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ORIGINAL RESEARCH

Insider sales based on short-term earnings information

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Abstract I find strong evidence of insiders selling shares prior to imminent bad earnings news through their Rule 10b5-1 trading plans. While Rule 10b5-1 selling plans may conjure images of regular selling over a sustained period of time, I find that insiders' sales under these plans often consist of a small number of sales (the median plan consists of four sales) and commonly occur over a short period of time (the median plan lasts less than 150 days). Abnormal stock returns, earnings surprises, and abnormal earnings announcement returns are all significantly negative following plans that are short-term in nature, but not following plans that are long-term in nature. Although Rule 10b5-1 does not specify a minimum length for selling plans, finding that sales within short plans significantly outperform sales within longer plans suggests that restrictions on plan length would reduce the incidence and appearance of informed selling through Rule 10b5-1 plans.

Keywords Insider trading · Earnings announcements · SEC Rule 10b5-1 · Pre-planned trades

JEL Classification G14 · M41

1 Introduction

A vast amount of research has not found a relation between insider sales and imminent negative earnings news.[1] Reasons for a lack of relation are that insiders can sell shares for liquidity or diversification purposes (e.g., Lakonishok and Lee 2001; Jeng et al. 2003),

[1] Papers that examine this issue include: Penman (1982), Elliott et al. (1984), Givoly and Palmon (1985), Sivakumar and Waymire (1994), Noe (1999), Ke et al. (2003), Cheng and Lo (2006), Roulstone (2008), Jagolinzer (2009), and Cohen et al. (2012). Roulstone (2008) finds evidence of a relation, but describes the relation as "economically small" and decreasing over his 1980–2002 sample period. Cheng et al. (2005) find

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insiders face greater litigation risk on their sales transactions prior to bad news (e.g., Meulbroek 1992; Johnson et al. 2007), and corporate policies such as blackout periods can restrict the timing of insiders' sales (e.g., Bettis et al. 2000; Roulstone 2003). I reexamine this relation due to a recent advance in the insider trading literature (i.e., Cohen et al. 2012) and a recent change in insider trading regulation (i.e., SEC Rule 10b5-1). Cohen et al. (2012) develop an algorithm for identifying liquidity and diversification-based insider sales, thus improving the ability to detect a relation between insider sales and future earnings news. SEC Rule 10b5-1 reduces litigation risk and has increased selling during blackout periods, hence potentially increasing insiders' incentives and/or ability to sell ahead of bad earnings news.[2]

Cohen et al. (2012) find that insider sales that follow simple patterns in terms of their timing likely reflect liquidity and diversification motives and do not earn future abnormal returns, but that sales that do not follow these patterns do earn future abnormal returns. For example, if an insider sells shares at the same point in time every year (perhaps coinciding with the timing of their stock grants), this likely reflects uninformed diversification or liquidity motivated selling by the insider.[3] And so, routine selling is more likely to be uninformed or not strategic, whereas non-routine selling is more likely to be informed or strategic.

As a means for insiders to better signal themselves as liquidity or diversification-based sellers, in October 2000, the SEC enacted Rule 10b5-1 which gives insiders the option to pre-plan their sales (while not in possession of private information) and allows insiders to disclose to the market that their sales were pre-planned. This new regulation makes it easier to defend, if necessary, these pre-planned sales in criminal or civil court. While Cohen et al. (2012) find that routine sales are likely for liquidity or diversification purposes, it is not clear whether the purportedly liquidity or diversification motivated sales under Rule 10b5-1 plans are routine.[4] Therefore, while Rule 10b5-1 adds legal protection to legitimately routine sales, it can also create the potential for abuse by increasing legal protection to insiders that claim their sales are routine when in fact their sales are not routine.[5]

In this paper, I examine the nature of insiders' Rule 10b5-1 sales plans. Specifically, I study whether plan characteristics are consistent with routine selling. The notion of routine selling suggests that plans consist of regular sales over a sustained period of time. Therefore, I examine the length of insiders' sales plans to determine if the plans are consistent with routine selling. I measure the length of Rule 10b5-1 sales plans by the number of sales executed and by the number of calendar days that a plan lasts.

I find that it is not unusual for a Rule 10b5-1 sales plan to consist of a single sale (22 % of all plans) or for a plan to last less than 30 days (35 % of all plans). Sales in short plans

Footnote 1 continued
a relation between insider trading activity and the news at earnings and dividend announcements for Hong Kong industrial firms, but they do not separately analyze insider sales.

[2] Veliotis (2010) and Henderson et al. (2012) discuss the favorable treatment that Rule 10b5-1 sales have received in legal proceedings. Jagolinzer (2009) and Sen (2008) find that Rule 10b5-1 sales are more likely than non-Rule 10b5-1 sales to occur just prior to earnings announcements (which are typically blackout periods).

[3] Cohen et al. (2012) classify about half of all insider sales as routine using their algorithm.

[4] The phenomenon of routine insider selling existed well before Rule 10b5-1. Cohen et al. (2012) find that their analysis of routine and non-routine selling is robust to the sample period prior to the enactment of Rule 10b5-1.

[5] The SEC does not oversee or supervise insiders' Rule 10b5-1 selling plans. Insiders voluntarily and typically add a footnote to their SEC Form 4 filing to indicate that their sale was under a Rule 10b5-1 plan.

such as these, on average, earn significantly negative abnormal returns over the following 1, 3, and 6 months (i.e., abnormal returns in excess of −1.25, −3, and −4.25 % over these horizons, respectively). Sales in these short plans, on average, also precede a significantly negative earnings surprise at the next earnings announcement and earn significantly negative abnormal returns at the following earnings announcement (i.e., abnormal announcement return in excess of −1 % over a 2-day window). Sales in longer plans such as those consisting of more than ten sales or those that last longer than 180 days do not precede negative abnormal returns or negative earnings news, on average. In sum, I find an economically large and statistically significant positive relation between the length of insiders' selling plans and both subsequent abnormal returns and subsequent earnings news following the sales within those plans.

My main contribution is documenting that insiders' that utilize Rule 10b5-1 to increase the legal protection for their non-routine sales, on average, are selling on short-term earnings information. This finding adds to the general insider trading literature and to the literature on Rule 10b5-1 sales (i.e., Jagolinzer 2009; Shon and Veliotis 2013; Henderson et al. 2012). Prior research has individually examined the relation between Rule 10b5-1 sales or non-routine sales and future earnings news, but finds no relation (i.e., Jagolinzer 2009; Cohen et al. 2012). Hence, it is the combination of the two (sales that are both Rule 10b5-1 sales and non-routine) that results in a strong association between insider sales and forthcoming negative earnings news. In addition, the results indicate that Rule 10b5-1 sales only precede future negative abnormal returns for Rule 10b5-1 plans that are short in length. Overall, insiders with long Rule 10b5-1 sales plans, on average, seem to be obeying the spirit of Rule 10b5-1, whereas insiders with short plans apparently are not.

The rest of the paper is organized as follows. Section 2 discusses prior literature and develops the hypothesis. Section 3 describes the data. Section 4 reports the results. Section 5 concludes.

2 Prior literature and hypothesis development

2.1 Prior literature

A large amount of prior research finds that positive abnormal returns follow insider purchases.[6] However, evidence of negative abnormal returns following insider sales has largely been lacking. For example, Lakonishok and Lee (2001) and Jeng et al. (2003) find that insider sales are not informative regarding future returns. Two recent studies, Cohen et al. (2012) and Jagolinzer (2009) find evidence of informed sales in subsets of all insider sales.[7]

Cohen et al. (2012) show that "routine" insider trades (both purchases and sales), which they define as those occurring in the same month for multiple consecutive years are not informative regarding future returns, while all other trades are informative.[8] The idea is

[6] See, for example, Lorie and Niederhoffer (1968), Jaffe (1974), Finnerty (1976), Seyhun (1986, 2000), Rozeff and Zaman (1988), Meulbroek (1992), and Lakonishok and Lee (2001).

[7] Marin and Olivier (2008) also find insider selling information useful in predicting future returns. However, in their paper it is the absence of insider sales that immediately precede negative returns. Firth et al. (2011) find that insider sales are more informative than purchases for stocks listed on the Hong Kong Exchange. Results in Gangopadhyay et al. (2014) are also consistent with informative insider sales.

[8] Cicero and Wintoki (2013) also examine insider trading patterns. Specifically, they study whether an insider's trades occur in a sequence of months or not.

that a clear pattern of trade reflects uninformed trading by an insider, whereas insiders without a clear pattern are more likely trading on private information. Jagolinzer (2009) documents that sales made in accordance with SEC Rule 10b5-1 precede significantly negative abnormal returns, while non-Rule 10b5-1 sales by insiders at those same firms do not precede significantly negative abnormal returns.[9]

While both of these recent studies find evidence of abnormal returns following large subsets of insider sales. Neither finds evidence of insider selling prior to negative earnings news. For example, Cohen et al. (2012) find no relation between non-routine sales and abnormal announcement returns around management forecasts and earnings announcements in the following month. Similarly, Jagolinzer (2009) does not find a relation between the dollar volume of planned sales and earnings announcement abnormal returns.[10] These results are also consistent with prior work that finds no evidence of insider selling based on the information in imminent earnings announcements or management forecasts (e.g., Elliott et al. 1984; Penman 1982; Givoly and Palmon 1985; Sivakumar and Waymire 1994; Noe 1999; Ke et al. 2003; Cheng and Lo 2006).

Overall, prior research presents strong evidence suggesting that the litigation risk of selling prior to imminent negative earnings news is too high for insiders to engage in this behavior. Indeed, Meulbroek (1992) finds that in her sample of illegal insider trading, cases related to negative earnings news outnumber cases related to positive earnings news 4 to 1. In addition, Johnson et al. (2007) find that abnormal insider selling is positively associated with securities litigation. Due to the increased litigation risk of insider sales, prior research finds that insiders typically sell well in advance of significant negative news. For example, Ke et al. (2003) and Piotroski and Roulstone (2005) conclude that insiders sell based on the knowledge of long-term earnings information, but not based on short-term earnings information. Relatedly, Marin and Olivier (2008) find that insider selling peaks well before negative news and that it is the absence of insider selling that immediately precedes extreme negative news.

2.2 Hypothesis development

Although *all* insider sales should be for liquidity or diversification purposes (because securities laws in the United States forbid insiders from trading on material non-public information), the SEC enacted Rule 10b5-1 in 2000 to further protect insiders that pre-plan their sales transactions.[11] While insiders are not required to disclose their plan-sales, it is to their benefit to disclose plan sales (e.g., on their SEC Form 4 filings) to signal to market participants that their sale is purportedly uninformed, thereby reducing suspicion of impropriety and reducing the potentially negative price impact on the firm's stock price due to the disclosure of the insider sale. The premise behind Rule 10b5-1 is that insider sales occurring near significant firm news are not related to that news if the insider had pre-planned their sale before they became aware of the news. Rule 10b5-1 does not specify a minimum lag between the creation of a plan and the first sale in a plan. Through my own

[9] Also see, Sen (2008) and Henderson et al. (2012) for more evidence on the abnormal returns following Rule 10b5-1 trades.

[10] Shon and Veliotis (2013) find a relation between plan sales and *prior* earnings announcement news. They find that plan sales are more likely to follow positive earnings surprises and attribute this to management managing the firm's earnings upward so that planned sales occur at higher prices.

[11] Insiders may also pre-plan purchase transactions, but pre-planned purchases are quite rare compared to pre-planned sales. This is consistent with insiders protecting their sales transactions through Rule 10b5-1 due to the greater litigation risk for sales than purchases.

casual examination of SEC Form 4s of Rule 10b5-1 trades, I find that some insiders disclose the date that their plan went into effect. For those that disclose the date the plan went into effect, it is not uncommon for the first sale to occur within a month of the creation of the plan. It is also not uncommon for insiders to execute a single planned-sale. Although there is nothing barring these practices, it is not clear whether this is what regulators had intended when they enacted Rule 10b5-1. Jagolinzer (2009) discusses other ways that insiders can use SEC Rule 10b5-1, in possibly unintended ways, to their advantage (e.g., terminating plans early). Similarly, Robbins (2010) suggests that insiders selectively cancel pre-planned trades. Overall, SEC Rule 10b5-1 reduces insiders' litigation risk (e.g., Muth 2009; Veliotis 2010; Henderson et al. 2012) on these planned sales, but due to the great leeway allowed and the lack of any oversight over insiders' selling plans it is unclear to the extent that these plans are entered into in good faith (e.g., Jagolinzer 2009; Robbins 2010; Shon and Veliotis 2013).

One method for assessing whether Rule 10b5-1 selling plans are entered into good faith is to examine the length of these plans. While Rule 10b5-1 selling plans may conjure images of regular selling over a sustained period of time in the minds of market participants, whether or not this presumption is actually the case has not been examined. In other words, if plan sales are truly motivated by liquidity or diversification needs these trades should exhibit characteristics similar to the routine selling described and identified in Cohen et al. (2012). Routine sales in Cohen et al. (2012) occur over multiple consecutive years. Therefore, I predict a positive relation between plan length and future abnormal returns. Because a firm's earnings are an example of value relevant information that insiders can have knowledge of before other market participants, I also predict a positive relation between plan length and forthcoming earnings news (in terms of both earnings surprises and earnings announcement returns). In sum, I expect that insider's using Rule 10b5-1 selling plans that are short in length are more likely selling on private information and that this is reflected in future abnormal returns and future earnings news.

3 Data

3.1 Sample selection

I obtain insider selling data from J3 Services Group Corporation in order to identify insider sales made pursuant to SEC Rule 10b5-1.[12] This company collects data from SEC Form 4 filings following June 30, 2003, when electronic filing became mandatory. They identify any Form 4 where there is a footnote disclosure that the sale was made under a Rule 10b5-1 plan. I collect firm market capitalizations, share prices, and daily stock returns from CRSP. I gather book values from Compustat and earnings announcement dates, analyst earnings forecasts, and earnings realizations from I/B/E/S.

I focus on insiders classified as corporate officers, as these insiders are more likely to be informed about near-term earnings than directors or large shareholders. Of the 58,127 Rule 10b5-1 sales in my sample, 28 % are by CEOs, 11 % are by senior vice presidents, 10 % are by CFOs, 10 % are by executive vice presidents, and 10 % are by vice presidents (untabulated). The rest of the sales are by a mix of officers mainly consisting of presidents, COOs, and CTOs.

[12] The Thomson Reuters Insiders database recently started identifying Rule 10b5-1 plan trades, but thus far they have not gone back through all SEC Form 4 filings to identify Rule 10b5-1 trades from the past.

Given the lack of disclosure requirements in SEC Rule 10b5-1 and the nature of the data, it is not possible to identify insiders selling plans with certainty. Therefore, I must use the timing of insiders' Rule 10b5-1 trades relative to each other in order to infer a sales plan. I define Rule 10b5-1 sales plans as consisting of any Rule 10b5-1 sales (disclosed via SEC Form 4) that occur within 400 days of another Rule 10b5-1 sale. I identify 6,769 Rule 10b5-1 sales plans during my sample period.

Although 400 days is an arbitrary cutoff, I select it because of the idea in Cohen et al. (2012) where if an insider is granted shares at the same time each year and creates a plan to sell these shares one may see a series of sales at around the same time each year.[13] For example, if an insider has Rule 10b5-1 sales each January throughout my sample period, I classify those sales as occurring within a single plan. If an insider has a Rule 10b5-1 sale in January 2005 and then another Rule 10b5-1 sale in January 2007, I classify each of those sales as part of a different plan.

My identification of plans is clearly imperfect. First, while there are benefits to the disclosure of a sale as planned (to both the insider and their firm), insiders are not required to disclose that a sale was planned. Thus, I am unable to identify a plan in which the insider never discloses a planned sale.[14] For this same reason, I incorrectly measure the length of plans in which the insider discloses some but not all of their planned sales as planned.[15] Second, an insider could create multiple plans within 400 days of each other and my identification scheme would improperly classify those multiple plans as a single plan.[16] To the extent that this is the case, it should bias my results against finding a relation between plan length and strategic selling because if short plans are truly more strategic than long plans, then classifying multiple short plans as a single long plan incorrectly increases the appearance of strategic selling within long plans. Third, I measure the length of plans by the transactions that take actually take place. Plan length is reduced by early termination (Jagolinzer 2009) or the failure to reach limit order prices.[17]

Given my 400 days cutoff, I examine Rule 10b5-1 sales during the August 2004 through May 2010 period, even though I have insider selling data from July 2003 through June 2011. I exclude any sales plans where the first trade occurs during the first or last 13 months of my data. I do this in order to avoid bias in measuring the lengths of plans. For example a sale occurring in July 2003 could be the last sale of a long series of sales that occurred before my data begins; similarly a sale in June 2011 could be the first of a long series of trades that occur after my data ends.

[13] I use 400 days instead of 365 days to allow for small timing differences from 1 year to the next. Results are robust to using 365 days.

[14] My results may not generalize to insiders that never disclose their planned sales as planned. However, failing to disclose planned sales as planned is likely uncommon given the benefits of disclosing.

[15] To address this concern, I repeat my analyses (untabulated) using all sales made by insiders who disclose at least one planned sale (i.e., sales not disclosed as planned are assumed to be planned, if the insider discloses at least one planned sale). My results are unaffected by this change because there is an extremely small number of unplanned sales by insiders that disclose a planned sale (i.e., the number of sales in the sample increases by about 1 %).

[16] For robustness, I also tried a 200 days cutoff instead of 400. As expected, using a 200 days cutoff results in a decrease in the number of longer plans and a relatively larger increase in the number of shorter plans. This occurs because the probability of no other trades occurring within a time window increases as that time window is narrowed. My results (untabulated) were slightly weaker, but not materially different when I use a 200 days cutoff.

[17] This concern is reduced by the fact that insiders sell in significantly greater quantities in their short plans which suggests that there was intent for short plans to be relatively short rather than short plans just being long plans that were prematurely cut short.

3.2 Variable measurement

I measure the length of sales plans by the number of sales and the number of days that a plan lasts. *NSales* is the number of sales made within a plan, and *NDays* is the number of days from the first sale in the plan to the last sale in the plan. *1MonthAbRet*, *3MonthAbRet*, and *6MonthAbRet* are the abnormal returns (starting the day after the insider sale) over the future 1, 3, and 6 months periods, respectively.[18] All abnormal returns in this paper are measured relative to the CRSP value-weighted index over the same period.[19] *EA1AbRet*, *EA2AbRet, EA3AbRet, EA4AbRet,* and *EA5AbRet* are the 2-day abnormal returns at the first, second, third, fourth, and fifth earnings announcements, respectively, following the insider sale. *ESurp1*, *ESurp2, and ESurp3* are the earnings surprises at the first, second, and third earnings announcements, respectively, following the insider sale. Earnings surprises are measured as the difference between the firm's actual earnings minus the mean analyst forecast prior to the earnings announcement, scaled by the firm's share price prior to the earnings announcement. In order to deal with potential data errors, I winsorize earnings surprises at the 1 and 99 % levels each calendar quarter. *PercentTraded* is the percentage of the insider's holdings sold. *RetPast1Month* is the firm's return during the 1-month period prior to the insider sale (including the firm's return on the day of the sale). *RetPast6Month* is the firm's return during the 6-month period prior to the insider sale excluding the 1-month period covered by *RetPast1Month*.

3.3 Descriptive statistics

Panel A of Table 1 describes the 58,127 Rule 10b5-1 sales in my sample. On average, plan sales earn significant abnormal returns of 0.25, 0.81, and 2.06 % over the following 1, 3, and 6 months periods, respectively. These results are inconsistent with Jagolinzer (2009) who finds significantly negative abnormal returns over these horizons during his 2001 through 2005 sample period. These results are also inconsistent with the average plan sale being strategic. The earnings announcement abnormal returns are significantly positive, on average, at each of the following five earnings announcements.[20] On average, the next two earnings surprises are significantly positive. The average Rule 10b5-1 sale is 23 % of the insider's holdings in the firm. Consistent with prior research insiders sell after a period of increasing prices. On average, prices increased 5.23 % in the month prior and 15.65 % in the 6 months prior (excluding the month prior).

Panel B of Table 1 describes the 6,769 Rule 10b5-1 sales plans in my sample. The average plan consists of 8.6 sales. However, the median plan only consists of 4 sales, and 25 % of plans consist of 2 sales or less. The average plan lasts for 277 days, the median plan lasts for 149 days, and 25 % of plans last for less than 4 days. The average plan, earns significantly negative abnormal returns, on average, over the 1, 3, and 6 months periods following a sale (−0.66, −1.53, and −1.88 %, respectively). Abnormal returns are significantly negative at the next three earnings announcements. The three upcoming earnings

[18] I focus on the six months following the sale to be consistent with prior literature and because the short-swing profit rule prohibits insiders form making conflicting trades (i.e., a purchase and a sale) within six months of each other.

[19] In calculating *1MonthAbRet*, *3MonthAbRet*, and *6MonthAbRet*, if a daily firm return is missing it is set equal to the CRSP value-weighted index for that day (i.e., no abnormal returns are generated due to missing future returns).

[20] This is consistent with the well-known earnings announcement premium (e.g., Ball and Kothari 1991; Cohen et al. 2007).

Table 1 Descriptive statistics

Variable	N	Mean	Std. Dev.	25th	Median	75th
Panel A: Rule 10b5-1 sales						
1MonthAbRet	58,127	0.25 %	12.09 %	−6.33 %	−0.20 %	6.29 %
3MonthAbRet	58,127	0.81 %	21.91 %	−12.38 %	−0.65 %	11.64 %
6MonthAbRet	58,127	2.06 %	32.54 %	−17.78 %	−1.27 %	17.62 %
EA1AbRet	58,127	0.27 %	10.13 %	−5.01 %	0.05 %	5.74 %
EA2AbRet	57,537	0.22 %	10.30 %	−4.87 %	0.20 %	5.72 %
EA3AbRet	56,715	0.23 %	10.39 %	−5.13 %	0.24 %	5.96 %
EA4AbRet	55,792	0.45 %	10.28 %	−5.00 %	0.26 %	5.85 %
EA5AbRet	54,088	0.40 %	10.34 %	−4.61 %	0.26 %	5.97 %
ESurp1	58,127	0.048 %	1.263 %	−0.007 %	0.059 %	0.187 %
ESurp2	57,464	0.030 %	1.655 %	−0.017 %	0.055 %	0.188 %
ESurp3	56,490	−0.003 %[c]	1.826 %	−0.026 %	0.055 %	0.187 %
PercentTraded	58,127	23 %	32 %	1 %	7 %	31 %
RetPast1Month	58,127	5.23 %	14.22 %	−2.69 %	4.70 %	12.31 %
RetPast6Month	58,127	15.65 %	33.90 %	−4.14 %	11.45 %	30.59 %
Panel B: Rule 10b5-1 sales plans						
NSales	6,769	8.6	20.5	2	4	9
NDays	6,769	277.4	356.4	4	149	401
1MonthAbRet	6,769	−0.66 %	8.65 %	−4.24 %	−0.53 %	3.23 %
3MonthAbRet	6,769	−1.53 %	17.34 %	−9.81 %	−1.51 %	6.33 %
6MonthAbRet	6,769	−1.88 %	26.69 %	−15.98 %	−2.42 %	10.11 %
EA1AbRet	6,769	−0.49 %	7.07 %	−3.50 %	−0.16 %	3.09 %
EA2AbRet	6,708	−0.20 %[a]	7.46 %	−3.54 %	0.01 %	3.39 %
EA3AbRet	6,626	−0.16 %[b]	7.93 %	−3.49 %	0.01 %	3.53 %
EA4AbRet	6,495	0.10 %[c]	7.33 %	−3.29 %	0.13 %	3.59 %
EA5AbRet	6,359	0.09 %[c]	7.64 %	−3.33 %	0.05 %	3.71 %
ESurp1	6,769	−0.012 %[c]	1.621 %	−0.021 %	0.067 %	0.178 %
ESurp2	6,697	−0.041 %[c]	2.523 %	−0.025 %	0.063 %	0.184 %
ESurp3	6,585	−0.024 %[c]	1.763 %	−0.038 %	0.060 %	0.193 %
PercentTraded	6,769	32 %	32 %	7 %	20 %	51 %
RetPast1Month	6,769	6.26 %	12.35 %	0.88 %	5.38 %	10.82 %
RetPast6Month	6,769	14.44 %	28.14 %	0.10 %	10.99 %	24.37 %

Panel A (Panel B) describes Rule 10b5-1 sales (sales plans) during the August 2004 through May 2010 period. In Panel B, all variables (except *NSales* and *NDays*) are averaged within each plan and descriptive statistics are presented over all plans. *NSales* is the number of sales made within the plan. *NDays* is the number of days from the first sale in the plan to the last sale in the plan. *1MonthAbRet*, *3MonthAbRet*, and *6MonthAbRet* are the abnormal returns following the insider sale over the future 1 month, 3 months, and 6 months periods, respectively. *EA1AbRet*, *EA2AbRet, EA3AbRet, EA4AbRet, EA5AbRet* are the 2-day abnormal returns at the first, second, third, fourth, and fifth earnings announcements, respectively, following the insider sale. All abnormal returns are measured relative to the CRSP value-weighted index over the same period. *ESurp1*, *ESurp2, ESurp3* are the earnings surprises at the first, second, and third earnings announcements, respectively, following the insider sale. *PercentTraded* is the percentage of the insider's holdings sold. *RetPast1Month* (*RetPast6Month*) is the return during the 1-month period (the 6-month period excluding the 1-month period covered by *RetPast1Month*) prior to the insider sale. All means are significant at the 1 % level, unless noted otherwise

[a] Mean is significant at the 5 % level

[b] Mean is significant at the 10 % level

[c] Mean is not significant at the 10 % level

surprises are not significantly different from zero. The difference in results between Panel A (the sales) and Panel B (the plans) suggest that there are some insiders with a substantial number of unprofitable sales in their plans, but that the average Rule 10b5-1 sales plan executes sales that are, on average, profitable (i.e., precedes negative abnormal returns).

In his analysis of Rule 10b5-1 sales, Sen (2008) argues that averaging future returns at the insider-level (which also applies to averaging at the plan-level as I do in Panel B of Table 1) creates a bias if insiders' plans consist of escalating limit orders. If that is the case, by averaging at the insider or plan-level and then averaging over all insiders or plans the researcher places less weight on sales that are followed by positive abnormal returns and more weight on sales that are followed by negative abnormal returns. While I agree that this is a concern, I argue that my method is appropriate in this paper because my interest is on how a plan characteristic, plan length, relates to future returns and future earnings news which makes the plan-level the appropriate level of analysis. In addition, the bias which Sen (2008) attributes to escalating limit orders, could equally be explained as an inherent characteristic of insider selling where insiders selling for liquidity or diversification purposes sell more often and insiders selling strategically sell less often and generate negative abnormal returns through their informed selling.

To examine whether the difference in results between Panels A and B in Table 1 is a mechanical result due to escalating limit orders that are unique to Rule 10b5-1 plans, I recreate Panels A and B of Table 1 in the same manner for insider sales at these same firms for which the SEC Form 4 filing does not indicate that the sale was pre-planned.[21] The (untabulated) results are similar. This suggests that significantly positive abnormal returns at the trade-level (i.e., Panel A) becoming negative abnormal returns after averaging at the insider or plan-level (i.e., Panel B) is not unique to samples of Rule 10b5-1 sales.

Table 2 presents Pearson and Spearman correlations between plan length and future abnormal returns, future abnormal earnings announcement returns, and future earnings surprises. The two plan length measures, *LnNSales* and *LnNDays* are highly correlated, Pearson (Spearman) correlation of 0.81 (0.83). *LnNSales* is the natural logarithm of *NSales*, and *LnNDays* is the natural logarithm of *NDays* the number of days from the first sale in the plan to the last sale in the plan. I use natural logarithms as the relation between plan length and future news is likely not linear. Both plan length measures are positively correlated at the 1 % level with future abnormal returns over all three horizons (1, 3, and 6 months), the next earnings announcement abnormal return, and the next earnings surprise. This indicates that plans consisting of more (less) sales and plans whose sales occur over a longer (shorter) period of time precede positive (negative) abnormal returns and positive (negative) earnings news.

To gain a better understanding of how the variables of interest vary across plans of different lengths, Table 3 presents variable means by plan length. In Panel A of Table 3, I group plans into six groups based on the number of sales made within the plan. While any such groupings are necessarily arbitrary, my aim is to document in a simple fashion the economic magnitude of the relation between plan length and the other variables of interest.

22 % of plans (1,491 plans) consist of a single trade and 9 % of plans (599 plans) consist of more than 20 trades. The difference in future abnormal returns between these two groups are 2.27, 5.09, and 7.63 % over the 1, 3, and 6 months horizons, respectively. These differences are significant at the 1 % level. The difference in future earnings

[21] Because insiders are not required to disclose their plan sales, I exclude non-plan sales that occur within 15 days of a plan-sale at the same firm due to the possibility that these are planned sales. In addition, non-plan sales may imitate plan-sales by other insiders at their firm.

Table 2 Pearson and Spearman correlations

Variable	*LnNSales*	*LnNDays*	*1MonthAbRet*	*3Mont-AbRet*	*6MonthAbRet*	*EA1AbRet*	*EA2AbRet*	*EA3AbRet*	*EA4AbRet*	*EA5AbRet*	*ESurp1*	*ESurp2*	*ESurp3*
LnNSales	1.00	0.81	0.08	0.09	0.09	0.07	0.03[a]	0.03[a]	0.03	0.02[b]	0.04	0.03[a]	0.01[c]
LnNDays	0.83	1.00	0.07	0.09	0.09	0.07	0.03	0.05	0.04	0.00[c]	0.05	0.04	0.01[c]
1MonthAbRet	0.09	0.09	1.00	0.64	0.48	0.28	0.01[c]	0.05	−0.01[c]	0.04	0.06	0.07	0.00[c]
3MonthAbRet	0.12	0.13	0.63	1.00	0.76	0.43	0.08	0.12	0.03[a]	0.04	0.04	0.08	0.03[a]
6MonthAbRet	0.13	0.16	0.47	0.77	1.00	0.32	0.29	0.14	0.03	0.04	−0.02[b]	0.08	0.06
EA1AbRet	0.07	0.07	0.28	0.46	0.36	1.00	0.10	0.10	0.06	0.07	0.07	0.12	−0.01[c]
EA2AbRet	0.03[a]	0.04	0.04	0.10	0.32	0.16	1.00	0.10	0.03[a]	0.04	0.04	0.06	0.04
EA3AbRet	0.02[b]	0.06	0.05	0.09	0.13	0.16	0.15	1.00	0.12	0.05	0.03[a]	0.03	0.13
EA4AbRet	0.04	0.05	0.03[a]	0.05	0.07	0.10	0.09	0.18	1.00	0.10	0.01[c]	0.03[a]	0.04
EA5AbRet	0.04	0.03	0.05	0.06	0.06	0.12	0.08	0.11	0.15	1.00	−0.02[c]	0.00[c]	0.00[c]
ESurp1	0.06	0.06	0.11	0.18	0.15	0.26	0.01[c]	0.06	0.04	0.04	1.00	0.48	0.10
ESurp2	0.02[c]	0.03[a]	0.06	0.10	0.16	0.10	0.25	0.03[a]	0.05	0.04	0.39	1.00	0.17
ESurp3	0.02[c]	0.04	0.01[c]	0.04	0.07	0.04	0.06	0.27	0.06	0.03[a]	0.32	0.41	1.00

This table presents Pearson (Spearman) correlation coefficients above (below) the diagonal for Rule 10b5-1 sales plans. All variables (except *LnNSales* and *LnDays*) are averaged within each plan and correlation coefficients are presented over all plans. *LnNSales* is the natural logarithm of the number of sales made within the plan. *LnNDays* is the natural logarithm of the number of days from the first sale in the plan to the last sale in the plan. *1MonthAbRet*, *3MonthAbRet*, and *6MonthAbRet* are the abnormal returns following the insider sale over the future 1 month, 3 months, and 6 months periods, respectively. *EA1AbRet*, *EA2AbRet, EA3AbRet, EA4AbRet, EA5AbRet* are the 2-day abnormal returns at the first, second, third, fourth, and fifth earnings announcements, respectively, following the insider sale. All abnormal returns are measured relative to the CRSP value-weighted index over the same period. *ESurp1*, *ESurp2, ESurp3* are the earnings surprises at the first, second, and third earnings announcements, respectively, following the insider sale. All correlation coefficients are significant at the 1 % level, unless noted otherwise

[a] Correlation coefficient is significant at the 5 % level

[b] Correlation coefficient is significant at the 10 % level

[c] Correlation coefficient is not significant at the 10 % level

Table 3 Variable means by sales plan length

NSales	1	(2, 3)	(4, 5)	(6, 10)	(11, 20)	>20
Panel A: variable means by number of trades in plan						
N	1,491	1,666	920	1,249	844	599
NSales	1	2.4	4.5	7.6	14.6	44.5
NDays	1	129.2	238.8	388.1	554.7	815.2
1MonthAbRet	−1.56 %	−0.99 %	−0.85 %	−0.14 %[c]	0.07 %[c]	0.71 %
3MonthAbRet	−3.37 %	−2.23 %	−1.89 %	−0.97 %[a]	0.40 %[c]	1.72 %
6MonthAbRet	−4.26 %	−3.37 %	−2.46 %	−1.37 %[a]	1.39 %[a]	3.37 %
EA1AbRet	−1.24 %	−0.54 %	−0.50 %[a]	−0.20 %[c]	−0.18 %[c]	0.51 %[a]
EA2AbRet	−0.29 %[c]	−0.32 %[c]	−0.37 %[c]	−0.35 %[b]	0.14 %[c]	0.43 %[a]
EA3AbRet	−0.55 %[a]	0.04 %[c]	−0.19 %[c]	−0.37 %[b]	0.09 %[c]	0.34 %[b]
EA4AbRet	−0.11 %[c]	−0.13 %[c]	0.13 %[c]	0.19 %[c]	0.39 %[b]	0.55 %[a]
EA5AbRet	0.10 %[c]	−0.32 %[c]	−0.08 %[c]	0.48 %	0.34 %[c]	0.22 %
ESurp1	−0.172 %[a]	0.030 %[c]	0.025 %[c]	0.059 %[c]	0.060 %[a]	0.073 %
ESurp2	−0.247 %[a]	0.044 %[b]	−0.052 %[c]	−0.045 %[c]	0.087 %	0.069 %
ESurp3	−0.019 %[c]	−0.061 %[c]	−0.069 %[c]	−0.024 %[c]	0.075 %	−0.010 %[c]
PercentTraded	41 %	36 %	32 %	29 %	24 %	20 %
RetPast1Month	6.98 %	6.87 %	6.65 %	5.53 %	5.56 %	4.66 %
RetPast6Month	12.32 %	13.81 %	14.78 %	15.61 %	16.01 %	16.27 %
NDays	(1, 30)	(31, 90)	(91, 180)	(181, 365)	(366, 730)	>730
Panel B: variable means by number of days in plan						
N	2,314	601	674	1,167	1,336	677
NSales	1.8	4.4	6.6	9.0	13.3	27.3
NDays	4.8	57.6	130.0	272.6	504.6	1,110.8
1MonthAbRet	−1.27 %	−1.09 %	−1.19 %	−0.10 %[c]	−0.24 %[c]	0.52 %
3MonthAbRet	−3.05 %	−3.25 %	−2.34 %	−0.62 %[c]	−0.10 %[c]	1.65 %
6MonthAbRet	−4.59 %	−5.38 %	−3.18 %	−0.50 %[c]	0.59 %[c]	4.50 %
EA1AbRet	−1.12 %	−0.64 %[b]	−0.51 %[b]	−0.11 %[c]	0.04 %[c]	0.14 %[c]
EA2AbRet	−0.46 %[a]	−1.07 %	−0.17 %[c]	−0.07 %[c]	0.23 %[c]	0.33 %[a]
EA3AbRet	−0.69 %	−0.36 %[c]	−0.46 %[c]	−0.04 %[c]	0.57 %	0.38 %
EA4AbRet	−0.32 %[b]	0.71 %[c]	−0.14 %[c]	0.01 %[c]	0.42 %	0.66 %
EA5AbRet	0.06 %[c]	0.11 %[c]	−0.15 %[c]	−0.20 %[c]	0.07 %[c]	0.83 %
ESurp1	−0.115 %[a]	0.038 %[c]	0.012 %[c]	0.098 %	0.050 %[c]	−0.040 %[c]
ESurp2	−0.154 %[b]	−0.057 %[c]	0.000 %[c]	0.041 %[c]	0.040 %[c]	0.008 %[c]
ESurp3	−0.006 %[c]	−0.138 %[a]	−0.179 %[a]	−0.016 %[c]	0.054 %[a]	−0.009 %[c]
PercentTraded	38 %	33 %	32 %	32 %	27 %	23 %
RetPast1Month	7.38 %	6.44 %	5.43 %	6.15 %	5.60 %	4.61 %

Table 3 continued

NDays	(1, 30)	(31, 90)	(91, 180)	(181, 365)	(366, 730)	>730
RetPast6Month	13.54 %	14.90 %	16.10 %	13.35 %	17.13 %	12.02 %

Panel A (Panel B) presents variable means by groups of sales plans sorted based on the number trades within the plan (the number of calendar days from the first sale in the plan to the last sale in the plan). All variables (except *NSales* and *NDays*) are averaged within each plan and variable means are presented over all plans within a given sales plan length group. *NSales* is the number of sales made within the plan. *NDays* is the number of days from the first sale in the plan to the last sale in the plan. *1MonthAbRet*, *3MonthAbRet*, and *6MonthAbRet* are the abnormal returns following the insider sale over the future 1 month, 3 months, and 6 months periods, respectively. *EA1AbRet*, *EA2AbRet, EA3AbRet, EA4AbRet, EA5AbRet* are the 2-day abnormal returns at the first, second, third, fourth, and fifth earnings announcements, respectively, following the insider sale. All abnormal returns are measured relative to the CRSP value-weighted index over the same period. *ESurp1*, *ESurp2, ESurp3* are the earnings surprises at the first, second, and third earnings announcements, respectively, following the insider sale. *PercentTraded* is the percentage of the insider's holdings sold. *RetPast1Month* (*RetPast6Month*) is the return during the 1-month period (the 6-month period excluding the 1-month period covered by *RetPast1Month*) prior to the insider sale. All means are significant at the 1 % level, unless noted otherwise

[a] Mean is significant at the 5 % level

[b] Mean is significant at the 10 % level

[c] Mean is not significant at the 10 % level

announcement returns between these two groups are 1.75, 0.72, 0.89, 0.66, and 0.12 % at the first, second, third, fourth, and fifth earnings announcement following a trade, respectively. The difference at the first earnings announcement is significant at the 1 % level. The difference at the second, third, and fourth earnings announcements are all significant at the 5 or 10 % level. The difference at the fifth earnings announcement is not significant. The difference in earnings surprises at the first, second, and third earnings announcements are 0.245, 0.316, and 0.009 %, respectively. The first two differences are significant at the 5 and 10 % levels, respectively, while the third difference is not significant.

Turning our attention to Panel B, 34 % of plans (2,314) are 30 days or shorter in length, and 10 % of plans (677) last for longer than 2 years. Generally, the results in Panel B are similar to Panel A which is not surprising given the high correlation between *LnNSales* and *LnNDays*. Overall, Table 3 indicates that plans consisting of five or less sales and plans consisting of 180 or less days earn significantly negative abnormal returns over the following 1, 3, and 6 months and at the following earnings announcement. Table 3 also indicates that the shortest plans (i.e., those consisting of single sale or those that are 30 days or shorter) precede a significantly negative earnings surprise.

As done earlier with Table 1, I recreate Table 3 using non-plan sales (untabulated). In the recreated Panel A (Panel B), for the non-plans that consist of 1 sale (last less than 30 days) I find abnormal returns of −0.70 % (−0.55 %), −1.33 % (−1.28 %), and −2.08 % (−2.08 %) at the 1, 3, and 6 months horizons. The following earnings surprise has a significantly negative abnormal return of −0.35 % (−0.36 %) and a positive earnings surprise of 0.052 % (0.051 %). This presents some evidence of strategic trade within non-plan sales, but not nearly to the extent that I find in plan sales. These means for the non-plans are all significantly greater at the 1 % level than the means in Panel A (Panel B). This is consistent with Rule 10b5-1 sales in very short plans being more strategic than non-plan sales (i.e., the additional legal protection provided by Rule 10b5-1 allows insiders to sell on upcoming earnings information to a much greater extent). In the recreated Panel A

(Panel B), none of the other five groupings (i.e., any of the groupings consisting of plans with more than one trade or lasting longer than 30 days) generate negative abnormal returns or negative abnormal earnings announcement returns.

As discussed earlier, one concern is that plans can consist of limit orders and that plans that last a long time are due to a firm's increasing stock price, while plans that are short are due to a firm's falling stock price and that this explains the difference in future abnormal returns, future earnings announcement returns, and future earnings surprises. To further address this issue, note that the average plan insider sells 41 % of their shares when the plan consists of a single sale while insiders in plans consisting of plans with more than 20 sales sell 20 % of their holdings, on average. This difference is significant at the 1 % level. The difference in transaction size across plan lengths suggests that short plans are not simply due to the use of limit orders and falling stock prices. If this were the case, we would expect transaction size to be equivalent across plan lengths.

Similarly, if short plans use limit orders to a greater extent than long plans then we would expect short plans to have sales following larger increases in share price than long plans. Consistent with this, plans consisting of a single sale follow increases of 6.98 % while plans consisting of more than 20 sales follow increases of 4.66 %. This difference of 2.32 % is significant at the 1 % level. This indicates that sales within short plans are better timed than long plans. This could result from limit orders, from insiders using short plans being more informed, or from a combination of the two. Even if we attribute the entire difference of 2.32 % in past 1 month return as due to limit orders that would only account for 31 % of the future abnormal difference over the following 6 months leaving 69 % of the abnormal performance unexplained.

4 Results

While the correlations in Table 2 and the descriptive analysis in Table 3 indicate a positive relation between plan length and future news (i.e., strategic trade is greater in shorter plans), in Tables 4, 5, and 6, I control for other factors that have been shown to explain returns such as size, market-to-book ratio, and past returns. I also cluster standard errors on two dimensions, firm and month of first plan sale (e.g., Petersen 2008).

The main independent variables of interest in the following tables are *LnNSales* and *LnNDays*. In Table 4 (Tables 5 and 6), the control variables are measured on the day prior to the insider sale (earnings announcement), and averaged over all sales within a plan. *LnSize* is the natural logarithm of the firm's market capitalization and *LnMB* is the natural logarithm of the firm's market-to-book ratio.[22] *RetPast1Month* (*RetPast6Month*) is the return during the 1-month period (the 6-month period excluding the 1-month period covered by *RetPast1Month*) prior. *AbRetPast1Month* (*AbRetPast6Month*) is the abnormal return during the 1-month period (the 6-month period excluding the 1-month period covered by *AbRetPast1Month*) prior. The past abnormal returns control for the momentum effect from Jegadeesh and Titman (1993). I control for the raw returns to control for differences in past returns that may be attributable to differences in the use of limit orders across plans of different lengths.

[22] Fama and French (1992) find a negative relation between market capitalization and returns and a positive relation between book-to-market and returns.

Table 4 Relation between sales plan length and future abnormal returns

Dependent variable	(1) *1MonthAbRet*	(2) *1MonthAbRet*	(3) *3MonthAbRet*	(4) *3MonthAbRet*	(5) *6MonthAbRet*	(6) *6MonthAbRet*
Intercept	−0.085*** (−2.63)	−0.074** (−2.35)	−0.208*** (−3.18)	−0.189*** (−2.93)	−0.268*** (−2.66)	−0.243** (−2.46)
LnNSales	0.008*** (5.27)		0.016*** (6.14)		0.025*** (6.01)	
LnNDays		0.002*** (4.06)		0.006*** (5.77)		0.011*** (6.12)
LnSize	0.003** (2.43)	0.003** (2.10)	0.009*** (3.05)	0.007*** (2.72)	0.011*** (2.71)	0.010** (2.39)
LnMB	−0.004 (−1.50)	−0.003 (−1.25)	−0.013*** (−2.74)	−0.012** (−2.43)	−0.027*** (−2.74)	−0.025** (−2.53)
AbRetPast1Month	0.023 (0.28)	0.021 (0.25)	−0.060 (−0.41)	−0.066 (−0.44)	−0.111 (−0.47)	−0.118 (−0.50)
RetPast1Month	0.008 (0.10)	0.010 (0.11)	0.098 (0.69)	0.101 (0.71)	0.137 (0.63)	0.143 (0.66)
AbRetPast6Month	0.019 (0.57)	0.019 (0.58)	0.038 (0.62)	0.040 (0.65)	0.107 (0.93)	0.111 (0.97)
RetPast6Month	−0.010 (−0.31)	−0.010 (−0.31)	−0.012 (−0.21)	−0.013 (−0.23)	−0.052 (−0.49)	−0.055 (−0.51)
N	6,769	6,769	6,769	6,769	6,769	6,769
R^2	1.25 %	0.95 %	1.73 %	1.50 %	1.82 %	1.79 %

This table presents the results of regressions with future abnormal returns as the dependent variables. The dependent variables: *1MonthAbRet*, *3MonthAbRet*, and *6MonthAbRet* are the abnormal returns following the insider sale over the future 1 month, 3 months, and 6 months periods, respectively. Abnormal returns are measured relative to the CRSP value-weighted index over the same period. *LnNSales* is the natural logarithm of the number of sales made within the plan. *LnNDays* is the natural logarithm of the number of days from the first sale in the plan to the last sale in the plan. *LnSize (LnMB)* is the natural logarithm of the firm's market capitalization (market-to-book ratio) measured on the day prior to the sale. *RetPast1Month* (*RetPast6Month*) is the return during the 1-month period (the 6-month period excluding the 1-month period covered by *RetPast1Month*) prior to the insider sale. *AbRetPast1Month* (*AbRetPast6Month*) is the abnormal return during the 1-month period (the 6-month period excluding the 1-month period covered by *AbRetPast1Month*) prior to the insider sale. Standard errors are clustered on two dimensions, firm and month of first plan sale

***, **, * indicate significance at 1, 5, and 10 % levels, respectively

Table 5 Relation between sales plan length and future earnings announcement abnormal returns

Dependent variable	(1) *EA1AbRet*	(2) *EA1AbRet*	(3) *EA2AbRet*	(4) *EA2AbRet*	(5) *EA3AbRet*	(6) *EA3AbRet*	(7) *EA4AbRet*	(8) *EA4AbRet*	(9) *EA5AbRet*	(10) *EA5AbRet*
Intercept	−0.073*** (−3.69)	−0.068*** (−3.44)	−0.037** (−2.06)	−0.036** (−1.99)	−0.040* (−1.74)	−0.041* (−1.87)	−0.017 (−0.87)	−0.015 (−0.79)	−0.014 (−0.68)	−0.010 (−0.47)
LnNSales	0.005*** (4.55)		0.002** (2.00)		0.002 (1.63)		0.002** (2.02)		0.002 (1.44)	
LnNDays		0.002*** (4.15)		0.001** (2.01)		0.002*** (2.76)		0.001** (2.28)		0.000 (0.46)
LnSize	0.003*** (3.35)	0.003*** (3.02)	0.001* (1.79)	0.001* (1.67)	0.002* (1.77)	0.002* (1.73)	0.001 (0.81)	0.001 (0.67)	0.001 (0.79)	0.001 (0.63)
LnMB	−0.003 (−1.50)	−0.002 (−1.31)	0.000 (0.20)	0.001 (0.25)	−0.000 (−0.24)	−0.001 (−0.28)	0.001 (0.46)	0.001 (0.53)	−0.002 (−0.82)	−0.001 (−0.69)
AbRetPast1Month	−0.060* (−1.84)	−0.058* (−1.77)	0.023 (0.51)	0.024 (0.55)	−0.057 (−1.45)	−0.05 (−1.33)	−0.031 (−0.85)	−0.030 (−0.82)	0.046 (1.20)	0.045 (1.15)
RetPast1Month	0.074** (2.51)	0.071** (2.44)	−0.022 (−0.56)	−0.024 (−0.60)	0.075** (1.99)	0.070* (1.85)	0.028 (0.81)	0.027 (0.78)	−0.011 (−0.34)	−0.010 (−0.30)
AbRetPast6Month	0.008 (0.30)	0.008 (0.30)	0.085 (0.44)	0.009 (0.45)	0.028 (1.32)	0.029 (1.34)	0.041** (1.97)	0.041** (1.98)	0.032* (1.70)	0.032* (1.68)
RetPast6Month	0.004 (0.17)	0.005 (0.19)	−0.003 (−0.15)	−0.003 (−0.15)	−0.029 (−1.21)	−0.029 (−1.22)	−0.040* (−1.91)	−0.040* (−1.91)	−0.027 (−1.46)	−0.026 (−1.43)
N	6,769	6,769	6,708	6,708	6,626	6,626	6,495	6,495	6,359	6,359
R^2	1.41 %	1.39 %	0.24 %	0.27 %	0.47 %	0.64 %	0.35 %	0.37 %	0.44 %	0.38 %

This table presents the results of regressions with future earnings announcement abnormal returns as the dependent variables. The dependent variables: *EA1AbRet*, *EA2AbRet, EA3AbRet, EA4AbRet, EA5AbRet* are the 2-day abnormal returns at the first, second, third, fourth, and fifth earnings announcements, respectively, following the insider sale. All abnormal returns are measured relative to the CRSP value-weighted index over the same period. *LnNSales* is the natural logarithm of the number of sales made within the plan. *LnNDays* is the natural logarithm of the number of days from the first sale in the plan to the last sale in the plan. *LnSize (LnMB)* is the natural logarithm of the firm's market capitalization (market-to-book ratio) measured on the day prior to the first earnings announcement following the sale. *RetPast1Month* (*RetPast6Month*) is the return during the 1-month period (the 6-month period excluding the 1-month period covered by *RetPast1Month*) prior to the first earnings announcement following the sale. *AbRetPast1Month* (*AbRetPast6Month*) is the abnormal return during the 1-month period (the 6-month period excluding the 1-month period covered by *AbRetPast1Month*) prior to the first earnings announcement following the sale. Standard errors are clustered on two dimensions, firm and month of first plan sale

***, **, * indicate significance at 1, 5, and 10 % levels, respectively

Table 6 Relation between sales plan length and future earnings surprises

Dependent variable	(1) *ESurp1*	(2) *ESurp1*	(3) *ESurp2*	(4) *ESurp2*	(5) *ESurp3*	(6) *ESurp3*
Intercept	−0.017*** (−2.78)	−0.017*** (−2.78)	−0.018* (−1.86)	−0.017* (−1.85)	−0.009 (−1.34)	−0.009 (−1.37)
LnNSales	0.0004** (2.05)		0.0005* (1.69)		0.0000 (0.23)	
LnNDays		0.0002** (2.15)		0.0002* (1.88)		−0.0000 (−0.08)
LnSize	0.0006** (2.55)	0.0006** (2.52)	0.0006* (1.65)	0.0006 (1.62)	0.0003 (1.23)	0.0003 (1.25)
LnMB	0.0021*** (3.10)	0.0021*** (3.12)	0.0021** (2.46)	0.0021** (2.48)	0.0010 (1.61)	0.0010 (1.61)
AbRetPast1Month	−0.0007 (−0.08)	−0.0002 (−0.03)	0.0036 (0.23)	0.0010 (0.25)	−0.0011 (−0.15)	−0.0012 (−0.17)
RetPast1Month	0.0102 (1.26)	0.0098 (1.22)	0.0175* (1.91)	0.0171* (1.84)	0.0070 (0.86)	0.0071 (0.88)
AbRetPast6Month	−0.0080 (−1.38)	−0.0078 (−1.38)	−0.0105 (−1.58)	−0.0105 (−1.58)	0.0008 (0.20)	0.0008 (0.20)
RetPast6Month	0.0103 (1.63)	0.0104 (1.64)	0.0146* (1.91)	0.0146* (1.92)	0.0026 (0.76)	0.0026 (0.77)
N	6,769	6,769	6,697	6,697	6,585	6,585
R^2	3.40 %	3.43 %	2.65 %	2.67 %	0.93 %	0.93 %

This table presents the results of regressions with future earnings surprises as the dependent variables. The dependent variables: *ESurp1*, *ESurp2, ESurp3* are the earnings surprises at the first, second, and third earnings announcements, respectively, following the insider sale. *LnNSales* is the natural logarithm of the number of sales made within the plan. *LnNDays* is the natural logarithm of the number of days from the first sale in the plan to the last sale in the plan. *LnSize (LnMB)* is the natural logarithm of the firm's market capitalization (market-to-book ratio) measured on the day prior to the first earnings announcement following the sale. *RetPast1Month* (*RetPast6Month*) is the return during the 1-month period (the 6-month period excluding the 1-month period covered by *RetPast1Month*) prior to the first earnings announcement following the sale. *AbRetPast1Month* (*AbRetPast6Month*) is the abnormal return during the 1-month period (the 6-month period excluding the 1-month period covered by *AbRetPast1Month*) prior to the first earnings announcement following the sale. Standard errors are clustered on two dimensions, firm and month of first plan sale

***, **, * indicate significance at 1, 5, and 10 % levels, respectively

4.1 Future abnormal returns

Table 4 presents the results of pooled regressions with future abnormal returns as the dependent variables. Over all three horizons (1, 3, and 6 months), both *LnNSales* and *LnNDays* are positively related to abnormal returns at the 1 % level. To assess the economic significance, a decrease in plan sales from the 75th percentile of 9 sales to the 25th percentile of 2 sales results in additional abnormal returns of −1.20, −2.41, and −3.76 % over the following 1, 3, and 6 months periods. A decrease in plan days from the 75th percentile of 401 days to the 25th percentile of 4 days results in additional abnormal returns of −0.92, −2.77, and −5.07 % over the following 1, 3, and 6 months periods. These results indicate that the relation between plan length and future abnormal returns is both statistically and economically significant.

4.2 Future earnings announcement returns

Table 5 presents the results of pooled regressions with future earnings announcement abnormal returns as the dependent variables. *LnNSales* and *LnNDays* are positively related to the first earnings announcement abnormal returns at the 1 % level and the second earnings announcement abnormal returns at the 5 % level. It is not until the fifth earnings announcement that there is no relation between either *LnNSales* or *LnNDays* and the abnormal earnings announcement return. A decrease in plan sales from the 75th percentile of 9 sales to the 25th percentile of 2 sales results in additional earnings announcement abnormal returns of −0.75 and −0.31 % over the following two earnings announcements, respectively. A decrease in plan days from the 75th percentile of 401 days to the 25th percentile of 4 days results in additional abnormal returns of −0.92 and −0.46 % over the following two earnings announcements, respectively. These results indicate that there is a positive relation between plan length and earnings news at following four earnings announcements. The relationship is strongest at the first earnings announcement following the insider sale. While prior research has found that insiders prefer to sell well in advance of negative news (e.g., Ke et al. 2003; Marin and Olivier 2008), I find that the additional legal protection offered by Rule 10b5-1 better allows insiders to create short plans based on the upcoming earnings announcement.

4.3 Future earnings surprises

Table 6 presents the results of pooled regressions with future earnings surprises as the dependent variable. *LnNSales* and *LnNDays* are positively related to the first earnings surprise at the 1 % level and the second earnings surprise at the 10 % level. It is not until the third earnings announcement that there is no relation between either *LnNSales* or *LnNDays* and the future earnings surprise. As in the prior two tables, to assess the economic significance, consider that a decrease in plan sales from the 75th percentile of 9 sales to the 25th percentile of 2 sales results in an earnings surprise change of −0.06 and −0.08 % over the following two earnings announcements, respectively. A decrease in plan days from the 75th percentile of 401 days to the 25th percentile of 4 days results in an earnings surprise change of −0.09 and −0.09 % over the following two earnings announcements, respectively. Once again, this indicates that Rule 10b5-1 reduces litigation risk to the point where insiders are willing to sell based on short-term earnings surprises.

5 Conclusion

This paper is the first to document a statistically and economically significant relation between insider sales and imminent bad earnings news (measured both through earnings surprises and earnings announcement returns). It appears that the perceived legal protection offered by Rule 10b5-1 has emboldened some insiders to sell on upcoming negative earnings information. It is the insiders implementing short plans (i.e., plans with a small number of sales or plans that occur over a short period of days) that appear to be trading on earnings information. The insiders with longer sales plans do not show any evidence of strategic selling. If regulators had intended Rule 10b5-1 sales plans to consist of regular selling over a sustained period of time, they may need to specify requirements regarding plan length because it is the short plans that appear informed or strategic. For example, sales plans consisting of more than ten sales or plans lasting longer than 180 days show no evidence of strategic trade.

Some caveats are in order. First, my determination of how to classify sales into plans is imperfect. However, error in classifying trades into plans should weaken the predicted relation between plan length and strategic trade. This occurs because if trades that are far apart are incorrectly considered as part of the same plan, then there is a greater chance of incorrectly classifying multiple short plans as a single long plan. On the other hand, if only trades that are very near to each other are considered as part of the same plan, then there is a greater chance of incorrectly classifying a long plan as multiple short plans. Thus, if there truly is a negative relation between strategic trading and plan length, then the mismeasurement of plan length will obscure this relation.

Second, the greater presence of limit orders in short plans could also play a role in creating the relations that I document. However, on average, the size of sales (in relation to the insiders' holdings) in short plans are significantly larger than the size of sales in long plans. This difference suggests that insiders have ex-ante intent for short plans to be shorter than long plans. Although returns in the month leading up to short plan sales are significantly more positive than returns in the month leading up to sales in long plans, which is consistent with the better timing of sales in short plans that may come from greater limit order use, the difference in past returns is not large enough to explain the much larger difference in future abnormal returns.

While the limit order explanation cannot be completely ruled out due to the nature of the data, the results in this paper suggest that insiders selling for liquidity or diversification purposes sell more often and that insiders selling strategically sell less often and generate negative abnormal returns through their informed selling. Finally, even if limit orders can explain some of the differences in future returns and future earnings news across plans of varying lengths, the results presented in this paper give at least the appearance of impropriety, on average, by insiders with short plans. The appearance of wrongdoing on the part of managers can be just as harmful to market confidence as the actual incidence of it and is something regulators should consider.

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