# Are Pre-planned Insider Sales Strategically Timed?

Rik Sen<sup>\*</sup>

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### ABSTRACT

Previous research and numerous media articles suggest that sales executed under 10b5-1 trading plans are strategically timed. However, we find no significant difference in stock price performance following plan sales and non-plan sales. We demonstrate that price-contingent orders (e.g. limit orders), a common feature in trading plans, give rise to empirical patterns that have been taken as evidence of strategic timing of sales. Event study methods employed in previous research on plan sales are shown to give biased estimates of post-event abnormal returns when the events are not exogenous to past returns.

Contact Information: Rik Sen, 44 W 4<sup>th</sup> Street, KMC 9-197, Stern School of Business, New York University, New York, NY -10012. Ph: +1-212-998-0345. Email: rsen@stern.nyu.edu Webpage: http://www.stern.nyu.edu/~rsen

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Recent academic studies suggest that the Rule [10b5-1] is being abused. The academic data shows that executives who trade within a 10b5-1 plan outperform their peers who trade outside of such a plan by nearly 6% [...] This raises the possibility that plans are being abused in various ways to facilitate trading based on inside information. We're looking

at this – hard. We want to make sure that people are not doing here what they were doing with stock options.

Linda Chatman Thomsen, Director, Division of Enforcement, U.S. Securities and Exchange Commission, March 8<sup>th</sup> 2007

SEC Rule 10b5-1 protects corporate insiders against allegations of illegal trading if their trades conform to a pre-arranged written trading plan that was set up at a time when the insider had no material nonpublic information. In 2006, about 45% of all sale transactions by top management were executed through such trading plans (henceforth referred to as "10b5-1 plans"). Prior research and numerous media articles report evidence of strategically timed sales executed under 10b5-1 plans, which suggests that loopholes in the rule allow insiders to trade profitably on private information while still obtaining legal protection. However, we find no evidence of abuse of the 10b5-1 safe harbor. We demonstrate that price-contingent orders (e.g., limit orders), a common feature in trading plans, give rise to empirical patterns that have been taken as evidence of strategically timed sales.

The question of whether sales by corporate insiders precede stock price underperformance has been extensively studied. Earlier studies (Jaffe (1974), Seyhun (1986, 1998)) find stock price underperformance following insider sales. However, more recent studies (e.g. Lakonishok and Lee (2001), Jeng et al. (2003)), which correct for returns on stocks with similar characteristics (like size, book-to-market and past returns) find insider sales are not informative about future abnormal returns. Jagolinzer (2007) finds that sales executed under a trading plan (henceforth referred to as plan sales) are followed by statistically significant negative abnormal returns (about -6% over 6 months). However, we show that the event study methodology gives downward biased estimates of abnormal returns following plan sales. The bias arises from the average abnormal return calculation method, which tends to give a lower weight to an event if it is followed by a positive abnormal return.

From a comprehensive sample of insider sales, which were reported to the SEC between January

2003 and June 2006, we identify those that were executed under a trading plan by searching the footnotes of the submitted form 4 documents. We find that abnormal returns following plan sales are small and statistically indistinguishable from zero. We also fail to find any difference in abnormal returns following plan sales and non-plan sales. This implies that contrary to current academic, media and regulatory views, there is no evidence that Rule 10b5-1 allows insiders to strategically time their sales.

We find a striking difference in the distribution of the occurrence of plan and non-plan sales around earnings announcement dates. There are very few non-plan sales in the month before an earnings announcement and lot in the month after it. This is consistent with prior research (Bettis et al. (2000)) showing that firms impose blackout periods before earnings announcements during which insiders are not allowed to trade. In contrast, the number of plan sales before and after earnings announcements are comparable, indicating that most plan sales are not subject to blackout period restrictions. This suggests that trading plans help lift illiquidity constraints faced by insiders due to blackout restrictions.

Our study has important implications for the regulation of insider trading. To our knowledge, this is the first study to document evidence that a fairly high proportion of all insider sales are being executed under 10b5-1 trading plans. Therefore, understanding the costs and benefits of allowing pre-planned insider sales is an important issue. Negative abnormal returns following plan sales by insiders would indicate that outside investors are trading at an informational disadvantage. If outsiders perceive that the markets are unfair to them, they may be less willing to trade, reducing the liquidity and efficiency of the market. Prior academic research and articles in the media give an impression that insiders are indeed able to trade at a significant information advantage under the cover of 10b5-1 plans. While it may be possible that 10b5-1 plans are being abused in a small number of firms, our results show that the aggregate profitability of plan sales by corporate insiders is negligible. On the other hand, 10b5-1 plans allow insiders greater flexibility in uninformed liquidation of their stock holdings.

The remainder of the paper is organized as follows. The next section contains the background information related to 10b5-1 plans. Section II describes the data used for this study. Section III presents the methodology and the main results. Section IV explains why prior research finds

underperformance following plan sales and why we do not. Section V discusses our results and offers our conclusion.

### I. 10b5-1 plans

#### A. Background

SEC Rule 10b-5 prohibits any act or omission resulting in fraud or deceit in connection with the purchase or sale of any security, including insider trading. Before 2000, different courts of appeals had reached varying conclusions about what activities constituted illegal insider trading under Rule 10b-5. Some ruled that a person could be held liable for insider trading simply by trading while in possession of inside information. Others required proof that the inside information was used when making the trading decision. To ensure consistent interpretation of its rules, in October 2000, the SEC promulgated Rule 10b5-1 which stated that a person violates Rule 10b-5 simply by trading while in possession of material nonpublic information.

Importantly, SEC Rule 10b5-1 provides certain affirmative defenses (legal protection) to give "appropriate flexibility to persons who wish to structure securities trading plans and strategies when they are not aware of material nonpublic information, and do not exercise any influence over the transaction once they do become aware of such information."<sup>1</sup> Specifically, the rule provides legal protection to trades made by insiders, if they conform to a written trading plan established at a time when they were not in possession of material nonpublic information, and the following conditions were satisfied<sup>2</sup>:

- i. The plan was established in good faith and not as part of a scheme to evade insider trading regulations;
- ii. (a) The plan specified the amount (either number of shares or dollar amount), prices and dates, or (b) the plan specified a formula or algorithm to determine amounts, prices and dates, or (c) the decisions were delegated to a person who had no material nonpublic information;
- iii. The insider had no influence or discretion over how, when or whether to effect the trades

<sup>&</sup>lt;sup>1</sup> Quoted from the SEC release on selective disclosure and insider trading available at

http://www.sec.gov/rules/final/33-7881.htm

<sup>&</sup>lt;sup>2</sup> Summarized from Rule 10b5-1(c)(1)

#### after entering into the plan

While the rule does not prevent someone from initiating a lawsuit against insiders, it does provide a defense if insiders entered into a plan in good faith<sup>3</sup>. Presumably, the intent of the regulator was to avoid imposing too much restriction on trading by insiders while inhibiting trading based on private information.

Companies or insiders are not required to disclose details or even the existence of trading plans. However, many insiders choose to disclose in a footnote of form 4 that trades were made under a 10b5-1 plan when reporting their trades to the SEC. Some firms disclose plan initiations, modifications, and cancellations by insiders through form 8-K filings or press releases. The disclosures by insiders and firms usually do not provide any details of the plans.

### B. Benefits of 10b5-1 plans

Executives receive a significant portion of their compensation in the form of options and stock grants. Therefore, they may justifiably want to sell stock of their own firm to meet their liquidity needs and for optimal management of personal portfolios. Properly implemented 10b5-1 plans allow executives to demonstrably separate the timing of the decision to sell from the timing of the actual sale, thereby avoiding some trading restrictions and reducing litigation risks associated with stock sales. Even when a corporate insider sells when she has no material nonpublic information, a possibility exists that the stock price could drop after the sale. Subsequently, the insider may face allegations of timing her sale based on inside information. The risk of facing such allegations is likely to be lower if the sale was made as a part of a trading plan that was set up well in advance, and at a time when the insider was unlikely to have had material nonpublic information.

Prior research (Bettis et al. (2000)) shows that most firms allow trading in their stock by corporate insiders only during certain trading windows. Our results suggest that most firms allow plan trades to be executed even during blackout periods, presumably because these trades were scheduled in advance and are not based on information possessed at the time of the trade. Some executives might

<sup>&</sup>lt;sup>3</sup> SEC Rule 10b5-1(c)(1)(ii) states – "Paragraph (c)(1)(i) of this section is applicable only when the contract, instruction, or plan to purchase or sell securities was given or entered into in good faith and not as part of a plan or scheme to evade the prohibitions of this section."

be in almost constant possession of material nonpublic information. Consequently, they would be prohibited from selling their stock most of the time. Establishing a 10b5-1 trading plan to sell at regular intervals, or when the price reaches certain target levels can help meet trading needs arising for liquidity and portfolio management reasons, with a lower risk of facing insider trading allegations.

#### C. Concerns about 10b5-1 plans

Cancellation of trading plans based on material nonpublic information does not result in liability under Rule 10b-5, as there cannot be a basis for securities fraud under the rule without an actual transaction involving the trading of securities. However, cancellation of a plan could affect the availability of legal protection for the trades already executed under the plan, as it could call into question whether the plan was entered into in good faith. Plans can be modified without affecting legal protection, if done in good faith and at a time when the insider has no material nonpublic information.<sup>4</sup> Numerous media articles and an academic study (Jagolinzer (2007)) indeed suggest that insiders employ trading strategies that use private information and earn abnormal trading returns, while enjoying legal protection provided by Rule 10b5-1. *BusinessWeek* conducted an empirical study and concluded that 10b5-1 plans give a "surprising amount of leeway over preplanned trades" (Sasseen et al. (2006)). Jagolinzer (2007) finds that "the Rule appears to enable strategic trade". We next discuss a few strategies pointed out in the above studies and media articles that might allow insiders to earn abnormal returns.

An insider could set up a plan to sell a fixed amount of stock after, say, 3 months. When the date of trade execution approaches, the insider could choose to cancel the plan, if she has private information indicating that the stock price is likely to go up after the chosen sale date. On the other hand, if the insider does not have any such information, or has private information that stock prices are likely to drop after the sale date, she could allow the planned trade to execute. In the latter case, she would enjoy the legal protection under Rule 10b5-1, since the trade was planned in advance. In the former case, the cancellation of the trade does not violate insider trading laws. Since pre-planned trades are allowed to execute even during blackout periods, the above strategy could open up

<sup>&</sup>lt;sup>4</sup> SEC release on selective disclosure and insider trading states – "… a person acting in good faith may modify a prior contract, instruction, or plan before becoming aware of material nonpublic information. In that case, a purchase or sale that complies with the modified contract, instruction, or plan will be considered pursuant to a new contract, instruction, or plan." Text available at http://www.sec.gov/rules/final/33-7881.htm#P259\_99295

profitable trading opportunities that had not been available earlier. However, repeated use of the above strategy, that is, cancellation of plans, would call into question whether plans were being entered into in good faith, and the trades might not enjoy the legal protection.

Insiders could dictate the timing and content of information releases to the market in order to maximize profits from their preplanned trades. For example, insiders could delay the release of negative news until after the execution of their pre-planned trades and release positive information before their trades. Since the timing of a trade would have been decided much earlier, the insider has a lower chance of being charged with illegally timing his trades based on private information. Delaying the trade until after positive news is released or releasing positive news early does not violate insider trading laws, even in the context of non-plan trades. Therefore, the additional opportunity to profit from trading under a plan comes from the possibility of delaying the release of negative news. If insiders could influence the timing and amount of the trades under a plan (which is explicitly disallowed) without too much risk of getting caught, they could sell higher amounts before anticipated stock price drops and lower amounts before stock price rises. It is not clear that insiders would indulge in the above strategies, since all of them involve some risk of litigation.

### II. Data

While firms and insiders are not required to disclose the existence of 10b5-1 plans, many of the form 4 filings, which are used by corporate insiders to report their trades to the SEC, have footnotes indicating that the reported transactions were a part of a 10b5-1 trading plan. Electronically filed form 4s are available online at SEC's Edgar website. We conducted text searches within these forms to identify the trades that were part of a trading plan. These were then matched with Thomson Financial's insider trading database. Electronic filing of form 4 became mandatory on June 30, 2003. However, since a fairly high proportion of forms had been filed electronically since January 2003, we use that as the beginning of our sample period. We get daily returns, prices and shares outstanding from Center for Research in Security Prices (CRSP). At the time of this study, CRSP had data current until December 2006. We include sales occurring until June 2006 in our sample, so as to have 6 months of returns following all trades. Our sample of plan trades does not include those that which were not disclosed as being executed under a plan in form 4 filings. Because trades under a plan receive legal protection under Rule 10b5-1, we expect that a large percentage of insiders would

voluntarily identify trades that are part of a trading plan to reduce the risk of litigation. However, inferences drawn from our sample may not apply to plan trades that were not voluntarily disclosed.

A broker might split a single sale order into multiple orders while executing it in the market. Some insiders report in form 4 filings every individual order that was executed in the market as part of the same transaction. Others report only the total shares and the volume weighted average price of all sales made in a day. To make the definition of a transaction comparable across insiders, we aggregate multiple sales by an insider on the same day into a single transaction. Our definition of an insider is a unique person-firm pair. Therefore, the CEO of one firm who is also a director of another firm will be considered as two different insiders. The above definition of transactions gives us 213,445 sale transactions during our sample period, of which 53,317 were executed under a 10b5-1 plan. After matching with CRSP, we are left with 203,184 sales, out of which 53,032 were plan sales. In this sample 5,184 insiders from 1,545 firms had at least one plan sale during our sample period. On matching this sample with Compustat and dropping firms that did not satisfy data requirements for computing size, book-to-market, and momentum portfolio assignment, we are left with 170,274 sale transactions, with 44,944 plan sales. Since the decrease in sample size is not negligible, some of our results that do not require information on size, book-to-market, and momentum portfolio assignments are based on the CRSP matched sample.

Table 1 presents the basic summary statistics of plan and non-plan trades for the CRSP-Compustat matched sample. 4,472 insiders from 1,324 firms in this sample have at least one plan sale. Of the above insiders, about 58% sold at least once outside a trading plan during our sample period. Insiders who sell under a trading plan have smaller transaction sizes, higher numbers of transactions, and they sell larger amounts in aggregate. Figure 1 shows a clear increasing pattern in the ratio of the number of plan sales to total sales during our sample period. In 2006, more than 30% of all insider sales transactions were plan sales.

Table 2 shows plan sales usage across different categories of insiders and over time. We categorize insiders as follows. CEOs, CFOs, COOs, Chairmen of the Board, Presidents, and General Counsels are categorized as "top management." Other executives of the firm are categorized as "officers". Owners of more than 10% of the shares outstanding, who do not fall under the categories of officers or top management, are classified as "large shareholders." Finally, directors of companies

who are neither officers of the firm nor hold more than 10% of the firm's shares are classified as "outside directors." The increasing trend in usage of plan sales is seen across all categories of insiders. In 2006, the ratio of number of plan sales to all sale transactions was more than 30% for all insiders and about 45% for top management. These estimates are lower bounds as we capture only those plan sales that were disclosed in form 4 filings. To our knowledge, this is the first study that uses a comprehensive cross-section of U.S. firms to document the increasing popularity of plan sales, and which points out that a fairly high proportion of all insider sales are executed under a trading plan. The results of Table 2 are based on the CRSP-Compustat matched sample. The CRSP matched sample gives almost identical results.

Plan usage across firms of different size and book-to-market is shown in Table 3. All firms in the CRSP-Compustat matched universe with positive book equity are sorted independently into size and book-to-market quintiles at the end of June for every year. These portfolio assignments apply from the next month to June of the following year. The definitions of size and book-to-market ratio follow Fama and French (1993). Size is defined as market equity, that is, number of shares outstanding times the price of each share. Book-to-market ratio is computed as the ratio of book equity<sup>5</sup> from the previous year to the market equity on the last trading day of the previous year. Table 3 shows that the ratio of number of plan sales to total sales is higher for firms with lower book-to-market. The ratio of number of firm-months with at least one plan sale to the number of firm-months with at least one sale also decreases with book-to-market. These patterns suggest that plan sales are more popular among high book-to-market firms. The proportion of plan sales to total sales seems to be smaller in the smallest quintile of firms, suggesting that 10b5-1 plans are less popular among small firms. However, this could reflect a lower tendency among insiders of these firms to disclose that sales were executed under a plan.

### III. Methodology and main results

We use event study methods, as is standard in insider trading literature, to study whether plan sales

<sup>&</sup>lt;sup>5</sup> Book equity is stockholder's equity plus any deferred taxes and any investment tax credit, minus the value of any preferred stock. To determine the value of preferred stock, we use the redemption value if this figure is available, otherwise we use liquidating value if it is available, and if not we use carrying value.

by corporate insiders are well timed. We conduct a preliminary analysis by calculating abnormal returns as the return on the stock minus the return on the value-weighted CRSP index. For each sale transaction, we calculate daily abnormal returns over a window of 90 days before and after the event. The sum of abnormal returns on all days in a window gives the cumulative abnormal return (CAR) for that window. We then look at the equally weighted average of CARs. Plan sales are preceded by an average CAR of about 11% over 90 days and are followed by an average CAR of -0.72% over 90 days, which is not statistically distinguishable from zero (t-statistic = -0.93). The t-statistic is computed using the methodology in Patell (1976). Studies of insider trading (Seyhun (1986, 1998), Lakonishok and Lee (2001), Jeng et al. (2003)) find that insiders sell stocks after rises. We find that this is true even for pre-planned sales. This suggests that insiders incorporate price-contingent orders in their plans allowing, them to sell in response to stock prices rises.

The measures of abnormal returns used in the preliminary analysis above are crude. In addition to the issue of using the return on the value-weighted market index as a benchmark return for all stocks, there are statistical problems in the computation of t-statistics due to cross-sectional dependence in the abnormal returns of transactions in the same firm and across firms. We therefore base our main statistical tests on a calendar time event study method that eliminates issues related to cross sectional dependence and controls for returns on stocks with similar characteristics while calculating abnormal returns.

A calendar time event study methodology, which is used by Loughran and Ritter (1995), Brav and Gompers (1997) and is one of the methods in Jeng et al. (2003), involves calculating the time series of returns on a hypothetical calendar time portfolio and looking at the intercept from a regression of this series on time series of factor returns (e.g., Fama-French factors and the momentum factor). Lyon, Barber and Tsai (1999) find that such methods do not perform well "in samples with size and book-to-market based biases." They yield ill specified tests that tend to significantly over-reject the null against an alternative of underperformance when the sample is biased towards of low book-to-market firms.<sup>6</sup> This is likely to be a concern for any study of plan sales since sales in general tend to be concentrated among low book-to-market firms (Jenter (2005)) and, as seen in Table 3, the

<sup>&</sup>lt;sup>6</sup> Table X, Panel A of Lyon, Barber and Tsai (1999) shows that in a randomly selected sample of low book-to-market firms, regression intercept method rejects the null of zero abnormal returns in 22.8% of the cases against an alternative of negative abnormal returns at a one-tailed significance level of 2.5%.

proportion of plan sales is higher among low book-to-market firms. An alternate calendar time method used in the literature (e.g. Jeng et al. (2003)) calculates abnormal return on a stock as the difference between the return on the stock and that on a characteristic matched portfolio. The abnormal return on a portfolio of stocks is then obtained as an average of abnormal returns on the constituent stocks. Lyon, Barber and Tsai (1999) show that tests of abnormal returns using this type of calendar time methodology are reasonably well specified<sup>7</sup>. Our study uses a calendar time methodology of the latter type the details of which are presented below.

Let us suppose we are interested in examining whether abnormal returns over a 90 day window following plan sales are significantly negative. To test this we look at abnormal returns on a dynamic calendar time portfolio that adds stocks to the portfolio on the day after it has a plan sale and keeps it in the portfolio for 90 days. If a stock that is already in the portfolio has a plan sale, then it is not added multiple times to the portfolio. However, the stock is kept in the portfolio for 90 days following the most recent plan sale. On each day, the abnormal return for each stock in the portfolio is calculated as the difference between the stock return and the return on a matching portfolio of stocks with similar characteristics<sup>8</sup>. The construction of the matching portfolio is described in Appendix A. The abnormal return on the calendar time portfolio for each day is obtained by averaging the abnormal returns of the constituent stocks. This gives us a time series of daily abnormal returns on the calendar time portfolio. Days on which the calendar time portfolio has fewr than 20 stocks are dropped. The annualized average abnormal return is calculated by averaging the above time series of abnormal returns and multiplying it by 250. To test whether the abnormal return on the calendar time portfolio is significantly different from zero, we look at the t-statistic calculated as [ (average)  $* \sqrt{(no of days)/(standard deviation)}$ ]. The procedure is also used to estimate abnormal returns following non-plan sales. We use a t-test to see if abnormal returns from plan-sales differ from non-plan sales. The test statistic is obtained by calculating the time series of the difference in abnormal returns between plan sale and non-plan sale portfolios and then computing [ (average)  $* \sqrt{(no of days)/(standard deviation)}$ ].

<sup>&</sup>lt;sup>7</sup> Table XI, Panel A of Lyon, Barber and Tsai (1999) shows that in a randomly selected sample of low book-to-market firms, the reference portfolio method rejects the null of zero abnormal returns in about 4% of the cases against an alternative of negative abnormal returns at a one-tailed significance level of 2.5%.

<sup>&</sup>lt;sup>8</sup> The matching is done based on characteristic of the stock as of the most recent plan sale date. This ensures that while calculating abnormal returns a stock that had a plan sale is compared with other stocks that were similar to it at the time of the event.

The above procedure is followed with stocks held in the portfolio for 10, 22, 90 or 130 days to examine abnormal returns over different horizons following plan sales and non-plan sales. Results are presented in Table 4. Panel A shows the results for the case in which an abnormal return on the calendar time portfolio for each day is calculated as an *equally* weighed average of the abnormal returns of the constituent stocks. Annualized abnormal return over a 6-month (130 days) horizon following plan sales is -2.45% (t-stat = -1.38). The corresponding abnormal return following non-plan sales is -0.64%. The difference in abnormal performance between the two portfolios is not statistically significant (t-stat = -1.07).

One could argue that small plan sales are unimportant and unlikely to be strategically timed. Larger plan sales might be more likely to be followed by negative abnormal returns than smaller plan sales. Additionally, sales by multiple insiders or multiple sales by the same insider within a short period of time may be more likely to be followed by underperformance. The calendar time portfolio used to obtain results presented in Panel A gives equal weight to all stocks in the portfolio irrespective of the number of sale transactions and the size of the sales. Potentially, this could result in a low power for detecting underperformance. To address these concerns, we use alternate methods for calculating abnormal returns on the calendar time portfolio is the weighted average of the abnormal returns of the constituent stocks, where the weights are proportional to the total dollar value sold under 10b5-1 plans over the previous k days. The value of k is 10, 22, 90 or 130 and is chosen to match the number of days for which the stocks are kept in the calendar time portfolio after a plan sale. Panel B presents the annualized average abnormal return for dollar-value-of-plan-sales weighted calendar time portfolios and corresponding test statistics. The tests are unable to reject the hypothesis of equal abnormal returns following plan and non-plan sales for any horizon.

The above procedure might give too much weight to larger firms and firms with many insiders. To address this, we calculate abnormal returns on the calendar time portfolio by assigning weights to the constituent stocks that are proportional to the fraction of outstanding shares sold under 10b5-1 plans over the previous k days. The value of k is chosen to match the number of days for which the stocks are kept in the calendar time portfolio after a plan sale. Panel C presents the results for

proportion-of-outstanding-shares-sold weighted calendar time portfolios and the corresponding test statistics. None of the tests are able to reject the hypothesis that abnormal returns following plan and non-plan sales are equal.

Prior studies (Bettis et al. (2000)) show that firms restrict trading by corporate insiders during a window preceding earnings announcements, since insiders are likely to possess nonpublic information at this time. We now examine if similar restrictions apply to plan sales. Figure 3 shows the distribution around earnings announcement dates of plan sales, non-plan sales across all firms, and non-plan sales after the first observed plan sale in firms with at least one plan sale. The earnings announcement dates were obtained from Compustat. There is a striking difference in the occurrence of non-plan sales before and after earnings announcements. There are very few non-plan sales in the 4 weeks preceding an earnings announcement and a large number of non-plan sales in the week following it. The number of non-plan sales gradually declines in the subsequent weeks. This is consistent with previous research that study insider sales that occur around earnings announcements. However, there is a much smaller difference in the number of plan sales before and after earnings announcements. This suggests that most firms allow pre-planned trades to execute during blackout periods. The distribution of non-plan sales in the firms with plan sales is almost identical to the distribution of all non-plan sales. Therefore the difference in distribution of plan sales and non-plan sales around earnings announcement does not arise from firm level differences in enforcement of black-out period restrictions. The striking difference in the distribution pattern for plan and non-plan sales around earnings announcement dates suggests that misclassification of plan and non-plan sales is infrequent.

#### IV. Comparison with prior research

#### A. Event study methodologies in Jagolinzer (2007)

Jagolinzer (2007) finds (in Table 2) that sales under 10b5-1 plans are followed by a mean abnormal return per insider of around -6% over the subsequent 6 months. The abnormal returns were calculated as follows. First, the abnormal return over a window following every sale was calculated as the difference between the return on the stock and the CRSP value-weighted market index over that window. Next, abnormal returns were averaged to each insider by taking the sales proceeds (in

dollars) weighted average of the abnormal returns over all plan sales by a particular insider. Finally, the equally weighted average of the averages obtained from the previous step was calculated.

Figure 1 of Jagolinzer (2007) shows a steep drop in average CARs following plan sales by corporate insiders. The figure was obtained by the following procedure. For each firm with at least one plan sale during the sample period, one sale was drawn at random from its pool of plan sales. The average CAR profile was obtained by averaging across all the CARs around the selected sale events. To ensure that a single influential draw does not confound results, the random draws were repeated 100 times and the average CAR profile across the 100 draws was plotted. The above procedure was used "to mitigate the potential that overlapping returns or multiple firm observation bias will confound results". We argue below that the mean abnormal return following plan sales calculated using the above procedures have a negative expected value, even if insiders do not time their sales strategically, but incorporate price-contingent orders in their trading plans.

### B. Price-contingent orders in 10b5-1 plans

Previous research on insider trading found that insiders tend to sell after a rise in stock prices. Since insiders are allowed to incorporate price-contingent orders in 10b5-1 plans, we expect that many insiders would do so. This hypothesis is supported by Figure 4 that shows plan sales are preceded by large, positive abnormal returns on an average. While the companies' plan initiation announcements usually did not divulge information about the plans themselves, a few mentioned that sales would occur only if certain price targets were met or that sales were subject to minimum price requirements. An example of one such press release is presented in Appendix B. Greg Besner, the president of Restricted Stock Systems, a software and service provider focusing on restricted and controlled stock plans was quoted in Sherman (2007)<sup>9</sup> as saying "We've probably seen thousands of trading plans over the years. Over 90 percent of the trades that are put in place by these trading plans are limit orders." Taken together the above pieces of evidence suggest that insiders incorporate price-contingent orders in 10b5-1 plans. As a result plan sales cannot be treated as exogenous events since their probability of occurrence is related to past stock price performance.

<sup>9</sup> The article is available online at

http://www.thecrossbordergroup.com/pages/1168/December+2007.stm?article\_id=12303

#### C. Example illustrating the source of bias

The following example illustrates the source of bias in the event study procedures described in subsection IV. A. The arguments presented below are closely related to that presented in Schultz (2003) in the context of biases in long run stock price performance measurement following IPOs and SEOs. In our example, insiders have no ability to forecast future returns, yet the estimates of abnormal returns following plan sales have negative expected values, that is, they are biased. We assume that the market earns a return of zero and every firm earns a return of either  $\pm 10\%$  or  $\pm 10\%$  in each period. The two possible values for returns are equally likely and unpredictable. Returns are independent across firms. We assume all firms have a stock price of \$100 in the beginning, that is, at time t=0. Every firm has exactly one insider who has set up the following trading plan: sell one stock at time t=0; sell two stocks if the price goes up to \$110 at time t=1 and no stocks of price drops to \$90. This is represented graphically in Figure 2. This stylized example captures a simple price-contingent order in a trading plan. Stocks can follow four possible paths that are all equally likely. Let us represent the paths by UU, UD, DU and DD. UU, for example, indicates that the stock price went up in both periods. Note that in the above setup, insider trades are triggered based on past stock price behavior and are not based on any information about future stock price movements.

We now look at the expected value of the average one-period post event abnormal return calculated using the first event study method described in subsection IV. A. We first find the value weighted average abnormal return for each insider. Insiders who belong to firms that have a positive return in the first period sell at t=0 and t=1. The average abnormal returns for insiders belonging to firms whose stock price paths are UU and UD would be (100 \* 10% + 220 \* 10%)/320 = 10%, and (100 \* 10% + 220 \* -10%)/320 = -3.75%, respectively. The average abnormal returns for insiders belonging to firms with price paths DU and DD would be -10%, since they have only one sale which is followed by an abnormal return of -10%. The probability of a particular firm having one of the four possible price paths is 1/4. Therefore, the expected value of average abnormal return following plan sales is equal to

$$(10\% - 3.75\% - 10\% - 10\%)/4 = -3.44\%$$

Now let us analyze the second event study method described in subsection IV. A in the context of the above example. For each firm a plan sale is drawn at random and the abnormal returns following

the randomly drawn plan sales are then averaged. For firms that follow the price paths UU or UD the first sale and the second sale have an equal chance of being drawn. For the other firms there is only one sale and that will be drawn with probability 1. The ex-ante expected value of abnormal return following a randomly drawn plan sale for a given firm is

 $\{10\% + [(1/2) * (10\%) + (1/2) * (-10\%)] + -10\% + -10\% \} * (1/4) = -2.5\%$ 

Therefore, the ex-ante expected value of the average abnormal returns across firms will also be -2.5%.

The above calculations illustrate that abnormal returns calculated using both methods described in the subsection IV.A have a negative expected value when insiders use price-contingent orders in their plans even when they have no ability to predict future returns. Even if insiders do not use price-contingent orders in their plans but are more likely to enter into new plans following rises in stock prices, the event study methods would be biased since high returns are more likely to be followed by more plan sales.

The bias demonstrated above arises from the fact that the weight each abnormal return gets in the final average abnormal return calculation is inversely related to the abnormal return following the event. If the abnormal return following a sale by an insider is positive, the insider is more likely to sell again in the future, since the stock price is likely to go up. This implies that the abnormal return would tend to get a lower weight, since each abnormal returns gets a weight in the final answer depending on total sales by the insider or total number of sales for that firm. The calculations of expected value of abnormal return estimates do not depend on the number of firms. Therefore, the above procedures would remain biased even when the number of firms in the sample becomes large. It can be shown that in the above example that the expected value of the equally weighted average of abnormal returns following all observed plan sales converges to zero (in probability) as the number of firms becomes large. Therefore, an equally weighted average is consistent and asymptotically unbiased, while the two methods described in subsection IV.A yield estimates that are biased and inconsistent.

From the above example, we note that firms that have more plan sales, that is, where the stock price path is either UU or UD, have an average post-plan-sale abnormal return of either +10% or 0% with equal probability. Therefore the expected value of the abnormal return estimate for these firms

is 5%. For firms that have fewer plan sales, that is, where the stock price path is either DU or DD, they have an average post-plan-sale abnormal return of -10% with probability 1. Therefore the expected value of the abnormal return estimate for these firms is -10%. Hence, we observe for firms that end up having a higher number of total plan sales, the average abnormal returns following plan sales is higher.

#### D. Empirical impact of the above bias

If the events are exogenous, it can be shown that the event study methods described in subsection A are unbiased under the null of zero post-event abnormal returns. However, as argued earlier, plan trades have a higher chance of occurring after positive abnormal returns and are, therefore, not exogenous. The previous section shows that this could potentially bias post sale abnormal return estimates negatively. However, the extent to which this bias could affect empirical results is not clear. In this section we explore this question by comparing results obtained using methods used in Jagolinzer (2007) with those using other methods that are similar but which do not suffer from the bias.

An equally weighted average of post-event abnormal returns is asymptotically unbiased under the null of zero abnormal returns. As reported earlier, this gives us an abnormal return estimate of -0.72% over a 6 month window following plan sales. First, averaging the 6-month abnormal returns to each insider and then averaging across insiders gives -6.2% in our sample. This is even lower than the value of -6.0% that Jagolinzer (2007) reports. This suggests that the difference between the results of our study and those of Jagolinzer (2007) are not due to differences in the samples, but are completely attributable to differences in methodology. Figure 1 of Jagolinzer, which shows a drop in CAR after plan sales, is obtained by averaging across CAR profiles of 100 random sample draws. The details of the procedure have been explained in subsection IV.A. If instead of 100 draws, the number of draws tends to infinity, the CAR profile from the methodology converges to the CAR profile obtained by first averaging the CAR profiles to each firm and then averaging these across firms. Figure 4 plots the CAR profile obtained in this manner and the equally weighted average of CARs across all plan sales. Averaging the firm averages results in a CAR profile that shows a decline after plan sales, just like Figure 1 of Jagolinzer (2007). In contrast, the equally weighted average of CARs stays almost flat after plan sales.

In the previous subsection we argued that average abnormal returns following plan sales in firms that have a higher number of plan sales should be higher. To check if this holds in the data, we classify firms into four categories based on the number of plan sales observed during the sample period: less than 21, between 21 and 50, between 51 and 200 and greater than 200. For firms in each category, we generate the CAR profile around plan sales by taking an equally weighted average across events. Figure 5 shows that plan sales in firms that have less than or equal to 20 plan sales during our sample period are followed by significant negative abnormal returns, while plan sales in firms which have more than 200 plan sales are followed by positive abnormal returns. The other two categories lie in between. This shows that the bias demonstrated in the previous subsection using a stylized example is empirically relevant for the study of plan sales.

An equally weighted average across all events overweighs firms that have more insiders. This was one of the reasons why the CAR profile in Jagolinzer (2007) was generated by picking one plan sale at random from the pool of multiple plan sales for each firm. The equally weighted calendar time portfolio method presented in Section III accounts for the above concern. Even if a firm has plan sales by multiple insiders around the same time, the weight of the firm in the hypothetical portfolio does not increase. An alternate way to address the above concern using a simple event study methodology would be to include only the first plan sale for each firm in each calendar month in the event study. This ensures that sales by multiple insiders in the same firm around the same time are not considered as different events. Note that the selection of the event is based on information that is available at the time of the event occurring and therefore will not suffer from any kind of look-ahead biases. If abnormal returns are calculated as the excess over value-weighted market returns, we get an average CAR over 90 days following the event of -0.51% (t-stat = -0.11). Therefore even this test fails to find any evidence of negative abnormal returns following plan sales by insiders.

#### E. Sample selection bias in comparison sample of Jagolinzer (2007)

In Jagolinzer (2007) the abnormal returns following plan sales are compared with abnormal returns following non-plan sales for firms that had at least one plan sale. The sample of non-plan sales suffers from a look-ahead bias. Jagolinzer considers all non-plan sales during the entire sample period for firms that had at least one plan sale. Some of these non-plan sales occurred before the first plan sale was observed for that firm. Therefore they were included in the sample based on information that was not available at the time of the sale. If insiders are more likely to enter into

trading plans following an increase in stock prices, the abnormal returns following these non-plan sales are expected to be positive conditional on the fact that insider will enter into trading plans in the future.

The sample of non-plan sales that occurred after the first plan sale in the firm would not suffer from this bias. In our sample we find that the average 90 day abnormal returns following all non-plan sales during our sample period for plan-sale firms is around +1.9%. On the other hand, the average 90 day abnormal return following the sample of non-plan sales following the first observed plan sale is around -1.0%. This shows that the look-ahead bias significantly affects the estimate of average abnormal returns for the comparison sample of non-plan sales used in Jagolinzer (2007).

### V. Discussion and conclusion

A number of articles in the media suggest that pre-planned sales by insiders are well timed. Following is an excerpt from one such article (Sasseen et al. (2006))<sup>10</sup>: "BusinessWeek found a surprising amount of leeway over preplanned trades. At nearly half the companies examined, sales were concentrated in the months leading up to a stock's peak or just thereafter. Frequently, the number of shares sold increased as the stock hit new highs, then trailed off or ended as the stock dove." The above patterns could be a result of insiders incorporating price-contingent orders in their trading plans, that is, sell only when the stock price hits certain pre-determined levels. There is some evidence that incorporating such orders in trading plans is quite common. Therefore, the observed patterns do not necessarily imply any wrongdoing by corporate insiders.

Jagolinzer (2007) finds significant stock price underperformance following plan sales by corporate insiders. We show that the post-event abnormal return estimates in the study, which are obtained using non-standard methods, are negatively biased if plan sales have a higher chance of occurring after a run-up in stock prices. Since many trading plans incorporate limit orders, they execute only when stock prices hit a predetermined level. As a result, plan trades indeed have a higher chance of occurring after stock price increases. The bias arises from the average abnormal return calculation

<sup>&</sup>lt;sup>10</sup> Available online at http://www.businessweek.com/magazine/content/06\_51/b4014045.htm

method that tends to give lower weight to an event if it is followed by a positive abnormal return, and higher weight if it is followed by a negative abnormal return. The negative post plan-sale abnormal return estimates in Jagolinzer (2007) largely reflect the negative bias in the estimation methodology. We find that average abnormal return is -1.23% over 6 months following plan sales, as against -6.0%, reported in Jagolinzer (2007). Statistical tests fail to reject the hypothesis that abnormal returns following plan sales are equal to zero, or the hypothesis that they are equal to abnormal returns following non-plan sales. Our sample of plan sales includes only those sales that are identified as having been executed under a trading plan in form 4 documents. To the extent that this sample is not representative of all plan sales, our results do not reflect stock price performance following all plan sales.

Since we classify plan sales based on automated text searches, there is a possibility that some plan sales are not captured, while some non-plan sales get classified as plan sales. Significant misclassification of plan and non-plan sales could result in an inability to find differences in stock price performance following them. However, we find a striking difference in the distribution of our sample of plan and non-plan sales around earnings announcement dates. This suggests that misclassification errors in our sample are very small.

In 2006, about 45% of all sale transactions by top management of firms were under a trading plan. This number is a lower bound since we do not capture all sales that were executed under a trading plan. To our knowledge, this is the first study to document that such a high proportion of sales are under a trading plan in a comprehensive cross-section of U.S. public firms. Contrary to previous research and media articles, we do not find any evidence of large scale timing of sales executed under 10b5-1 plans. However, it is possible that in a small subset of firms plan sales are strategically timed. Our study does not explore this. Our study shows that event study methods that seem reasonable may give biased abnormal return estimates when the events are not exogenous. Therefore, event study techniques that are not standard should be analyzed to check if the abnormal return estimates obtained are consistent.

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#### Appendix A: Construction of benchmark portfolios

This Appendix describes the construction of matching portfolios. The method is similar to the one used in Daniel et al. (1997). Stocks in the CRSP-Compustat matched universe are classified every month into 250 bins through dependent  $10 \times 5 \times 5$  sorts based on size (market equity value), bookto-market ratio and momentum. Size and book-to-market sorts are performed once a year at the end of June, while the momentum sorts are performed monthly. Therefore stocks can change bins every month. Every June stocks in the CRSP-Compustat universe are first sorted into size deciles based on market equity, the product of number of shares and share price, obtained from CRSP. Then the stocks within each size decile are further sorted into quintiles based on their book-to-market ratio. In calculating the book-to-market ratio, we use the book equity from the previous year and the market equity on the last trading day of the previous year. Book equity is stockholder's equity plus any deferred taxes and any investment tax credit, minus the value of any preferred stock, all obtained from Compustat. To determine the value of preferred stock we use redemption value if this is available, otherwise we use liquidating value if it is available, and if not we use carrying value. The end of June is used as the sorting date because the annual report containing the book-equity value for the preceding year is virtually certain to be public information by that time (Fama and French (1993)). The above procedure sorts stocks into 50 bins based on size and book-to-market ratio at the end of every June which applies to all months from July of the sorting year to June of the subsequent year. Within each of these 50 bins, at the beginning of every month, firms are further sorted into quintiles based on the returns over the 12 months preceding the month before the sorting month. The return over the month preceding the sorting month is not used. This avoids problems associated with bid-ask bounce and monthly reversals (Jegadeesh (1990)). Only those firms, for which book equity data are available from Compustat and are positive, have prices available on CRSP in both December of the previous year and June of the sorting year and have monthly returns data in CRSP for at least 6 out of the 12 months required for momentum sorting, are classified into bins by the above procedure. The value-weighted returns of stock in each of the 250 bins are calculated on each day and used as the return on the matched portfolio for stocks in that bin. The above procedure ensures that there are an equal number of firms in the 250 matching portfolios at all times.

Appendix B:

Press release by Interphase Corporation (NASDAQ: INPH) announcing adoption of 10b5-1 plans by executive officers



**Press Release** 

### FOR IMMEDIATE RELEASE

### Interphase Executives Adopt 10b5-1 Trading Plans

**PLANO, Texas, June 26, 2006** — Interphase Corporation (NASDAQ: INPH), a leading global supplier of next-generation networking technologies, today announced that six of its Executive Officers have established 10b5-1 plans to sell shares of Company stock in accordance with guidelines specified under the Securities Exchange Act of 1934 and the Company's policies with respect to insider sales.

Gregory B. Kalush, Chairman, President and Chief Executive Officer; Thomas N. Tipton, Jr., Chief Financial Officer and Vice President of Finance; Felix V. Diaz, Vice President of Engineering and Chief Technology Officer; Randall E. McComas, Vice President of Global Sales and Customer Support; Deborah Shute, Vice President of Human Resources and Administration and James W. Gragg, Vice President of Operations and Fulfillment, have established 10b5-1 plans to sell a portion of their holdings of Company common stock. The maximum number of shares of Interphase Corporation common stock to be sold by the six Executive Officers under these plans is approximately 640,000 shares **at limit prices ranging from \$15.00 per share to \$41.00 per share**, beginning on August 1, 2006 and ending on August 1, 2007. Any transactions under the plans will be disclosed publicly through Form 144 and Form 4 filings with the Securities and Exchange Commission.

Rule 10b5-1 plans permit insiders to sell fixed portions of their holdings over a designated period of time under prearranged written plans that are established at a time when they are not in possession of material non-public information. Such programs provide for regular selling of a predetermined, fixed number of company shares in order to gradually diversify the individual's investment portfolio, minimize the market effect of share sales by spreading them out over an extended period of time and avoid concerns about initiating transactions while in possession of material non-public information.

### Figure 1: Growth in 10b5-1 plan sales

The sample is obtained by matching all insider sales from Thomson Financial's insiders trading database from January 2003 to June 2006 with CRSP. Plan sales are identified by conducting text searches through form 4s filed by insiders. Multiple sales of the same type (plan or non-plan) by an insider on the same day are consolidated into a single sale transaction. An insider is defined as a unique person-firm pair. Panel A presents the ratio of the number of plan sale transactions to the total number sale transactions within each quarter during our sample period. Panel B presents the ratio of total amount (in dollars) sold under a plan to total sales in each quarter.



### Panel A





## Figure 2: Price-contingent orders and abnormal return calculations

The figure presents a two-period, binomial tree model for a simple price-contingent order. The analysis of abnormal return estimates for this example is presented in Section IV.C of this paper.



#### Figure 3: Distribution of plan and non-plan sales around earnings announcements

The sample is obtained by matching all insider sales from Thomson Financial's insiders trading database from January 2003 to June 2006 with CRSP and Compustat. Plan sales are identified by conducting text searches through form 4s filed by insiders. Multiple sales of the same type (plan or non-plan) by an insider on the same day are consolidated into a single sale transaction. An insider is defined as a unique person-firm pair. Earnings announcement dates are obtained from Compustat. The figure shows the distribution of transactions for 10 weeks around earnings announcement dates for three categories of sales – a) plan sales, b) non-plan sales after the first observed plan sale (in firms that have at least one plan sale during our sample period), and c) all non-plan sales during our sample period. The histograms show the ratio of the number of transactions observed in each week relative to the earnings announcement date to the total number of transactions of that type occurring within  $\pm 5$  weeks of earnings announcement. The day of earnings announcement and the four prior days are defined as week -1 and the five trading days following the earnings announcement date constitute week +1.



#### Figure 4: Effect of calculation method on CAR profile around 10b5-1 plan sales

The figure shows the average cumulative abnormal return (CAR) profile calculated by different methods. The solid red line is the result of first averaging the CARs of each firm and then averaging these across firms. This is similar to the method used to obtain Figure 1 in Jagolinzer (2007). The green line is obtained by averaging the CARs across all plan sales. The sample is obtained by matching all insider sales from Thomson Financial's insiders trading database from January 2003 to June 2006 with CRSP. Plan sales are identified by conducting text searches through form 4s filed by insiders. Multiple sales of the same type (plan or non-plan) by an insider on the same day are consolidated into a single sale transaction.



Trading days relative to sale date

#### Figure 5: Number of plan sales in a firm and cumulative abnormal returns

Firms are categorized into four categories based on the number of plan sales observed during our sample period: a) less than 21, b) between 21 and 50, c) between 50 and 200, and d) greater than 200. Plan sales from these firms are correspondingly categorized. The figure shows the equally weighted average of CARs for each plan sales in a category. The sample is obtained by matching all insider sales from Thomson Financial's insiders trading database from January 2003 to June 2006 with CRSP. Plan sales are identified by conducting text searches through form 4s filed by insiders. Multiple sales of the same type (plan or non-plan) by an insider on the same day are consolidated into a single sale transaction.



### Table 1: Summary of data for plan sales, non-plan sales and all sales

The sample in this table is obtained by matching all insider sales from Thomson Financial's insiders trading database from January 2003 to June 2006 with CRSP and Compustat. Firms that do not meet data requirements for sorting into portfolios based on size, book-to-market and momentum are dropped. Multiple sales of the same type (plan or non-plan) by an insider on the same day are consolidated into a single sale transaction. An insider is defined as a unique person-firm pair. The data in each column of the table are for the sample of firms with at least one transaction of that type. The means and medians for different variables are conditional on the variable being greater than zero. For example, the mean amount sold per insider under a plan sale is calculated only across insiders that have at least one plan sale during our sample period.

	<b>Plan Sales</b>	Non plan sales	All sales
Number of sale transactions	44,944	125,395	170,274
Number of unique firm sale days	34,596	98,943	131,586
No of insiders	4,472	29,897	31,765
No of firm-months of trade	11,225	36,687	44,255
No of firms	1,324	4,280	4,332
Value of sale per transaction (\$)			
Mean	726,835	1,123,368	1,019,132
Median	140,701	193,864	176,444
Amount sold per firm-month of sale (\$)			
Mean	2,910,189	3,839,637	3,921,176
Median	510,000	482,891	522,582
Total amount sold per insider (\$)			
Mean	7,304,757	4,711,668	5,462,982
Median	1,138,779	674,640	760,958
No of selling days per insider			
Mean	10.1	4.2	5.4
Median	5.0	2.0	3.0
No of trades per firm-month of sale			
Mean	4.0	3.4	3.8
Median	2.0	2.0	2.0

#### Table 2: Proportion of 10b5-1 plan sales over time and across insider categories

We categorize insiders as follows. CEOs, CFOs, COOs, Chairmen of the Board, Presidents and General Counsels are categorized as "top management." Other executives of the firm are categorized as "officers." Owners of more than 10% of the shares outstanding, who are not officers or top management, are classified as "large shareholders." Finally directors of companies who fall in none of the above categories are classified as "outside directors." Panel A presents the ratio of number of plan sale transactions to the total number of sale transactions within each quarter during our sample period and across insider categories. Panel B presents the ratio of total amount (in dollars) sold under a plan to total sales in each quarter across insider categories.

	Top management	Officers	Large Shareholders	<b>Outside Directors</b>	All
2003-Q1	25.4%	16.5%	5.6%	8.3%	14.3%
2003-Q2	22.1%	10.6%	2.2%	11.3%	12.2%
2003-Q3	24.3%	14.6%	4.3%	12.2%	14.9%
2003-Q4	30.3%	18.4%	8.1%	14.8%	19.0%
2004-Q1	33.5%	21.5%	6.7%	17.4%	21.5%
2004-Q2	38.7%	24.6%	8.6%	24.5%	26.6%
2004-Q3	38.0%	23.5%	11.0%	22.4%	26.5%
2004-Q4	38.9%	22.7%	12.1%	17.4%	25.6%
2005-Q1	40.2%	23.7%	21.5%	17.7%	27.1%
2005-Q2	43.9%	25.2%	22.8%	21.0%	29.3%
2005-Q3	43.3%	24.9%	25.7%	21.7%	29.2%
2005-Q4	40.2%	26.3%	24.5%	20.3%	28.6%
2006-Q1	44.2%	30.7%	18.1%	22.5%	31.7%
2006-Q2	44.6%	33.8%	14.3%	23.1%	32.0%
All	37.5%	23.5%	13.1%	18.7%	25.0%

#### Panel A:

#### Panel B:

	Top management	Officers	Large Shareholders	<b>Outside Directors</b>	All
2003-Q1	7.9%	15.1%	8.3%	3.6%	8.2%
2003-Q2	35.4%	5.5%	0.5%	6.9%	14.9%
2003-Q3	13.0%	13.9%	2.2%	10.5%	9.5%
2003-Q4	23.9%	14.5%	2.2%	8.0%	11.2%
2004-Q1	19.9%	12.5%	1.9%	6.4%	10.6%
2004-Q2	31.6%	19.1%	4.8%	9.2%	18.0%
2004-Q3	24.9%	15.1%	2.9%	11.9%	15.2%
2004-Q4	23.5%	18.0%	3.0%	5.7%	13.6%
2005-Q1	23.4%	25.2%	11.2%	11.4%	18.8%
2005-Q2	24.1%	31.4%	4.9%	13.3%	20.8%
2005-Q3	24.4%	33.9%	11.0%	18.0%	22.2%
2005-Q4	25.7%	43.8%	15.1%	11.8%	25.0%
2006-Q1	32.1%	41.2%	5.2%	14.5%	25.3%
2006-Q2	30.9%	41.9%	5.0%	26.4%	23.6%
All	25.2%	26.9%	5.4%	11.8%	17.7%

#### Table 3: Proportion of 10b5-1 plan sales across book-to-market and size quintiles

All firms in the CRSP-Compustat matched universe with positive book equity are sorted every year at the end of June into independent size and book-to-market quintiles. In calculating the book-tomarket ratio, we use the book equity from the previous year and the market equity on the last trading day of the previous year. Book equity is stockholder's equity plus any deferred taxes and any investment tax credit, minus the value of any preferred stock, all obtained from Compustat. To determine the value of preferred stock we use redemption value if this is available, otherwise we use liquidating value if it is available, and if not we use carrying value. The panles present various measures of plan sale usage during our sample period of January 2003 to June 2006 across size and book-to-market quintile based categories. Proportion of transactions is the ratio of the number of plan sale transactions for firms in a category to the total number of sales transactions in that category. Proportion of firm-months is the ratio of number of firm-months in which at least one plan sale was observed for firms in a particular category to the number of firm-months in which at least one sale (of any type) was observed for firms in the same category. Proportion of dollar amount is defined in a similar manner by looking at the total value of stocks sold under a plan to the total value of stocks sold. Panel A presents the ratios across book-to-market ratio based quintiles, while Panel B presents the same across size based quintiles.

Panel A:

Book-to-market quintiles	Proportion of transactions	Proportion of firm-months	Proportion of dollar amount
Growth	34.5%	34.5%	23.5%
2	24.9%	25.8%	14.1%
3	24.6%	23.5%	19.4%
4	22.5%	20.4%	17.2%
Value	18.9%	16.9%	8.5%

Panel B:

Size quintiles	Proportion of transactions	Proportion of firm-months	Proportion of dollar amount
Small	13.2%	11.6%	6.5%
2	23.0%	21.5%	8.8%
3	29.5%	28.8%	14.7%
4	28.8%	29.0%	14.5%
Big	26.3%	25.4%	21.2%

#### Table 4: Calendar time abnormal returns on plan and non-plan sale portfolios

For each trading day between February 1, 2003 and September 30, 2006, hypothetical plan and nonplan sale portfolios are constructed for various portfolio formation periods of k trading days. All stocks that had at least one plan sale during k-day window ending on the previous trading day are included in the portfolio. The abnormal return on a hypothetical portfolio for that day is the weighted average of abnormal returns of the stock in the portfolio. Abnormal return for each stock is calculated as the difference between return on the stock and that on a matched portfolio of similar stocks. The construction of the matched portfolio is described in Appendix A. The stocks in the matched portfolio are selected based on the characteristics on the date of the last plan (or non-plan) sale during the portfolio formation window. The annualized abnormal returns are obtained by multiplying the average of daily abnormal returns on hypothetical portfolios by 250. Days on which the hypothetical portfolio has less than 20 stocks are dropped. The time series of the difference in daily abnormal returns between the plan sale and non-plan sale portfolios are used to calculate the tstatistic to test differences in performance. Panel A presents the results for the case where abnormal returns on the hypothetical portfolio is an equally weighted average of abnormal returns for all the stocks included in the portfolio. Panel B presents the results when each stock gets a weight proportional to the total amount of sales by all insiders during the portfolio formation period. For Panel C, the stock weights are proportional to the ratio of total number of shares sold by all insiders during the portfolio formation period to the total number of outstanding shares.

	Plan sa	les	Non-plan	sales	
Window	Abnormal returns (annualized)	t-stat	Abnormal returns (annualized)	t-stat	t-stat for difference
[+1, +130] [+1, +90] [+1, +22] [+1, +10]	-2.45% -2.56% -3.92% -4.43%	-1.38 -1.40 -1.87 -1.86	-0.64% -1.28% -2.42% -4.74%	-1.19 -2.20 -2.73 -4.23	-1.07 -0.73 -0.70 0.07

Panel A: Equally weighted portfolio

	Plan sa	les	Non-plan	sales	
Window	Abnormal returns (annualized)	t-stat	Abnormal returns (annualized)	t-stat	t-stat for difference
[+1, +130]	1.00%	0.24	0.71%	0.40	0.07
[+1, +90]	0.71%	0.17	0.78%	0.40	-0.02
[+1, +22]	-3.21%	-0.69	-0.13%	-0.05	-0.59
[+1, +10]	-3.10%	-0.63	-3.27%	-0.95	-0.07

Panel B: Portfolio weighted by sales proceeds (in dollars)

Panel C: Portfolio weighted by proportion of shares outstanding sold

	Plan sa	les	Non-plan	sales	
Window	Abnormal returns (annualized)	t-stat	Abnormal returns (annualized)	t-stat	t-stat for difference
[+1, +130]	-1.64%	-0.44	0.09%	0.03	-0.42
[+1, +90]	-3.32%	-0.87	-0.23%	-0.07	-0.70
[+1, +22]	-5.46%	-1.22	-4.98%	-0.89	-0.07
[+1, +10]	-2.23%	-0.41	-5.03%	-0.67	0.53