

Idiosyncratic Volatility and the Timing of Corporate Insider Trading

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Abstract

This paper addresses the question of how the corporate insiders' trading activities are related to the level of information asymmetry in a stock price. Using idiosyncratic volatility as a proxy for the asymmetric information between insiders and outsiders, we conduct an empirical investigation in order to shed light on the timing of corporate insider trading and further reveal other factors affecting the probability of insider trading. We find that corporate insiders are likely to exploit their informational advantage through trading at times of high information asymmetry. Furthermore, trading during periods of high information asymmetry generates higher profits which suggests that insiders may increase their trading gains through strategic timing.

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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 trade 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.

Their apparent attempts to trade 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.

Furthermore, we find firms' market capitalization affects corporate insiders' abnormal returns. In particular, buys of small firms' stocks are followed by

higher abnormal returns while lower abnormal returns follow sales of stocks of small firms. A possible explanation is that insider trades in small firms cause more price pressure, including that caused by investors that follow the insiders' trades, than trades in larger firm stocks.

Also, we find that corporate fundamentals and firm valuation impact insider trading. In line with earlier research, insiders appear to be contrarians as inferred by their trading activity with respect to their firms' Tobin's q . Also, they seem to act on profitability, as purchases increase and sells decrease with the firm's return on equity.

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 advan-

tage 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 information 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 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 disclo-

sure types because the occurrence 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 asymmetry¹ *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. 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.

Daily stockreturn data that are used to compute idiosyncratic volatility and

¹We will extend the empirical analysis to measures of information asymmetry other than idiosyncratic volatility prior to the conference.

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. 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.

2.2 Construction of measures

In our construction of a measure of corporate insider trading activity we consider that insiders often split their trades among several transactions over several days so that subsequent transactions should be aggregated. We choose to aggregate insider trades in a firm's stocks if less than seven days pass between subsequent trades, i.e., for such trades, in our analysis we use the day such trading activity begins as the date of the trade. While Ke et al. (2003) suggest monthly aggregation, we believe this approach to be more suitable considering the quickly changing nature of measures of asymmetric information. We follow them in aggregating the number of net sales (buys) over an aggregation period. They rationalize this choice by arguing that each

transaction represents an insider's choice of buying or selling.

We use idiosyncratic volatility as a proxy for information activities in a stock. This measure is defined as the volatility of residual returns unexplained by market models as the CAPM (Sharpe (1964), Lintner (1965), Mossin (1966)), the Fama-French three-factor model (Fama and French (1993)), the Carhart four-factor model (Carhart (1997)) or the three-factor model by Chen and Zhang (2010). 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.

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.

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. We compute idiosyncratic volatilities with respect to the CAPM and the Fama-French three factor model.

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.

Quarterly earnings announcements present a channel through which information about firm value is communicated to investors. Asymmetric information is likely to be high before earnings announcements and low after earnings announcements as the disclosure of earnings evens out asymmetric information, at least partially. Quarterly earnings announcements therefore generate a pattern of fluctuations in the temporary information advantage which is predictable and applies to all listed firms in the U.S. 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. To control for the effect the blackout periods have on corporate insider trading, we introduce a dummy variable that is 0 during the 30 days after an earnings announcement and 1 otherwise.

3 Empirical design and results

This section will be significantly extended 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 the relationship between the informational environment and the profits gained through insider trading.

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.

3.1 Timing of Insider Trading

[Table 1 about here.]

[Table 2 about here.]

[Table 3 about here.]

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 asymmetric information differs between buy and sell transactions.

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 the amount of insider ownership, management compensation, or simply idiosyncrasies in the managers' acting. Furthermore, insider trading may vary marketwide over time for exogenous reason, e.g., the enactment of the Sarbanes Oxley Act may have generally altered the amount of insider trading. We accommodate these cross-sectional and longitudinal determinants using a panel approach with firm and time fixed effects.

Our empirical results are displayed in tables 1 to 3. Table 1 shows the results for the entire sample of insider trades, i.e., both purchase and sale transactions. The results show that there appears to be a strong positive relation between relative information asymmetry and insider trading activity, i.e. there are both more buy and sell insider transactions when information asymmetry is relatively high. The blackout variable has the expected effect, i.e. there tends to be less insider trading 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 increases with their company's return on equity whereas the inclination to sell decreases. By contrast, insiders appear to be contrarians with respect to the valuation of their firm as purchases decrease with a firm's Tobin's q . However, there is no opposite effect for sale transactions which suggests sales by insiders are less strongly driven by firm fundamentals. Another finding is that insiders' inclination to buy increases with the return on equity while the reverse holds true for sell transactions. Size positively affects both the probability of buys and sells though this is likely to be due to the presence of a larger number of insiders in larger firms.

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.

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 due 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. We run separate regressions for purchases and sales.

We conduct linear regressions with firm fixed effects and robust standard errors. For buy transactions, we use the regular cumulative abnormal returns, for sell transactions we do the same when we consider these only but reverse the abnormal returns when analyzing the whole sample to obtain the abnormal returns achieved by the corporate insider through the buy or sale of the stock.

In a first set of regressions (tables 4 through 9), we look at the effect the level of idiosyncratic volatility has on abnormal returns obtained through corporate insider trading. This encompasses both long-term differences between firms and short-term variations of idiosyncratic volatility at individual firms. The results show that high idiosyncratic volatility increases the ex-

pected returns both from all transactions and from insider purchases. For sales transactions, the coefficients vary across specifications and are generally smaller in size than those for buys in case they are positive. This is in line with both sales being less informative than buys and idiosyncratic volatility generally being positively related to expected returns.

A second set of regressions (tables 10 through 15) looks 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. The results are comparable to those for the level of idiosyncratic volatility. They show that insiders as a whole and when buying their firms' stock profit from information asymmetry while the picture for sales is unclear.

Size appears to significantly affects abnormal returns. While the effect of size is positive for the whole sample of insider trades, the estimations differ markedly between buy and sell transactions. For buys, insiders at firms with high market capitalizations appear to earn lower returns than those of small firms while the reverse holds true for sells. This is likely to stem from investors trading in the same directions as the insiders having a larger influence on small-firm and therefore more likely illiquid stocks. Book equity as a proxy for firm size without consideration of market valuation appears to positively influence abnormal returns though this may be due to its relation to other factors and further analysis, particularly the removal of one or more variables to avoid collinearities, seems in order.

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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 trading is significantly more likely on a given day when recent idiosyncratic volatility is relatively high.

Beyond support for timing strategies of insiders, i.e., insiders trade when information asymmetry is high, we also find that timing actually enhances the cumulative abnormal returns they gain 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 are contrarians, as indicated by the estimation coefficients with respect to Tobin's q , and they tend to purchase more and sell less when the return on equity is higher. This, again, could possibly be due to the use of a foreknowledge of information as some time passes between the application of the latest firm data at their year's end² and their publication.

²This is valid in this case as we are not trying to show the ability of an outsider to predict such behavior but rather describe the insiders' way of acting.

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Table 1:

Logit regressions of total insider trading activity against firm characteristics and idiosyncratic volatility

	Total Insider Trading			
	coef.	p-value	coef.	p-value
$iVol_{CAPM,rel}$	1.5060	0.0000		
$iVol_{FF,rel}$			1.3116	0.0000
Blackout	-0.3122	0.0000	-0.4832	0.0000
Book Lev.	-0.0906	0.4012	0.0123	0.8673
Size	0.5017	0.0000	0.3338	0.0000
Q	-0.0333	0.0000	-0.0176	0.0000
Book Equity	0.0000	0.8637	0.0000	0.9678
Return on Eq.	-0.0000	0.0546	-0.0000	0.1220

The table presents the estimation output of logit firm and year fixed effects regressions of a daily insider trading dummy constructed as described in section 3 against the variables displayed.

Tables

Table 2:

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

	Purchases by Insiders			
	coef.	p-value	coef.	p-value
$iVol_{CAPM,rel}$	0.4598	0.0000		
$iVol_{FF,rel}$			0.4583	0.0000
Blackout	-0.1831	0.0000	-0.2334	0.0000
Book Lev.	-0.0764	0.2634	-0.0592	0.3662
Size	0.1333	0.0000	0.1266	0.0000
Q	-0.0561	0.0000	-0.0557	0.0000
Book Equity	0.0000	0.2050	0.0000	0.1789
Return on Eq.	0.0000	0.0248	0.0001	0.0160

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

	Sells by Insiders			
	coef.	p-value	coef.	p-value
$iVol_{CAPM,rel}$	0.5924	0.0000		
$iVol_{FF,rel}$			0.5895	0.0000
Blackout	-0.2668	0.0000	-0.3416	0.0000
Book Lev.	-0.0115	0.6416	0.0172	0.9437
Size	0.2416	0.0000	0.2261	0.0000
Q	-0.0040	0.2462	-0.0021	0.5153
Book Equity	-0.0000	0.0078	-0.0000	0.005
Return on Eq.	-0.0001	0.0000	-0.0001	0.0000

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

	Total Insider Trading			
	1 month		3 months	
	coef.	p-value	coef.	p-value
$iVol_{CAPM}$	0.1382	0.000	0.3351	0.000
Blackout	0.0013	0.120	-0.0013	0.349
Book Lev.	0.0082	0.010	0.0222	0.000
Size	0.0080	0.000	0.0274	0.000
Q	0.0005	0.000	0.0016	0.0000
Book Equity	0.0000	0.457	0.0000	0.000
Return on Eq.	-0.0000	0.000	-0.0000	0.000
	Total Insider Trading			
	6 months		12 months	
	coef.	p-value	coef.	p-value
$iVol_{CAPM}$	0.3028	0.000	0.7015	0.000
Blackout	-0.0019	0.336	-0.0018	0.566
Book Lev.	0.3377	0.000	0.1182	0.000
Size	0.0401	0.000	0.0467	0.000
Q	0.0043	0.000	0.0050	0.000
Book Equity	0.0000	0.618	0.0000	0.000
Return on Eq.	-0.0000	0.000	0.0000	0.034

The table presents the estimation output of linear firm fixed effects regressions with robust standard errors of the cumulative abnormal returns of both insider buy and 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 5: Determinants of cumulative abnormal returns in k calendar months after an insider trade based on the Fama-French model and using ordinary idiosyncratic volatility

Total Insider Trading				
	1 month		3 months	
	coef.	p-value	coef.	p-value
iVol _{FF}	0.1262	0.000	0.2429	0.001
Blackout	0.0021	0.009	0.001	0.512
Book Lev.	0.0078	0.006	0.0154	0.001
Size	0.0068	0.000	0.0252	0.000
Q	0.0004	0.028	-0.0016	0.000
Book Equity	0.0000	0.278	0.0000	0.000
Return on Eq.	-0.0000	0.000	0.0000	0.000
Total Insider Trading				
	6 months		12 months	
	coef.	p-value	coef.	p-value
iVol _{FF}	0.2804	0.000	1.1288	0.000
Blackout	0.0003	0.870	0.0002	0.947
Book Lev.	0.0318	0.000	0.1327	0.000
Size	0.0415	0.000	0.0621	0.000
Q	-0.0012	0.012	-0.0046	0.000
Book Equity	0.0000	0.000	0.0000	0.000
Return on Eq.	-0.0000	0.000	0.0000	0.013

The table presents the estimation output of linear firm fixed effects regressions with robust standard errors of the cumulative abnormal returns of both insider buy and 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 6: Determinants of cumulative abnormal returns in k calendar months after an insider buy transaction based on the CAPM and using ordinary idiosyncratic volatility

	Purchases by Insiders			
	1 month		3 months	
	coef.	p-value	coef.	p-value
$iVol_{CAPM}$	0.5467	0.000	0.8723	0.000
Blackout	0.0059	0.001	-0.0073	0.007
Book Lev.	-0.0137	0.106	-0.0362	0.007
Size	-0.0470	0.000	-0.1306	0.000
Q	-0.0025	0.003	-0.0012	0.376
Book Equity	0.0000	0.592	0.0000	0.000
Return on Eq.	-0.0000	0.000	0.0000	0.000

	Purchases by Insiders			
	6 months		12 months	
	coef.	p-value	coef.	p-value
$iVol_{CAPM}$	0.4404	0.001	1.537429	0.000
Blackout	-0.0116	0.004	-0.0234	0.000
Book Lev.	-0.0206	0.321	0.1415	0.000
Size	-0.2593	0.000	-0.4388	0.000
Q	0.0021	0.329	0.0100	0.056
Book Equity	0.0000	0.001	0.0000	0.000
Return on Eq.	-0.0000	0.000	0.0000	0.034

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 7: Determinants of cumulative abnormal returns in k calendar months after an insider buy transaction based on the Fama-French model and using ordinary idiosyncratic volatility

Purchases by Insiders				
	1 month		3 months	
	coef.	p-value	coef.	p-value
$iVol_{FF}$	0.3714	0.000	0.5791	0.000
Blackout	0.0083	0.000	-0.0017	0.537
Book Lev.	-0.0184	0.0296	-0.0568	0.000
Size	-0.0457	0.000	-0.1191	0.000
Q	-0.0019	0.025	-0.0004	0.740
Book Equity	0.000	0.009	0.0000	0.000
Return on Eq.	-0.0000	0.230	0.0000	0.497

Purchases by Insiders				
	6 months		12 months	
	coef.	p-value	coef.	p-value
$iVol_{FF}$	0.1049	0.437	0.7944	0.004
Blackout	-0.0091	0.028	-0.0156	0.017
Book Lev.	-0.0582	0.005	0.0438	0.251
Size	-0.2337	0.000	-0.4056	0.000
Q	0.00022	0.937	-0.0076	0.135
Book Equity	0.0000	0.000	0.0000	0.000
Return on Eq.	0.0000	0.000	0.0000	0.000

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 8: Determinants of cumulative abnormal returns in k calendar months after an insider sell transaction based on the CAPM and using ordinary idiosyncratic volatility

Sales by Insiders				
	1 month		3 months	
	coef.	p-value	coef.	p-value
$iVol_{CAPM}$	0.2555	0.000	0.1655	0.096
Blackout	0.0030	0.001	0.0043	0.008
Book Lev.	-0.0018	0.493	-0.0090	0.027
Size	-0.0340	0.000	-0.0999	0.000
Q	-0.0001	0.597	0.0002	0.442
Book Equity	0.0000	0.000	0.0000	0.000
Return on Eq.	-0.0000	0.233	-0.0000	0.474

Sales by Insiders				
	6 months		12 months	
	coef.	p-value	coef.	p-value
$iVol_{CAPM}$	0.2266	0.008	0.4416	0.001
Blackout	0.0071	0.001	0.0113	0.000
Book Lev.	-0.0086	0.053	-0.0134	0.489
Size	-0.1784	0.000	-0.2832	0.000
Q	0.0005	0.135	0.0009	0.110
Book Equity	0.0000	0.860	-0.0000	0.0720
Return on Eq.	0.0000	0.000	-0.0000	0.659

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 9: Determinants of cumulative abnormal returns in k calendar months after an insider sell transaction based on the Fama-French model and using ordinary idiosyncratic volatility

Sales by Insiders				
	1 month		3 months	
	coef.	p-value	coef.	p-value
iVol _{FF}	0.1304	0.002	0.378	0.693
Blackout	0.0025	0.008	0.0029	0.078
Book Lev.	-0.0027	0.271	-0.0091	0.0180
Size	-0.0304	0.000	-0.0879	0.000
Q	0.0010	0.000	0.0037	0.000
Book Equity	0.000	0.000	0.0000	0.000
Return on Eq.	-0.0000	0.725	-0.0000	0.766

Sales by Insiders				
	6 months		12 months	
	coef.	p-value	coef.	p-value
iVol _{FF}	-0.0899	0.305	-0.9432	0.000
Blackout	0.0041	0.056	0.0095	0.004
Book Lev.	-0.0180	0.001	-0.0914	0.000
Size	-0.1631	0.000	-0.2811	0.000
Q	0.0055	0.000	0.0122	0.000
Book Equity	0.0000	0.143	-0.0000	0.726
Return on Eq.	0.0000	0.877	-0.0000	0.606

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

	Total Insider Trading			
	1 month		3 months	
	coef.	p-value	coef.	p-value
$iVol_{CAPM,rel}$	0.0085	0.000	0.0171	0.000
Blackout	0.00116	0.051	-0.0009	0.530
Book Lev.	0.0078	0.012	0.0219	0.000
Size	0.0082	0.000	0.0275	0.000
Q	0.0005	0.022	0.0015	0.0000
Book Equity	0.0000	0.374	0.0000	0.000
Return on Eq.	-0.0000	0.000	-0.0000	0.000
	Total Insider Trading			
	6 months		12 months	
	coef.	p-value	coef.	p-value
$iVol_{CAPM,rel}$	0.0158	0.000	0.0294	0.000
Blackout	-0.0015	0.455	-0.0015	0.636
Book Lev.	0.03341	0.000	0.1181	0.000
Size	0.0403	0.000	0.0464	0.000
Q	0.0043	0.000	0.0050	0.000
Book Equity	0.0000	0.000	0.0000	0.000
Return on Eq.	-0.0000	0.000	0.0000	0.037

The table presents the estimation output of linear firm fixed effects regressions with robust standard errors of the cumulative abnormal returns of both insider buy and 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 11: Determinants of cumulative abnormal returns in k calendar months after an insider trade based on the Fama-French model and using relative idiosyncratic volatility

	Total Insider Trading			
	1 month		3 months	
	coef.	p-value	coef.	p-value
iVol _{FF,rel}	0.0078	0.000	0.0137	0.000
Blackout	0.0024	0.003	0.0014	0.325
Book Lev.	0.0075	0.008	0.0150	0.001
Size	0.0070	0.000	0.0253	0.000
Q	-0.0004	0.019	-0.0017	0.000
Book Equity	0.0000	0.223	0.0000	0.000
Return on Eq.	-0.0000	0.000	-0.0000	0.000
	Total Insider Trading			
	6 months		12 months	
	coef.	p-value	coef.	p-value
iVol _{FF,rel}	0.0154	0.000	0.0450	0.000
Blackout	0.0008	0.688	0.0005	0.869
Book Lev.	0.0313	0.000	0.1333	0.000
Size	0.0417	0.000	0.0614	0.000
Q	-0.0012	0.009	-0.0045	0.000
Book Equity	0.0000	0.000	0.0000	0.000
Return on Eq.	-0.0000	0.000	0.0000	0.017

The table presents the estimation output of linear firm fixed effects regressions with robust standard errors of the cumulative abnormal returns of both insider buy and 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 12: 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
$iVol_{CAPM,rel}$	0.0255	0.000	0.0398	0.000
Blackout	0.0059	0.051	-0.0073	0.008
Book Lev.	-0.0135	0.112	-0.0358	0.008
Size	-0.0476	0.000	-0.1317	0.000
Q	-0.0025	0.003	0.0011	0.383
Book Equity	0.0000	0.015	0.0000	0.000
Return on Eq.	-0.0000	0.490	0.0000	0.271

Purchases by Insiders				
	6 months		12 months	
	coef.	p-value	coef.	p-value
$iVol_{CAPM,rel}$	0.0249	0.000	0.0681	0.000
Blackout	-0.0113	0.005	-0.0233	0.000
Book Lev.	-0.0218	0.294	0.1423	0.000
Size	-0.2594	0.000	-0.4402	0.000
Q	-0.0021	0.318	0.0100	0.057
Book Equity	0.0000	0.000	0.0000	0.000
Return on Eq.	0.0000	0.001	0.0000	0.000

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 13: 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
iVol $_{FF,rel}$	0.0176	0.000	0.0211	0.000
Blackout	0.0075	0.000	-0.0031	0.275
Book Lev.	-0.0185	0.027	0.0544	0.000
Size	-0.0458	0.000	-0.1199	0.000
Q	-0.0019	0.026	-0.0003	0.816
Book Equity	0.0000	0.009	0.0000	0.000
Return on Eq.	-0.0000	0.188	0.0000	0.599

Purchases by Insiders				
	6 months		12 months	
	coef.	p-value	coef.	p-value
iVol $_{FF,rel}$	0.0134	0.016	0.0380	0.000
Blackout	-0.0095	0.021	-0.0177	0.006
Book Lev.	-0.0596	0.004	0.0430	0.264
Size	-0.2323	0.000	-0.4041	0.000
Q	0.0001	0.981	-0.0077	0.130
Book Equity	0.0000	0.000	0.0000	0.000
Return on Eq.	0.0000	0.005	0.0000	0.000

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 14: 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
$iVol_{CAPM,rel}$	0.0044	0.001	-0.0002	0.954
Blackout	0.0024	0.010	0.0036	0.026
Book Lev.	-0.0012	0.661	-0.0083	0.039
Size	-0.0345	0.000	-0.1005	0.000
Q	-0.0000	0.846	0.0003	0.282
Book Equity	0.0000	0.000	0.0000	0.000
Return on Eq.	-0.0000	0.236	-0.0000	0.455

	Sales by Insiders			
	6 months		12 months	
	coef.	p-value	coef.	p-value
$iVol_{CAPM,rel}$	0.0043	0.121	0.0142	0.001
Blackout	0.0066	0.002	0.0111	0.001
Book Lev.	-0.0080	0.068	-0.1259	0.514
Size	-0.1788	0.000	-0.2835	0.000
Q	0.0005	0.183	0.0009	0.094
Book Equity	0.0000	0.804	-0.0000	0.091
Return on Eq.	0.0000	0.000	-0.0000	0.663

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 15: 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
$iVol_{FF,rel}$	-0.0001	0.931	-0.0072	0.011
Blackout	0.0019	0.039	0.0019	0.244
Book Lev.	-0.0022	0.376	-0.0082	0.029
Size	-0.0309	0.000	-0.0887	0.000
Q	0.0010	0.0006	0.0038	0.000
Book Equity	0.0000	0.000	0.0000	0.000
Return on Eq.	-0.0000	0.745	-0.0000	0.755

	Sales by Insiders			
	6 months		12 months	
	coef.	p-value	coef.	p-value
$iVol_{FF,rel}$	-0.0125	0.000	-0.0473	0.000
Blackout	0.0030	0.162	0.0079	0.018
Book Lev.	-0.0172	0.001	-0.0889	0.000
Size	-0.1638	0.000	-0.2816	0.000
Q	0.0056	0.000	0.0123	0.130
Book Equity	0.0000	0.172	0.0000	0.528
Return on Eq.	0.0000	0.894	0.0000	0.600

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.