# Relative Idiosyncratic Volatility and the Timing of Corporate Insider Trading
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# Idiosyncratic Volatility and the Timing of Corporate Insider Trading

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**Abstract**

This paper addresses the question of how the timing of corporate insider trading is related to the level of information asymmetry in a stock price. Our empirical analysis shows that, when buying their firm's shares, corporate insiders are likely to exploit their informational advantage through trading at times of high information asymmetry, while their selling appears more cautious because of reputational costs. Trading at times of high informational asymmetry pays off as abnormal returns increase in abnormal informational asymmetry. Further, we find that outside blockholdings, as a proxy for monitoring, can alleviate the exploitative behavior of insiders.

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# 1   Introduction

Corporate insiders, i.e., executive directors, board members or large shareholders are likely to possess superior information about the true value of their firm compared to outside investors. They are involved in decision making processes that affect the value of the firm such as investment or merger decisions, and they receive notice about major events in advance of official public announcements. Several empirical studies (e.g., Seyhun (1986), Chang and Suk (1998) or Fidrmuc et al. (2006)) document that corporate insiders are able to generate significant abnormal returns from trading. This indicates that they use their advantage for profitable trading strategies. Moreover, it is likely that the information asymmetry between informed and uninformed investors and consequently the information advantage of insiders varies over time. The question then arises whether corporate insiders time their transactions in such a way that they exploit high peaks of information asymmetry.

Our findings indicate that corporate insiders appear to make use of short-term informational advantages. They tend to buy their firm's stocks more frequently when idiosyncratic volatility is high, i.e., at times during which it can be expected that there is private information being impounded into stock prices. However, for large firms the likelihood of selling decreases with idiosyncratic volatility. This may be due to concerns about litigation and reputation risks which are likely asymmetric, i.e. higher with respect to insider sales, and more important to insiders of larger, and therefore more visible firms. Further, the information content is likely lower as sales might be motivated by other reasons than profit seeking, i.e., diversification or liquidation

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needs. Chairpersons buy less aggressively than CEOs who again buy less sensitively to information asymmetries than other executives which suggests there is a tradeoff between potential to gain from superior information that those involved in day to day business are most likely to possess and reputational costs that are especially important to people in more prominent roles. Monitoring, as measured by blockholdings of outside investors, appears to be able to alleviate the exploitation when insider purchases are concerned.

The insiders' apparent attempts to buy during times of high information asymmetry prove successful. An analysis of cumulative abnormal returns following a corporate insider trade shows that the former significantly correlate with the level of information asymmetry at the time of the trade in the case of buys. This result also holds for insider.

The welfare implications of corporate insider trading are ambiguous. On the one hand it is argued that insider trading leads to more informative prices as more private information is impounded into prices. Kyle's model, for instance, presents a situation in which uninformed traders learn about the private information from observing prices. On the other hand insider trading may prevent outsiders from trading in the stock because it imposes adverse selection costs (see, e.g., Bhattacharya and Spiegel (1991)). The question is whether corporate insiders trade on the foreknowledge of announcements or whether their transactions make prices more informative as their trading is based on information that would otherwise not be reflected in prices.

We distinguish between two types of informational advantage that insiders may possess - a temporary and a permanent information advantage - and

argue that the exploitations of these two types differ with respect to their welfare implications.

It can be argued that on the one hand there is a kind of informational advantage that is of *temporary* or *short-term* nature. Corporate insiders generally know of events and decisions before they are publicly disclosed to all market participants. For example, they receive notice of preliminary earnings before official earnings figures are released, or they know of outstanding mergers because they are personally involved in the decision making processes. The short-term information advantage can be eliminated quickly and at relatively low cost by disclosing the respective information.

On the other hand there exists an informational advantage that is of *permanent* or *long-term* nature. There may be a permanent information asymmetry between insiders and outsiders that is due to specific firm characteristics. Small firms, whose stocks are infrequently traded and subject to little analyst coverage, typically suffer from asymmetric information between insiders and outsiders. This asymmetry is not due to knowing concrete information in advance. The long-term information advantage is rather due to mispricing by the market and is, hence, more difficult to eliminate as it cannot be extinguished by disclosing concrete information.

The welfare effects of exploiting temporary or permanent information advantages are different: the contribution of trading on short-term information with respect to price informativeness is limited as the information on which insiders trade will be disclosed to the market anyway. Trading on long-term information, however, makes prices more informative, because the informa-

tion on which insiders trade would otherwise not be revealed (at least not immediately).

Preventing insider trades on the foreknowledge of short-term information is the main concern of insider trading regulation. Usually, regulators prohibit trading on "material non-public information". E.g., in the US, insiders are only allowed to trade on private information after turning it into public information. Thereby, regulators try to prevent insiders from trading on this "unfair" information advantage. Most companies have, additionally, their own policies restricting insider trading, particularly around corporate news announcements (Bettis et al. (2000)).

Empirical evidence suggests that the level of asymmetric information varies both *over time* and *cross-sectionally*Clarke and Shastri (2000) empirically compare various proxies for information asymmetry, namely proxies based on market microstructure and metrics that are typically used in the corporate finance literature such as growth opportunities as well as analyst followings. Aslan et al. (2007) analyze to what extent the probability of informed trading is related to firm characteristics. E.g., Krinsky and Lee (1996) investigate the behavior of the components of the bid-ask spread around earnings announcements. Brooks (1996) studies the behavior of asymmetric information around earnings and dividend announcements using the price impact of a trade as a proxy. Graham et al. (2006) study the behavior of the price impact of a trade and adverse selection around dividend announcements. Aktas et al. (2007) investigate the behavior of the probability of informed trading around the announcement of mergers and acquisitions.

Under the assumption that variations in measures of information asymmetry over time are due to changes in short-term informational asymmetry, we analyze whether corporate insiders exploit their temporary informational advantage.

To the best of our knowledge, there is only one paper that relates corporate insider trading to market-based measures of information asymmetry. Aktas et al. (2007) study the effects of legal corporate insider trading on market efficiency. Their findings indicate that legal insider trading improves price discovery on insider trading days. Their empirical study is designed to address a different question. Whereas they analyze how insider trading activity affects informed trading, we investigate whether the presence of information asymmetry can explain corporate insider trading activity.

In order to address the question of whether corporate insiders time their trades to exploit a short-term information advantage, we need a proxy for the existence of temporary information. There are several empirical studies which use corporate news. These studies investigate whether insiders use the foreknowledge of corporate announcements that are empirically found to have a significant price impact, such as dividend announcements, corporate bankruptcy, seasoned equity offerings, stock repurchases and takeover bids (e.g., Elliott et al. (1984), Noe (1999), Ke et al. (2003), Piotroski and Roulstone (2005)). If insiders traded on early access to corporate news, one would observe insider buying activity before good news and insider selling activity before bad news.

The extant empirical literature does not arrive at a conclusive result of

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whether corporate insiders exploit short-term information or not. There are two problems associated with the existing approaches. First, the risk of litigation and adverse publicity is likely to be higher before such disclosure types because the occurance of such events is easily verifiable. This is likely to prevent corporate insiders from blatantly exploiting this kind of information. Many firms even have self-imposed compliance guidelines which prevent insiders from trading before such events. Second, there may be types of temporary information advantages of insiders not covered by the events which have been considered so far. It is in general difficult to measure the surprise component of corporate announcements. By considering measures of information asymmetry *directly*, we propose an alternative approach which is not subject to these problems.

The paper is structured as follows. Section 2 presents the dataset and the measures used for insider trading and informed trading. The empirical design and results of the study are detailed in section 3. Section 4 concludes.

## 2 Data

### 2.1 Data sources

We merge data from the TFN database with stock market data from CRSP and COMPUSTAT. Further, we use the blockholder data of Dlugosz et al. (2006) and the index of antitakeover measures (henceforth CG) by Gompers et al. (2003). The TFN database includes trades by corporate insiders which Section 16 of the Securities Exchange Act requires them to file via Form

4. Our sample starts in 1992, as this is when details on insider transactions begin to be reported in the TFN database, and includes insider until including 2008. We choose to use only those trades in a stock that follow periods of at least 21 trading days without insider trades in that stock in order to avoid any contamination of our idiosyncratic volatility variables with prior insider trades. Further, we ensure to only consider one trade in a firm's stock on a given day, i.e. we avoid double counting due to several insiders trading on the same day.

Daily stock return data that are used to compute idiosyncratic volatility and insider trading profitability are from CRSP. For the market models we make use of the Fama-French factors and riskfree rate from Kenneth French's data library and Chen and Zhang's (2010) investment to assets and return on assets factors from Long Chen's website. Firm characteristics are from COMPUSTAT. Book leverage is defined as long term debt (data item 9) plus debt in current liabilities (item 34) divided by long term debt plus current liabilities plus stockholders' equity (item 216). Book equity is the sum of stockholders' equity and deferred taxes and investment tax credit (item 35) minus preferred stock liquidating value (item 10). Firm size is defined as the natural logarithm of the market value of equity (item 25 times item 199). Tobin's q is the market value of assets, proxied for by the sum of market equity and total assets (item 6) minus book equity, divided by the book value of total assets. Return on equity is net income (item 172) divided by book equity.

While the other firm characteristics are used as control variables in our em-

pirical analyses, we compute book equity in order to remove stocks with a negative one as it is frequently done in the literature. Also, we remove financial companies due to their usually atypical firm characteristics compared to other firms, and regulated utilities whose informational environment is likely to be different from that of other companies.

## 2.2 Construction of measures

As our measure of corporate insider trading, we use buy and sell dummies that are 1 when a transaction by a corporate insider in his firm's stock takes place on a given day and 0 otherwise.

We use idiosyncratic volatility as a proxy for information activities in a stock. This measure is defined as the standard deviation of residual returns unexplained by market models. We compute the idiosyncratic volatilities $iVol_{CAPM}, iVol_{FF}, iVol_{CZ}, iVol_C$ with respect to the CAPM (Sharpe (1964), Lintner (1965), Mossin (1966)), the Fama-French three-factor model (Fama and French (1993)), the three-factor model by Chen and Zhang (2010), and the Carhart four-factor model (Carhart (1997)), respectively. The firms' market model coefficients are estimated using 12 calendar month rolling windows of daily returns. To reduce biases caused by infrequent trading, we estimate the coefficients using the approach suggest by Dimson (1979) with one lead and one lag. Our idiosyncratic volatility measure is based on the 21 last trading days. While such a short sample renders the estimates inexact, these errors can be expected to average out over our whole sample of insider transactions. As we want to look at short-term variation in information

asymmetry we consider this choice an appropriate compromise.

The measure is based on the argument that informed trading induces volatility. This relationship is corroborated by theoretical models (Glosten and Milgrom (1985)) and empirical evidence (French and Roll (1986)). Trading on private information is likely to take place with respect to information about individual firms rather than general market information which is typically publicly available. As a consequence, informed trading is expected to affect the idiosyncratic part of volatility which has to be distinguished from market volatility. Ferreira and Laux (2007), e.g., use idiosyncratic volatility as a measure of stock price informativeness which they relate to corporate governance.

Beyond the aforementioned idiosyncratic volatilities, we compute a measure of relative idiosyncratic volatility, i.e. the ratio of a firm's idiosyncratic volatility at a point in time to its mean idiosyncratic volatility. This serves the analysis of the effect of short-term asymmetric information as it corresponds to the abnormal idiosyncratic volatility in a firm's stock and will be used in most of our empirical analysis.

Quarterly earnings announcements present a channel through which information about firm value is communicated to investors. On this account, the majority of U.S. firms have self-imposed insider trading restrictions in place according to which most of them allow insider trading only in the 30 days following the quarterly earnings announcement and prohibit trading in the 60 days preceding the next earnings announcement which presents the so called "blackout period" (see Roulstone (2003)). This restriction aims to

prevent corporate insiders from exploiting asymmetric information that will be reduced by the following earnings announcement. When such trading restrictions are in place and enforced, insider trading is certainly more likely to occur outside of blackout periods. It may be also the case that idiosyncratic volatility itself is different in blackout and non-blackout periods. We compare idiosyncratic volatility inside and outside of the alleged blackout periods using Wilcoxon ranksum tests. The results in Table 1 clearly show that idiosyncratic volatility in blackout periods is significantly lower than outside those periods. The actual ranksum of the idiosyncratic volatility for non-blackout periods is significantly larger than the expected. This holds for all four specifications of idiosyncratic volatility and also for several subsamples such as small and large firms as well as low and high q firms (unreported). Apparently, private information activities are more intense outside blackout periods.

In the multivariate analysis we should therefore control for blackout periods. We assume that firms have a blackout period in place that restricts insider trading such that it is only allowed to trade during the 30 days following an earnings announcement. Our blackout dummy is 0 for the 30 days following the earnings announcement and 1 for 90 days preceding the next earnings announcement.

# 3 Empirical design and results

This section first provides an analysis as to the importance of the level of asymmetric information for the timing of insider trading. Next, we look at whether the factors relevant for the timing choice also affect the abnormal profits obtained from insider trading.[1]

## 3.1 Timing of Insider Trading

The goal of this part of the empirical analysis is to investigate the relationship between insider trading activity and idiosyncratic volatility in order to address the question of whether corporate insiders trade on short-term information.

It is argued that next to exploiting superior information there are alternative trading motives for corporate insiders such as portfolio rebalancing or liquidity reasons. According to the approach introduced above, we may not find significant differences in measures of informed trading because we confound informative transactions with non-informative ones. We therefore also try to classify the insider transactions according to their assumed informativeness. We take into account that buying by corporate insiders is more likely to be information driven than selling as there are other motives, such as diversification or liquidity needs, that may motivate an insiders to sell their stocks. Hence, it is interesting to analyze whether the importance of measures of

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[1]We will extend this section prior to the conference through descriptive statistics, the addition of further measures of information asymmetry and a more detailed analysis of both the determinants of insider trading and, in particular, the relationship between the informational environment and the profits gained through insider trading.

asymmetric information differs between buy and sell transactions.

### 3.1.1 Univariate Comparison

Before we conduct more detailed analyses in the next subsection, we start off with Wilcoxon ranksum tests to compare idiosyncratic volatility in periods before insider trading days and before non-insider trading days. Results are displayed in table 1.

With respect to purchases idiosyncratic volatility before insider trading days is greater than before non-insider trading days. For sales, we obtain the reverse result: idiosyncratic volatility before insider trading days is smaller than before non-insider trading days. This result remains robust over all specifications of idiosyncratic volatility. These findings suggest that insider-buyers time their trades during periods of high asymmetric information why insider-sellers trade during periods of low asymmetric information. Apparently, insiders exploit their information advantage only with respect to purchases but not with respect to sales which is consistent with the notion that purchases are more information-driven than sales. The fact that we find that for sales, idiosyncratic volatility is not merely insignificant for the trading decision but is even inversely related to it, may indicate that litigation risks are higher for sales. Hence, insider-sellers want to avoid the suspicion of exploiting their information advantage which is why they trade during periods of very low asymmetric information.

[Table 1 about here.]

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### 3.1.2 Multivariate Analysis

The above subsection has given a first impression of the role idiosyncratic volatility may play though a multivariate analysis is warranted as insider trading may also depend on other variables. Furthermore, here we use relative idiosyncratic volatilities, i.e. a firm's current idiosyncratic volatility relative to its mean, as our main interest lies in whether insiders time their trades to make use of abnormal asymmetric information. To empirically test the hypothesis that insider trading activity is higher when there is more information asymmetry than on average, the dummy, as described in section 2, of insider trading activity is regressed on firms' relative idiosyncratic volatility. There may be several periods with no insider trading activity at all and our dependent variable is binary. As a consequence, a multivariate logit model is used to account for the nonnormality of the distribution (see Elliott et al. (1984)).

The overall corporate insider trading activity is likely to be determined by other factors, for instance by management compensation or simply idiosyncrasies in the managers' acting. Furthermore, insider trading may vary marketwide over time for exogenous reasons, e.g., the enactment of the Sarbanes Oxley Act may have generally altered the amount of insider trading. We accommodate for these cross-sectional and longitudinal determinants using a panel approach with firm and time fixed effects.

[Table 2 about here.]

[Table 3 about here.]

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Our empirical results are displayed in tables 2 and 14. The results show that for buy transactions there appears to be a strong positive relation between relative information asymmetry and insider trading activity, i.e. there are more buy insider transactions when information asymmetry is relatively high. This does not seem to be the case for insider sales which suggests that they are less informative, i.e. driven by other motives than profit, and that insiders recognize the reputation and possibly litigation risk that is likely to be higher when firms perform poorly after insider sales than vice versa.

The blackout variable has the expected effect, i.e. insider trading is less frequent in the two months before an earnings announcement than in the month thereafter. A further important insight is that insider trading follows firm fundamentals. Insiders' tendency to buy is inversely related to their company's market capitalization whereas the inclination to sell increases with size.

### 3.1.3 Different Kinds of Insiders

In this section we look at whether there are differences in the timing of corporate insiders holding different positions within the firm. One may argue that CEOs carry greater reputational risks than other corporate insiders while they are also likely to be better informed. The question then arises whether they make use of their advantages or are more careful to avoid a loss of reputation and possibly litigation. We separate the insider trades into those carried out by CEOs, chairpersons, other executive directors, and other non-executive directors, affiliates and beneficial owners. Results are reported

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in tables 4 through 10.

[Table 4 about here.]

[Table 5 about here.]

[Table 6 about here.]

[Table 7 about here.]

[Table 8 about here.]

[Table 9 about here.]

[Table 10 about here.]

For the first three groups we find similar results for sales[2] They appear to conduct their sales at times of low idiosyncratic volatility, possibly to preserve their reputation. For buys among these three groups the sensitivity to idiosyncratic volatility is largest for other executive directors and smallest for chairmen which suggests that, while a more prominent role may actually lead to less aggressive insider buying, indicating that the reputational costs are relevant, this effect does appear smaller for CEOs - who may have more to gain from their more detailed knowledge of day to day business, than for chairpersons. For other insiders, we find buy transactions about as positively

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[2]Due to a lack of sufficient observations the logit regression does not yield meaningful coefficients for chairpersons which is why these are not reported here. However, the coefficients are almost unchanged when grouping chairpersons and other executives.

related to idiosyncratic volatility as those of CEOs or other executive directors. However, in contrast to the other three groups, there is no significant relation between idiosyncratic volatility and the probabiltiy of selling which suggests that these insiders can make use of their informational advantage while the others refrain from doing so when selling.

### 3.1.4 Effects of Corporate Governance

In order to gain further insights into factors affecting the timing of corporate insider trading, we analyze whether well-known corporate governance variables have any influence. We use the blockholder data of Dlugosz et al. (2006) and the index of antitakeover measures (henceforth CG) by Gompers et al. (2003). Unreported results considering the blockholder data or the CG index only show that the significance of idiosyncratic volatility holds while the blockholdings and the CG index themselves are not significant in determining the probability of corporate insider trading, i.e. they do not affect it or the blockholdings and antitakeover measures within firms do not vary sufficiently implying that any effect would be included in the firm fixed effects. However, as reported in tables 11 and 12, we find significant interactions between the outside blockholder variables and relative idiosyncratic volatility. We find a negative interaction of outside blockholdings with idiosyncratic volatility for buy transactions, i.e. larger blockholdings reduce the tendency to buy at times of high idiosyncratic volatility which suggests a monitoring effect. In reported results, we find these results do not stem from the trading behavior of outside investors. However, blockholdings owned by

management do not significantly affect the probability of insider buys. Thus, better aligned incentives when management ownership is high so that managment may refrain from value-destroying actions such as the exploitation of other shareholders do not appear to play a role here. For insider sales, there is no significant interaction as one would expect since insiders appear to be cautious regarding the timing of their selling anyway. The index of antitakeover measures does not significantly affect the sensitivity of insider trading to idiosyncratic volatility.

[Table 11 about here.]

[Table 12 about here.]

### 3.1.5 Differences between Large and Small Firms

We suspect there may be differences in large and small firms' insiders tendency to make use of their informational advantage. There is empirical evidence that the information procession differs between small and large companies, see, e.g., Collins et al. (1987) and Collins and Kothari (1989). We separate our sample by firm size and conduct logit regressions for the smallest third and the largest third. Results are displayed in tables 13 to 16.

We find insider buy transactions in large firm stocks appear to be more driven by short-term asymmetric information than those in small firm stocks. However, we caution against drawing definite conclusions from this result as this may be, at least partly, due to differences in the measurement errors of idiosyncratic volatility. Small firm stocks are ususally less liquid than large

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firm stocks and thus errors due to nonsynchronous trading may cause larger measurement errors in these stocks than in large cap stocks. Hence, any economically present effect will appear weaker in the set of small cap stocks. Size only predicts the probability of insider buying among the small firm stocks, suggesting that the probability of insider trading is increased for the smallest stocks while size has no such effect among larger firms. Further, we find that among large firm stocks the probability of insider trading increases with recent economic performance as measured by the return on equity, while buying among small firm stocks rather increases with financial constraints a firm may be facing, as measured by the book leverage.

The results for insider sales show a dramatic difference with regard to the timing with respect to short-term information asymmetries. While for large firms the probability of selling decreases with idiosyncratic volatility similar to our results for the whole sample, among small firms we actually find insider selling with idiosyncratic volatility. This suggests that insiders of smaller firms are less concerned with a loss of reputation or a potential risk of litigation and thus try and make use of their short-term informational advantages even when selling their firms' stocks. We also find that the relevance of size for the probability of selling is only present in the large firm sample.

[Table 13 about here.]

[Table 14 about here.]

[Table 15 about here.]

[Table 16 about here.]

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## 3.2 Profits from Insider Trading

Having found evidence for an effect of idiosyncratic volatility on the timing of insider trading, the next logical step is to analyze whether the timing criteria actually impact the profits gained from corporate insider trading. To do so, we look at whether cumulative abnormal returns obtained in the $k$ calendar months (1, 3, 6 and 12, respectively) following the month in which an insider trade took place depend on idiosyncratic volatility and corporate fundamental control variables. The direct price reaction to the trades is not of too much interest to us as we are concerned with the predictability of future returns through insider trading rather than in mere immediate responses of the market to the former.

The choice of trading horizon to calculate the abnormal profit that accrues to insider trading Huddart et al. (2007) can be justified as follows: the so called short-swing rule poses the smallest lower bound: the shortest plausible trading horizon for an insider because section 16(b) of the Securities and Exchange Act of 1934 provides that insiders must disgorge profits attributable to offsetting purchases and sales that occur within six months of each other Using long windows increases the likelihood that the window includes the events of which insiders might have foreknowledge of. But using a long time window also comes at the expense of adding too much noise. We use several time windows to control for the robustness of the results. However, the length of the time window is not too crucial for our purposes since we are mainly interested in the sources of insider gains and not in the absolute magnitudes.

It is often argued that insider purchases and sales differ with respect to their

information content. First, sales can be due to diversification and liquidity needs of the insider. In particular, manager-insiders are highly exposed to firm risk sue to receiving performance-linked compensation and job security being a function of firm value. Therefore, they may wish to reduce such exposure by selling shares. Second, litigation risk is asymmetric in the sense that the regulator watches insider sales more closely than insider purchases. Uninformed investors may suffer losses from informed insiders selling but with respect to purchases they do not lose but merely forego possible gains to be made. As before when considering the probability of insider trades, we run separate regressions for purchases and sales.

We conduct linear regressions with firm fixed effects and robust standard errors. For both buy and sell transactions, we use the regular cumulative abnormal returns a stock has achieved, i.e. for sales the abnormal returns earned by insiders are the reverse.

We look at the effect idiosyncratic volatility relative to a firm's mean has on abnormal returns. Therefore, these analyses show the impact of timing by corporate insiders on their returns. Tables 17 to 24 report results for all four market models. They show that insiders buying their firms' stock profit from information asymmetry while the same holds true for sales, i.e. stocks returns are negatively related to the idiosyncratic volatility at the time of insider sales even though insiders do not specifically time their trades at times of high idiosyncratic volatility.

Buying during a blackout period does appear to increase abnormal returns in the short term though the longer term effect is negative. Stocks sold during a

blackout period also experience lower returns than otherwise so that trading during a blackout period altogether negatively predicts stock returns. Size appears to significantly affect abnormal returns. For buys, insiders at firms with high market capitalizations appear to earn lower returns in the short to medium returns than those of small firms while this had reversed one year after a trade. The lower performance of large cap stocks in the near term may stem from investors trading in the same directions as the insiders having a larger influence on small-firm and therefore more likely illiquid stocks. For sales, stock returns decrease with size though an explanation appears unclear. Abnormal returns universally decrease in Q indicating a reversion from a prior misvaluation.

[Table 17 about here.]

[Table 18 about here.]

[Table 19 about here.]

[Table 20 about here.]

[Table 21 about here.]

[Table 22 about here.]

[Table 23 about here.]

[Table 24 about here.]

# 4 Conclusion

Using idiosyncratic volatility as a measure of information asymmetry between firm insiders and ordinary investors, rather than following the established approach in the literature of focusing on specific firm events, we find corporate insiders likely exploit their foreknowledge of short-term information. Using the insider trades on the US market that have been registered with the SEC, we find that insider buys are significantly more likely on a given day when recent idiosyncratic volatility is relatively high. For large firms, this effect does not appear to exist for sell transactions which suggests that these are less short-term information driven and that insiders may fear reputational costs or litigation when selling at times of high information asymmetry in anticipation of a negative development of their firm.

Further results indicate that chairpersons buy, with respect to information asymmetry, less aggressively than CEOs or other executives, suggesting that reputational costs for people in more prominent roles have importance though these may be counterbalanced by CEO's larger informational advantage concerning short-term information in comparison to chairpersons. Other insiders, who likely face less reputational costs than the top executives, buy when idiosyncratic volatility is high while their selling does not decrease with idiosyncratic volatility.

We find monitoring can reduce the exploitation of information asymmetries which suggests there is a disciplining effect. However, blockholdings by the top management does have no effect so aligning incentives does not appear to reduce the exploitation of short-term information which may be detrimental

to firm value.

Beyond support for timing strategies of insiders, i.e., insiders buy when information asymmetry is high, we also find that timing actually enhances the cumulative abnormal returns they gain with both buys and sells in the following months. This presents strong evidence that corporate insiders are capable of timing their trades successfully to use their short-term informational advantages to achieve superior returns.

These results appear somewhat sobering given the regulatory attempts to avoid trading on the foreknowledge of information. While these efforts clearly have some effect as insider trading is less pronounced during times when insider knowledge can be fairly certainly assumed, it is obvious that a complete removal of the use of short-term information by insiders in their trading is likely impossible.

Further results suggest that insiders may be contrarians, as indicated by the estimation coefficients with respect to size and Tobin's q.

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# Tables

Table 1: Wilcoxon ranksum test of idiosyncratic volatility before days with insider trades and days without

| | Buy Transactions | | | | |
| | No insider trades | | Insider trades | | |
| | actual | expected | actual | expected | z-value |
|---|---|---|---|---|---|
| $iVol_{CAPM}$ | 1.23E+14 | 1.23E+14 | 9.28E+11 | 8.33E+11 | -64.231 |
| $iVol_{FF}$ | 1.23E+14 | 1.23E+14 | 9.27E+11 | 8.33E+11 | -63.762 |
| $iVol_{CZ}$ | 1.23E+14 | 1.23E+14 | 9.28E+11 | 8.33E+11 | -64.171 |
| $iVol_{C}$ | 1.23E+14 | 1.23E+14 | 9.27E+11 | 8.33E+11 | -63.741 |
| | Sell Transactions | | | | |
| | No insider trades | | Insider trades | | |
| | actual | expected | actual | expected | z-value |
| $iVol_{CAPM}$ | 1.25E+14 | 1.24E+14 | 2.43E+12 | 2.66E+12 | 88.100 |
| $iVol_{FF}$ | 1.25E+14 | 1.24E+14 | 2.41E+12 | 2.66E+12 | 94.654 |
| $iVol_{CZ}$ | 1.25E+14 | 1.24E+14 | 2.41E+12 | 2.66E+12 | 93.388 |
| $iVol_{C}$ | 1.25E+14 | 1.24E+14 | 2.41E+12 | 2.66E+12 | 94.074 |

The table presents the estimation output of Wilcoxon ranksum tests of idiosyncratic volatility before days with insider trades versus days without insider days.

Table 2: Logit regressions of insider buying activity against firm characteristics and idiosyncratic volatility

|  | Purchases by Insiders | | | |
|  | coef. | p-value | coef. | p-value |
| --- | --- | --- | --- | --- |
| $\text{iVol}^{rel}_{CAPM}$ | 0.3412 | 0.0000 | | |
| $\text{iVol}^{rel}_{FF}$ | | | 0.3434 | 0.0000 |
| Blackout | -0.7596 | 0.0000 | -0.7596 | 0.0000 |
| Book Lev. | 0.0016 | 0.2730 | 0.0016 | 0.2695 |
| Size | -0.0932 | 0.0030 | -0.0923 | 0.0033 |
| Q | -0.0002 | 0.0694 | -0.0002 | 0.0679 |
| Return on Eq. | 1.798E-7 | 0.5642 | 1.823E-7 | 0.5609 |
|  | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CZ}$ | 0.3444 | 0.0000 | | |
| $\text{iVol}^{rel}_{C}$ | | | 0.3431 | 0.0000 |
| Blackout | -0.7600 | 0.0000 | -0.7602 | 0.0000 |
| Book Lev. | 0.0016 | 0.2687 | 0.0016 | 0.2680 |
| Size | -0.0929 | 0.0031 | -0.0929 | 0.0031 |
| Q | -0.0002 | 0.0672 | -0.0002 | 0.0668 |
| Return on Eq. | 0.0000 | 0.5639 | 0.0000 | 0.5623 |

The table presents the estimation output of logit firm and year fixed effects regressions of a daily insider buying dummy constructed as described in section 2 against the variables displayed.

Table 3: Logit regressions of insider selling activity against firm characteristics and idiosyncratic volatility

| | Sales by Insiders | | | |
| | coef. | p-value | coef. | p-value |
| --- | --- | --- | --- | --- |
| $\text{iVol}^{rel}_{CAPM}$ | -0.0960 | 0.0000 | | |
| $\text{iVol}^{rel}_{FF}$ | | | -0.0935 | 0.0000 |
| Blackout | -0.6287 | 0.0000 | -0.6284 | 0.0000 |
| Book Lev. | 0.0026 | 0.0324 | 0.0026 | 0.0323 |
| Size | 0.2005 | 0.0000 | 0.2006 | 0.0000 |
| Q | -5.95E-6 | 0.9121 | -6.03E-6 | 0.9110 |
| Return on Eq. | 8.273E-7 | 0.1054 | 8.268E-7 | 0.1056 |
| | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CZ}$ | -0.0928 | 0.0000 | | |
| $\text{iVol}^{rel}_{C}$ | | | -0.0947 | 0.0000 |
| Blackout | -0.6282 | 0.0000 | -0.6284 | 0.0000 |
| Book Lev. | 0.0026 | 0.0326 | 0.0026 | 0.0319 |
| Size | 0.2006 | 0.0000 | 0.2007 | 0.0000 |
| Q | -5.4E-6 | 0.9203 | -5.52E-6 | 0.9185 |
| Return on Eq. | 8.269E-7 | 0.1054 | 8.284E-7 | 0.1049 |

The table presents the estimation output of logit firm and year fixed effects regressions of a daily insider selling dummy constructed as described in section 2 against the variables displayed.

Table 4: Logit regressions of insider buying activity against firm characteristics and idiosyncratic volatility

| | Purchases by CEOs | | | |
|---|---|---|---|---|
| | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CAPM}$ | 0.3009 | 0.0000 | | |
| $\text{iVol}^{rel}_{FF}$ | | | 0.3077 | 0.0000 |
| Blackout | -0.7837 | 0.0000 | -0.7837 | 0.0000 |
| Book Lev. | 0.0026 | 0.5155 | 0.0026 | 0.5171 |
| Size | -0.0196 | 0.8160 | -0.0188 | 0.8238 |
| Q | -0.0004 | 0.1237 | -0.0004 | 0.1208 |
| Return on Eq. | -1.21E-7 | 0.8410 | -1.16E-7 | 0.8473 |
| | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CZ}$ | 0.3105 | 0.0000 | | |
| $\text{iVol}^{rel}_{C}$ | | | 0.3073 | 0.0000 |
| Blackout | -0.7837 | 0.0000 | -1.0113 | 0.0000 |
| Book Lev. | 0.0025 | 0.5268 | 0.0025 | 0.5211 |
| Size | -0.0189 | 0.8226 | -0.0203 | 0.8096 |
| Q | -0.0004 | 0.1217 | -0.0004 | 0.1209 |
| Return on Eq. | -1.24E-7 | 0.8376 | -1.21E-7 | 0.8410 |

The table presents the estimation output of logit firm and year fixed effects regressions of a daily insider buying dummy constructed as described in section 2 against the variables displayed.

Table 5: Logit regressions of insider buying activity against firm characteristics and idiosyncratic volatility

| | Purchases by Chairpersons | | | |
|---|---|---|---|---|
| | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CAPM}$ | 0.1868 | 0.0499 | | |
| $\text{iVol}^{rel}_{FF}$ | | | 0.1923 | 0.0466 |
| Blackout | -0.6350 | 0.0000 | -0.6341 | 0.0000 |
| Book Lev. | 0.0071 | 0.3729 | 0.0070 | 0.3754 |
| Size | -0.4902 | 0.0331 | -0.4898 | 0.0332 |
| Q | -0.0003 | 0.7990 | -0.0003 | 0.8021 |
| Return on Eq. | 8.293E-7 | 0.7199 | 8.289E-7 | 0.7199 |
| | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CZ}$ | 0.1934 | 0.0468 | | |
| $\text{iVol}^{rel}_{C}$ | | | 0.1871 | 0.0550 |
| Blackout | -0.6348 | 0.0000 | -0.6345 | 0.0000 |
| Book Lev. | 0.0071 | 0.3731 | 0.0071 | 0.3728 |
| Size | -0.4892 | 0.0334 | -0.4913 | 0.0328 |
| Q | -0.0003 | 0.7979 | -0.0003 | 0.8043 |
| Return on Eq. | 8.305E-7 | 0.7194 | 8.282E-7 | 0.7202 |

The table presents the estimation output of logit firm and year fixed effects regressions of a daily insider buying dummy constructed as described in section 2 against the variables displayed.

Table 6: Logit regressions of insider buying activity against firm characteristics and idiosyncratic volatility

| Purchases by other Executive Directors | | | | |
|---|---|---|---|---|
| | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CAPM}$ | 0.3602 | 0.0000 | | |
| $\text{iVol}^{rel}_{FF}$ | | | 0.3661 | 0.0000 |
| Blackout | -0.7753 | 0.0000 | -0.7752 | 0.0000 |
| Book Lev. | 0.0040 | 0.0836 | 0.0041 | 0.0830 |
| Size | -0.1190 | 0.0121 | -0.1177 | 0.0131 |
| Q | -0.0002 | 0.1607 | -0.0002 | 0.1556 |
| Return on Eq. | -4.99E-7 | 0.6758 | -4.81E-7 | 0.6864 |
| | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CZ}$ | 0.3645 | 0.0000 | | |
| $\text{iVol}^{rel}_{C}$ | | | 0.3598 | 0.0000 |
| Blackout | -0.7757 | 0.0000 | -0.7764 | 0.0000 |
| Book Lev. | 0.0041 | 0.0808 | 0.0041 | 0.0825 |
| Size | -0.1180 | 0.0128 | -0.1188 | 0.0122 |
| Q | -0.0002 | 0.1568 | -0.0002 | 0.1546 |
| Return on Eq. | -5.15E-7 | 0.6659 | -4.75E-7 | 0.6906 |

The table presents the estimation output of logit firm and year fixed effects regressions of a daily insider buying dummy constructed as described in section 2 against the variables displayed.

Table 7: Logit regressions of insider buying activity against firm characteristics and idiosyncratic volatility

| | Purchases by other insiders | | | |
| | coef. | p-value | coef. | p-value |
| --- | --- | --- | --- | --- |
| $iVol^{rel}_{CAPM}$ | 0.3376 | 0.0000 | | |
| $iVol^{rel}_{FF}$ | | | 0.3377 | 0.0000 |
| Blackout | -0.7142 | 0.0000 | -0.7144 | 0.0000 |
| Book Lev. | -0.0002 | 0.9158 | -0.0002 | 0.9259 |
| Size | -0.0410 | 0.3637 | -0.0397 | 0.3802 |
| Q | -0.0002 | 0.2703 | -0.0002 | 0.2698 |
| Return on Eq. | 3.262E-7 | 0.5712 | 3.297E-7 | 0.5696 |
| | coef. | p-value | coef. | p-value |
| $iVol^{rel}_{CZ}$ | 0.3375 | 0.0000 | | |
| $iVol^{rel}_{C}$ | | | 0.3411 | 0.0000 |
| Blackout | -0.7148 | 0.0000 | -0.7147 | 0.0000 |
| Book Lev. | -0.0002 | 0.9287 | -0.0002 | 0.9284 |
| Size | -0.0408 | 0.3657 | -0.0398 | 0.3787 |
| Q | -0.0002 | 0.2661 | -0.0002 | 0.2647 |
| Return on Eq. | 3.318E-7 | 0.5669 | 3.321E-7 | 0.5672 |

The table presents the estimation output of logit firm and year fixed effects regressions of a daily insider buying dummy constructed as described in section 2 against the variables displayed.

Table 8: Logit regressions of insider buying activity against firm characteristics and idiosyncratic volatility

| | Sells by CEOs | | | |
|---|---|---|---|---|
| | coef. | p-value | coef. | p-value |
| $iVol_{CAPM}^{rel}$ | -0.1504 | 0.0009 | | |
| $iVol_{FF}^{rel}$ | | | -0.1393 | 0.0023 |
| Blackout | -0.5444 | 0.0000 | -0.5430 | 0.0000 |
| Book Lev. | 0.0017 | 0.6433 | 0.0017 | 0.6432 |
| Size | 0.3020 | 0.0000 | 0.3023 | 0.0000 |
| Q | -0.0001 | 0.4710 | -0.0001 | 0.4714 |
| Return on Eq. | -0.00002 | 0.7525 | -0.00002 | 0.7524 |
| | coef. | p-value | coef. | p-value |
| $iVol_{CZ}^{rel}$ | -0.1392 | 0.0024 | | |
| $iVol_{C}^{rel}$ | | | -0.1354 | 0.0031 |
| Blackout | -0.5428 | 0.0000 | -0.5423 | 0.0000 |
| Book Lev. | 0.0017 | 0.6460 | 0.0018 | 0.6416 |
| Size | 0.3019 | 0.0000 | 0.3028 | 0.0000 |
| Q | -0.0001 | 0.4714 | -0.0001 | 0.4721 |
| Return on Eq. | -0.00002 | 0.7536 | -0.00002 | 0.7529 |

The table presents the estimation output of logit firm and year fixed effects regressions of a daily insider selling dummy constructed as described in section 2 against the variables displayed.

Table 9: Logit regressions of insider selling activity against firm characteristics and idiosyncratic volatility

| Sells by other Executives Directors | | | | |
|---|---|---|---|---|
| | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CAPM}$ | -0.1654 | 0.0000 | | |
| $\text{iVol}^{rel}_{FF}$ | | | -0.1630 | 0.0000 |
| Blackout | -0.7133 | 0.0000 | -0.7129 | 0.0000 |
| Book Lev. | 0.0024 | 0.1557 | 0.0024 | 0.1559 |
| Size | 0.2881 | 0.0000 | 0.2884 | 0.0000 |
| Q | -0.00004 | 0.6177 | -0.00004 | 0.6118 |
| Return on Eq. | -4.21E-8 | 0.9642 | -4.53E-8 | 0.9616 |
| | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CZ}$ | -0.1651 | 0.0000 | | |
| $\text{iVol}^{rel}_{C}$ | | | -0.1641 | 0.0000 |
| Blackout | -0.7130 | 0.0000 | -0.7128 | 0.0000 |
| Book Lev. | 0.0024 | 0.1567 | 0.0024 | 0.1548 |
| Size | 0.2883 | 0.0000 | 0.2885 | 0.0000 |
| Q | -0.00004 | 0.6336 | -0.00004 | 0.6206 |
| Return on Eq. | -4.4E-8 | 0.9626 | -4.24E-8 | 0.9641 |

The table presents the estimation output of logit firm and year fixed effects regressions of a daily insider selling dummy constructed as described in section 2 against the variables displayed.

Table 10: Logit regressions of insider selling activity against firm characteristics and idiosyncratic volatility

| | Sells by other insiders | | | |
| | coef. | p-value | coef. | p-value |
|---|---|---|---|---|
| iVol$^{rel}_{CAPM}$ | 0.00478 | 0.8280 | | |
| iVol$^{rel}_{FF}$ | | | 0.0058 | 0.7949 |
| Blackout | -0.5241 | 0.0000 | -0.5240 | 0.0000 |
| Book Lev. | 0.0032 | 0.1008 | 0.0032 | 0.1010 |
| Size | 0.0789 | 0.0489 | 0.0790 | 0.0487 |
| Q | 0.00008 | 0.3390 | 0.00008 | 0.3394 |
| Return on Eq. | 1.577E-6 | 0.2106 | 1.576E-6 | 0.2106 |
| | coef. | p-value | coef. | p-value |
| iVol$^{rel}_{CZ}$ | 0.0099 | 0.6557 | | |
| iVol$^{rel}_{C}$ | | | 0.0032 | 0.8881 |
| Blackout | -0.5235 | 0.0000 | -0.5242 | 0.0000 |
| Book Lev. | 0.0032 | 0.1013 | 0.0032 | 0.1007 |
| Size | 0.0792 | 0.0480 | 0.0788 | 0.0492 |
| Q | 0.00008 | 0.3410 | 0.00008 | 0.3387 |
| Return on Eq. | 1.576E-6 | 0.2107 | 1.577E-6 | 0.2106 |

The table presents the estimation output of logit firm and year fixed effects regressions of a daily insider selling dummy constructed as described in section 2 against the variables displayed.

Table 11: Logit regressions of insider buying activity against firm characteristics and idiosyncratic volatility

| | Purchases by Insiders | | | |
| | coef. | p-value | coef. | p-value |
|---|---|---|---|---|
| $\text{iVol}_{CAPM}^{rel}$ | 0.4709 | 0.0140 | | |
| $\text{iVol}_{CAPM}^{rel} * block_{outs}$ | -0.0082 | 0.0093 | | |
| $\text{iVol}_{CAPM}^{rel} * block_{mgmt}$ | -0.0021 | 0.8247 | | |
| $\text{iVol}_{CAPM}^{rel} * CG$ | 0.0087 | 0.6093 | | |
| $\text{iVol}_{FF}^{rel}$ | | | 0.4369 | 0.0236 |
| $\text{iVol}_{FF}^{rel} * block_{outs}$ | | | -0.0090 | 0.0051 |
| $\text{iVol}_{FF}^{rel} * block_{mgmt}$ | | | -0.0029 | 0.7615 |
| $\text{iVol}_{FF}^{rel} * CG$ | | | 0.0144 | 0.4022 |
| Blackout | -1.4146 | 0.0000 | -1.4118 | 0.0000 |
| Book Lev. | -0.0029 | 0.6947 | -0.0029 | 0.6941 |
| Size | -0.0768 | 0.6650 | -0.0843 | 0.6347 |
| Q | -0.0012 | 0.0970 | -0.0012 | 0.0978 |
| Return on Eq. | 0.0001 | 0.7886 | 0.0001 | 0.7849 |
| | coef. | p-value | coef. | p-value |
| $\text{iVol}_{CZ}^{rel}$ | 0.4390 | 0.0245 | | |
| $\text{iVol}_{CZ}^{rel} * block_{outs}$ | -0.0083 | 0.0097 | | |
| $\text{iVol}_{CZ}^{rel} * block_{mgmt}$ | -0.0008 | 0.9349 | | |
| $\text{iVol}_{CZ}^{rel} * CG$ | 0.0120 | 0.4893 | | |
| $\text{iVol}_{C}^{rel}$ | | | 0.4327 | 0.0260 |
| $\text{iVol}_{C}^{rel} * block_{outs}$ | | | -0.0088 | 0.0061 |
| $\text{iVol}_{C}^{rel} * block_{mgmt}$ | | | -0.0024 | 0.8063 |
| $\text{iVol}_{C}^{rel} * CG$ | | | 0.0140 | 0.4178 |
| Blackout | -1.4137 | 0.0000 | -1.4131 | 0.0000 |
| Book Lev. | -0.0028 | 0.7005 | -0.0029 | 0.6921 |
| Size | -0.0794 | 0.6545 | -0.0873 | 0.6227 |
| Q | -0.0012 | 0.0980 | -0.0012 | 0.1015 |
| Return on Eq. | 0.0001 | 0.7904 | 0.0001 | 0.7833 |

The table presents the estimation output of logit firm and year fixed effects regressions of a daily insider buying dummy constructed as described in section 2 against the variables displayed.

Table 12: Logit regressions of insider selling activity against firm characteristics and idiosyncratic volatility

| | Sells by Insiders | | | |
|---|---|---|---|---|
| | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CAPM}$ | -0.4286 | 0.0224 | | |
| $\text{iVol}^{rel}_{CAPM} * block_{outs}$ | 0.0037 | 0.2504 | | |
| $\text{iVol}^{rel}_{CAPM} * block_{mgmt}$ | 0.0007 | 0.9035 | | |
| $\text{iVol}^{rel}_{CAPM} * CG$ | -0.0019 | 0.9163 | | |
| $\text{iVol}^{rel}_{FF}$ | | | -0.3772 | 0.0466 |
| $\text{iVol}^{rel}_{FF} * block_{outs}$ | | | 0.0032 | 0.3226 |
| $\text{iVol}^{rel}_{FF} * block_{mgmt}$ | | | -0.0004 | 0.9484 |
| $\text{iVol}^{rel}_{FF} * CG$ | | | -0.0059 | 0.7466 |
| Blackout | -1.3341 | 0.0000 | -1.3341 | 0.0000 |
| Book Lev. | -0.0008 | 0.8744 | -0.0009 | 0.8690 |
| Size | -0.1286 | 0.3333 | -0.1248 | 0.3480 |
| Q | 0.0005 | 0.1946 | 0.0005 | 0.1926 |
| Return on Eq. | -0.0001 | 0.9155 | -0.0001 | 0.9050 |
| | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CZ}$ | -0.4613 | 0.0151 | | |
| $\text{iVol}^{rel}_{CZ} * block_{outs}$ | 0.0049 | 0.1269 | | |
| $\text{iVol}^{rel}_{CZ} * block_{mgmt}$ | 0.0017 | 0.7854 | | |
| $\text{iVol}^{rel}_{CZ} * CG$ | -0.0018 | 0.9219 | | |
| $\text{iVol}^{rel}_{C}$ | | | -0.3634 | 0.0549 |
| $\text{iVol}^{rel}_{C} * block_{outs}$ | | | 0.0032 | 0.3196 |
| $\text{iVol}^{rel}_{C} * block_{mgmt}$ | | | -0.0008 | 0.8956 |
| $\text{iVol}^{rel}_{C} * CG$ | | | -0.0067 | 0.7147 |
| Blackout | -1.3357 | 0.0000 | -1.3329 | 0.0000 |
| Book Lev. | -0.0011 | 0.8423 | -0.0009 | 0.8686 |
| Size | -0.1241 | 0.3497 | -0.1242 | 0.3503 |
| Q | 0.0005 | 0.2132 | 0.0005 | 0.1936 |
| Return on Eq. | -0.0001 | 0.9145 | -0.0001 | 0.9002 |

The table presents the estimation output of logit firm and year fixed effects regressions of a daily insider selling dummy constructed as described in section 2 against the variables displayed.

Table 13: Logit regressions of large firm insider buying activity against firm characteristics and idiosyncratic volatility

| | Purchases by Insiders | | | |
|---|---|---|---|---|
| | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CAPM}$ | 0.6194 | 0.0000 | | |
| $\text{iVol}^{rel}_{FF}$ | | | 0.6262 | 0.0000 |
| Blackout | -0.9120 | 0.0000 | -0.9110 | 0.0000 |
| Book Lev. | 0.0045 | 0.1573 | 0.0046 | 0.1500 |
| Size | -0.0211 | 0.8295 | -0.0180 | 0.8543 |
| Q | -0.0001 | 0.6836 | -0.0001 | 0.7060 |
| Return on Eq. | 0.0004 | 0.0006 | 0.0004 | 0.0007 |
| | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CZ}$ | 0.6196 | 0.0000 | | |
| $\text{iVol}^{rel}_{C}$ | | | 0.6123 | 0.0000 |
| Blackout | -0.9129 | 0.0000 | -0.9144 | 0.0000 |
| Book Lev. | 0.0045 | 0.1566 | 0.0045 | 0.1525 |
| Size | -0.0198 | 0.8395 | -0.0199 | 0.8388 |
| Q | -0.0001 | 0.6660 | -0.0001 | 0.6868 |
| Return on Eq. | 0.0004 | 0.0007 | 0.0004 | 0.0008 |

The table presents the estimation output of logit firm and year fixed effects regressions of a daily insider buying dummy constructed as described in section 2 against the variables displayed.

Table 14: Logit regressions of large firm insider selling activity against firm characteristics and idiosyncratic volatility

| | Sales by Insiders | | | |
| | coef. | p-value | coef. | p-value |
|---|---|---|---|---|
| $iVol^{rel}_{CAPM}$ | -0.2365 | 0.0000 | | |
| $iVol^{rel}_{FF}$ | | | -0.2372 | 0.0000 |
| Blackout | -0.6487 | 0.0000 | -0.6487 | 0.0000 |
| Book Lev. | -0.0003 | 0.0324 | -0.0003 | 0.8729 |
| Size | 0.2694 | 0.0000 | 0.2705 | 0.0000 |
| Q | -0.0001 | 0.0595 | -0.0001 | 0.0550 |
| Return on Eq. | 6.177E-8 | 0.9910 | 9.145E-8 | 0.9867 |
| | coef. | p-value | coef. | p-value |
| $iVol^{rel}_{CZ}$ | -0.2284 | 0.0000 | | |
| $iVol^{rel}_{C}$ | | | -0.2352 | 0.0000 |
| Blackout | -0.6472 | 0.0000 | -0.6481 | 0.0000 |
| Book Lev. | -0.0003 | 0.8561 | -0.0003 | 0.8815 |
| Size | 0.2698 | 0.0000 | 0.2707 | 0.0000 |
| Q | -0.0001 | 0.0608 | -0.0001 | 0.0580 |
| Return on Eq. | 7.279E-8 | 0.9894 | 1.456E-7 | 0.9788 |

The table presents the estimation output of logit firm and year fixed effects regressions of a daily insider selling dummy constructed as described in section 2 against the variables displayed.

Table 15: Logit regressions of small firm insider buying activity against firm characteristics and idiosyncratic volatility

| | Purchases by Insiders | | | |
|---|---|---|---|---|
| | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CAPM}$ | 0.1220 | 0.0000 | | |
| $\text{iVol}^{rel}_{FF}$ | | | 0.1207 | 0.0000 |
| Blackout | -0.5747 | 0.0000 | -0.5750 | 0.0000 |
| Book Lev. | 0.00456 | 0.0402 | 0.0046 | 0.0395 |
| Size | -0.2391 | 0.0000 | -0.2398 | 0.0000 |
| Q | 0.0001 | 0.7045 | 0.0001 | 0.7025 |
| Return on Eq. | 8.345E-8 | 0.9081 | 8.629E-8 | 0.9049 |
| | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CZ}$ | 0.1188 | 0.0000 | | |
| $\text{iVol}^{rel}_{C}$ | | | 0.1221 | 0.0000 |
| Blackout | -0.5752 | 0.0000 | -0.5751 | 0.0000 |
| Book Lev. | 0.00456 | 0.0392 | 0.0046 | 0.0396 |
| Size | -0.2401 | 0.0000 | -0.2398 | 0.0000 |
| Q | 0.0001 | 0.7024 | 0.0001 | 0.7037 |
| Return on Eq. | 8.568E-8 | 0.9057 | 8.59E-8 | 0.9055 |

The table presents the estimation output of logit firm and year fixed effects regressions of a daily insider buying dummy constructed as described in section 2 against the variables displayed.

Table 16: Logit regressions of small firm insider selling activity against firm characteristics and idiosyncratic volatility

| | Sales by Insiders | | | |
| | coef. | p-value | coef. | p-value |
|---|---|---|---|---|
| $\text{iVol}^{rel}_{CAPM}$ | 0.2540 | 0.0000 | | |
| $\text{iVol}^{rel}_{FF}$ | | | 0.2611 | 0.0000 |
| Blackout | -0.4433 | 0.0000 | -0.4433 | 0.0000 |
| Book Lev. | -0.0001 | 0.9850 | -0.0001 | 0.9877 |
| Size | 0.0409 | 0.5970 | 0.0421 | 0.5858 |
| Q | 0.0006 | 0.1531 | 0.0006 | 0.1545 |
| Return on Eq. | 1.603E-6 | 0.8773 | 1.62E-6 | 0.8774 |
| | coef. | p-value | coef. | p-value |
| $\text{iVol}^{rel}_{CZ}$ | 0.2568 | 0.0000 | | |
| $\text{iVol}^{rel}_{C}$ | | | 0.2609 | 0.0000 |
| Blackout | -0.4438 | 0.0000 | -0.4436 | 0.0000 |
| Book Lev. | -0.0001 | 0.9887 | -0.0001 | 0.9876 |
| Size | 0.0420 | 0.5870 | 0.0419 | 0.5879 |
| Q | 0.0006 | 0.1555 | 0.0006 | 0.1566 |
| Return on Eq. | 1.614E-6 | 0.8777 | 1.639E-6 | 0.8798 |

The table presents the estimation output of logit firm and year fixed effects regressions of a daily insider selling dummy constructed as described in section 2 against the variables displayed.

Table 17: Determinants of cumulative abnormal returns in $k$ calendar months after an insider trade based on the CAPM and using relative idiosyncratic volatility

| | Purchases by Insiders | | | |
| | 1 month | | 3 months | |
| | coef. | p-value | coef. | p-value |
| --- | --- | --- | --- | --- |
| $iVol^{rel}_{CAPM}$ | 0.0344 | 0.000 | 0.0529 | 0.000 |
| Blackout | 0.0073 | 0.059 | -0.0057 | 0.335 |
| Book Lev. | 0.00004 | 0.746 | -0.0001 | 0.693 |
| Size | -0.0201 | 0.000 | -0.0458 | 0.000 |
| Q | -0.0001 | 0.000 | -0.0002 | 0.000 |
| Return on Eq. | -2.78e-08 | 0.401 | 1.94e-08 | 0.677 |
| | Purchases by Insiders | | | |
| | 6 months | | 12 months | |
| | coef. | p-value | coef. | p-value |
| $iVol^{rel}_{CAPM}$ | 0.0590 | 0.000 | 0.0780 | 0.000 |
| Blackout | -0.0130 | 0.088 | -0.0247 | 0.004 |
| Book Lev. | 0.0005 | 0.097 | 0.0006 | 0.097 |
| Size | -0.0366 | 0.000 | 0.0284 | 0.001 |
| Q | -0.0002 | 0.000 | -0.0002 | 0.000 |
| Return on Eq. | 3.36e-08 | 0.383 | 1.73e-08 | 0.832 |

The table presents the estimation output of linear firm fixed effects regressions with robust standard errors of the cumulative abnormal returns of insider buy transactions over $k$ calendar months following the insider trade against idiosyncratic volatility of the firm's stock at the time of the insider trade, the blackout dummy and several fundamental firm characteristic computed as described in section 2.

Table 18: Determinants of cumulative abnormal returns in $k$ calendar months after an insider trade based on the Fama-French model and using relative idiosyncratic volatility

| | Purchases by Insiders | | | |
| | 1 month | | 3 months | |
| | coef. | p-value | coef. | p-value |
|---|---|---|---|---|
| $\text{iVol}_{FF}^{rel}$ | 0.0258 | 0.000 | 0.0357 | 0.000 |
| Blackout | 0.0108 | 0.006 | 0.0008 | 0.883 |
| Book Lev. | -4.58e-06 | 0.974 | -0.0002 | 0.254 |
| Size | -0.0198 | 0.000 | -0.0405 | 0.000 |
| Q | -0.0001 | 0.001 | -0.0001 | 0.000 |
| Return on Eq. | -8.26e-09 | 0.794 | 4.69e-08 | 0.280 |
| | Purchases by Insiders | | | |
| | 6 months | | 12 months | |
| | coef. | p-value | coef. | p-value |
| $\text{iVol}_{FF}^{rel}$ | 0.0314 | 0.000 | 0.0345 | 0.000 |
| Blackout | -0.0108 | 0.154 | -0.0212 | 0.008 |
| Book Lev. | 0.0002 | 0.573 | 0.0001 | 0.713 |
| Size | -0.0289 | 0.000 | 0.0219 | 0.010 |
| Q | -0.0002 | 0.000 | -0.0002 | 0.000 |
| Return on Eq. | 8.31e-08 | 0.035 | 8.41e-08 | 0.100 |

The table presents the estimation output of linear firm fixed effects regressions with robust standard errors of the cumulative abnormal returns of insider buy transactions over $k$ calendar months following the insider trade against idiosyncratic volatility of the firm's stock at the time of the insider trade, the blackout dummy and several fundamental firm characteristic computed as described in section 2.

Table 19: Determinants of cumulative abnormal returns in $k$ calendar months after an insider trade based on the Chen-Zhang model and using relative idiosyncratic volatility

| | Purchases by Insiders | | | |
| | 1 month | | 3 months | |
| | coef. | p-value | coef. | p-value |
|---|---|---|---|---|
| $\text{iVol}_{CZ}^{rel}$ | 0.0332 | 0.000 | 0.0442 | 0.000 |
| Blackout | 0.0059 | 0.131 | -0.0108 | 0.079 |
| Book Lev. | 0.0001 | 0.598 | 0.00002 | 0.903 |
| Size | -0.0184 | 0.000 | -0.0444 | 0.000 |
| Q | -0.0001 | 0.000 | -0.0002 | 0.000 |
| Return on Eq. | -1.53e-08 | 0.709 | 1.55e-08 | 0.790 |
| | Purchases by Insiders | | | |
| | 6 months | | 12 months | |
| | coef. | p-value | coef. | p-value |
| $\text{iVol}_{CZ}^{rel}$ | 0.0427 | 0.000 | 0.0594 | 0.000 |
| Blackout | -0.0188 | 0.014 | -0.0325 | 0.000 |
| Book Lev. | 0.0007 | 0.023 | 0.0009 | 0.006 |
| Size | -0.0431 | 0.000 | 0.0097 | 0.327 |
| Q | -0.0003 | 0.000 | -0.0003 | 0.000 |
| Return on Eq. | 5.89e-08 | 0.249 | 3.44e-08 | 0.727 |

The table presents the estimation output of linear firm fixed effects regressions with robust standard errors of the cumulative abnormal returns of insider buy transactions over $k$ calendar months following the insider trade against idiosyncratic volatility of the firm's stock at the time of the insider trade, the blackout dummy and several fundamental firm characteristic computed as described in section 2.

Table 20: Determinants of cumulative abnormal returns in $k$ calendar months after an insider trade based on the Carhart model and using relative idiosyncratic volatility

| | Purchases by Insiders | | | |
| | 1 month | | 3 months | |
| | coef. | p-value | coef. | p-value |
|---|---|---|---|---|
| $\text{iVol}_C^{rel}$ | 0.0246 | 0.000 | 0.0396 | 0.000 |
| Blackout | 0.0066 | 0.089 | 0.0011 | 0.848 |
| Book Lev. | 0.0001 | 0.669 | -0.0001 | 0.568 |
| Size | -0.0202 | 0.003 | -0.0453 | 0.000 |
| Q | -0.0001 | 0.000 | -0.0001 | 0.000 |
| Return on Eq. | -2.06e-08 | 0.450 | 5.58e-08 | 0.234 |
| | Purchases by Insiders | | | |
| | 6 months | | 12 months | |
| | coef. | p-value | coef. | p-value |
| $\text{iVol}_C^{rel}$ | 0.0341 | 0.000 | 0.0509 5 | 0.000 |
| Blackout | -0.0136 | 0.084 | -0.0214 | 0.014 |
| Book Lev. | 0.0004 | 0.236 | 0.0003 | 0.388 |
| Size | -0.0352 | 0.000 | 0.0209 | 0.019 |
| Q | -0.0002 | 0.000 | -0.0002 | 0.000 |
| Return on Eq. | 7.76e-08 | 0.066 | 7.04e-08 | 0.279 |

The table presents the estimation output of linear firm fixed effects regressions with robust standard errors of the cumulative abnormal returns of insider buy transactions over $k$ calendar months following the insider trade against idiosyncratic volatility of the firm's stock at the time of the insider trade, the blackout dummy and several fundamental firm characteristic computed as described in section 2.

Table 21: Determinants of cumulative abnormal returns in $k$ calendar months after an insider trade based on the CAPM and using relative idiosyncratic volatility

| | Sales by Insiders | | | |
| | 1 month | | 3 months | |
| | coef. | p-value | coef. | p-value |
|---|---|---|---|---|
| $iVol^{rel}_{CAPM}$ | -0.0099 | 0.000 | -0.02668 | 0.000 |
| Blackout | 0.0010 | 0.616 | -0.0084 | 0.007 |
| Book Lev. | -0.0002 | 0.057 | -0.0002 | 0.087 |
| Size | -0.0203 | 0.000 | -0.0416 | 0.000 |
| Q | -0.00003 | 0.000 | -0.0001 | 0.000 |
| Return on Eq. | -9.67e-09 | 0.598 | -3.45e-09 | 0.919 |
| | Sales by Insiders | | | |
| | 6 months | | 12 months | |
| | coef. | p-value | coef. | p-value |
| $iVol^{rel}_{CAPM}$ | -0.0534 | 0.000 | -0.0740 | 0.000 |
| Blackout | -0.0107 | 0.004 | -0.01198 | 0.006 |
| Book Lev. | -0.0004 | 0.016 | 0.0001 | 0.671 |
| Size | -0.0438 | 0.000 | -0.0056 | 0.172 |
| Q | -0.0001 | 0.000 | -0.0001 | 0.000 |
| Return on Eq. | -8.69e-09 | 0.921 | 1.33e-07 | 0.418 |

The table presents the estimation output of linear firm fixed effects regressions with robust standard errors of the cumulative abnormal returns of insider sell transactions over $k$ calendar months following the insider trade against idiosyncratic volatility of the firm's stock at the time of the insider trade, the blackout dummy and several fundamental firm characteristic computed as described in section 2.

Table 22: Determinants of cumulative abnormal returns in $k$ calendar months after an insider trade based on the Fama-French model and using relative idiosyncratic volatility

| | Sales by Insiders | | | |
| | 1 month | | 3 months | |
| | coef. | p-value | coef. | p-value |
| --- | --- | --- | --- | --- |
| iVol$_{FF}^{rel}$ | -0.0131 | 0.000 | -0.0338 | 0.000 |
| Blackout | 0.0011 | 0.540 | -0.0068 | 0.024 |
| Book Lev. | -0.0001 | 0.112 | -0.0003 | 0.054 |
| Size | -0.0198 | 0.000 | -0.0369 | 0.000 |
| Q | -0.00002 | 0.000 | -0.00004 | 0.000 |
| Return on Eq. | -4.72e-08 | 0.205 | -2.78e-08 | 0.649 |
| | Sales by Insiders | | | |
| | 6 months | | 12 months | |
| | coef. | p-value | coef. | p-value |
| iVol$_{FF}^{rel}$ | -0.0682 | 0.000 | -0.1016 | 0.000 |
| Blackout | -0.0125 | 0.001 2 | -0.0148 | 0.001 |
| Book Lev. | -0.0005 | 0.001 | -0.0004 | 0.045 |
| Size | -0.0442 | 0.000 | -0.0151 | 0.000 |
| Q | -0.0001 | 0.000 | -0.0001 | 0.000 |
| Return on Eq. | -1.94e-08 | 0.880 | 1.65e-07 | 0.363 |

The table presents the estimation output of linear firm fixed effects regressions with robust standard errors of the cumulative abnormal returns of insider sell transactions over $k$ calendar months following the insider trade against idiosyncratic volatility of the firm's stock at the time of the insider trade, the blackout dummy and several fundamental firm characteristic computed as described in section 2.

Table 23: Determinants of cumulative abnormal returns in $k$ calendar months after an insider trade based on the Chen-Zhang model and using relative idiosyncratic volatility

| | Sales by Insiders | | | |
| | 1 month | | 3 months | |
| | coef. | p-value | coef. | p-value |
|---|---|---|---|---|
| $\text{iVol}_{CZ}^{rel}$ | -0.0107 | 0.000 | -0.0333 | 0.000 |
| Blackout | 0.0016 | 0.393 | -0.0073 | 0.018 |
| Book Lev. | -0.0001 | 0.311 2 | -0.0001 | 0.633 |
| Size | -0.0218 | 0.000 | -0.0454 | 0.000 |
| Q | -0.00003 | 0.000 | -0.0001 | 0.000 |
| Return on Eq. | -6.01e-09 | 0.771 | -8.85e-09 | 0.784 |
| | Sales by Insiders | | | |
| | 6 months | | 12 months | |
| | coef. | p-value | coef. | p-value |
| $\text{iVol}_{CZ}^{rel}$ | -0.0679 | 0.000 | -0.0921 | 0.000 |
| Blackout | -0.0107 | 0.004 2 | -0.0151 | 0.001 |
| Book Lev. | -0.0001 | 0.401 | 0.0003 | 0.185 |
| Size | -0.0542 | 0.000 | -0.0235 | 0.000 |
| Q | -0.0001 | 0.000 | -0.0001 | 0.000 |
| Return on Eq. | -2.53e-08 | 0.781 | 1.12e-07 | 0.461 |

The table presents the estimation output of linear firm fixed effects regressions with robust standard errors of the cumulative abnormal returns of insider sell transactions over $k$ calendar months following the insider trade against idiosyncratic volatility of the firm's stock at the time of the insider trade, the blackout dummy and several fundamental firm characteristic computed as described in section 2.

Table 24: Determinants of cumulative abnormal returns in $k$ calendar months after an insider trade based on the Carhart model and using relative idiosyncratic volatility

| | Sales by Insiders | | | |
| | 1 month | | 3 months | |
| | coef. | p-value | coef. | p-value |
|---|---|---|---|---|
| $iVol_C^{rel}$ | -0.0136 | 0.000 | -0.0330 | 0.000 |
| Blackout | -0.0006 | 0.762 | -0.0072 | 0.019 |
| Book Lev. | -0.0001 | 0.204 2 | -0.0002 | 0.103 |
| Size | -0.0203 | 0.000 | -0.0384 | 0.000 |
| Q | -0.00002 | 0.000 | -0.0001 | 0.000 |
| Return on Eq. | -5.50e-08 | 0.158 | -2.13e-08 | 0.747 |

| | Sales by Insiders | | | |
| | 6 months | | 12 months | |
| | coef. | p-value | coef. | p-value |
|---|---|---|---|---|
| $iVol_C^{rel}$ | -0.0662 | 0.000 | -0.0928 | 0.000 |
| Blackout | -0.0147 | 0.000 2 | -0.0152 | 0.001 |
| Book Lev. | -0.0005 | 0.004 | -0.0003 | 0.184 |
| Size | -0.0455 | 0.000 | -0.0156 | 0.000 |
| Q | -0.0001 | 0.000 | -0.0001 | 0.000 |
| Return on Eq. | -1.77e-08 | 0.898 | 1.49e-07 | 0.250 |

The table presents the estimation output of linear firm fixed effects regressions with robust standard errors of the cumulative abnormal returns of insider sell transactions over $k$ calendar months following the insider trade against idiosyncratic volatility of the firm's stock at the time of the insider trade, the blackout dummy and several fundamental firm characteristic computed as described in section 2.