599)
Completed		2.9784*** ($<.0001$)	2.9674*** ($<.0001$)	2.9667*** ($<.0001$)	2.9690 ($<.0001$)
Size of repurchase		0.1491*** ($<.0001$)	0.1493*** ($<.0001$)	0.1482*** ($<.0001$)	0.1504 ($<.0001$)
Observations	1006	1006	1006	1006	1006
Likelihood Ratio Chi-Square	3.3041 (0.3471)	195.0534*** ($<.0001$)	194.9778*** ($<.0001$)	193.0272*** ($<.0001$)	194.7222*** ($<.0001$)
Score Chi-Square	1.4603 (0.6915)	200.5253*** ($<.0001$)	200.6900*** ($<.0001$)	201.3391*** ($<.0001$)	200.1492*** ($<.0001$)
Wald Chi-Square	1.9256 (0.5880)	98.7789*** ($<.0001$)	98.8164*** ($<.0001$)	99.5521*** ($<.0001$)	98.7933*** ($<.0001$)
Max-rescaled R-Square	0.0079	0.4283	0.4281	0.4242	0.4276
R-Square	0.0033	0.1764	0.1763	0.1747	0.1761

Table 6

Logistic regression of tender offer repurchase likelihood (180 days insider trading window)

This table presents the results of six logistic regressions that explain the likelihood of a tender offer repurchase over an open market repurchase announcement. The dependent variable is a binomial variable that equals one if the firm announced a tender offer repurchase and zero if the firm announced an open market repurchase. Net sales (\$ - Prior) is the net amount of insider sales as a percentage of the market capitalization of the firm in the 180 days prior to the announcement. Net sales (\$ - Following) is the net amount of net insider sales as a percentage of the market capitalization of the firm in the 180 days following the announcement. Net sales (Units - Prior) is the net number of units sold by insiders as a percentage of the total number of common shares outstanding of the firm in the 180 days prior to the announcement. Net sales (Units - Following) is the net number of units sold by insider as a percentage of the total number of common shares outstanding of the firm in the 180 days following the announcement. Largest sales is a dummy variable equal to one if insider unit sales for the firm following the repurchase announcement are among the largest among the sample firms (top decile). The four year abnormal return is calculated as the four year BHAR using the Fama-French three factor model. Change in net income is calculated as the average change in income as a percentage of total assets for the four fiscal year ends following the announcement. Cash and investments, book to market ratios and the size of the firm are computed at the fiscal year end prior to the stock repurchase announcement. The size of repurchase measures the proportion of shares to be repurchased relative to total shares outstanding. Completed is a dummy variable that equals to one if the stock repurchase is completed partially or with the full number of shares announced. P-values are listed in parentheses below the regression coefficients. * indicates significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	-2.5667	-26.1961 (0.9405)	-26.2293 (0.9399)	-26.1975 (0.9403)	-26.5350 (0.9363)
Net sales (\$ - Prior)	-0.2593** (0.0120)	-0.0650 (0.5185)		-0.0754 (0.4529)	0.0259 (0.5143)
Net sales (\$ - Following)	0.2255*** (<.0001)	0.1266** (0.0198)		0.1297** (0.0157)	
Net sales (Units - Prior)			-0.0193 (0.7940)		
Net sales (Units - Following)			0.1525** (0.0164)		
Largest sales					0.8992 (0.0268)**
Four year abnormal return	0.0221 (0.3523)	0.0447 (0.1624)	0.0439 (0.1682)		0.0458 (0.1690)

Change in net income				-0.0686 (0.2745)	
Cash on assets		-0.5390 (0.6302)	-0.4712 (0.6762)	-0.6869 (0.5291)	-0.8490 (0.4470)
Leverage		-0.0565 (0.2385)	-0.0565 (0.2376)	-0.0613 (0.2193)	-0.0518 (0.2575)
Book to market decile		0.1276* (0.0593)	0.1364** (0.0435)	0.1278* (0.0558)	0.1340 (0.0455)**
Size of firm		-0.1601 (0.1064)	-0.1559 (0.1159)	-0.1267 (0.2011)	-0.1551 (0.1130)
Completed		2.9324*** ($<.0001$)	2.9102*** ($<.0001$)	2.9210*** ($<.0001$)	2.9941*** ($<.0001$)
Size of repurchase		0.1471*** ($<.0001$)	0.1474*** ($<.0001$)	0.1457*** ($<.0001$)	0.1504*** ($<.0001$)
Observations	1006	1006	1006	1006	1006
Likelihood Ratio Chi-Square	24.6753*** ($<.0001$)	202.2553*** ($<.0001$)	202.6853*** ($<.0001$)	200.3713*** ($<.0001$)	198.9550*** ($<.0001$)
Score Chi-Square	32.9108*** ($<.0001$)	218.1972*** ($<.0001$)	220.5313*** ($<.0001$)	219.1942*** ($<.0001$)	206.0226*** ($<.0001$)
Wald Chi-Square	23.4333*** (0.0018)	103.6045*** ($<.0001$)	103.9343*** ($<.0001$)	104.3592*** ($<.0001$)	100.1259*** ($<.0001$)
Max-rescaled R-Square	0.0584	0.4425	0.4434	0.4388	0.4360
R-Square	0.0242	0.1823	0.1826	0.1808	0.1796

Table 7

Logistic regression of tender offer repurchase likelihood (60 days insider trading window)

This table presents the results of six logistic regressions that explain the likelihood of a tender offer repurchase over an open market repurchase announcement. The dependent variable is a binomial variable that equals one if the firm announced a tender offer repurchase and zero if the firm announced an open market repurchase. Net sales (\$ - Prior) is the net amount of insider sales as a percentage of the market capitalization of the firm in the 60 days prior to the announcement. Net sales (\$ - Following) is the net amount of insider trading as a percentage of the market capitalization of the firm in the 60 days following the announcement. Net sales (Units - Prior) is the net number of units sold by insiders as a percentage of the total number of common shares outstanding of the firm in the 60 days prior to the announcement. Net sales (Units - Following) is the net number of units sold by insider as a percentage of the total number of common shares outstanding of the firm in the 60 days following the announcement. Largest sales is a dummy variable equal to one if insider unit sales for the firm following the repurchase announcement are among the largest among the sample firms (top decile). The four year abnormal return is calculated as the four year BHAR using the Fama-French three factor model. Change in net income is calculated as the average change in income as a percentage of total assets for the four fiscal year ends following the announcement. Cash and investments, book to market ratios and the size of the firm are computed at the fiscal year end prior to the stock repurchase announcement. The size of repurchase measures the proportion of shares to be repurchased relative to total shares outstanding. Completed is a dummy variable that equals to one if the stock repurchase is completed partially or with the full number of shares announced. P-values are listed in parentheses below the regression coefficients. * indicates significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	-2.5495*** (<.0001)	-21.2566 (0.9233)	-25.8894 (0.9350)	-25.9709 (0.9366)	-26.7174 (0.9360)
Net sales (\$ - Prior)	-0.2453*** (0.4330)	-0.2059 (0.5823)		-0.2440 (0.5179)	-0.2513 (0.5298)
Net sales (\$ - Following)	0.2934*** (<.0001)	0.1667* (0.0514)		0.1567* (0.0546)	
Net sales (Units - Prior)			0.0160 (0.8543)		
Net sales (Units - Following)			0.1915** (0.0354)		
Largest sales					1.0554*** (0.0077)
Four year abnormal return	0.0257 (0.3052)	0.0472 (0.1505)	0.0473 (0.1501)		0.0419 (0.1990)

Change in net income				-0.0656 (0.2910)	
Cash on assets		-0.5088 (0.6544)	-0.4599 (0.6851)	-0.6717 (0.5436)	-0.7227 (0.5308)
Leverage		-0.0366 (0.4517)	0.0414 (0.3704)	-0.0423 (0.4045)	-0.0456 (0.3485)
Book to market decile		0.1173* (0.0767)	0.1240* (0.0615)	0.1168* (0.0757)	0.1339** (0.0438)
Size of firm		-0.1611 (0.1030)	-0.1575 (0.1118)	-0.1316 (0.1838)	-0.1416 (0.1509)
Completed		2.9255*** (<.0001)	2.9115*** (<.0001)	2.8855*** (<.0001)	2.9064*** (<.0001)
Size of repurchase		0.1475*** (<.0001)	0.1482*** (<.0001)	0.1502*** (<.0001)	0.1507*** (<.0001)
Observations	1006	1006	1006	1006	1006
Likelihood Ratio Chi-Square	21.9361*** (<.0001)	198.3431*** (<.0001)	198.4918*** (<.0001)	195.9335*** (<.0001)	200.7837*** (<.0001)
Score Chi-Square	34.9672*** (<.0001)	214.2798*** (<.0001)	215.9763*** (<.0001)	215.2863*** (<.0001)	210.1029*** (<.0001)
Wald Chi-Square	19.4554*** (0.0002)	101.8573*** (<.0001)	102.3926*** (<.0001)	102.3826*** (<.0001)	101.3059*** (<.0001)
Max-rescaled R-Square	0.0520	0.4348	0.4351	0.4300	0.4396
R-Square	0.0216	0.1791	0.1792	0.1771	0.1811

Table 8

Logistic regression of tender offer repurchase likelihood (multiple insider trading windows)

This table presents the results of three logistic regressions that explain the likelihood of a tender offer repurchase over an open market repurchase announcement. The dependent variable is a binomial variable that equals one if the firm announced a tender offer repurchase and zero if the firm announced an open market repurchase. Net sales (period) is the net amount of insider sales as a percentage of the market capitalization of the firm in the days surrounding the announcement. The four year abnormal return is calculated as the four year BHAR using the Fama-French three factor model. Change in net income is calculated as the average change in income as a percentage of total assets for the four fiscal year ends following the announcement. Cash and investments, book to market ratio and the size of the firm are computed at the fiscal year end prior to the stock repurchase announcement. The size of repurchase measures the proportion of shares to be repurchased relative to total shares outstanding. Completed is a dummy variable that equals to one if the stock repurchase is completed partially or with the full number of shares announced. P-values are listed in parentheses below the regression coefficients. * indicates significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

	Model 1	Model 2	Model 3
Intercept	-2.5671*** (<.0001)	-16.0458 (0.9465)	-16.0828 (0.9500)
Net sales (-390, -181)	0.00385 (0.9529)	-0.0414 (0.5998)	-0.0424 (0.5871)
Net sales (-180, -61)	-0.1070 (0.4921)	-0.00987 (0.9221)	-0.0246 (0.8225)
Net sales (-60, -1)	-0.3609 (0.3001)	-0.2517 (0.5011)	-0.2882 (0.4334)
Net sales (0, 60)	0.2786*** (<.0001)	0.1534* (0.0702)	0.1428* (0.0804)
Net sales (61, 180)	0.1306 (0.1374)	0.1186 (0.1300)	0.1303* (0.0934)
Net sales (181, 390)	-0.00675 (0.8985)	-0.00326 (0.9557)	0.000822 (0.9886)
Four year abnormal return	0.0234 (0.3378)	0.0450 (0.1614)	
Change in net income			-0.0654 (0.2970)
Cash on assets		-0.2582 (0.7922)	-0.3770 (0.6999)
Leverage		-0.0546 (0.2775)	-0.0618 (0.2323)
Book to market decile		0.1221* (0.0776)	0.1212* (0.0748)
Size of firm		-0.1635* (0.0987)	-0.1341 (0.1770)
Completed		2.9330***	2.9280***

		(<.0001)	(<.0001)
Size of repurchase		0.1498***	0.1487***
		(<.0001)	(<.0001)
Observations	1006	1006	1006
Likelihood Ratio Chi-Square	26.4347***	206.7219***	204.6536***
	(<.0001)	(<.0001)	(<.0001)
Score Chi-Square	42.0307***	224.4285***	225.1785***
	(<.0001)	(<.0001)	(<.0001)
Wald Chi-Square	24.0298***	106.0307***	106.6490***
	(<.0001)	(<.0001)	(<.0001)
Max-rescaled R-Square	0.0625	0.4480	0.4440
R-Square	0.0259	0.1858	0.1841

Table 9

**Logistic regression of tender offer repurchase likelihood
(by stock repurchase size)**

This table presents the results of a series of logistic regressions that explain the likelihood of a tender offer repurchase over an open market repurchase announcement for two subgroups of stock repurchases based on the size of the repurchase program. The dependent variable is a dummy variable that equals one if the firm announced a tender offer repurchase and zero if the firm announced an open market repurchase. Net sales (\$ - Prior) is the net amount of insider trading as a percentage of the market capitalization of the firm in the days prior to the announcement. Net sales (\$ - Following) is the net amount of insider trading as a percentage of the market capitalization of the firm in the days following the announcement. Four year abnormal return is calculated as the four year BHAR using the Fama-French three factor model. Change in net income is calculated as the average change in income as a percentage of total assets for the four fiscal year ends following the announcement. Cash and investments, book to market ratio and the size of the firm are computed at the fiscal year end prior to the stock repurchase announcement. The size of repurchase measures the proportion of shares to be repurchased relative to total shares outstanding. Completed is a dummy variable that equals to one if the stock repurchase is completed partially or with the full number of shares announced. P-values are listed in parentheses below the regression coefficients. * indicates significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

Panel A: Stock repurchases with less than 10 percent of total shares outstanding to be repurchased

	60 days		180 days		390 days	
	Estimate	P-value	Estimate	P-value	Estimate	P-value
Intercept	-19.6223	(0.9145)	-21.7358	(0.9435)	-20.3595	(0.9369)
Net sales (\$ - Prior)	-0.0978	(0.7815)	-0.0491	(0.7349)	0.0363	(0.2239)
Net sales (\$ - Following)	0.2412**	(0.0196)	0.2218**	(0.0156)	0.0271	(0.8043)
Four year abnormal return	0.0543	(0.4185)	0.0467	(0.4496)	0.0450	(0.4720)
Cash on assets	-1.2199	(0.5176)	(-0.9711)	(0.6119)	-2.2163	(0.2403)
Leverage	-0.0266	(0.6273)	(-0.0569)	(0.3291)	-0.0644	(0.2124)
Book to market decile	0.0186	(0.8613)	(0.0657)	(0.5527)	0.0287	(0.7877)
Size of firm	-0.0987	(0.5133)	-0.0760	(0.6214)	-0.1522	(0.3059)
Completed	2.0758***	(0.0004)	2.3262***	(0.0008)	2.0851***	(0.0004)
Observations	787		787		787	
Likelihood Ratio Chi-Square	48.8985***	(0.0013)	53.8930***	(0.0003)	34.0027***	(0.0055)
Max-rescaled R-Square	0.2596		0.2852		0.2335	
R-Square	0.0602		0.0662		0.0542	

Panel B: Stock repurchases with larger than 10 percent of total shares outstanding announced to be repurchased

	60 days		180 days		390 days	
	Estimate	P-value	Estimate	P-value	Estimate	P-value
Intercept	-13.6458	(0.9523)	-11.0315	(0.9393)	-9.5482	(0.9487)
Net sales (\$ - Prior)	-1.0237	(0.4496)	-0.2368	(0.3569)	-1.1000*	(0.0902)
Net sales (\$ - Following)	0.3942	(0.1309)	0.1872	(0.1463)	0.00833	(0.8985)
Four year abnormal return	0.0326	(0.4177)	0.0290	(0.4438)	0.0333	(0.3706)
Cash on assets	-0.5428	(0.7710)	-0.7013	(0.7129)	0.2515	(0.8975)
Leverage	0.00683	(0.9419)	0.0159	(0.8626)	-0.00180	(0.9842)
Book to market decile	0.0484	(0.6182)	0.0486	(0.6190)	0.0538	(0.5819)
Size of firm	-0.3430**	(0.0372)	-0.3608**	(0.0258)	-0.3392**	(0.0343)
Complete	3.1703***	(<.0001)	3.2388***	(<.0001)	3.0063***	(<.0001)
Observations	219		219		219	
Likelihood Ratio Chi-Square	92.6105***	(<.0001)	91.4325***	(<.0001)	92.6499***	(<.0001)
Max-rescaled R-Square	0.5191		0.5138		0.5193	
R-Square	0.3461		0.3426		0.3462	

Table 10

Regression of insider sales

This table provides coefficient estimates for a series of ordinary least squares regressions in which we regress net insider sales during different trading windows on a series of explanatory variables. The explanatory variables include net insider sales in the period prior to the trading window, the cumulative abnormal return during a period of days -5 to +5 days around the announcement, a tender offer dummy variable that equals one if the repurchase method is fixed price or Dutch auction. The book to market ratio and the size of the firm are computed at the fiscal year end prior to the stock repurchase announcement. The size of the repurchase measures the proportion of shares to be repurchased relative to total shares outstanding. Completed is a dummy variable that equals to one if the stock repurchase is completed partially or with the full number of shares announced. R&D to sales is calculated as R&D expenses divided by sales for the fiscal year ending prior to the announcement. Standard deviation is calculated as the standard deviation of stock returns for the period from 310 to 186 days before the announcement date. Change in standard deviation is calculated as the difference between the standard deviation of stock returns for the period from 185 to 60 days before and the period from 310 to 186 days before the announcement date. P-values are listed in parentheses below the regression coefficients. * indicates significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

	Model 1	Model 2	Model 3	Model 4	Model 5
Dependent Variable Window	(0, 60)	(61, 180)	(61, 180)	(181, 390)	(181, 390)
Intercept	0.61569 (0.3591)	0.62656 (0.5629)	0.49515 (0.6449)	0.93167 (0.4927)	1.03557 (0.4281)
Net sales (-390, -1)	0.01193** (0.0366)	0.08461*** (<.0001)	0.08206*** (<.0001)	0.01027 (0.3265)	-0.01418 (0.1748)
Net sales (0, 60)			0.21343*** (<.0001)		
Net sales (0, 180)					0.25099*** (<.0001)
CAR (-5, 5)	0.60653** (0.0604)	-0.11746 (0.8215)	-0.24691 (0.6332)	-0.20967 (0.7234)	-0.31689 (0.5791)
Tender offer	0.60007*** (<.0001)	0.80128*** (0.0011)	0.67321*** (0.0061)	0.23322 (0.4030)	-0.11953 (0.6601)
Completed	0.06552 (0.3999)	-0.00276 (0.9825)	-0.01674 (0.8931)	-0.01585 (0.9116)	-0.04311 (0.7545)

Size of repurchase	0.00433 (0.2455)	-0.00264 (0.6606)	-0.00357 (0.5503)	0.00700 (0.3066)	0.00681 (0.3035)
Size of firm	-0.05141** (0.0428)	-0.03649 (0.3725)	-0.02552 (0.5302)	-0.09059** (0.0446)	-0.06904 (0.1120)
Book to market decile	-0.01293 (0.4506)	-0.05079* (0.0664)	-0.04803* (0.0801)	-0.06579** (0.0367)	-0.04980 (0.1007)
R&D to sales	-0.07622 (0.7318)	-0.15683 (0.6621)	-0.14056 (0.6929)	-0.19042 (0.6425)	-0.13733 (0.7279)
Standard deviation	0.29756 (0.9586)	-5.15106 (0.5774)	-5.21456 (0.5695)	-2.04178 (0.4868)	-0.99790 (0.9127)
Change in standard deviation	-1.61625 (0.8120)	3.95156 (0.7186)	4.29651 (0.6928)	5.62321 (0.5392)	4.52873 (0.6073)
Observations	1006	1006	1006	1006	1006
Adjusted R-Squared	0.0700	0.1061	0.1218	0.0346	0.1070
F-Test (p-value)	<.0001	<.0001	<.0001	0.0705	<.0001

Table 11

Tests of the relationship between net insiders sales and stock repurchase method

This table provides the results for a test of the relationship between insider trades and method of repurchase. Means represent the net amount of insider sales as a percentage of the market capitalization of the firm in the 60 days prior to or following the announcement. The control group consists of firms with an open market repurchase. Firms are linked on the basis of industry and firm size. Two-digit SIC codes are used to match by industry. The log market capitalization of each firm is calculated at the first fiscal year end prior to the repurchase announcement and is used as a proxy for size. Firms from the tender offer sample are removed from the analysis if we are unable to find a matching firm in terms of two-digit SIC code or decile of market capitalization in the open market repurchase sample group. When multiple control firms exist within the same two-digit SIC code and size decile, we select the control firm with the smallest size difference. Panel B and C add more stringent restrictions based on the difference between the tender offer and the corresponding open market repurchase announcement. * indicates significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

	Tender Offer Sample (51 firms)	Open Market Sample - Control (51 firms)	p-Value
Panel A: Stock repurchase announcements =<365 days apart			
Mean - (Net Sales - \$ - Following)	0.59	0.13	0.0870*
Std Dev	(1.68)	(0.91)	
Mean - (Net Sales - \$ - Prior)	0.04	1.91	0.1759
Std Dev	(0.10)	(9.75)	
Panel B: Stock repurchase announcements =<90 days apart			
	Tender Offer Sample (34 firms)	Open Market Sample - Control (34 firms)	p-Value
Mean - (Net Sales - \$ - Following)	0.4958	0.0548	0.0741*
Std Dev	(1.3721)	(0.2649)	
Mean - (Net Sales - \$ - Prior)	0.0341	0.0326	0.9726
Std Dev	(0.0924)	(0.2303)	
Panel C: Stock repurchase announcements =<30 days apart			
	Tender Offer Sample (19 firms)	Open Market Sample - Control (19 firms)	p-Value
Mean - (Net Sales - \$ - Following)	0.3464	0.0758	0.2464
Std Dev	(0.9735)	(0.1570)	
Mean - (Net Sales - \$ - Prior)	0.0136	0.00548	0.6680
Std Dev	(0.0564)	(0.0598)	

Table 12

Logistic regression of tender offer repurchase likelihood (Abnormal insider trading - 60 days window)

This table presents the results of three logistic regressions that explain the likelihood of a tender offer repurchase over an open market repurchase announcement using abnormal insider trading volumes. The dependent variable is a binomial variable that equals one if the firm announced a tender offer repurchase and zero if the firm announced an open market repurchase. Net sales (\$ - Prior) is the net amount of abnormal insider sales as a percentage of the market capitalization of the firm in the 60 days prior to the announcement. Net sales (\$ - Following) is the net amount of abnormal insider trading as a percentage of the market capitalization of the firm in the 60 days following the announcement. The four year abnormal return is calculated as the four year BHAR using the Fama-French three factor model. Change in net income is calculated as the average change in income as a percentage of total assets for the four fiscal year ends following the announcement. Cash and investments, book to market ratios and the size of the firm are computed at the fiscal year end prior to the stock repurchase announcement. The size of repurchase measures the proportion of shares to be repurchased relative to total shares outstanding. Completed is a dummy variable that equals to one if the stock repurchase is completed partially or with the full number of shares announced. P-values are in parenthesis under the regression estimate coefficients. * indicates significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

	Model 1	Model 2	Model 3
Intercept	-2.5138*** (<.0001)	-21.2278 (0.9288)	-21.0413 (0.9298)
Net sales (D - Prior)	-0.2452 (0.4348)	-0.2419 (0.5336)	-0.2784 (0.4742)
Net sales (D - Following)	0.2702*** (<.0001)	0.1661* (0.0504)	0.1539* (0.0573)
Four year abnormal return	0.0250 (0.3103)	0.0473 (0.1499)	
Change in net income			-0.0632 (0.3082)
Cash on assets		-0.5538 (0.6242)	-0.7047 (0.5229)
Leverage		-0.0366 (0.4546)	-0.0424 (0.4049)
Book to market decile		0.1205* (0.0700)	0.1196* (0.0698)
Size of firm		-0.1567 (0.1122)	-0.1279 (0.1966)
Completed		2.9269*** (<.0001)	2.9149*** (<.0001)
Size of repurchase		0.1456*** (<.0001)	0.1449*** (<.0001)
Observations	981	981	981
Likelihood Ratio Chi-Square	19.5232*** (<.0001)	196.4270*** (<.0001)	193.9017*** (<.0001)

Score Chi-Square	29.1742*** (<.0001)	210.5220*** (<.0001)	211.4908*** (<.0001)
Wald Chi-Square	17.9403*** (0.0005)	101.1337*** (<.0001)	101.8640*** (<.0001)
Max-rescaled R-Square	0.0469	0.4350	0.4300
R-Square	0.0197	0.1816	0.1795

Table 13

Logistic regression of tender offer repurchase likelihood (Abnormal insider trading - multiple insider trading windows)

This table presents the results of three logistic regressions that explain the likelihood of a tender offer repurchase over an open market repurchase announcement using abnormal insider trading volumes. The dependent variable is a binomial variable that equals one if the firm announced a tender offer repurchase and zero if the firm announced an open market repurchase. sales (period) is the net amount of abnormal insider sales as a percentage of the market capitalization of the firm in the days surrounding the announcement. The four year abnormal return is calculated as the four year BHAR using the Fama-French three factor model. Change in net income is calculated as the average change in income as a percentage of total assets for the four fiscal year ends following the announcement. Cash and investments, book to market ratios and the size of the firm are computed at the fiscal year end prior to the stock repurchase announcement. The size of repurchase measures the proportion of shares to be repurchased relative to total shares outstanding. Completed is a dummy variable that equals to one if the stock repurchase is completed partially or with the full number of shares announced. P-values are in parenthesis under the regression estimate coefficients. * indicates significance at the 10% level, ** indicates significance at the 5% level, and *** indicates significance at the 1% level.

	Model 1	Model 2	Model 3
Intercept	-2.5167*** (<.0001)	-21.8765 (0.9274)	-21.8292 (0.9279)
Net sales (-390, -181)	-0.0415 (0.6409)	-0.0695 (0.4753)	-0.0630 (0.5144)
Net sales (-180, -61)	-0.1774 (0.2863)	-0.0770 (0.6012)	-0.1044 (0.4969)
Net sales (-60, -1)	-0.1681 (0.6404)	-0.2863 (0.4810)	-0.3242 (0.4081)
Net sales (0, 60)	0.2691*** (<.0001)	0.1511* (0.0756)	0.1384* (0.0907)
Net sales (61, 180)	0.0957 (0.1234)	0.0885 (0.1033)	0.0931* (0.0931)
Net sales (181, 390)	-0.0130 (0.8108)	-0.0136 (0.8196)	0.0589 (0.3991)
Four year abnormal return	0.0245 (0.3324)	0.0454 (0.1657)	
Change in net income			-0.0720 (0.2582)
Cash on assets		-0.6081 (0.5929)	-0.7821 (0.4807)
Leverage		-0.0591 (0.2407)	-0.0665 (0.1993)
Book to market decile		0.1168* (0.0986)	0.1164* (0.0938)
Size of firm		-0.1565 (0.1162)	-0.1261 (0.2082)

Completed		2.9255*** (<.0001)	2.9256*** (<.0001)
Size of repurchase		0.1466*** (<.0001)	0.1447*** (<.0001)
Observations	981	981	981
Likelihood Ratio Chi-Square	25.4738*** (0.0006)	202.4158*** (<.0001)	200.7747*** (<.0001)
Score Chi-Square	38.0230*** (<.0001)	217.6848*** (<.0001)	218.5601*** (<.0001)
Wald Chi-Square	21.4019*** (0.0032)	103.4193*** (<.0001)	104.2271*** (<.0001)
Max-rescaled R-Square	0.0610	0.4470	0.4437
R-Square	0.0256	0.1866	0.1852

Figure 1: Insider trading activity around stock repurchase program announcements

Figure 1.a isolates the insider trading data for firms that perform a stock repurchase and plots the net insider sales for the eight weeks prior and following the stock repurchase announcement date for both types of repurchase methods. The net dollar amount sold by insiders is calculated as the sum of insider sales for the specified period. The announcement date is included in week one.

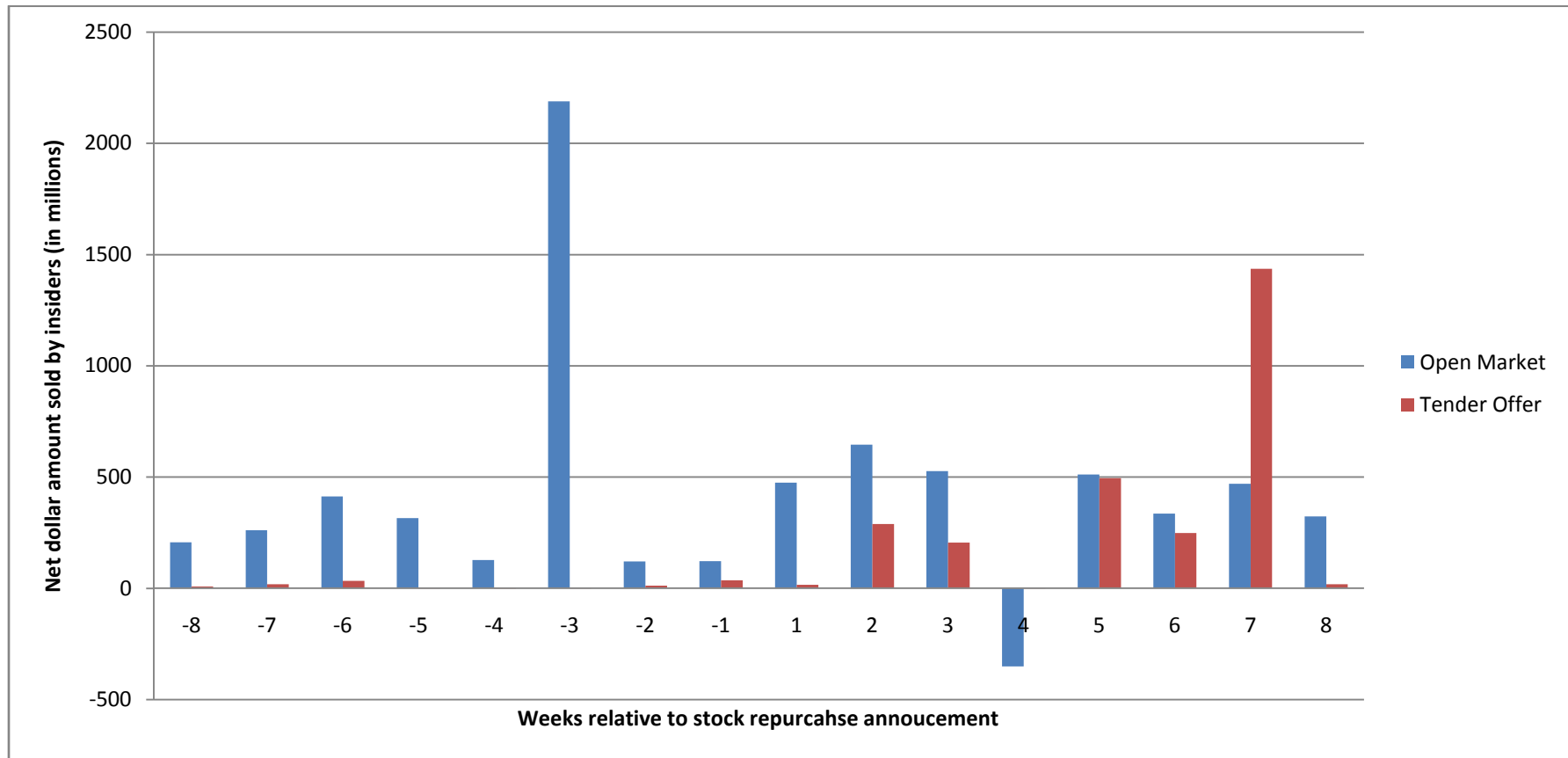


Figure 1.b isolates the insider trading data for firms that perform a stock repurchase and plots the net insider sales for the eight weeks prior and following the stock repurchase announcement date for both types of repurchase methods. The net number of units sold by insiders is calculated as the sum of insider sales for the specified period. The announcement date is included in week one.

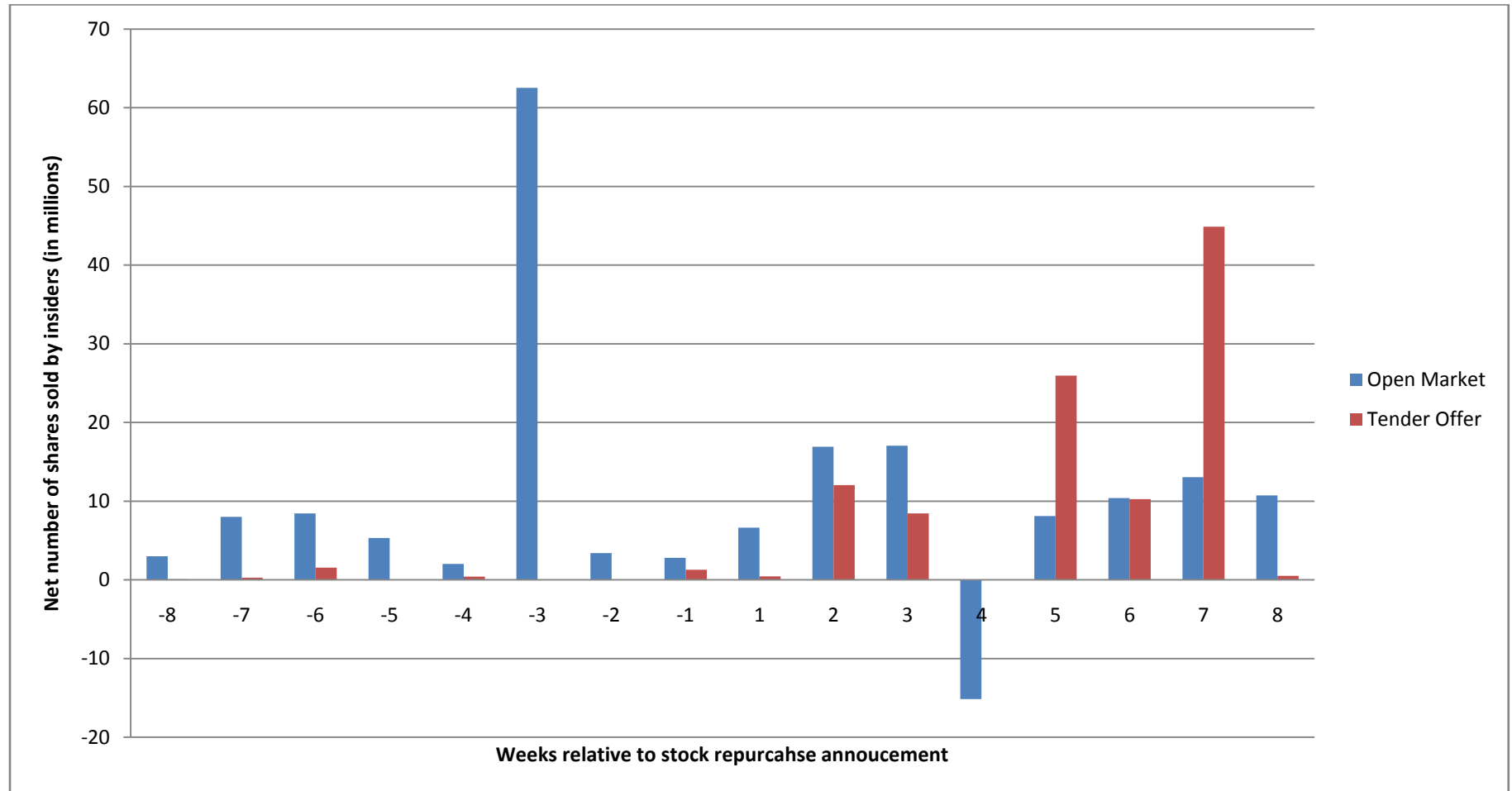


Figure 2: Cumulative insider trading from day 0 to day 61

Figure 2 plots the cumulative net insider sales following a stock repurchase announcement dates.

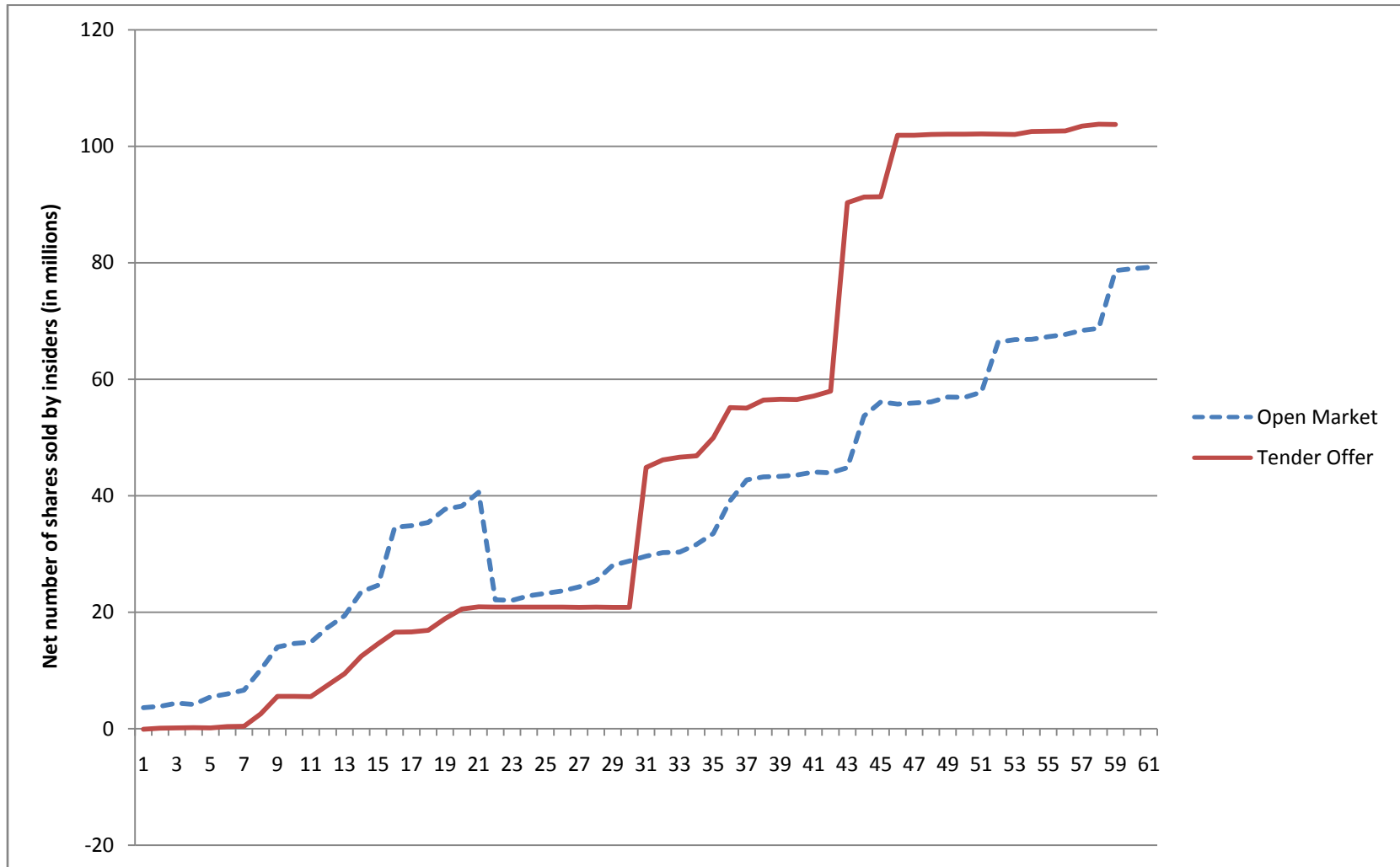


Figure 3. Distribution of insider trading per repurchase

Figure 3 plots the percentage of repurchase announcements by the size of insider trading in the 60 days following the announcement.

