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Strategic Trading and Trade Reporting
by corporate Insiders

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Look deeper

Strategic Trading and Trade Reporting by Corporate Insiders[*]

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Abstract

Regulations in the pre-Sarbanes–Oxley era allowed corporate insiders considerable flexibility in strategically timing their trades and SEC filings, for example, by executing several trades and reporting them jointly after the last trade. We document that even these lax reporting requirements were frequently violated and that the strategic timing of trades and reports was common. Event study abnormal returns are larger after reports of strategic insider trades than after reports of otherwise similar nonstrategic trades. Our results also imply that delayed reporting is detrimental to market efficiency and lend strong support to the more stringent trade reporting requirements established by the Sarbanes–Oxley Act.

Keywords: Insider trading, directors' dealings, corporate governance, market efficiency

JEL classification: G14, G30, G32

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Corporate insiders arguably know more about the prospects of their firms than other market participants. This hypothesis is supported by a host of papers documenting that insider trades, and purchases in particular, convey information to the market (e.g., Seyhun (1986) and Chang and Suk (1998) for the US; Fidrmuc et al. (2006) and Friederich et al. (2002) for the UK). The US and many other countries have adopted regulations that require corporate insiders to report their trades.[1] The model of Huddart et al. (2001) provides a theoretical justification for these regulations. The authors show that information is reflected more rapidly in prices when insiders have to disclose their trades. Several empirical papers (e.g., Chang and Suk (1998), Betzer and Theissen (2009)) have shown that share price reactions occur on both the trading and reporting dates. Thus, without the report the market is unable to infer the full information content of the trade, which implies that market prices are distorted in the period between the trading and reporting dates. Delayed reporting, then, may be detrimental to market efficiency.

In the era prior to the Sarbanes–Oxley Act (SOX), Section 16 of the Securities Exchange Act required corporate insiders in the US to report their trades by the 10th of the month following the trade. Thus, the maximum time allowed between the trade and the report was 40 days, allowing corporate insiders considerable flexibility to time their trades and reports. This flexibility could be used strategically. An insider wishing to trade a large quantity could split up the order into

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[1] Some countries (e.g., the UK) even prohibit trading by corporate insiders in certain circumstances. Similarly, many listed firms in the US have adopted policies restricting trading by insiders (Bettis et al. (2000)).

several smaller chunks. Splitting up a large order reduces the order's price impact and thus results in reduced execution costs (e.g., Kyle (1985), Chordia and Subrahmanyam (2004)). However, if the insider reported each individual trade immediately, the share price reaction on the reporting day would move the price against her, and the subsequent trades would occur at less favorable prices. Consequently, the insider has an incentive to delay the reporting of a series of trades until after the last transaction. By doing so, insiders can benefit from the reduced price impacts of split-up trades while avoiding the adverse price reaction that immediate reports would trigger. The present paper analyzes incidences of strategically timed U.S. Securities and Exchange Commission (SEC) filings. We identify a trade as strategic whenever it is either followed by another trade by the same insider before it is reported or executed after another trade by the same insider that has not yet been reported.

Note that the incentive to strategically time trades and reports does not depend on the assumption that the insider trades on private information. The only assumption necessary for our argument is that other market participants believe that insiders possess private information with a positive probability. The stylized fact that prices react to the publication of insider trades supports this assumption.

This paper asks four related questions. First, how long are reporting delays during the pre-SOX era? Second, do insiders strategically use their flexibility in choosing the timing and reporting of their trades, and, if so, is this strategic behavior systematically related to the characteristics of the

insider or the firm? Third, what are the implications of delayed reporting on market efficiency? Fourth, how does the market react to the strategic timing of trades and reports?

The first question is important because, as argued above, delayed reporting can be detrimental to market efficiency. The relevance of the second question derives from the observation that strategic timing benefits the insider at the expense of other market participants. If each trade were reported immediately, the second and subsequent trades of a series of insider trades would be executed at prices less favorable to the insider but more favorable to the insider's counterparties. The answer to the third question allows us to assess the relevance of the issues addressed in this paper. The fourth question is important because its answer enables one to draw inferences on the trading motives of insiders engaging in strategic timing. On reporting dates, market participants learn whether the strategic delaying of reports has taken place. If market participants believe that insiders possessing private information are more likely to time their trades and reports, one should observe a larger price reaction than that for an otherwise similar but nonstrategic trade.

Our results can be summarized as follows. First, reporting delays were substantial. The mean reporting delay was 35.0 days and the median was 24 days, with 13.2% of all trades in our sample reported later than on the 10th of the month following the trade. The very large number of violations of the trade reporting requirement implies that the requirement was apparently not enforced. In fact, we were unable to detect even a single case in which an insider was fined because of late reporting. We further find clear evidence of strategic trading. Only 32.1% of the trades in our

sample were nonstrategic trades (i.e., these trades were reported before the same insider traded again, and they were not preceded by a trade by the same insider that had not yet been reported).

Logit models reveal that the occurrence of both late filings and strategic trades is systematically related to firm, trade, and trader characteristics. In particular, the results are consistent with the notion that insiders who are more closely monitored (and who therefore may be facing higher litigation risks) are less likely to file their trades late.

Consistent with previous findings, our event study results show that share prices react to the reporting of insider trades. The cumulative abnormal returns (CARs) over 10- and 20-day windows are larger after purchases than after sales. In cross-sectional regressions we find that the magnitude of the price reaction decreases only slowly in the reporting delay (after insider sales), or not at all (after purchases). Thus, our results support the notion that market prices are distorted in the period between a trade and its report, which supports our conjecture that delayed reporting is detrimental to market efficiency. Finally, event study CARs are larger after reports of strategic insider trades than after reports of otherwise similar nonstrategic trades. Thus, market participants apparently believe that insiders acting strategically are more likely to possess private information.

Our results clearly support the more stringent trade reporting requirements established by SOX. They also suggest that countries that currently allow longer reporting delays should consider revising and/or enforcing their regulations. Recent evidence reported in Fidrmuc et al. (2008) suggests that some countries do not yet mandate and enforce timely trade reporting. Using recent

samples (ending May 2007), the authors find median reporting delays of five days for Italy, seven days for Belgium, and 14 days for France.

Our paper is related to four recent papers by Cheng et al. (2007), Betzer and Theissen (2010), Brochet (2010), and Lebedeva et al. (2009). Cheng et al. (2007) exploit the feature that corporate insiders in the US could, in certain circumstances, delay the reporting of non-open market trades until the end of the fiscal year of the firm (SEC Form 5 trades). The authors find that insider sales by top executives in Standard & Poor's (S&P) 500 firms disclosed in such a delayed manner predict negative future returns and lower operating profitability relative to analyst forecasts. Insider purchases, on the other hand, are hardly predictive of future returns. Cheng et al. (2007) conclude that "managers in large firms may have used late-disclosure Form 5 sales for information-based trading" (p. 1861). Betzer and Theissen (2010) use data from Germany to show that substantial reporting delays are common, that the delays are systematically related to firm characteristics, and that abnormal returns after the reporting dates of insider trades are independent of the reporting delays. The latter finding implies that prices are distorted in the period between the trading and reporting dates. Brochet (2010) focuses on differences in the information content of insider trades before and after SOX. The author regresses event study CARs on a set of explanatory variables, including the reporting delay, and finds that price reactions after purchases are weaker when trades are reported with longer lags, but that the reverse is true for insider sales. Lebedeva et al. (2009) find strong evidence that corporate insiders in the US break up larger trades into series of

smaller trades. The authors refer to this as stealth trading. They also find that liquidity-based explanations for this behavior have more explanatory power than information-based explanations.

Our paper differs from these previous papers in that it is the first paper to systematically document strategic trade reporting and to analyze the determinants and implications of this phenomenon. It further differs from Cheng et al. (2007) in that we do not analyze the relatively small sample of non-open market trades eligible for late reporting but, rather, the much larger sample of all insider trades that had to be filed on SEC Form 4.[2] Betzer and Theissen (2010) analyze reporting delays in Germany but have a much smaller sample (1,977 observations as compared to 314,696 in the present paper), and the regulatory regime in Germany is distinctly different from that in the US. Brochet (2010) includes a reporting delay variable in his analysis but interprets it as a control variable measuring the information leakage between trading and reporting dates. Furthermore, his sample is much smaller than ours because his sample starts in 1997 and only includes trades by the chief executive officer (CEO), the chief financial officer (CFO), the chief operating officer (COO), the board chair, and the president. Lebedeva et al. (2009) focus on the motives for stealth trading but do not analyze late filings or how reporting delays affect CARs on the reporting dates.

The remainder of the paper is organized as follows. Section I describes the data set and presents descriptive statistics. Section II presents evidence on delayed trade reporting. Section III deter-

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[2] The number of Form 5 sales (purchases) for S&P 500 stocks during 1998–2001 amounts to 438 (419). The corresponding figures for Form 4 trades are 10,166 and 7,217, respectively (Cheng et al. (2007), Table 1D).

mines whether incidences of strategic trading and trade reporting took place and also analyzes whether so-called strategic trades are systematically different from nonstrategic trades. Section IV uses event study methodology to compare market responses to strategic and nonstrategic trades. Section V presents our conclusions.

I.   Data

Our analysis requires data on insider trades, firm characteristics, and stock prices. The data selection process follows that of Lakonishok and Lee (2001) and Marin and Olivier (2008) and merges data from four different sources, namely, the TFN Insider Filing Data Files, the Center for Research in Security Prices (CRSP) database, the Compustat database, and the I/B/E/S database. The initial sample consists of insider trades reported on SEC Form 4 in companies listed on the New York Stock Exchange, the American Stock Exchange, or the NASDAQ during 1992–2001. It covers the last 10 calendar years before the implementation of SOX, which enacted a regime change, since it requires insiders to report a trade within two working days.

We start our sample construction with the TFN database. We include all open market or private purchases (transaction code P) and all open market or private sales (transaction code S) of nonderivative securities whose records were not amended (amendment indicator "blank") between January 1, 1992, and December 31, 2001. Of these transactions, we retain only those filings whose data can be verified by TFN with a high level of confidence (cleanse indicators R and H). The TFN Insider Filing Data Files contain the following information:

- The company name and CUSIP.

- The transaction date and the reporting date (SEC receipt date).

- The transaction code (purchase or sale), the number of shares exchanged in the transaction, and the transaction price.

- The insider's position within the firm, which we classify into four groups:

  - The CEO (also possibly the chairman of the board).

  - Chairman (only if not also the CEO).

  - Executive directors, excluding the CEO.

  - Other non-executive officers, affiliates, beneficial owners, or other persons required to report their trades.

We exclude all filings that have no entry in either the transaction price, number of shares, reporting date to SEC, position of insider, or sector fields, leaving us with 741,653 records. We also exclude insider transactions whenever the reported transaction price was not inside a 20% interval around the CRSP closing price on the insider trading day. We further exclude trades when the number of shares traded exceeded 20% of the total shares outstanding. We do not attempt to single out Rule 10b5-1 trades because very few of these pre-planned trades took place during the pre-SOX era. Brochet (2010), using a sample covering 1997–2002, reports that Rule 10b5-1 trades accounted for only 0.55% of the trades in his sample.

We complement the data on insider transactions with supplementary data from different sources. We obtain financial data from the Compustat database. All data items are taken from the firms' financial statements at the end of the fiscal year preceding the reporting of the insider trades. We measure book leverage (the variable *bookleverage*) as the ratio of long-term debt (data item 9) plus debt in current liabilities (item 34) to long-term debt plus debt in current liabilities plus stockholder equity (item 216). Firm size (*size*) is defined as the natural logarithm of the market value of equity. Tobin's Q (*Q*) is calculated as the ratio of the market value of assets to the book value of total assets (item 6). Following Malmendier and Tate (2007), we define the market value of assets as total assets plus market equity (item 25 times item 199) minus book equity. We calculate book equity as the sum of stockholder equity and balance sheet deferred taxes and investment tax credit (item 35), where available, minus the preferred stock liquidating value (item 10) and minus post-retirement assets (item 336), where available.[3]

Furthermore, we obtain data on analysts' forecasts and the announcement dates of quarterly or annual earnings reports from the I/B/E/S and Compustat databases. We define our variable *numest* as the total number of analysts covering a company in the last available yearly earnings forecast before the transaction date of the insider trade. We further obtain the dates of all quarterly earnings announcements.

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[3]   When stockholder equity was not available as data item 216, we calculated stockholder equity alternatively as common equity (item 60) plus the preferred stock par value (item 130) or total assets minus total liabilities (item 181). If the preferred stock liquidating value was not available as data item 10, we calculated the preferred stock

For an observation to be included in our analysis, all the necessary data items in the CRSP, Compustat, and I/B/E/S databases must be available. This requirement reduces the sample to 314,696 observations.

In our empirical analysis we use the following additional variables. The *delay* variable is the difference in days between the reporting and transaction dates. We calculate the variable *TradeVolume* as the number of shares exchanged in a transaction times the transaction price divided by the market value of equity. We define *NumInsider* as the total number of insiders who traded shares in the same company on the same day. Table I summarizes the definitions of these variables.

Insert Table I about here

Our analysis uses two different data sets: a "transaction sample" and an "event study sample." For the transaction sample we aggregate all transactions by the same insider that are a) executed on the same day and b) jointly reported on the same day. We present an aggregated transaction as one trade with the net amount traded. The (net) transaction volume is positive (negative) if the sum of all the individual trades by this particular insider on the trading day is positive (negative). After these calculations, we classify each aggregated transaction as a purchase or a sale. Our final transaction sample consists of 98,933 purchases and 215,763 sales (314,696 observations in total). The announcement date in our event study analysis is the day on which an insider trade was

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liquidating value alternatively as redemption value (item 56) or par value (item 130). Return on equity (the variable RoE) is net income (item 172) divided by book equity.

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filed with the SEC. Therefore, we aggregate all insider trades in the shares of a given firm that were reported on the same day, irrespective of whether the trades were reported by the same insider or different insiders. We refer to this sample as our event study sample. Again, aggregated transactions are treated as one trade, and the net trade direction and net volume are as defined above. The final data set for the event study consists of 34,648 purchases and 65,319 sales (99,967 trades in total).

Table II presents the descriptive statistics for the firms in our sample. The average firm size, as measured by the market value of equity, is $4544.39 million. The firm size distribution is heavily skewed. The average Tobin's Q of the sample firms is 3.52, the average return on equity is 8.90%, and the mean book leverage is 31.43%. The mean trade size, expressed as a percentage of the market value of equity, is 0.121%. In 62.10% of cases, only one insider traded on a given day. In the remaining cases, more than one insider traded on the same day. The average number of insiders trading on a given day is 2.04, with a maximum of 32. The average insider trade was executed 57.0 calendar days before the firm reported its next annual or quarterly earnings report.

Insert Table II about here

Figure 1 shows the distribution of the trading dates. Although it appears to follow a weak U-shaped pattern, the general impression from Figure 1 is that trades are more or less evenly distributed over the month. The distribution of reporting dates, shown in Figure 2, is, however, dramatically different. The daily frequencies start low (only 0.81% of trades are reported on the first day

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of the month) and then increase strongly until the 10th of the month. Almost 32% of all the trades are reported on this day alone. When we weight the trades by their volume, this number increases further to 42.7%. After the 10th, the frequencies decline sharply. In the second half of the month, there is no single day on which more than 0.75% of the trades are reported.

Insert Figure 1 about here

Insert Figure 2 about here

There are two not mutually exclusive (and observationally equivalent) explanations for the strong pattern we document. First, many corporate insiders may routinely report trades made during the previous month on the 10th. This practice may hamper market efficiency and may be to the disadvantage of other traders (although not intentionally). Whenever share prices react to the reporting of an insider trade, reporting delays imply distorted prices in the period between the trading and filing dates. If an insider executes several trades on different days but reports them jointly, the later trades are executed at prices that are more favorable than they would have been in the case where each trade had been reported immediately. This is beneficial for the insider but obviously to the disadvantage of the counterparties to the insider's trades. Second, some insiders may *intentionally* delay the reporting of their trades to avoid the price impact triggered by the report. By considering only the trading and filing dates, the two cases mentioned cannot be distinguished from each other. However, the share price reaction on the filing date can be expected to reflect the

market's beliefs about the insiders' motives. Therefore, analyzing the price reaction will allow us to draw inferences about these motives and the economic significance of strategic trade reporting.

II. Reporting Delays

This section presents evidence concerning the magnitude of reporting delays and the determinants of late filings. The frequency distributions of trading and reporting dates shown in Figure 1 and Figure 2 demonstrate that trades are approximately evenly distributed over the month, whereas reports cluster around the 10th. If insider trades were indeed equally distributed over the days of the month and if each trade were reported on the 10th of the month after the trade (i.e., on the last permissible day), we would expect an average reporting delay of approximately 25 days. Table III shows the actual reporting delays. The median delay (24 days for purchases and sales) corresponds roughly to the benchmark value derived above. The mean delay is much longer, at 35.0 days.[4] Purchases are reported with longer delays than sales (40.4 days, compared to 32.5 days, respectively). This difference may be indicative of strategic delaying, because previous papers (e.g., Seyhun (1986) and Brochet (2010) for the US, and Fidrmuc et al. (2006) for the UK) document that insider purchases are more informative, as evidenced by larger abnormal returns. This finding, in turn, implies that insiders who purchase shares are more likely to possess private information and therefore have greater incentives to conceal their trading activity.

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[4] This figure is greater than that given in Table 1 of Brochet (2010). The author uses a shorter sample period (starting in 1997) and confines his analysis to trades initiated by the CEO, CFO, COO, board chairs, and presidents.

Insert Table III about here

The discrepancy between the mean and median reporting delays implies that the distribution of reporting delays is heavily skewed. The magnitude of the average delay further implies that a significant fraction of trades, particularly the purchases, are reported too late (i.e., later than the 10th of the month following the trade). In fact, Table III reveals that 13.2% of the trades in our sample were reported too late.[5] We use the term *late filings* for these cases. Late filings are more common for purchases than for sales (17.5%, compared to 11.3%, respectively).

The high percentage of late filings is stunning and implies that in the pre-SOX era, reporting requirements were not enforced. In fact, we were unable to identify even a single case in which a corporate insider was fined for late filing. This is all the more surprising because violations of the reporting requirement are easily detectable: The TFN database contains the trading and reporting dates together with a unique person identification number that allows for the insider's easy identification.

The percentage of late filings is too large to be explained by accidental omissions. Rather, a substantial fraction of insiders exists who do not care about the reporting requirements or who deliberately (and maybe strategically) file their reports late. To shed light on the issue, we estimate a logit model where the dependent variable is zero if a trade was reported in time (i.e., by the 10th

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[5]   These figures take into account the fact that when the 10th of a month is a Saturday or a Sunday, the trade only needs to be reported on the 12th or the 11th of the month, respectively.

of the month following the trade), and one if the trade was reported late. The independent variables include firm and trade characteristics. We use the number of analysts following as a proxy for investor attention.[6] Trade characteristics include trade volume relative to the firm's market capitalization and the number of different insiders trading on the same day. We include three further control variables, namely, Tobin's Q as a proxy for the valuation of the firm, the return on equity as a measure of operating profitability, and book leverage. We do not have a clear prediction regarding the sign and significance of the coefficients.

Many firms restrict insider trading by defining a blackout period during which trading is prohibited. Typically, the blackout period is just prior to an earnings announcement. A common arrangement is to only allow trading within a short period after an earnings announcement (Bettis et al. (2000), Roulstone (2003)). We include in our model the dummy variable "pre-announcement", which is set to one if a trade was *not* executed within a 30-calendar-day window after an earnings announcement, and zero otherwise.[7]

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[6] To avoid multicollinearity (the correlation between firm size and the number of analysts following is 0.79 in the transaction sample), we do not include firm size. We obtain very similar results, however, when we replace the number of analysts by firm size.

[7] Two comments are in place. First, Bettis et al. (2000) survey 663 firms and report that the most common restriction is to only allow insiders to trade within a short window (e.g. days 3 to 12) after an earnings announcement. Roulstone (2003) analyzes a large sample of insider trades. From the observed trading pattern he deducts whether a firm has a restriction in place. Specifically, he assumes that a firm has a restriction in place when more than 75% of the insider trades occur in the 20 trading days (approximately one month) after earnings announcements are made. Since our sample is closer to Roulstone's than to the sample of firms surveyed by Bettis et al. (2000) we adopt a one month period. Second, data on earnings announcement dates are missing in some cases. We deal with this by excluding all observations where the time between the insider trade and the date of the publication of the next quarterly earnings announcement is more than 91 days. We obtain similar results when we include all obser-

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We further define three dummy variables that describe the insider's position in the firm. The first dummy is set to one when the CEO is among the traders trading on a given day, and zero otherwise. The second dummy identifies trades by the chairman of the board (unless the chairman is simultaneously the CEO) and the third one identifies trades by other executive directors of the firm. Trades by outside directors, beneficial owners, and others thus constitute the base group.

We estimate a pooled model that includes both purchases and sales and two separate models including only purchases and sales, respectively. The pooled model includes a dummy variable that captures differences in the probability of late reporting between purchases and sales. All models include sector dummies (where we adopt the classification used in the TFN insider filings) and year dummies. Standard errors are clustered at the firm level. Table IV reports marginal effects (the change in the probability of late filing for a unit change in the explanatory variable, evaluated at the mean values of the explanatory variables) and the respective z-statistics.

The probability of late filings is generally higher for purchases than for sales. This result is consistent with the earlier finding that average reporting delays are longer for purchases than for sales. Trades by insiders in firms followed by more analysts are less likely to be filed late. This is an intuitive finding, given that these firms tend to be larger and are under closer scrutiny by ana-

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vations. In the latter case we misclassify those insider trades that were executed within a 30-day window after the publication date of an earnings announcement not included in our data set.

lysts and investors in general. We further find that sales by insiders in more highly leveraged firms are more likely to be reported late. No such relation is found for insider purchases.

Insert Table IV about here

Considering trade-specific variables next, we find that trades executed during the period prior to earnings announcements are significantly more likely to be reported late. There are two not mutually exclusive explanations for this finding. First, insiders are more likely to possess relevant private information prior to an earnings announcement and therefore have an incentive to strategically delay the reporting of their trades. Second, as noted above, many firms have adopted policies that allow insider trades only in a window which is open for a specified period after the quarterly earnings announcement (Bettis et al. (2000)). Insiders in these firms are more likely to trade shortly after an earnings announcement and, at the same time, are more likely to be scrutinized and may therefore tend to file their reports in time.

The other two trade-specific variables, trade size and the number of insiders trading on a given day, do not yield significant results. With respect to the position of the insider within the firm, we find that CEOs, chairmen of the board, and executive directors are significantly less likely to file late than other corporate insiders (such as, e.g., non-executive directors and beneficial owners). This finding is again consistent with the notion that insiders who are under closer scrutiny are more reluctant to file their reports late.

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In summary, our results are consistent with the notion that the occurrence of late filings is not random. In particular, it appears that insiders who are more closely monitored (and who therefore may be facing higher litigation risk) are less likely to file their trades late.

III. Incidences of Strategic Trading and Strategic Trade Reporting

So far, we have documented that considerable reporting delays exist and that the reporting requirement is violated in more than 13% of cases. Delayed reporting per se may be detrimental to market efficiency, but it does not necessarily benefit the insider. An insider who only wants to execute a single trade has no incentive (beyond convenience) to delay the filing. This is different, however, when the insider intends to trade more than once. In this case, delaying the reporting of earlier trades avoids the price reaction the report would trigger. Thus, later trades are executed at prices that are more favorable than those that would have prevailed had each trade been reported immediately. Note that this is true irrespective of whether the insider trades on private information or not. It is sufficient that other market participants believe the insider to be informed with positive probability.

In this section we search for evidence of strategic trade reporting. We classify a trade as nonstrategic if it is a) not preceded by another trade that has not been reported until the trading date and

b) is not followed by another trade before it is reported.[8] All other trades are classified as strategic because they are part of a series of trades in which some trades were executed while other trades were not yet reported. Figure 3 demonstrates two cases. Trades 1 and 2 in panel A of Figure 3 are executed on different days but reported jointly. According to the definition above, both trades are classified as strategic. Because they are reported jointly, market participants can infer that the trades are strategic. Panel B of Figure 3 shows a different situation, where trades 1 and 2 are executed on different days as well as reported on different days. Because trade 1 is reported after trade 2 is executed, both trades are strategic according to our definition. However, on the date on which trade 1 is reported, market participants cannot infer that trade 1 is strategic. Upon trade 2 being reported, however, it becomes apparent that both trades are strategic. When we analyze the market response to strategic trades in the next section, we adjust our definition of strategic trades accordingly. A trade will be considered strategic only when market participants can infer it was a strategic trade. Consequently, trade 1 in Panel B of Figure 3 will be classified as nonstrategic when we analyze the abnormal returns after the filing of insider trades in Section IV. In the current section, however, we stick with our original definition because we take the point of view of the insider.

Insert Figure 3 about here

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[8] We use an alternative definition as a robustness check. We only consider trades in the same direction (i.e., only purchases or only sales) and consider a series to be terminated when no further trades took place for at least 40 days (the maximum reporting delay). This definition, which is similar to that used in Lebedeva et al. (2009) to identify stealth trading, yields the same conclusions.

We note that our classification is conservative. The group of strategic trades does not only contain trades that were deliberately reported late. As noted previously, it is likely that some corporate insiders routinely report their trades on the 10th of the following month. If an insider adhering to this reporting practice trades several times in a month, our classification scheme will treat these trades as strategic.[9] There are two reasons why we stick to our classification. First, we cannot distinguish *why* we observe a specific pattern of trades and reports. Second, even if an insider does not intentionally delay the reporting of the earlier trades of a series, the delayed report still puts the counterparties to the later trades at a disadvantage, since they would have traded at more favorable prices had the insider reported all trades immediately.

The results of a descriptive analysis are reported in Table V. Only 32.1% of the trades in our sample are categorized as nonstrategic.[10] This percentage is larger for purchases than for sales (38.0% versus 29.4%, respectively). This finding is surprising at first, since purchases are known to have larger price impacts (which should increase the incentive to strategically delay the reporting of a trade). Furthermore, we documented earlier that average reporting delays are larger for purchases. A potential explanation for the result is the difference in trade size. Table V reveals that insider sales are, on average, much larger than insider purchases. The large sizes of sell or-

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[9]   Our results are also conservative in a second sense. We only classify a trade as strategic when *the same* insider trades several times before reporting the trade. Besides these cases there are a large number of cases in which insiders trade while the SEC filing of *another* insider is still pending. This sequence also puts the counterparties to the later insider trades at a disadvantage because they would have traded at more favorable prices had the insider who traded first reported her trades immediately.

ders provide an incentive to split up trades and report individual trades only after all the trades of a sequence have been executed.

A total of 67.9% of the trades in our sample are classified as strategic. Each strategic trade is part of a sequence of trades. The end of a sequence is reached when there are no more unreported trades. Table V reveals that 15.0% of the trades are classified as the first trade of a sequence, while 52.9% are classified as second or subsequent trades of a sequence. These numbers imply that a sequence, on average, consists of 4.5 trades. This number is higher for purchases than for sales (4.9, compared to 4.4, respectively).

Insert Table V about here

Table V documents that strategic trade reporting is widely practiced. We therefore now analyze whether strategic trades are systematically different from nonstrategic trades. To this end we estimate logit models where the dependent variable indicates whether a trade is classified as strategic or nonstrategic. The independent variables are the trade, firm, and trader characteristics introduced in the previous section. We add a dummy variable that identifies trades that were filed

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[10]   As one might expect, the percentage of non-strategic trades is lower in the subsample of trades that are filed late. Only 22% of these trades are classified as non-strategic.

late.[11] We estimate a pooled model as well as separate models for purchases and sales. Standard errors are clustered at the firm level.

The results (marginal effects and z-statistics) are reported in Table VI. Purchases are less likely than sales to be classified as strategic, which is consistent with the descriptive results presented above and may be related to the fact that insider purchases on average are much smaller than insider sales. The likelihood of observing strategic trades is lower in firms followed by more analysts. This finding is intuitive because insiders in these firms are more closely monitored. We further find the likelihood for strategic trades to be increased in firms with lower returns on equity. Insider sales in firms with higher Q and in less leveraged firms are more likely to be classified as strategic whereas no such relation is found for insider purchases.

Insert Table VI about here

Turning to the trade-specific variables next, we find that larger trades are less likely to be classified as strategic trades. This finding is consistent with the conjecture that strategic trades are the result of large orders that have been split up into smaller chunks. We also find that trades that are filed late are more likely to be classified as strategic. The dummy variable identifying trades executed in the period prior to the publication of an earnings announcement is positive and significant for insider purchases, but insignificant for sales. Interestingly, the chairman of the board is

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[11]   We obtain similar results when we replace the "late reporting" dummy by the reporting delay measured in days. We prefer the specification that includes the dummy because it is more robust in the presence of outliers (i.e.,

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more likely to engage in strategic trading, whereas executive directors (excluding the CEO) are less likely to engage in strategic trading than the members of the base group (non-executive directors, beneficial owners, and others). The results for the CEO are somewhat less clear, with an (insignificant) negative coefficient for purchases and a (significant) positive coefficient for sales.

Our results lend support to the hypothesis that insiders strategically time their trades and made strategic use of pre-SOX reporting rules. The next section addresses whether market reactions to the reporting of insider trades take that into account.

IV.   Market Response to Strategic Trades

This section analyzes share price reactions after the reporting of insider trades using standard event study methodology. This analysis serves a dual purpose. First, we want to test our conjecture that delayed reporting is detrimental to market efficiency. To this end, we analyze whether reporting day CARs decrease with the length of the reporting delay and, if so, how quickly. A finding that CARs decrease quickly with the length of the delay would provide evidence that the market is able to learn the information contained in the insider trade from other sources and thus does not have to rely on the report. If, on the other hand, we find that the CAR decreases slowly, or not at all, with the length of the delay, this could be interpreted as evidence that market prices

trades reported with extremely long delays).

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are indeed distorted in the period between the trading and reporting dates. This, in turn, would imply that delayed reporting hampers market efficiency. Second, we wish to analyze whether the CARs are larger after the reporting of strategic trades. The result will allow us to draw conclusions about the market's belief about insider trading motives. If the market reaction after strategic trades is stronger than after otherwise similar nonstrategic trades, this would provide evidence that the market attributes higher information content to these trades.

As already noted above, we use standard event study methodology. The event date is defined to be the day on which an insider trade is filed with the SEC. The analysis is based on the event study sample introduced in Section I. This sample is obtained by aggregating all insider trades in shares of the same firm that were reported on the same day. We must aggregate reports filed by different insiders because otherwise we would double-count observations. We estimate the market model over a 255-day estimation window ending 46 days[12] prior to the announcement date. We use the CRSP value-weighted index as our market proxy, and T-statistics are based on the standardized cross-sectional test proposed by Boehmer et al. (1991).

The event study results are reported in Table VII. We report CARs over four event windows, namely, (0; 1), (0; 2), (0; 10), and (0; 20), and we report separate results for insider purchases and insider sales. Consistent with previous research, we find that CARs over a short event window

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[12] We choose a longer delay between the end of the estimation window and the event window because we do not want the estimation window to be contaminated by the execution of the insider trade. Note that 46 days is slightly more than the maximum delay for reporting admissible in the pre-SOX era.

are small. The CARs over the two-day window (0; 1) amount to 0.29% for purchases and -0.21% for sales. The CARs increase significantly when the lengths of the event window are increased. The CARs over the event window (0; 10) are 1.99% for purchases and -0.87% for sales; the corresponding values for the 21-day event window (0; 20) are 2.97% and -2.05%, respectively. These results confirm previous findings that the share price reaction is stronger after insider purchases than after insider sales.

Insert Table VII about here

We next compare the CARs after strategic and nonstrategic trades. As noted previously, we only categorize a trade as strategic when, on the filing date, market participants can infer that the trade was strategic. The results provide clear evidence that market participants attribute higher information content to strategic trades. The share price reaction after these trades is stronger than that after nonstrategic trades, irrespective of whether we consider purchases or sales or the length of the event window. Consider the CAR over the 20-day window (0; 20) as an example: It is 3.75% after strategic purchases but only 2.45% after nonstrategic purchases. The corresponding figures for strategic and nonstrategic sales are -2.55% and -1.49%, respectively. The difference between the price reactions after strategic and nonstrategic trades is (based on a t-test for equality of means) statistically significant in all cases.

Table VII also reports the results of further cross-tabulations. As noted previously, many firms restrict insider trading by defining a blackout period during which trading is prohibited. Typical-

ly, the blackout period is the period just prior to an earnings announcement (often two months; see Bettis et al. (2000) and Roulstone (2003)). Such a restriction is based on the assumption that the informational asymmetry between corporate insiders and other market participants is larger prior to earnings announcements. If this assumption is true, we should observe larger CARs after trades that non-restricted insiders execute prior to earnings announcements. To test this hypothesis, we define the dummy variable "pre-announcement" as set to one if at least one of the trades reported on a given day was executed within a 60-day window prior to an earnings announcement. We find that purchases made during the pre-announcement period result in significantly larger share price reactions. This finding is consistent with the notion that earnings announcements reduce informational asymmetries. For insider sales, there are no significant differences between trades executed during the pre-announcement period and other trades.

We next consider the timing of trades relative to earnings announcement dates. We look at trades that were executed in the period before an earnings announcement but reported after the announcement. To this end we define the dummy variable "timed", which is set to one if all trades reported on a given day were executed before and reported after the earnings announcement date.[13] We find that timed trades convey significantly less information to the market. Considering again the (0; 20) event window as an example, we find a CAR of 3.22% for non-timed purchases

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[13] We used an alternative definition as a robustness check. Specifically, we only considered trades as "timed" if they were executed prior to but reported after the earnings announcement, but prior to the next announcement. This excludes trades that were reported with very long delays. Both the results of the cross-tabulations and the results

and a CAR of only 1.87% for timed purchases. The corresponding figures for sales are -2.19% and -1.21%, respectively. These results are again consistent with the notion that earnings announcements reduce the informational asymmetry between insiders and the market.

Next we compare trades that were reported in time with trades that were filed late. We define a dummy variable late filing that is set to one if all of the trades reported on a given day were filed late. The results are inconsistent. Over longer event windows (10 or 20 days), trades reported in time trigger stronger share price reactions (3.02% versus 2.69% for purchases and -2.06% versus -2.04% for sales). The difference is significant only for insider purchases, however.

Trades that are filed late are, by definition, reported with longer delays. Thus, finding that insider purchases that are filed late trigger smaller share price reactions is consistent with the notion that the market learns some of the information contained in the report from other sources. To shed more light on this important issue, we next sort the insider trades in our sample into ten groups with respect to their weighted average reporting delays (delay 0–5 days, 5–10 days, and so on, with trades in the 10th group having a weighted average delay of more than 45 days). We find that the CARs are significantly different from zero irrespective of the trading delay. They tend to slightly decrease with the length of the delay for purchases, but not for sales.[14] These results imp-

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of the cross-sectional regressions to be presented below are very similar when we use this alternative specification.

[14] Brochet (2010) reports a similar result.

ly that prices are distorted in the period between the execution and filing of an insider trade. Consequently, delayed reporting is detrimental to market efficiency.

The results in Table VII suggest that timed trades, that is, trades executed before but reported after an earnings announcement, and trades executed within a 30-day window after an earnings announcement trigger smaller share price reactions. The results also suggest that the CAR decreases with the length of the reporting delay for insider purchases but not for sales. However, up to now we did not control for the other firm and trade characteristics. Including such controls is important because we showed previously that trades that are filed late are systematically different from trades that are filed in time. Similarly, we showed that strategic trades are different from nonstrategic trades. In addition, reporting strategic trades typically involves reporting several trades on the same day,[15] and therefore the total reported volume is larger. It may be the larger volume rather than the strategic nature of the trade per se that causes the larger CARs.

We therefore estimate cross-sectional regressions that control for the total reported volume and other potentially relevant variables. The dependent variable is the CAR. We report results for the CARs measured over the event window (0; 20). Using the shorter event window (0; 10) yields results that are qualitatively similar.

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[15] The typical case is illustrated in Panel A of Figure 3. Several trades are executed on different days but reported jointly. The case illustrated in Panel B of Figure 3, where strategic trades are reported individually, is much less common.

The independent variables include measures of firm characteristics (Tobin's Q, return on equity, book leverage, and number of analysts following[16]) and trade characteristics (transaction volume relative to the firm's market capitalization and aggregated over all trades that were reported jointly, number of different insiders trading on the same day, and weighted average reporting delay[17]). We further include dummy variables identifying strategic trades, trades executed in the period prior to an earnings announcement, and timed trades (i.e., those executed in the period prior to an earnings announcement and reported after the announcement, but prior to the next earnings announcement). We also include the interaction between the timed dummy and the strategic dummy. Three further dummy variables control for the position of the insider in the firm (CEO, chairman of the board, other executive directors[18]). Finally, we include year and industry dummies.

We estimate separate models for purchases and sales. Note that we expect different signs for the coefficients in the two regressions, because the CARs after purchases are predominantly positive

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[16] To avoid multicollinearity (the correlation between firm size and the number of analysts following is 0.80 in our event study sample), we do not include firm size. When we replace the number of analysts with firm size, we obtain very similar results. We also estimated versions of our models which include additional firm characteristics (a measure of asset tangibility as defined in Almeida and Campello 2007 and the standard deviations of returns in the 60 days prior to the event date). Tangibility turned out to be insignificant, return volatility was positive and significant for purchases but not for sales.

[17] One potential problem with the delay variable lies in the fact that there are obvious outliers in the sample, as is evidenced by a maximum reporting delay in excess of 10 years. We deal with this issue by estimating three alternative versions of the model. We use a) a delay variable that is winsorized at 42 (the maximum delay allowed in the pre-SOX era), b) the log of 1 plus the delay, and c) a dummy variable that identifies trades that were filed late. These alternative specifications yield similar results. We therefore report results only for the base model.

while those after sales are predominantly negative. We include firm fixed effects. Standard errors are clustered at the reporting-day level. The results are shown in Table VIII. The CARs after insider purchases are smaller for firms with higher values of Tobin's Q and for firms with more analysts following. The other firm characteristics are insignificant. The share price reaction after a purchase does not depend on the transaction volume. It is larger when more than one insider reported trades on the same day. Consistent with our earlier results, we find that purchases executed during the period prior to an earnings announcement trigger significantly larger price reactions. Timed purchases—those that are executed before but reported after an earnings announcement— trigger significantly smaller share price reactions than other purchases. These results are consistent with the notion that earnings announcements convey information to the market and reduce informational asymmetries. Purchases by the CEO, the chairman of the board, and other executive directors result in higher CARs than purchases by members of the base group (non-executive directors, affiliates, beneficial owners, and others). This result in general and the relative sizes of the coefficients in particular are consistent with the informational hierarchy hypothesis, which posits that trades by insiders with more privileged access to information convey more information to the market.

Insert Table VIII about here

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[18] If several insiders report their trades on the same day, we choose the highest insider position; that is, we set the dummy to one if at least one of the insiders is the CEO, the chairman of the board, or an executive director, and zero otherwise.

The most important results are those with respect to the strategic trading dummy and the reporting delay. Strategic purchases trigger a significantly larger share price reaction, even after controlling for other relevant variables. Note that, on the reporting day (our event day), market participants observe whether a report contains strategic trades. Our results thus imply that market participants believe that strategic purchases are more likely to be motivated by private information than otherwise similar nonstrategic trades.[19] The additional abnormal return is 0.9%, which is also economically significant. The coefficient on the reporting delay is insignificant, indicating that CARs do not decrease when a trade is reported with a longer delay. Thus, once we control for trade and firm characteristics, the negative relation reported in Table VII disappears. This result supports our conjecture that delayed reporting is detrimental to market efficiency.

The results for insider sales differ from those for purchases in several respects. Trades by insiders in more highly valued firms (larger Q) trigger stronger (more negative) price reactions, as do trades by insiders in firms followed by more analysts. Price reactions after insider sales filings are stronger when more than one insider reports a trade on the same day. Trade size, on the other hand, does not have a systematic impact. Trades by CEOs and other executive directors cause stronger price reactions. The insignificant coefficients on the pre-announcement and timing

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[19] As noted earlier many insiders routinely file their reports on the 10th of the month following the trades. It is conceivable that these routine reports are less informative than reports filed on other days. Therefore, we re-estimated the regression with two additional dummy variables. The first identifies reports filed on the 10th of a month, the second one interacts this dummy with the dummy identifying strategic trades. We find that indeed reports filed on the 10th of a month trigger smaller CARs. However, the coefficient on the interaction term is positive and signifi-

dummies indicate that the timing of the trade itself and of the report relative to earnings announcements do not significantly affect the abnormal returns.

The coefficient for the reporting delay is significantly positive, though small in magnitude. Thus, the CARs after insider sales tend to decrease when a trade is reported with a longer delay. The decrease is slow, however. Therefore, the conclusion that delayed reporting is detrimental to market efficiency is still valid.

Strategic sales apparently convey more information to the market than nonstrategic trades, as is evidenced by the significantly negative coefficient on the strategic trade dummy.[20] We note, though, that the absolute magnitude of the coefficient is smaller than that of the corresponding coefficient in the regression for insider purchases. This, together with our findings that CARs after insider sales are generally smaller and that the timing of the trade and the report does not affect the magnitude of the price reaction, is consistent with the view that insider sales are generally less likely to be motivated by private information than insider purchases.

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cant. Thus, the result that strategic trades trigger larger abnormal returns also holds for those reports filed on the 10th of a month.

[20] When we re-estimate the regression including a dummy that identifies trades reported on the 10th of a month and an interaction between this dummy and the "strategic" dummy, none of the coefficient estimates is significant.

V. Summary and Conclusions

In the pre-SOX era corporate insiders in the US were required to report their trades by the 10th of the month following the trade. Thus, the maximum time allowed between the trade and the report was 40 days, giving corporate insiders considerable flexibility to time their trades and reports. This flexibility may be used strategically. An insider wishing to trade a large quantity may split up an order into several smaller chunks. Splitting up a large order reduces its price impact and thus results in reduced execution costs. By delaying the reporting of the trades of a series until after the last transaction, an insider can avoid the price impact caused by the reports.

This paper asks four related questions. First, how long are the reporting delays in the pre-SOX era? Second, do insiders strategically use their flexibility in choosing the timing of their trades and reports? If so, is strategic behavior systematically related to the characteristics of the insider or the firm? Third, what are the implications of delayed reporting on market efficiency? Fourth, how does the market react to the strategic timing of trades and reports?

Our results demonstrate that substantial reporting delays existed. The mean reporting delay was 35 days. More than 13% of the trades in our sample were filed late (i.e., later than on the 10th of the month following the trade). The very large number of violations of the trade reporting requirement implies that the requirement was not enforced in the pre-SOX era. Corporate insiders apparently used their discretion to time their reports. More than two-thirds of the trades in our sample are part of a sequence of trades in which some trades were executed while earlier trades

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were not yet reported. Strategic trade reporting benefits the insider but is disadvantageous to the counterparties to the insider's trades. If each trade were reported immediately, the second and subsequent trades of a series of insider trades would be executed at prices less favorable to the insider but more favorable to the counterparties.

We find that both the occurrence of late filings and the occurrence of strategic trades are systematically related to the characteristics of the firm, the trade, and the trader. In particular, our results are consistent with the notion that insiders who are more closely monitored (and who therefore may be facing higher litigation risk) are less likely to file their trades late. The probability of observing a strategic trade is larger in firms followed by fewer analysts as well as for larger trades.

Our event study results reveal that share prices react to the reporting of insider trades. In cross-sectional regressions, we find that the magnitude of the price reaction does not decrease with the reporting delay after purchases, and decreases slowly after sales. Thus, our results support the notion that market prices are distorted in the period between the trade and the report. Consequently, the delayed reporting of insider trades is detrimental to market efficiency. Finally, event study CARs are larger after reports of strategic insider trades compared to after otherwise similar non-strategic trades for both purchases and sales. Thus, market participants apparently believe that insiders acting strategically are more likely to possess private information.

Our results support the more stringent trade reporting requirements established by SOX. They also suggest that the strict enforcement of existing regulations is beneficial. Furthermore, our results lead to the conclusion that countries that currently allow for long reporting delays (or do not require corporate insiders to report trades in the shares of their firm) should consider tightening their regulations.

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Table I: Description of variables.

Variable	Definition
Pre-ann.	A trade that occurs during the period of less than 60 days prior to the next earnings announcement.
CAR	Cumulative abnormal return calculated using the market model over a 255-day estimation window ending 46 days prior to the announcement date. The market proxy is the CRSP value-weighted index.
D_pre-ann.	Pre-announcement dummy: Dummy variable that takes on the value of one if the trade occurs during the period of less than 60 days prior to the next earnings announcement, and zero otherwise.
	For the cross-sectional regression of CARs, if several trades are reported on the same day, the dummy takes on the value of one if at least one trade occurs during the period of less than 60 days prior to the next earnings announcement, and zero otherwise.
D_CEO	Dummy variable that takes on the value of one if the trader is a CEO, and zero otherwise.
	For the cross-sectional regression of CARs, if there are several trades in the same stock on the same day, the highest insider position is selected, according to the ranking CEO, chairman, executive, and other.
D_chairman	Dummy variable that takes on the value of one if the trader is the chairman but not the CEO, and zero otherwise.
	For the cross-sectional regression of CARs, if there are several trades in the same stock on the same day, the highest insider position is selected according to the ranking CEO, chairman, executive, and other.
D_executive	Dummy variable that takes on the value of one if the trader is an executive director but not the CEO, and zero otherwise.
	For the cross-sectional regression of CARs, if there are several trades in the same stock on the same day, the highest insider position is selected according to the ranking CEO, chairman, executive, and other.
D_late	Dummy variable that takes on the value of one if it was reported later than the 10th of the month following the trade, and zero otherwise. If the 10th of the month falls on a weekend, the trade is classified as illegal if it was reported later than the following Monday.
D_other	Dummy variable that takes on the value of one if the trader is a non-executive officer, affiliate, beneficial owners, or other person required to report trades, and zero otherwise.
	For the cross-sectional regression of CARs, if there are several trades in the same stock on the same day, the highest insider position is selected according to the ranking CEO, chairman, executive, and other.
D_purchase	Dummy variable that takes on the value of one if the (net) transaction volume of the

insider trade is positive, and zero otherwise.

D_strategic	For the cross-sectional regression of CARs, the dummy variable takes on the value of one if a) the trade is followed by at least one additional trade by the same insider before it is reported or it follows a trade by the same insider that has not yet been reported, and b) the market can infer on the reporting date that the trade was strategic (see Figure 3 for an illustration). All other trades are classified as nonstrategic and the dummy variable is zero for these cases. With respect to strategic trades that are reported in an overlapping way, only serial transactions and not just the first one can be identified as strategic.
D_timing	Dummy variable that takes on the value of one if the trade is executed within 60 days prior to the next earnings announcement and is reported after the announcement (but before the following announcement), and zero otherwise.
D_timing * D_stra	Interaction term of the variables D_timing and D_strategic.
Days to next report	Number of days from the transaction to the next quarterly earnings announcement.
Delay	Lag in days between trading and reporting the transaction.
	For descriptive statistics and the cross-sectional regression of CARs, Delay is the trading-volume–weighted average delay of all insider trades of a firm reported on the same day.
Filed in time	Refers to a trade reported before the 10th of the month following the trade or by the next Monday if the 10th falls on a weekend.
Filed late	Refers to a trade reported after the 10th of the month following the trade. If the 10th of the month falls on a weekend, the trade is classified as illegal if it reported later than the following Monday.
First of series	A trade that is the first in a series of trades where at least one trade is followed by at least one additional trade by the same insider before being reported.
Leverage	Ratio of long-term debt plus debt in current liabilities divided by long-term debt plus debt in current liabilities plus stockholder equity.
Market value of equity ($ millions)	Share price multiplied by the number of shares outstanding.
Non pre-ann.	Refers to a trade that does not occur during the period of less than 60 days prior to the next earnings announcement.
Nonstrategic	Refers to a trade that is not followed by at least one additional trade by the same insider before being reported or that does not follow a trade by the same insider that has not yet been reported.
Non-timed	Refers to a trade that is either (a) not executed within the 60 days prior to the next earnings announcement, (b) reported by the next earnings announcement, or (c) reported after the earnings announcement that follows the next earnings announcement.
Numest	Total number of analysts covering a company in the month before the reporting date of the insider trade.
NumInsider	Total number of insiders who traded shares in the same company on the same day.

	For the cross-sectional regression of CARs, this refers to the total number of insiders who reported trades in shares of the same company on the same day.
RoE	Return on equity, defined as net income divided by book equity.
Serial trade	A trade that follows another one by the same insider that has not yet been reported.
Strategic	Refers to a trade that is followed by at least one additional trade by the same insider before being reported or that follows a trade by the same insider that has not yet been reported.
	For descriptive statistics of CARs, a) the trade is followed by at least one additional trade by the same insider before it is reported or it follows a trade by the same insider that has not yet been reported, and b) the market can infer on the reporting date that the trade was strategic (see Figure 3 for an illustration). All other trades are classified as nonstrategic. With respect to strategic trades that are reported in an overlapping way, only serial transactions and not just the first one can be identified as strategic.
Timed	Refers to a trade that is executed within 60 days prior to the next earnings announcement and reported after the announcement (but before the following announcement).
Tobin's Q	Ratio of the market value of assets to the book value of total assets.
TradeVolume	The number of shares exchanged in a transaction times the transaction price divided by the market equity of the company whose stocks were bought or sold in the insider trade.
	For the cross-sectional regression of CARs, if several trades were reported on the same day, we sum the total volume of those trades.

Table II: Descriptive statistics.

This table reports the summary statistics for the transaction sample. Tobin's Q is calculated as the ratio of the market value of assets to the book value of total assets. The variable RoE is net income divided by book equity. We measure leverage as the ratio of long-term debt plus debt in current liabilities to long-term debt plus debt in current liabilities plus stockholder equity. We define the variable Numest as the total number of analysts covering a company in the month before the reporting date of an insider trade. We calculate the variable TradeVolume as the number of shares exchanged in a transaction times the transaction price to the market equity of the company whose stocks were bought or sold in the insider trade. We define NumInsider as the total number of insiders who traded their shares in the same company on the same day. Days to next report denotes the number of days from a transaction to the next quarterly earnings announcement. Delay indicates the lag in days between the trading and reporting of a transaction.

Variables	Observations	Mean	St. dev.	Min	Median	Max
Market value of equity ($ millions)	314,696	4544.39	21599.05	0.83	463.779	508329.5
Tobin's Q	314,696	3.518829	6.176608	.2060	1.809387	105.0904
RoE	314,696	.0890093	.2683587	-.80291	.0970181	9.886905
Leverage	314,696	.3142774	.5807833	0	.2453287	69.17618
TradeVolume	314,696	.00121	.0059537	0	.000221	.5794915
NumInsider	314,696	2.037859	2.120972	0	1	32
Days to next report	314,696	57.00452	23.36936	0	62	91
Numest	314,696	7.568774	7.434395	1	5	51
Delay (days)	314,696	34.99665	95.14544	0	24	3,815

Table III: Distribution of delays.

This table reports summary statistics for the distribution of the reporting delays.

	All	Purchases	Sales
Observations	314,696	98,933	215,763
Mean	35.00	40.42	32.51
St. dev.	95.15	114.54	84.66
0.25 quantile	15	14	16
Median	24	24	24
0.75 quantile	33	34	33
Percentage of late filings	13.21%	17.48%	11.25%

Table IV: Determinants of late filing.

This table reports the results of a logit regression of the dichotomized variable filed late on the explanatory variables listed in the first column. A trade is classified as having been filed late when it was reported later than the 10th of the month following the trade. If the 10th of the month falls on a weekend, the trade is classified as having been filed late when it was reported later than the following Monday. D_purchase is a dummy variable that takes on the value of one if the (net) transaction volume of the respective insider trade is positive, and zero otherwise. Tobin's Q is calculated as the ratio of the market value of assets to the book value of total assets. RoE is net income divided by book equity. We measure leverage as the ratio of long-term debt plus debt in current liabilities to long-term debt plus debt in current liabilities plus stockholder equity. We define Numest as the total number of analysts covering a company in the month before the reporting date of the insider trade. We calculate TradeVolume as the number of shares exchanged in the transaction times the transaction price divided by the market equity of the company whose stocks were bought or sold in the insider trade. We define NumInsider as the total number of insiders who traded their shares in the same company on the same day. D_pre-ann. is a dummy variable that takes on the value of one if the trade occurs during the period of less than 60 days prior to the next earnings announcement. We classified all insiders into four groups (four variables): D_CEO if the trader was the CEO, D_chairman if the trader was the chairman but not the CEO, D_executive if the trader was an executive director but not the CEO, and the reference group D_other, which includes all other insiders. Standard errors are clustered at the firm level. dy/dx denotes the change in probability for a unit change in the explanatory variable evaluated at the average value of the explanatory variable. With respect to dummy variables, dy/dx is for discrete change of dummy variable from 0 to 1. Here *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Independent variables	All		Purchases		Sales	
	dy/dx	z-Statistic	dy/dx	z-Statistic	dy/dx.	z-Statistic
D_purchase	0.0310	5.44***				
Tobin's Q	0.0001	0.12	0.0013	0.94	-0.0001	-0.13
RoE	-0.0001	-0.53	-0.0004	-1.31	0.0000	-0.12
Leverage	0.0065	1.15	0.0032	0.85	0.0100	2.85***
Numest	-0.0046	-11.17***	-0.0059	-6.77***	-0.0040	-9.69***
TradeVolume	-0.1150	-0.56	0.5173	0.84	-0.1749	-0.92
NumInsider	0.0002	0.09	0.0012	0.41	-0.0007	-0.35
D_pre-ann.	0.0266	8.62***	0.0351	5.31***	0.0220	6.81***
D_CEO	-0.0487	-12.23***	-0.0737	-8.41***	-0.0373	-8.9***
D_chairman	-0.0404	-6.15***	-0.0585	-4.6***	-0.0332	-4.55***
D_executive	-0.0472	-11.6***	-0.0566	-6.18***	-0.0420	-10.27***
Predicted prob.	0.1206		0.1642		0.1038	
Year dummies	Included		Included		Included	
Industry dummies	Included		Included		Included	
Observations	314,696		98,933		215,763	
McFadden R²	3.93%		3.45%		3.18%	

Table V: Descriptive statistics of strategic trades.

This table shows the descriptive statistics for the transactions in our sample sorted by classifying trades into nonstrategic and strategic categories. A trade is classified as strategic when it is followed by at least one additional trade by the same insider before it is reported or if it follows a trade by the same insider that has not yet been reported, and nonstrategic otherwise. The strategic category is split into first of series and serial trades. A trade is classified as first of series if the trade is the first trade in a series of trades where at least one trade is followed by at least one additional trade by the same insider before it is reported. A trade is classified as a serial trade if it follows a trade by the same insider that has not yet been reported. Percentages indicate fractions with respect to all transactions, all purchases or all sales, respectively. Average volume denotes the average volume of the trade, that is, the number of shares bought or sold multiplied by the transaction price.

	All		Purchases		Sales	
Observations	314,696		140,734		215,763	
	Percentage	Average volume $	Percentage	Average volume $	Percentage	Average volume $
Nonstrategic	32.12%	1,291,563	37.97%	197,628	29.44%	1,938,516
Strategic	67.88%	1,015,069	62.03%	284,504	70.56%	1,309,553
First of series	14.98%	1,389,175	12.59%	213,350	16.08%	1,811,510
Serial trades	52.90%	909,106	49.44%	302,631	54.48%	1,161,429

Table VI: Determinants of strategic trades.

This table reports the results of a logit regression of the dichotomized variable strategic on the explanatory variables listed in the first column. A trade is classified as strategic when it is followed by at least one additional trade by the same insider before it is reported or if it follows a trade by the same insider that has not yet been reported, and non-strategic otherwise. D_purchase is a dummy variable that takes on the value of one if the transaction is a purchase, and zero if the transaction is a sale. Tobin's Q is calculated as the ratio of the market value of assets to the book value of total assets. RoE is net income divided by book equity. We measure leverage as the ratio of long-term debt plus debt in current liabilities to long-term debt plus debt in current liabilities plus stockholder equity. We define Numest as the total number of analysts covering a company in the month before the reporting date of the insider trade. TradeVolume is the number of shares exchanged in the transaction times the transaction price divided by the market equity of the company whose stocks were bought or sold in the insider trade. We define NumInsider as the total number of insiders who traded their shares in the same company on the same day. D_pre-ann. is a dummy variable that takes on the value of one if the trade occurs within 60 days prior to the next quarterly earnings announcement. D_late is a dummy that takes on the value of one if the trade is reported later than the 10th of the month following the trade. If the 10th of the month falls on a weekend, the trade is classified as illegal if it was reported later than the following Monday. We classified all insiders into four groups (four variables): D_CEO if the trader was the CEO, D_chairman if the trader was the chairman but not the CEO, D_executive if the trader was an executive director but not the CEO, and the reference group D_other, which includes all other insider groups. Standard errors are clustered at the firm level. dy/dx denotes the change in probability for a unit change in the explanatory variable evaluated at the average value of the explanatory variable. With respect to dummy variables, dy/dx is for a discrete change of dummy variable from 0 to 1. Here *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Independent variables	All		Purchases		Sales	
	dy/dx	z-Statistic	dy/dx	z-Statistic	dy/dx	z-Statistic
D_purchase	-0.1381	-17.68***				
Tobin's Q	0.0066	7.37***	-0.0018	-0.7	0.0066	7.39***
RoE	-0.0009	-2.68***	-0.0013	-1.69*	-0.0007	-2.86***
Leverage	0.0023	0.8	0.0258	1.11	-0.0063	-1.73*
Numest	-0.0075	-14.5***	-0.0128	-12.06***	-0.0064	-11.95***
TradeVolume	-4.5124	-8.91***	-1.3043	-1.33	-4.5983	-8.92***
NumInsider	0.0030	1.05	0.0027	0.53	0.0017	0.58
D_pre-ann.	0.0081	2.21**	0.0256	3.92***	-0.0009	-0.21
D_late	0.1064	18.7***	0.1401	13.9***	0.0843	15.3***
D_CEO	0.0184	2.19**	-0.0193	-1.34	0.0393	4.18***
D_chairman	0.0778	5.81***	0.0415	1.67*	0.0886	5.8***
D_executive	-0.1852	-27.76***	-0.2460	-22.53***	-0.1561	-19.94***
PredictedProb.	0.6980		0.6316		0.7269	
Year dummies	Included		Included		Included	
Industry dummies	Included		Included		Included	
Observations	314,696		98,933		215,763	
McFadden R²	8.05%		8.45%		7.96%	

Table VII: Event study results.

This table shows the CARs over various event windows and various subsamples. Here *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels. The significance levels for the CARs are based on the standardized cross-sectional test of Boehmer et al. (1991), and those for the differences are based on a t-test for equality of means.
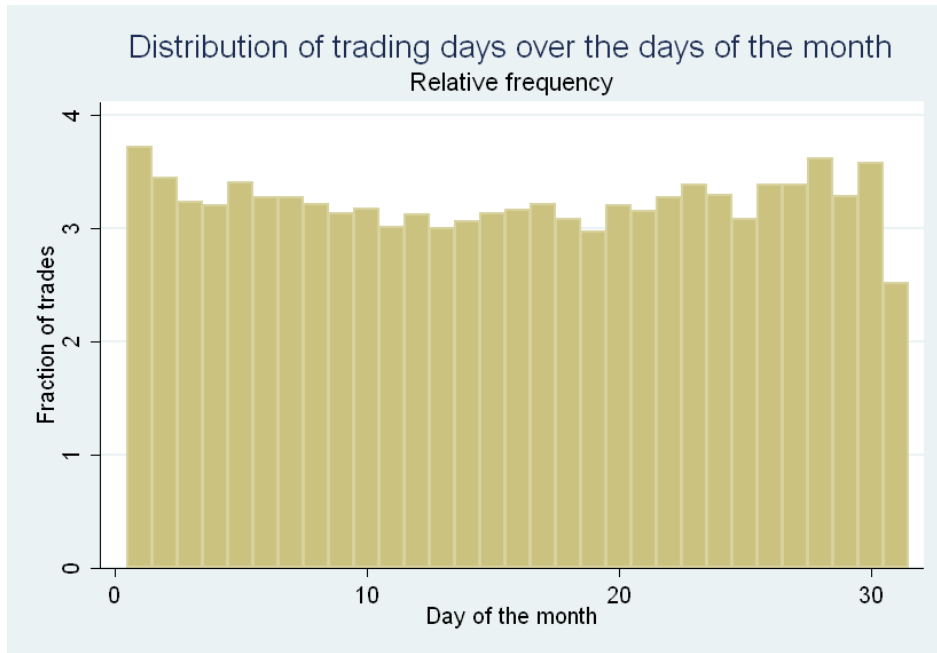
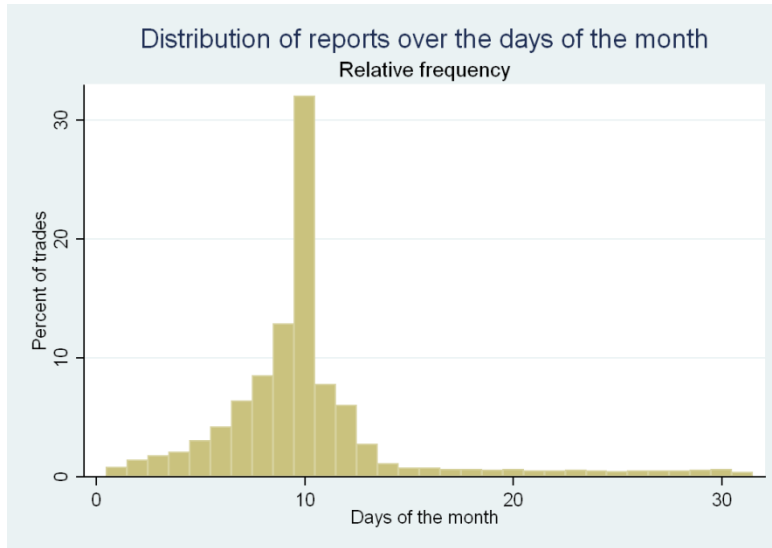|	Purchases					Sales				
	#	(0; 1)	(0; 2)	(0; 10)	(0; 20)	#	(0; 1)	(0; 2)	(0; 10)	(0; 20)
All	34,648	0.29***	0.59***	1.99***	2.97***	65,319	-0.21***	-0.29***	-0.87***	-2.05***
Strategic	13,782	0.36***	0.76***	2.54***	3.75***	34,735	-0.25***	-0.38***	-1.05***	-2.55***
Nonstrategic	20,866	0.25***	0.49***	1.64***	2.45***	30,584	-0.17***	-0.21***	-0.66***	-1.49***
Difference		0.11**	0.27***	0.90***	1.30***		-0.07*	-0.17***	-0.39***	-1.06***
Pre-ann.	20,643	0.34***	0.64***	2.16***	3.18***	37,849	-0.19***	-0.24***	-0.91***	-1.99***
Non pre-ann.	14,005	0.22***	0.52***	1.76***	2.66***	27,470	-0.23***	-0.35***	-0.81***	-2.14***
Difference		0.12**	0.12**	0.40***	0.52***		0.04	0.11**	-0.10	0.14
Timed	6,472	0.26***	0.40***	1.28***	1.87***	8,793	0.05	0.03	-0.50***	-1.21***
Non-timed	28,176	0.30***	0.64***	2.16***	3.22***	56,526	-0.24***	-0.33***	-0.92***	-2.19***
Difference		-0.05	-0.23***	-0.88***	-1.34***		0.30***	0.36***	0.43***	0.98***
Filed late	8,105	0.31***	0.52***	1.65***	2.69***	14,897	-0.22***	-0.30***	-0.79***	-2.04***
Filed in time	25,430	0.27***	0.58***	2.06***	3.02***	47,816	-0.21***	-0.29***	-0.88***	-2.06***
Difference		0.04	-0.06	-0.41***	-0.32*		0.00	-0.01	0.09	0.02
Delay 0–5	1,160	0.92***	1.32***	3.81***	4.52***	780	0.38***	0.35***	-0.01	-1.07***
Delay 6–10	3,602	0.31***	0.83***	2.31***	3.35***	4,216	-0.26***	-0.36***	-0.65***	-1.71***
Delay 11–5	5,402	0.21***	0.51***	2.07***	2.93***	9,068	-0.13***	-0.19***	-0.86***	-2.01***
Delay 16–20	4,833	0.40***	0.69***	2.02***	3.35***	9,760	-0.11***	-0.20***	-0.91***	-2.11***
Delay 21–25	5,082	0.39***	0.72***	2.23***	3.36***	11,356	-0.22***	-0.30***	-0.81***	-2.04***
Delay 26–30	4,781	0.28***	0.54***	1.57***	2.47***	11,135	-0.31***	-0.46***	-1.05***	-2.32***
Delay 31–35	3,943	0.08	0.38***	1.95***	3.12***	8,448	-0.24***	-0.36***	-0.99***	-2.29***
Delay 36–40	3,788	-0.03	0.22***	1.67***	2.52***	4,570	-0.32***	-0.44***	-0.80***	-2.45***
Delay 41–45	669	0.33***	0.75***	1.15***	1.99***	1,068	-0.23***	-0.15***	-0.69***	-1.52***
Delay > 45	3,202	0.38***	0.55***	1.49***	2.40***	4,918	-0.15***	-0.16***	-0.71***	-1.61***

Table VIII: Determinants of CARs (0; 20).

This table reports the results of a regression with firm-fixed effects of the reporting day CARs (0, 20) on the explanatory variables listed in the first column. If several transactions in the same stock were reported on the same day, the transactions count as a single observation. A report is classified as a purchase if the net transaction volume reported is positive. Tobin's Q is calculated as the ratio of the market value of assets to the book value of total assets. RoE is net income divided by book equity. Leverage is the ratio of long-term debt plus debt in current liabilities to long-term debt plus debt in current liabilities plus stockholder equity. We define Numest as the total number of analysts covering the company in the month before the reporting date of the insider trade. We calculate TradeVolume as the number of shares exchanged in the transaction times the transaction price divided by the market equity of the company whose stocks were bought or sold in the insider trade. If several trades were reported on the same day, we sum the total volume of those trades. We define NumInsider as the total number of insiders who reported their trades in the same company on the same day. D_pre-ann. is a dummy variable that takes on the value of one if the trade (or at least one trade, if several trades are reported on the same day) occurs during a period of less than 60 days prior to the next earnings announcement; D_timing is a dummy variable that takes on the value of one if the trade is executed within 60 days prior to the next earnings announcement and is reported after the announcement (but before the following announcement); and D_strategic is set to one when a) the trade is followed by at least one additional trade by the same insider before it is reported or if it follows a trade by the same insider that has not yet been reported and when b) the market can infer on the reporting date that the trade was strategic (see Figure 3 for an illustration). All other trades are classified as nonstrategic. With respect to strategic trades reported in an overlapping way, only serial transactions and not the first one can be identified as strategic. D_timing * D_stra. is an interaction term of the variables D_timing and D_strategic. Delay is the trading-volume–weighted average delay of all insider trades of a firm reported on the same day. We classified all insiders into four groups (four variables): D_CEO if the trader is the CEO, D_chairman if the trader is the chairman but not the CEO, D_executive if the trader is an executive director but not the CEO, and the reference group D_other, which includes all other insider groups. If there were several trades in the same stock on the same day, the highest insider position is selected according to the ranking CEO, chairman, executive, and other. Standard errors are clustered at the reporting day level. Here *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

	Purchases		Sales	
Independent variables	Coef.	t-Statistic	Coef.	t-Statistic
Tobin's Q	-1.2663	-6.79***	-0.6351	-7.05***
RoE	0.0201	0.45	-0.0157	-0.56
Leverage	0.4168	1.62	-0.0305	-0.17
Numest	-0.3112	-4.2***	-0.2987	-5.49***
TradeVolume	-7.6341	-0.63	-11.0827	-1.47
NumInsider	0.3561	3.59***	-0.3868	-4.18***
D_pre-ann.	0.9130	3.62***	0.2334	1.04
D_timing	-0.9636	-2.39**	0.5219	1.42
D_strategic	0.9047	3.05***	-0.6151	-3.35***
D_timing * D_stra.	-0.1863	-0.38	0.0387	0.09
Delay	-0.0019	-1.55	0.0031	2.09**
D_CEO	2.3162	6.77***	-0.8353	-2.4**
D_chairman	1.9570	2.96***	-0.6719	-1.73*
D_executive	1.0402	3.72***	-0.6146	-2.84***
Constant	2.5661	0.96	-1.5233	-0.55
Year dummies	Included		Included	
Industry dummies	Included		Included	
Observations	34,648		65,319	
Adjusted R²	11.12%		7.99%	

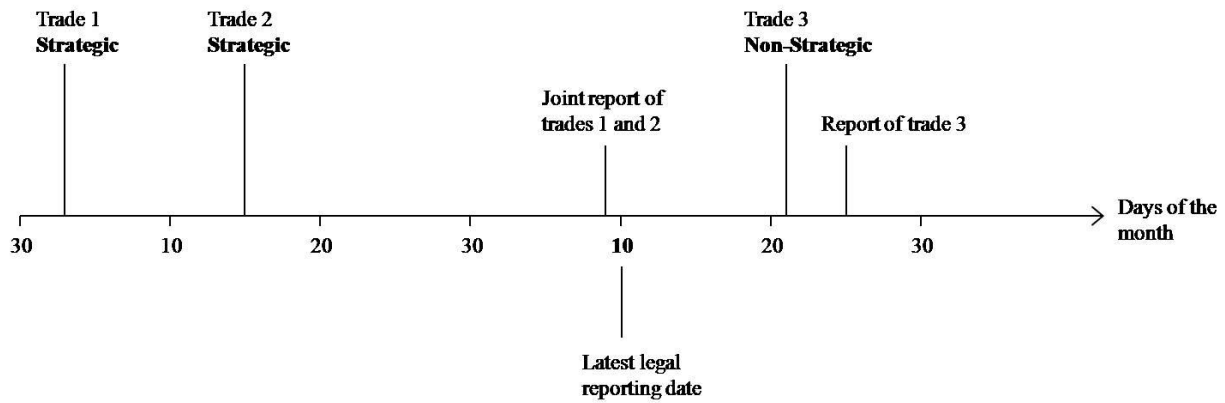**Figure 1: Distribution of trading dates over the month.**

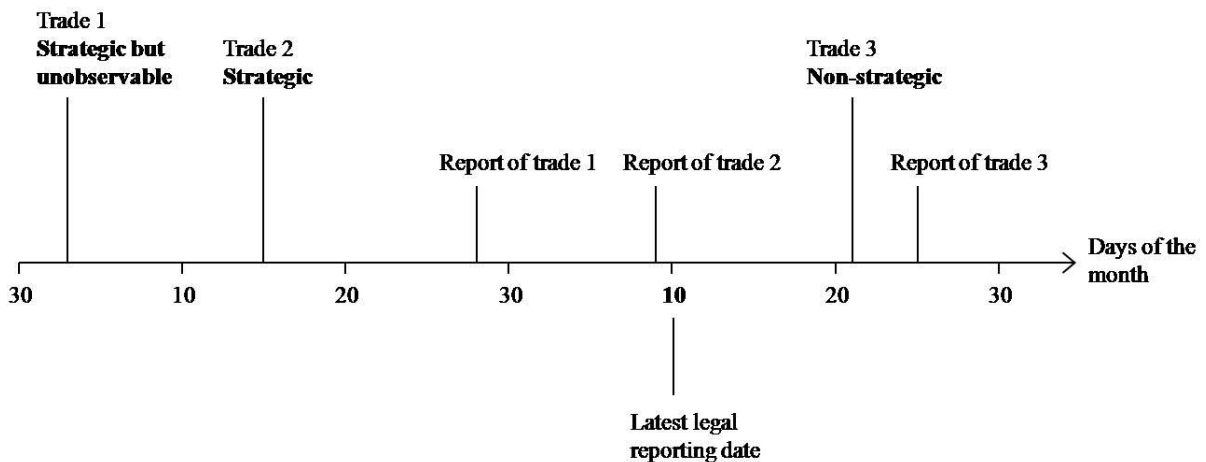**Figure 2: Distribution of reporting dates over the month.**

Figure 3: Definition of strategic trading

The figure illustrates our definition of strategic trade reporting. Panel A illustrates the more common case where two trades (labeled trade 1 and 2) are executed and then reported jointly. Trade 3 is non-strategic because a) there is no unreported trade by the same insider on the trading day and b) trade 3 is reported before the insider makes another trade. Panel B illustrates the case of overlapping reports. Trades 1 and 2 are strategic because trade 1 has not yet been reported on the day on which trade 2 is executed. However, the trades are not reported jointly. Therefore, on the reporting day of trade 1 market participants cannot infer that trade 1 is strategic.

Panel A: joint report

Panel B: overlapping reports

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