# Strategic Trading by Corporate Insiders[*]

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**Abstract:** In the pre-Sarbanes-Oxley era corporate insiders were required to report trades in shares of their firm until the 10th of the month following the trade. This gave them a lot of leeway to trade strategically, e.g. by executing a string of trades and reporting them jointly after the last trade is consummated. In this paper we a) analyze whether there are incidences of strategic informed trading as described above, b) analyze the determinants of strategic insider trading (i.e., which insiders trades strategically?) and c) analyze the market's response to strategic trading and its determinants. Our proxy for strategic insider trading is a binary variable that classifies a trade as strategic when it is followed by at least one additional trade by the same insider before it is reported.

We find clear evidence of strategic trading. 15.32% of the insider trades in our sample are classified as strategic. We further find that the probability of strategic trading depends on firm and trade characteristics and on the role of the insider in the firm. Finally, we find that event study cumulated abnormal returns are larger after the report of strategic insider trades as compared to other insider trades.

Keywords:         Insider trading, directors' dealings, corporate governance

JEL classification:     G14, G30, G32

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# 1    Introduction

Corporate insiders arguably know more about the prospects of their firm 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 regulation that requires corporate insiders to report their trades. 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).

Reporting requirements are intended to limit the insiders' ability to exploit their informational advantage. In the pre-Sarbanes-Oxley era the report was due on the 10th of the month following the trade. The maximum delay was thus between 10 and 42 days, depending on the trading date. Corporate insiders can exploit this feature by timing their trades strategically. An insider who wants to trade a large number of shares may decide to split the trade up and execute the first trade in the beginning of a month. The insider then may take up to 40 days to execute all trades without having to report any trade. Such a trading strategy may maximize profits when the insider possesses long-lived private information.

The objective of the present paper is a) to analyze whether there are incidences of strategic informed trading as described above, b) to analyze the determinants of strategic insider trading (i.e., which insiders trades strategically?) and c) to analyze the market's response to strategic trading and its determinants. Our proxy for strategic insider trading is a binary variable that classifies a trade as strategic when it is followed by at least one additional trade by the same insider before it is reported.

Our results can be summarized as follows. First, there is clear evidence of strategic trading. More than 15% of the insider trades in our sample are classified as strategic. We further find that there are more strategic trades in the first ten days of a month. This observation is consistent with insiders delaying a trade until the beginning of a month in order to have more time until the report is due. Second, we find that insiders in firms followed by more analysts and in less profitable firms are less likely to trade strategically. Larger trades are less likely to be strategic. The probability of observing a strategic trade increases with the number of days left until the publication date of the next quarterly or annual report. Third, we find that event study cumulated abnormal returns are larger after the report of strategic insider trades as compared to other insider trades.

Our paper adds to the literature on trading by corporate insiders. It is most closely related to two recent papers by Cheng et al. (2007) and Betzer and Theissen (2007). 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). They find that insider sales by top executives in 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. conclude (p. 1861) that "managers in large firms may have used late-disclosure Form 5 sales for information-based trading...".

Betzer and Theissen (2007) use data from Germany to show that substantial reporting delays are common, that the delays are systematically related to certain characteristics of the firm and that abnormal returns after the reporting date of an insider trade are independent of the reporting delay. The latter finding implies that prices are distorted in the period between the trading and the reporting date.

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Our paper differs from Cheng et al. (2007) in that we do not analyze the relatively small sample of non-open market trades that were eligible for late reporting but the full sample of all insider trades that had to be filed on SEC Form 4.[1] It differs from Betzer and Theissen (2007) in that a) our sample is much larger than theirs (1,977 observations as compared to 366,764), b) the regulatory regime is different and c) we explicitly take into account whether an insider trade was followed by another trade before it was reported.

The remainder of the paper is organized as follows. In section 2 we describe our data set and present descriptive statistics. In section 3 we test whether there are incidences of strategic trading and trade reporting. We also analyze whether trades classified as "strategic" are systematically different from non-strategic trades. Section 4 uses event study methodology to compare the market response to strategic and non-strategic trades. Section 6 concludes.

## 2    Legal Background and Data

Our data selection process follows Lakonishok and Lee (2001) and Marin and Oliver (2007). We merge data from four different sources, the TFN Insider Filing Data Files, the 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 in on the NYSE, AMEX or Nasdaq during the 1992 – 2001 period. It covers the last 10 calendar years before the implementation of the Sarbanes Oxley Act (SOX). The SOX enacted a regime change as it required insiders to report their trades within two working days after their trade.

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)

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

of non-derivative securities whose records have not been amended (amendment indicator "blank") between the 1st of January 1992 and the 31st of December 2001. Out of these transactions, we only retained those filings whose data is verified by Thomson with a high level of confidence (cleanse indicator R and H). The TFN Insider Filing Data Files contain information about the following:

- 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 role or positions within the company. We decided to classify all insiders into eight groups (eight variables):

  - Role 1: Only CEO

  - Role 2: CEO and Chairman (CB)

  - Role 3: Only Chairman (CB)

  - Role 4: Other executive directors (All officers but not CEO and codes H and OD)

  - Role 5: Other non-executive officers ( codes D, DO and VC and not officer)

  - Role 6: Affiliates

  - Role 7: Beneficial Owners

  - Role 8: Other

We exclude all filings which have no entry in the fields "transaction price", "number of shares", "reporting date to SEC", "position of insider" and "sector". This procedure leaves us with 741,653 records. We also exclude insider transactions whenever the reported transactions price is 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 exceeds 20% of the total shares outstanding.

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 financial statement of the respective firm at the end of the fiscal year preceding the reporting of the insider trade. We measure book leverage (variable *bookleverage*) as the ratio of long term debt (data item 9) plus debt in current liabilities (item 34) divided by long term debt plus debt in current liabilities plus stockholders' 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 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 obtain book equity by adding stockholder's equity and balance sheet deferred taxes and investment tax credit (item 35) where available minus preferred stock liquidating value (item 10) and minus post retirement assets (item 336) where available. If stockholder's equity is not available as data item 216 we calculate stockholder's equity alternatively as common equity (item 60) plus preferred stock par value (item 130) or total assets minus total liabilities (item 181). If preferred stock liquidating value is not available as data item 10 we calculate preferred stock liquidating value alternatively as redemption value (item 56) or par value (item 130). Return on Equity (variable *ROE*) is net income (item 172) divided by book equity.

Furthermore, we obtain data on analysts' forecasts and the announcement dates of quarterly or annual earnings reports from the I/B/E/S database and COMPUSTAT database. We define our variable *numest* as the total number of analysts covering the respective company in the last available yearly earnings-forecast before the transaction date of the respective insider trade. The variable *daystonextreport* is defined as the total number of calendar days that lie between the transaction date of the respective insider trade and the announcement day of the

following quarterly or annual report of the company whose stocks were bought or sold in the insider trade.

For an observation to be included in our analysis we require all necessary data items in CRSP, COMPUSTAT and I/B/E/S to be available. This reduces the sample to 654,377 observations.

In our empirical analysis we use additional variables that are defined as follows: *d_tcode_p* (*d_tcode_s*) are two dummy variables that takes on the value one if the net transaction volume (to be defined below) of the respective insider trade is positive (negative). The *days_delay* variable is just the difference in days between the reporting date and the transaction date. We calculate the variable *transvolmarketcap* as the ratio of 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 *insidertradesameday* as the total number of insiders that traded their shares in the same company on the same day.

In our analysis we use two different data sets, a "delay sample" and an "event study sample". For the delay 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 the aggregated transaction as one trade with the net amount traded. The (net) transaction volume is positive (negative) if the sum of all individual trades by this particular insider on the trading day is positive (negative). After these calculations, we classify the aggregated transactions as purchase or sale. Our final "delay sample" contains 141,026 purchases and 253,046 sales (394,072 observations in total).

The announcement date in our event study analysis is the day on which an insider trade was 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 by different insiders. Again, the aggregated transactions are treated as one trade.

The (net) transaction volume is the sum of the individual trading volumes. If the (net) transaction volume is positive (negative), we classified the aggregated transaction as purchase (sale). The final dataset for the event study consists of 127,197 observations (52,432 purchases and 74,765 sales).

Table 1 presents descriptive statistics for the firms in our sample. The average firm size, as measured by the market value of equity, is 4,050.27 Mio. $. The firm size distribution is heavily skewed as can be seen from the discrepancy between the mean and the median. We therefore use the log of firm size in our empirical analysis. The average Tobin's Q of the sample firms is 3.24, the average return on equity amounts to 4.25% and the mean book leverage to 28.7%.

The mean trade size, expressed as a percentage of the market value of equity, is 0.126%. In 61.96 percent of the cases only one insider trades on a given day. However, there are cases in which many insiders (up to 25) trade on the same day. The mean value of the variable *insidertradesameday* therefore is 1.998. The average insider trade is executed 62.4 calendar days before the firm reports the next annual or quarterly earnings report

If insider trades were equally distributed over the days of the month and if each trade was 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. The actual figure is much larger, amounting to 36.9 days. There are two not mutually explanations for this large average delay. First, trades may be reported too late. Second, insiders may time their trades strategically by delaying a trade until the beginning of the month. This increases the time allowed for the filing of the report and thus enables the insider to execute several trades and report them jointly after the last trade has been consummated.

## 3    Incidences of Strategic Trading and Strategic Trade Reporting

Table 2 takes a closer look at the reporting delays. Panel A reveals that purchases are reported with longer delays than sales. This may be indicative of strategic delaying because previous papers (e.g. Seyhun 1986 for the US and Fidrmuc et al. 2006 for the UK) have documented that insider purchases are more informative as evidenced by larger abnormal returns.

Panel B provides evidence that a substantial fraction of the trades are reported too late. The panel provides separate figures for "legal" and "illegal" trades where a legal trade is defined as a trade that was filed with the SEC until the 10th day of the month after the trade. Only 81.8% of the trades in our sample are classified as legal. Late reporting is more common for purchases than for sales (22.36% late reportings as compared to 15.95%).

An insider wanting to buy or sell a large number of shares may split his transaction up and spread the individual trades over several days. The insider obviously has an incentive to delay the report until all trades have been executed. Panel C of Table 2 looks at incidences of this type of strategic trading. It sorts insider trades into two groups, "strategic" and "non-strategic" trades. A trade is classified as strategic if it is the first trade in a series of trades executed on different days but reported jointly. This definition of strategic trading has two advantages. First, it is intuitively appealing, and second, strategic trades defined in this way are observable by the market. This is true because a strategic trade by definition is reported on the same day as other trades that were executed on different days.

A trade is classified as non-strategic if it is reported individually and if there is no other trade by the same insider between the trading and the filing date. Note that the total number of observations in Panel C is reduced because the second and subsequent trades in a series of trades reported jointly are excluded.

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15.32% of all trades in our sample are classified as strategic trades, 32.12% are classified as non-strategic. Interestingly, the percentage of strategic purchases is lower than the percentage of strategic sales (13.07% of purchases as compared to 16.54% of the sales). This is surprising since, first, purchases are known to have larger price impacts (which should increase the incentive to strategically delay reporting) and, second, the average reporting delays are larger for purchases.

The large fraction of trades reported too late (almost 18% as documented in Panel B of Table 2) is surprising. To shed light on the issue we estimate a logit model where the dependent variable is 0 if a trade was reported in time (i.e., until the 10th of the month following the trade) and 1 if the trade was reported late. The independent variables include measures of firm characteristics (Tobin's Q., the return on equity, book leverage and the number of analysts following[2]), trade characteristics (the trade volume relative to the market capitalization of the firm, the number of different insiders trading on the same day, the number of days until the publication of the next quarterly or annual report and a dummy variable that identifies purchases) and a set of dummy variables characterizing the role of the insider in the firm. 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.

The results are reported in Table 3. The explanatory power of the models is modest, as is evidenced by a Mc Fadden-$R^2$ of only 3.17% for the pooled model and 2.64% and 2.68% for the models including purchases and sales only. Still (and unsurprisingly given the large number of observations), likelihood ratio tests strongly reject the null hypothesis that the explanatory

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[2] We do not include firm size to avoid multicollinearity (the correlation between firm sie and the number of analysts following is 0.79). Replacing the number of analysts following by firm size yields very similar results.

variables are jointly insignificant. The individual parameter estimates reveal that insider trades in more highly leveraged firms, in firms followed by fewer analysts and in less profitable firms have a higher probability of being reported late. The same is true for insider purchases (but not sales) in more highly valued firms (where valuation is measured by Tobin's Q).

The relative transaction volume has no impact on the probability of late reporting. Trades in closer proximity to the next annual or quarterly report are more likely to be filed late. Finally, a trade is less likely to be reported late if other insiders in the same firm traded on the same day. The "role dummies" that identify the role of the insider in the firm are all significantly negative. This indicates that the probability of late reporting is largest for the base group (role 8, others, as defined in section 2).

The evidence reported in Table 2 suggests that there are incidences of strategic insider trading. We therefore now turn to a closer analysis of the occurrence and determinants of strategic trading. If insiders wishing to execute a string of trades indeed delay the first trade until the beginning of a month in order to have more time until the report is due, we would expect that there are more strategic trades at the beginning of the month and fewer trades at the end of a month. Figure 1 visualizes the evidence. We have grouped the strategic insider trades into three groups, those executed between the 1st and the 10th day of a month, between the 11th and the 20th and between the 21st and the 31st. For the complete sample of all strategic trades and for the sub-samples of purchases and sales we indeed find that the number of trades is highest in the first ten days of the month.[3]

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[3]  There is an important caveat. We define a trade as strategic if it is the first trade in a series of trades by the same insider that are reported jointly. Now assume that a) each trade is reported at a random date within the period specified by the law (i.e., until the tenth of the month after the trade) and b) insider trades themselves occur at random date and independent of whether a previous trade has already been reported or not. There is thus no strategic trading. Nevertheless, our classification scheme would classify some trade as strategic, and

We next analyze whether there is a relation between the occurrence of strategic trades and the characteristics of the firm or those of the trade itself. To this end we estimate logit models where the dependent variable indicates whether a trade is classified as strategic or as non-strategic. A strategic trade is the first trade in a string of trades by the same insider that were reported jointly. A non-strategic trade is a trade that is reported individually. Trades that belong to a string of trades reported jointly but are not the first trade of that series are excluded from the analysis. Therefore the number of observations is reduced to 173,993.

The independent variables are the same as above, and we again estimate a pooled model as well as separate models for purchases and sales. The results are reported in Table 4. The Mc Fadden-$R^2$ is 4.66% for the pooled model and 5.12% and 3.92% for the models including only purchases and sales, respectively. A likelihood ratio test strongly rejects the null hypothesis of no explanatory power of the right-hand side variables.

Insiders in firms followed by more analysts and in less profitable firms (where profitability is measured by the RoE) are less likely to trade strategically. Similarly, insiders in more highly leveraged firms and in firms with a lower market valuation are less likely to sell strategically. Turning to the characteristics of the trade we find that larger trades are less likely to be strategic. The probability of observing a strategic trade increases with the number of days left until the publication date of the next quarterly or annual report.

Insider purchases executed on the same day as trades by other insiders in the same firm are less likely to be classified as strategic. The position of the insider in the firm also affects the probability of strategic trading. Trades by the chairman of the board, by the chairman/CEO and by beneficial owners of the firm are significantly more likely to be strategic than trades

the probability of observing such a trade early in the month is higher. There is no obvious way of controlling for this in Figure 1.

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by members of the base group (others). On the other hand, trades by other executive and non-executive directors are significantly less likely to be classified as strategic.

The results thus far lend support to the hypothesis that insiders strategically time their trades and make strategic use of the pre-SOX reporting rules. In the next section we turn to the question of whether the market reaction to the reporting of insider trades takes that into account.

## 4    The Market Response to Strategic Trades

The occurrence of strategic trades is observable to other market participants. As noted previously, this is true because by definition strategic trades are reported on the same day as other trades that were consummated at different dates. We therefore expect that the price reaction on the reporting date is stronger for strategic trades.

We test this hypothesis using event study methodology. The event date is defined to be the day on which an insider trade was filed with the SEC. The analysis is based on the "event study sample" introduced in section 2. This sample is obtained by aggregating all insider trades in shares of the same firm that were reported on the same day. An event involves a strategic trade whenever the trades reported on one day contain more than one trade by the *same* insider, and when these trades were executed on different days.

We estimate the market model over a 255 days estimation window ending 46 days[4] prior to the announcement date and using the CRSP value-weighted index as our market proxy. t-statistics are based on th standardized cross-sectional test proposed by Boehmer et al. (1991).

The event study results are reported in Table 5. Consistent with previous research we find that CARs over a short event window are small. The cumulative abnormal return over the two-day

window (-1, 1) amounts to 0.29% for purchases and -0.46% for sales. The CARs increase significantly when the lengths of the event window is increased. The cumulated abnormal returns over the event window (0, 10) are 2.14% for purchases and -1.33% for sales. The corresponding values for the 30-day event window (0, 30) are 3.82% and -4.16%, respectively. Interestingly, and in contrast to previous findings, in our sample CARs for purchases are not larger than those for insider sales.

When we consider strategic and non-strategic trades separately we find that the market response to strategic trades is stronger, irrespective of whether we consider purchases or sales, and irrespective of the event window considered. This result has to be interpreted with care, however. Since a strategic trade is, by definition, reported on the same day as at least one other trade, the total reported volume may be larger. It may be the larger volume rather than the occurrence of a strategic trade that causes the larger CARs. Therefore we will later report the results of cross-sectional regressions that control for the total reported volume and other interfering variables.

An important question is whether the market learns the information conveyed by an insider trade only from the report or whether the information will eventually be impounded into prices even without a report. In the first case we would expect the CARs to be independent from the reporting delay whereas CARs would be decreasing in the reporting delays in the second case. The last 10 lines of table 5 report the CARs for subsamples sorted by the reporting delay. We find that the CARs for insider purchases decrease almost monotonically in the reporting delays. Thus the market learns the information on which insider purchases are based even when the trade is not reported. For insider sales, on the other hand, we obtain the sur-

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

prising result that the CARs tend to *increase* with the reporting delay. One potential explanation is that we do not control for the characteristics of the firm and the trade. We will return to the issue later and present results of cross-sectional regressions in which we include control variables.

In Table 4 we have documented that strategic trades are systematically different from non-strategic trades. The larger CARs of strategic trades may be due to these different characteristics rather than to the classification of the trade as strategic. We therefore estimate cross-sectional regressions where the CAR is the dependent variable. We report results for the CARs measured over the event window (0, 30), but using a (0, 10) window instead yields similar results.

The independent variables include measures of firm characteristics (Tobin's Q., the return on equity, book leverage and the number of analysts following[5]), trade characteristics (the trade volume relative to the market capitalization of the firm, the number of different insiders trading on the same day, the number of days until the publication of the next quarterly or annual earnings report) and a dummy variable indicating whether the insider whose trade is reported is an executive director.[6] We further include the weighted average reporting delay on order to account for the relation between the reporting day CARs and the delays reported above.[7] Fi-

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[5] We do not include firm size to avoid multicollinearity (the correlation between firm sie and the number of analysts following is 0.79). Replacing the number of analysts following by firm size yields very similar results.

[6] If several insiders report their trades on the same day, we set the dummy to 1 if at least one of them is an executive director.

[7] In a large number of cases (including all reports of strategic trades) several trades are reported on the same date. In these cases we calculate a volume-weighted average of the individual trading delays. One potential problem 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 four different versions of the model. Model 1 is a linear specification that simply ignores the outliers. Models 2 is truncated. We exclude observations with a delay in excess of 100 days. In model 3 we include all observations but replace the delay by the natural log of the delay plus 1 (where adding 1 is necessary because there are many zero day delays). This specification puts less weight on extreme delays. In model 4 we replace the delay variable by a dummy that is set to 1 if the delay is in excess of 40 days and is zero otherwise. Since all specifications yield very similar results we only report results for model 1 in Table 6.

nally, we include a dummy variable that indicates whether at least one of the reported trades is strategic. A report includes a strategic trade whenever one insider jointly reports several trades that were executed on different days.

The results are shown in Table 6. The overall explanatory power is rather low as is evidenced by $R^2$s of 0.7% and 1.3% for purchases and sales, respectively. When interpreting the signs of the coefficients it should be kept in mind that the CARs for sales are predominantly negative. Thus, a positive coefficient implies that an increase in the independent variable tends to decrease the magnitude of the CARs and thus the information content of the report. Of the firm characteristics only the number of analysts following and Tobin's Q have a significant impact on the CARs. The CARs are generally smaller in firms with more analysts following. A larger value of Tobin's Q decreases the CARs for purchases but increases the magnitude of the CARs for sales. We observe the same pattern for the size of the trades and for the number of days until the next earning report. Larger purchases and purchases in greater distance to the next report are associated with smaller CARs whereas larger sales and sales in greater distance to the next report are associated with CARs that are larger in absolute value.

The CARs are generally larger when more than one different insider trades on the same day. Similarly, they are larger when an executive director is among the traders. Consistent with the results from Table 5, we find that purchases reported with longer delays are associated with smaller CARs. No such relation is found for sales. Thus, the positive relation documented in Table 5 may be due to the fact that we did not control for firm and trade characteristics.

Most importantly, the coefficient on the dummy variable identifying strategic trades is positive for purchases and negative for sales, indicating that strategic trades trigger more pronounced price changes.

# 5     Summary and Conclusion

In the pre-Sarbanes-Oxley era corporate insiders were required to report trades in shares of their firm until the 10th of the month following the trade. This gave them a lot of leeway to trade strategically, e.g. by executing a string of trades and reporting them jointly after the last trade is consummated. In this paper we a) analyze whether there are incidences of strategic informed trading as described above, b) analyze the determinants of strategic insider trading (i.e., which insiders trades strategically?) and c) analyze the market's response to strategic trading and its determinants. Our proxy for strategic insider trading is a binary variable that classifies a trade as strategic when it is followed by at least one additional trade by the same insider before it is reported.

Our results can be summarized as follows. First, there is clear evidence of strategic trading. 15.3% of the insider trades in our sample are classified as strategic. We further find that there are more strategic trades in the first ten days of a month. This observation is consistent with insiders delaying a trade until the beginning of a month in order to have more time until the report is due. Second, we find that insiders in firms followed by more analysts and in less profitable firms are less likely to trade strategically. Larger trades are less likely to be strategic. The probability of observing a strategic trade increases with the number of days left until the publication date of the next quarterly or annual report. Third, we find that event study cumulated abnormal returns are larger after the report of strategic insider trades as compared to other insider trades. Taken together, these results provide a strong rationale for the more stringent reporting requirements enacted in the Sarbanes-Oxley act.

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**Table 1: Descriptive Statistics**

| Variables | Observations | Mean | St. Dev. | Min | Median | Max |
|---|---|---|---|---|---|---|
| SIZE (MVof Equity in Mio.) | 366764 | 4050.27 | 20322.51 | 0.95 | 369.50 | 508329 |
| Q | 366764 | 3.240032 | 5.711029 | 0.206048 | 1.66706 | 137.183 |
| ROE | 366764 | 0.042541 | 0.230603 | -0.997994 | 0.09297 | 0.99568 |
| BOOKLEVERAGE | 366764 | 0.287189 | 0.266484 | 0 | 0.24360 | 0.99426 |
| TRANSVOLMARKETCAP | 366764 | 0.001257 | 0.005851 | 0 | 0.00023 | 0.57949 |
| INSIDERTRADESAMEDAY | 366764 | 1.997516 | 2.037646 | 0 | 1 | 25 |
| DAYSTONEXTREPORT | 366764 | 62.43644 | 32.06016 | 0 | 64 | 365 |
| #ANALYSTS (NUMEST) | 366764 | 6.744687 | 7.404856 | 0 | 4 | 51 |
| DAYS_DELAY | 366764 | 36.90796 | 110.3863 | 0 | 24 | 3815 |

## Table 2: Distribution of Delays

The table reports some parameters for the distribution of the delays. A trade is classified as illegal when it was reported later than the 10th of the month following the trade. If the 10th of month falls on a weekend, the trade is classified as illegal when it was reported later than the following Monday. All other trades are legal. A trade is classified as strategic when it is followed by at least one additional trade by the same insider before it is reported. A trade is classified as non-strategic when it is not strategic and when it is not involved in a strategic trade.

### Panel A: All trades

|  | All | Purchase | Sales |
|---|---|---|---|
| Observations | 366,764 | 128,116 | 238,648 |
| Mean | 36.90819 | 44.74172 | 32.70284 |
| St. Dev. | 110.3872 | 145.892 | 85.14682 |
| Min | 0 | 0 | 0 |
| Max | 3815 | 3485 | 3815 |
| 0.25 Quantile | 15 | 15 | 16 |
| Median | 24 | 24 | 24 |
| 0.75 Quantile | 33 | 34 | 33 |

### Panel B1: Legal trades / Panel B2: Illegal trades

|  | Panel B1: Legal trades | | | Panel B2: Illegal trades | | |
|---|---|---|---|---|---|---|
|  | All | Purchase | Sales | All | Purchase | Sales |
| Observations | 300,061 | 99,473 | 200,588 | 66,703 | 28,643 | 38,060 |
| Mean | 22.33923 | 21.28891 | 22.86009 | 102.4461 | 126.1899 | 84.57717 |
| St. Dev. | 9.463928 | 9.67057 | 9.315965 | 247.6861 | 293.8297 | 204.4544 |
| Min | 0 | 0 | 0 | 11 | 11 | 11 |
| Max | 42 | 42 | 42 | 3815 | 3485 | 3815 |
| 0.25 Quantile | 14 | 13 | 15 | 26 | 28 | 25 |
| Median | 22 | 21 | 22 | 40 | 42 | 37 |
| 0.75 Quantile | 30 | 29 | 31 | 73 | 91 | 63 |

### Panel C1: Strategic / Panel C2: Non-Strategic

|  | Panel C1: Strategic | | | Panel C2: Non-Strategic | | |
|---|---|---|---|---|---|---|
|  | All | Purchase | Sales | All | Purchase | Sales |
| Observations | 56,206 | 16,742 | 39,464 | 117,787 | 46,818 | 70,969 |
| Mean | 44.95283 | 56.19693 | 40.1827 | 26.50996 | 27.67004 | 25.74466 |
| St. Dev. | 129.0179 | 157.6258 | 114.4155 | 44.43812 | 56.25149 | 34.47621 |
| Min | 1 | 1 | 1 | 0 | 0 | 0 |
| Max | 3815 | 3386 | 3815 | 2557 | 2490 | 2557 |
| 0.25 Quantile | 18 | 18 | 18 | 14 | 13 | 14 |
| Median | 27 | 27 | 26 | 21 | 21 | 22 |
| 0.75 Quantile | 35 | 36 | 35 | 31 | 31 | 31 |

**Table 3: Determinants of Late Reporting**

The table reports the results of a logit regression of the dichotomized variable *illegal* on the explanatory variables listed in column 1. A trade is classified as illegal when it was reported later than the 10<sup>th</sup> of the month following the trade. If the 10<sup>th</sup> of month falls on a weekend, the trade is classified as illegal when it was reported later than the following Monday. All other trades are legal. We measure *bookleverage* as the ratio of long term debt (item data 9) plus debt in current liabilities (item 34) divided by long term debt plus debt in current liabilities plus stockholders' equity (item 216). The variable *daystonextreport* is defined as the total number of calendar days that lie between the transaction date of the respective insider trade and the announcement day of the following quarterly or annual report of the company whose stocks were bought or sold in the insider trade. We define *insidertradesameday* as the total number of insiders that traded their shares in the same company on the same day. We define our variable *numest* as the total number of analysts covering the respective company in the month before the reporting date of the respective insider trade. Tobin's Q (variable *Q*) is calculated as the ratio of the market value of assets to book value of total assets (item 6). Following Malmendier and Tate (2007), we define market value of assets as total assets plus market equity (item 25 times item 199) minus book equity. *ROE* is net income (item 172) divided by book equity. We calculate the variable *transvolmarketcap* as the ratio of 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. *d_tcode_p* is a dummy variable that takes on the value one if the (net) transaction volume of the respective insider trade is positive and zero otherwise. We decided to classify all insiders into eight groups (eight variables): *Role1* (Only CEO), *Role2* (CEO and Chairman), *Role3* (Only Chairman), *Role4* (Other executive directors (All officers but not CEO and codes H and OD)), *Role5* (Other non-executive officers (codes D, DO and VC and not officer)), *Role6* (Affiliates), *Role7* (Beneficial Owners). *Role8* (Other) is the reference group.

| | All | | Purchases | | Sales | |
|---|---|---|---|---|---|---|
| Target Characteristics | Coefficient | p-value | Coefficient | p-value | Coefficient | p-value |
| BOOKLEVERAGE | 0.213793 | 0 | 0.398012 | 0 | 0.071786 | 0.002 |
| Q | 0.003298 | 0.0002 | 0.029509 | 0 | -3.48E-05 | 0.9715 |
| ROE | -0.215172 | 0 | -0.049876 | 0.0905 | -0.325693 | 0 |
| # ANALYSTS (NUMEST) | -0.043104 | 0 | -0.048253 | 0 | -0.040722 | 0 |
| D_TCODE_P | 0.136526 | 0 | | | | |
| TRANSVOLMARKETCAP | -0.157691 | 0.824 | -0.388273 | 0.8158 | 0.105725 | 0.8919 |
| DAYSTONEXTREPORT | -0.001856 | 0 | -0.002288 | 0 | -0.001442 | 0 |
| INSIDERTRADESAMEDAY | -0.018921 | 0 | -0.01072 | 0.0005 | -0.031834 | 0 |
| ROLE1 | -0.860047 | 0 | -1.24059 | 0 | -0.572136 | 0 |
| ROLE2 | -1.060313 | 0 | -1.473841 | 0 | -0.749619 | 0 |
| ROLE3 | -0.883259 | 0 | -1.358116 | 0 | -0.557761 | 0 |
| ROLE4 | -0.907234 | 0 | -1.279545 | 0 | -0.633315 | 0 |
| ROLE5 | -0.61483 | 0 | -0.983347 | 0 | -0.338789 | 0 |
| ROLE6 | -0.595658 | 0 | -0.932827 | 0 | -0.337225 | 0 |
| ROLE7 | -0.276129 | 0 | -0.648991 | 0 | 0.009083 | 0.8118 |
| C | -0.50975 | 0 | -0.097365 | 0.0325 | -0.746281 | 0 |
| Mc Fadden R² | 0.031747 | | 0.026382 | | 0.026767 | |
| LR | 11,043.19 | | 3,592.125 | | 5,606.035 | |
| Number of Observations | 366,764 | | 128,116 | | 238,648 | |

**Table 4: Determinants of Strategic Trades**

The table reports the results of a logit regression of the dichotomized variable *strategic* on the explanatory variables listed in column 1. A trade is classified as strategic when it is followed by at least one additional trade by the same insider before it is reported. A trade is classified as non-strategic when it is not strategic and when it is not involved in a strategic trade. We measure *bookleverage* as the ratio of long term debt (item data 9) plus debt in current liabilities (item 34) divided by long term debt plus debt in current liabilities plus stockholders' equity (item 216). The variable *daystonextreport* is defined as the total number of calendar days that lie between the transaction date of the respective insider trade and the announcement day of the following quarterly or annual report of the company whose stocks were bought or sold in the insider trade. We define *insidertradesameday* as the total number of insiders that traded their shares in the same company on the same day. We define our variable *numest* as the total number of analysts covering the respective company in the month before the reporting date of the respective insider trade. Tobin's Q (variable *Q*) is calculated as the ratio of the market value of assets to book value of total assets (item 6). Following Malmendier and Tate (2007), we define market value of assets as total assets plus market equity (item 25 times item 199) minus book equity. *ROE* is net income (item 172) divided by book equity. We calculate the variable *transvolmarketcap* as the ratio of 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. *d_tcode_p* is a dummy variable that takes on the value one if the (net) transaction volume of the respective insider trade is positive and zero otherwise. We decided to classify all insiders into eight groups (eight variables): *Role1* (Only CEO), *Role2* (CEO and Chairman), *Role3* (Only Chairman), *Role4* (Other executive directors (All officers but not CEO and codes H and OD)), *Role5* (Other non-executive officers (codes D, DO and VC and not officer)), *Role6* (Affiliates), *Role7* (Beneficial Owners). *Role8* (Other) is the reference group.

| Target Characteristics | All | | Purchases | | Sales | |
|---|---|---|---|---|---|---|
| | Coefficient | p-value | Coefficient | p-value | Coefficient | p-value |
| BOOKLEVERAGE | -0.423261 | 0 | -0.01449 | 0.6987 | -0.63558 | 0 |
| Q | 0.031133 | 0 | 0.001662 | 0.7267 | 0.029345 | 0 |
| ROE | -3.02E-01 | 0 | -0.368338 | 0 | -0.29724 | 0 |
| # ANALYSTS (NUMEST) | -0.024464 | 0 | -0.037002 | 0 | -0.021429 | 0 |
| D_TCODE_P | -0.572688 | 0 | | | | |
| TRANSVOLMARKETCAP | -23.93363 | 0 | -28.70009 | 0 | -22.92432 | 0 |
| DAYSTONEXTREPORT | 0.002998 | 0 | 0.001195 | 0 | 0.004235 | 0 |
| INSIDERTRADESAMEDAY | -0.022456 | 0 | -0.074289 | 0 | -0.000609 | 0.8599 |
| ROLE1 | 0.060144 | 0.2115 | -0.343714 | 0.0001 | 0.195298 | 0.0007 |
| ROLE2 | 0.284947 | 0 | -0.108494 | 0.2434 | 0.409317 | 0 |
| ROLE3 | 0.273313 | 0 | -0.156423 | 0.1146 | 0.414481 | 0 |
| ROLE4 | -0.512258 | 0 | -0.909529 | 0 | -0.384594 | 0 |
| ROLE5 | -0.284376 | 0 | -0.687781 | 0 | -0.117112 | 0.0233 |
| ROLE6 | -0.128341 | 0.1078 | -0.703584 | 0.0026 | 0.037259 | 0.6679 |
| ROLE7 | 1.027427 | 0 | 1.168027 | 0 | 0.824948 | 0 |
| C | -0.16222 | 0.0004 | -0.196215 | 0.0271 | -0.375265 | 0 |
| Mc Fadden R² | 0.0466 | | 0.051228 | | 0.039222 | |
| LR | 10,202.17 | | 3,754.814 | | 5,647.105 | |
| Number of Observations | 173,993 | | 63,560 | | 110,433 | |

**Table 5: Event Study Results**

|  | Purchases | | | | Sales | | | |
|---|---|---|---|---|---|---|---|---|
|  | # | -1, 1 | 0, 10 | 0, 30 | # | -1, 1 | 0, 10 | 0, 30 |
| all | 139477 | 0.29% | 2.14% | 3.82% | 249967 | -0.46% | -1.33% | -4.16% |
| strategic | 18058 | 0.39% | 2.55% | 4.86% | 41084 | -0.50% | -1.53% | -4.58% |
| non-strategic | 49704 | 0.32% | 1.94% | 3.50% | 72607 | -0.46% | -1.19% | -3.53% |
| Delay 0 - 5 | 3269 | 1.30% | 4.36% | 6.51% | 2122 | -0.21% | -0.74% | -2.53% |
| Delay 6 - 10 | 12808 | 0.53% | 2.87% | 4.99% | 17102 | -0.44% | -0.98% | -2.89% |
| Delay 11 - 15 | 22574 | 0.36% | 2.42% | 4.63% | 42264 | -0.40% | -1.33% | -4.03% |
| Delay 16 - 20 | 17980 | 0.33% | 2.16% | 3.87% | 34843 | -0.33% | -1.18% | -3.74% |
| Delay 21 - 25 | 18888 | 0.32% | 2.35% | 4.09% | 37223 | -0.53% | -1.38% | -4.23% |
| Delay 26 - 30 | 18633 | 0.09% | 2.01% | 3.70% | 36386 | -0.50% | -1.33% | -4.44% |
| Delay 31 - 35 | 17258 | 0.12% | 1.84% | 3.65% | 37527 | -0.45% | -1.50% | -4.86% |
| Delay 36 - 40 | 10806 | 0.21% | 1.66% | 3.03% | 23390 | -0.47% | -1.25% | -5.02% |
| Delay 41 - 45 | 2969 | -0.11% | 1.99% | 4.11% | 4461 | -0.68% | -1.72% | -4.49% |
| Delay > 45 | 14292 | 0.30% | 1.11% | 1.29% | 14649 | -0.60% | -1.62% | -3.16% |

## Table 6: Market Response to Strategic Trades

The table reports the results of a regression of the reporting day CARs(0, 30) on the explanatory variables listed in column 1. We measure *bookleverage* as the ratio of long term debt (item data 9) plus debt in current liabilities (item 34) divided by long term debt plus debt in current liabilities plus stockholders' equity (item 216). *D_executives* is a dummy variable that takes on the value one if one of the insiders who report their trade to the SEC is an executive director and zero if not. The variable *daystonextreport* is defined as the total number of calendar days that lie between the transaction date of the respective insider trade and the announcement day of the following quarterly or annual report of the company whose stocks were bought or sold in the insider trade. We define *insidertradesameday* as the total number of insiders that traded their shares in the same company on the same day. *Notrades* are the total number of trades reported. We define our variable *numest* as the total number of analysts covering the respective company in the month before the reporting date of the respective insider trade. Tobin's Q (variable *Q*) is calculated as the ratio of the market value of assets to book value of total assets (item 6). Following Malmendier and Tate (2007), we define market value of assets as total assets plus market equity (item 25 times item 199) minus book equity. *ROE* is net income (item 172) divided by book equity. We calculate the variable *transvolmarketcap* as the ratio of the number of shares exchanged in the reported transactions times the respective transaction price divided by the market equity of the company whose stocks were bought or sold in the insider trades. *Days_delay_weighted* is the weighted delay of all insider trades of a firm reported to the SEC on a particular day. The weights are the transaction volumes of the individual trades. *D_Strategic* is a dummy variable that is set to 1 if the report revealed that there was at least one strategic trade. The CARs are obtained from a standard event study. The event window is [0; 30]. t-values are given in parentheses and are based on heteroscedasticity-consistent standard errors.

| Explanatory Variable | Purchases Coeff. | Purchases t-statistic | Sales Coeff. | Sales t-statistic |
|---|---|---|---|---|
| BOOKLEVERAGE | -0.001709 | -0.90 | -0.000589 | -0.49 |
| D_EXECUTIVES | 0.018583 | 8.18 | -0.005747 | -3.00 |
| DAYSTONEXTREPORT | -9.05E-05 | -2.96 | -8.00E-05 | -2.65 |
| INSIDERREPSAMEDAY | 0.003023 | 3.11 | -0.003464 | -5.52 |
| NUMEST | -0.000667 | -4.08 | 0.000691 | 6.90 |
| Q | -0.005211 | -6.60 | -0.004714 | -12.79 |
| ROE | 0.000137 | 0.81 | -0.000184 | -0.92 |
| TRANSVOLMARKETCAP | -0.342386 | -2.74 | -0.259824 | -4.69 |
| DAYS_DELAY_WEIGHTED | -4.42E-05 | -4.34 | 1.44E-05 | 1.31 |
| D_STRATEGIC | 0.011866 | 5.09 | -0.005762 | -3.33 |
| C | 0.039087 | 11.82 | 0.000485 | 0.17 |
| N | 41,262 | | 67,604 | |
| $R^2$ | 0.007 | | 0.013 | |

**Figure 1: Distribution of Strategic Trades**