Trading Against the Grain: Why Insiders Buy High and Sell Low[1]

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ABSTRACT

This study uncovers a new way to tell when insiders are trading on nonpublic information. We find that U.S. corporate insiders are likely to buy (sell) more shares of a stock when its price nears its 52-week low (high). This suggests that insiders fixate on 52-week lows (highs) as anchor levels in their trading decisions. Our findings suggest, however, that insiders overcome this anchoring bias if they have compelling private information. We show that outsiders can reap sizeable abnormal returns by piggybacking on insiders who make these "buy high and sell low" trades.

JEL Classification: G11, G14, G15

Key words: Insider trade, anchoring bias, 52-week high and 52-week low, private information

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"*Human behavior flows from three main sources: desire, emotion, and knowledge.*" – Plato

1. Introduction

On July 25, 2017, Dr. James Healy, an independent director of E*TRADE Financial Corporation (ticker symbol: ETFC), bought 5,000 shares of ETFC worth a total of $209,850. He paid $41.97 per share. The close price that day was $41.92, a multiyear high. Despite Healy buying the stock at a point some would say was overvalued, in the following six months, ETFC logged a return of 31.66%.

Questions about why corporate insiders make seemingly counterintuitive trades are one reason financial economists extensively analyze insider trading and the ensuing return predictability. Unfortunately, however, there is little research on why corporate insiders occasionally buy (sell) at relatively high (low) prices, and there is little research about its implications for asset prices.

We shed light on this intriguing and important issue by analyzing behavioral biases and informational advantages that drive insider trades. The findings are simple: insiders tend to buy low and sell high, likely influenced by anchoring bias. Should insiders decide to do otherwise (that is, "buy high and sell low"), they likely do so because they have valuable private information that helps them overcome the bias. In turn, outside investors can piggyback on these informative insider trades and reap sizeable returns.

Insiders, like any other investors, have emotions that can overpower reason. However, unlike other investors, insiders have private information. If Plato is right that behavior flows from desire, emotion, and knowledge, then given an insider's trading behavior, an investigation into her emotional or behavioral biases may reveal her true motives, which, in turn, helps other investors determine whether insider trades are informative.

In this study, we focus on one particular behavioral bias that can undercut effective investment decision-making: anchoring bias. Anchoring bias refers to a systematic heuristic in which human beings make decisions based on past reference points, or anchors.[4] Our reasoning is that, except for meeting

[4] See Baker and Nofsinger (2010) and the references therein for a review of the behavioral finance literature. Anchoring bias literature includes Northcraft and Neale (1987); Heath, Huddart, and Lang (1999); Grinblatt and Keloharju (2001); Lambson, McQueen, and Slade (2004); George and Hwang (2004); Huddart, Lang, and Yetman (2009); Driessen, Lin, and Van Hemert (2012); Baker, Pan, and Wurgler (2012); George, Hwang, and Li (2015), etc. We briefly review the literature on anchoring bias in the financial market in section 2.

instant liquidity needs, insiders incorporate both anchoring bias and private information into their trades, and if they trade against the bias, we can infer that nonpublic information is likely in play.

Being able to identify information-rich insider trades is valuable to outside investors and regulators. Outside investors can mimic the insiders' trades and reap sizeable abnormal returns, and the U.S. Securities and Exchange Commission (SEC) can more easily detect illegal insider trading.

We focus on anchoring bias because investors are routinely told to "buy low and sell high." It is thus natural for an investor to look for a low-price anchor when she buys a security and a high-price anchor when she sells. Two common anchors are the highest and lowest stock prices in the prior 52 weeks (i.e., the 52-week high and the 52-week low). They are widely reported and easily retrieved from financial information outlets such as the *Wall Street Journal*, Bloomberg, and Yahoo Finance. Stocks approaching their 52-week highs and lows also receive extensive media coverage. This suggests that 52-week highs and lows are salient information and that investors refer to them when they trade. Thus, 52-week highs and lows conveniently meet the anchor criteria.

Existing studies on anchoring bias greatly enhance our understanding of its prevalence in various financial markets and its implications on investor behavior and stock market response to informational events. However, very few studies examine anchoring bias within the context of insider trading. We fill the gap.

We argue that insider trading provides a very rich setting for anchoring-bias research for a number of reasons. First, considering that high-frequency trading and algorithmic trading account for an increased proportion of total equity trading volume in recent years, we believe trading by corporate insiders is ideal for examining the existence and implications of psychological biases in the financial markets. On one hand, corporate insiders, unlike computer programs constructed on a set of market conditions and factors, can suffer from anchoring bias. On the other hand, corporate insiders are actively involved in the operations and management of their firms, which gives them certain informational

advantages over outside investors. Such informational advantages may mitigate the effect of anchoring bias because the insiders are in a better position to value the firms.

Second, the interaction between information-driven insider trading and bias-driven insider trading is intriguing. Disentangling these trading motives may shed light on which insider trades outside investors can learn the most from.

Third, insiders are now required to report their trades in a timely fashion. The reported insider trades with granular information on transaction dates, the transaction prices, and the shares traded provide us with fertile ground to examine anchoring bias.

Our paper first investigates whether corporate insiders are subject to anchoring bias. Anchoring bias implies that insiders are less likely to buy when a stock price moves away from its 52-week low given that their valuation is anchored to its 52-week low, the buy-price anchor. Similarly, insiders are less likely to sell when a stock price moves away from its 52-week high given that their valuation is anchored to its 52-week high, the sell-price anchor. This is precisely what we find in the data.

Using a comprehensive insider trading database from 1986 to 2017, we show that corporate insiders exhibit strong anchoring bias. They are likely to buy (sell) disproportionally more as the stock price moves closer to its 52-week low (high). Our interpretation is that insiders, like many investors, use the 52-week low as the anchor when they buy and the 52-week high as the anchor when they sell.

Private information also influences insiders, however. More specifically, if insiders have positive private information about their firms, they may overcome anchoring bias and buy a stock even when the price is far above its 52-week low (that is, when the stock price is very high). Similarly, if insiders have negative private information about their firms, they might sell the stock even when the price is far below its 52-week high (that is, when the stock price is very low.)

This confounding effect of anchoring bias and informational advantages allows us to derive testable hypotheses about stock returns following insider trades. Specifically, if insiders overcome their anchoring bias due to their access to private information and buy when the stock price is far above its 52-week low, positive inside information may drive such purchases. Consequently, we expect higher stock returns

following insider purchases when such purchases (hereinafter referred to as "high buys") take place than when the stock price is close to its 52-week low (hereinafter referred to as "low buys"). Similarly, if insiders sell when the stock price is far below its 52-week high, negative inside information may be the driver. As a result, we expect lower subsequent stock returns on such insider sales (hereinafter referred to as "low sells") than on sales when the stock price is close to its 52-week high (hereinafter referred to as "high sells").

The insider trading sample lends strong support to our predictions. We find that the subsequent 30-day stock returns following high buys using decile sorting are at least 3.31% higher than low buys. In contrast, the subsequent 30-day stock returns following low sells are at least 1.03% lower than high sells. This differential return pattern survives a number of robustness checks, including alternative sorting schemes, various return horizons, different abnormal return specifications, univariate versus multiple regression analysis, and insider contrarian/momentum investment style. We conclude that when insiders buy and sell against the influence of anchoring bias, they do so because they have compelling private information. More important, we show that outsiders can follow these informative trades and make significant returns. A long-short trading strategy ("buy high and sell low") based on these findings can generate an average annual abnormal return of 23.76% to 31.32% before transaction costs. Conventional contrarian or momentum trading strategies do not fully explain our findings.

In a parallel study, Lee and Piqueira (2016) examine whether insiders are subject to anchoring bias. However, they mainly use the 52-week high as the anchor. We argue that it is important to examine the role of both 52-week highs and 52-week lows as anchor variables. The human nature of buying low and selling high implies that investors in general will refer to the 52-week low if they want to buy and the 52-week high if they want to sell.

Although our findings are consistent with Lee and Piqueira (2016) in that we find evidence of anchoring bias when corporate insiders trade, some important and novel contributions of our paper are the return implications of insiders overcoming anchor bias. Observing insider purchases and sales taking place when a stock price is far away from its anchor levels allows us to be more confident that private

information is the driver. Our findings that more positive subsequent returns follow high buys and more negative subsequent returns follow low sells confirm this logic.

This paper stands at the intersection of the behavioral finance literature and insider trading research. As far as we know, it is among the first to adopt a behavioral-based approach to insider trading research. Given the legal and economic implications of insider trading, extending insider trading research into behavioral finance is important and meaningful. Extant insider trading research primarily focuses on the rational aspects of insider trading, largely ignoring the possibility that insiders, just like any other human beings, are subject to behavioral biases. The existence of anchoring bias among insiders supports such a behavioral perspective. In this regard, our paper complements the behavioral finance literature and opens the door for more studies on other psychological biases of corporate insiders. Our paper is also one of the few academic studies to advocate the use of both 52-week highs and lows as anchoring variables. Our findings that insiders exhibit anchoring bias confirm their relevance.

Perhaps the most important contribution of this paper, however, is to the investment profession. Our findings that insider trades are more informative when the stock price moves away from its anchor levels provide valuable insights that outside investors can use to reap substantial abnormal returns. A five-factor alpha of 216 basis points on a monthly basis is certainly significant by normal economic metrics. The sizeable abnormal returns following such trades sheds light not only on how professional money managers can piggyback on informative insider trades, but also on how regulators can expend their limited resources to curb illegal insider trading.

The rest of the paper is organized as follows. We review the behavioral finance literature on anchoring bias in section 2. In section 3 we briefly describe the data and methodologies we use for our empirical design. Section 4 presents our main empirical analysis. Section 5 concludes.

2. Literature review on anchoring bias

Humans often use simple heuristics, or rules of thumb, in uncertain situations (Tversky and Kahneman, 1974). Although these heuristics are often useful and accurate, they can lead to systematic

biases. The anchoring heuristic, for instance, helps investors make decisions using readily available information, even though such information could be irrelevant (Kahneman, 1992). The systematic bias induced by the anchoring heuristic is often referred to as anchoring bias.

An emerging strand of the behavioral finance literature applies anchoring bias to the financial markets and examines how anchoring bias affects various market participants and their financial decision-making. Such applications center upon three main themes: different financial market segments, significant corporate events, and investor behavior. We briefly survey the literature around each of the three themes.

Many empirical studies document evidence consistent with the existence of anchoring bias in the equity markets, the options markets, the real estate markets, and the credit markets. Huddart, Lang, and Yetman (2009), for example, document volume spikes in the stock market when a stock passes a 52-week high. In an influential paper, George and Hwang (2004) find that taking a long position in stocks near their 52-week highs and a short position in stocks far from their 52-week highs generates abnormal future returns. Driessen, Lin, and Van Hemert (2011) document that option-implied volatility increases after stock prices rise above their 52-week highs. Similarly, Northcraft and Neale (1987) and Lambson, McQueen, and Slade (2004) document that investors in the real estate market are likely subject to anchoring bias. Dougal, Engelberg, Parson, and Van Wesep (2015) examine anchoring bias in the credit markets. They find that if credit spreads decline from the firms' past loans, firms pay higher interest rates than justified by current fundamentals and vice versa. They argue that anchoring to past loan terms can explain their findings.

It is worth noting that the majority of studies on anchoring bias in the equity markets use only the stock price's 52-week high as the anchoring variable; few use the stock price's 52-week low as the reference point. From a psychological perspective, using two-sided anchors separately for buying versus selling makes sense because it is natural for investors to refer to the 52-week low when they buy and use the 52-week high when they sell. Moreover, in today's financial markets, both 52-week highs and 52-week lows are readily available. We thus advocate the use of 52-week high and 52-week low as anchors throughout the paper.

The anchoring effect also plays a profound role around significant corporate information events such as mergers and acquisitions and earnings announcements. Baker, Pan, and Wurgler (2012) demonstrate that target shareholders are substantially more likely to accept takeover offers if such offers are made above the target firm's 52-week high. George, Hwang, and Li (2015) show that the existence of post-earnings announcement drift depends strongly on whether stock prices are near (far from) their 52-week highs when positive (negative) earnings surprises arrive. They argue that it is not the earnings surprise itself but anchoring on the 52-week high that drives the market's underreaction to extreme earnings news for individual stocks.

A few empirical studies also suggest that anchoring bias affects the behavior of different types of investors. For example, using the 52-week high stock price as the anchor, Heath, Huddart, and Lang (1999) show that the probability of employee option exercise doubles when the underlying stock price crosses its 52-week high. Grinblatt and Keloharju (2001) document that both retail and institutional investors seem to exhibit anchoring bias in that they are more likely to sell stocks trading at a historical high and buy stocks trading at a historical low.

Existing studies on anchoring bias confirm the significant role anchoring bias plays in investors' financial decision-making. Our paper adds to the anchoring literature by examining whether corporate insiders exhibit anchoring bias and the economic implications of such anchoring bias for market participants.

3. Data and methodologies

This study utilizes a number of data sources. Stock characteristics such as daily prices and returns are from the Center for Research in Securities Prices (CRSP) database. Insider trading data are from Thomson Reuters Insider Filing Data Feed (IFDF). The insider trading records are the transactions of persons subject to the disclosure requirements of Section 16(a) of the Securities and Exchange Act of 1934

reported on forms 4 and 5.[5] The information required on Form 4 includes name and address of the reporting person, issuer name and ticker or trading symbol, relationship of the reporting person to the issuer (officers, directors, or other positions held by the reporting persons in issuers), whether it is a purchase or sale, the date, price, and transaction size. In our empirical tests, we classify insiders into top executives, officers/directors, and large block shareholders. To do this we rely on the identity information of corporate insiders revealed through the role code (role code 1 to role code 4).

According to the data manual file of Thomson Reuter IFDF, insiders tend to make common mistakes and omit pertinent data when filing their documents; hence, the data has gone through a unique cleansing process. In spite of this, the finance literature documents many data errors in this database.[6] We apply a number of filters to eliminate such data errors. We require that trading records have a matching CUSIP with data available from CRSP, and we consider only open-market transactions in equity securities in this sample. Moreover, the transaction price for reported trades must stay within the daily price range recorded in CRSP for the corresponding trading day. We impose a $1 minimum transaction price and a 100-share minimum. Following Jeng et al. (2003), we also purge duplicate transactions (i.e., those with identical entries in all categories) from the final sample.

Table 1 presents the summary statistics for insider trades over our sample period 1986–2017. We slice all insider trades into three subsamples and calculate the aggregate number of trades, number of shares reported, and total dollar amount of shares traded. We also calculate the number of insiders trading and the number of firms reporting insider trades for each of the three subsample periods. There are many cases where a single insider reports multiple trades on the same day. We aggregate the number of shares traded and calculate the weighted average of the transaction prices in these cases.

As we can see from table 1, insiders traded a fairly large number of shares in the last two decades. Over the last three decades, U.S. corporate insiders traded $980 billion worth of shares. This clearly

[5] According the Securities and Exchange Act of 1934, *corporate insider* refers to officers, directors, and large shareholders who own more than 10% of the firm's stock. If insiders buy or sell their firm's stock, they are mandated to file with the Securities and Exchanges Commission (SEC) within the first 10 days of the next month after their transactions. Starting August 29, 2002, insiders are required to report their trades within two business days.

[6] See appendix A in Jeng, Metrick, and Zeckhauser (2003) for more details.

speaks to the importance of insider trading research. Also, insider trading activity is more pronounced on the sell side than on the buy side. This is consistent with the notion that a lot of insider sales are of shares insiders acquire via stock option awards and grants or as founders.

4. Empirical analysis

4.1. Do insiders demonstrate anchoring bias when they trade?

Our analysis starts with an investigation of whether insiders are subject to anchoring bias when they trade. Anchoring bias implies that investors are hesitant to believe the prices of stocks approaching their 52-week highs will continue rising. Similarly, investors are reluctant to believe the prices of stocks approaching their 52-week lows will continue falling. In technical-analysis jargon, the 52-week high and low are the resistance level and the support level for the stock price, respectively. Thus, the anchoring effect is strongest when the stock price is very close to its 52-week high or low. Consequently, price proximity to a 52-week high is often a key variable in empirical tests for anchoring bias (George, Hwang, and Li, 2015).

We follow this empirical methodology and examine the likelihood of insider purchases as a function of stock price proximity to 52-week highs by pooling all insider trades (purchases and sales). If insiders are subject to anchoring bias, we expect that as the stock price gets closer to its 52-week high, insiders are more likely to sell than to buy. This intuition motivates us to examine the insider trade direction as a function of nearness to 52-week highs. In the following sections we perform univariate and multivariate tests for anchoring bias.

4.1.1. Univariate tests for anchoring bias

To capture insiders' propensity to buy or sell, we turn to the fraction of insider purchases or sales relative to total insider trades. This seems to be a natural choice given that we observe all the reported

insider trades and that such trades occur when the stock price is at different proximities to its 52-week high.

Our first set of tests explore whether the proportion of insider purchases relative to the total insider trades changes as stock price (scaled by the 52-week high) falls into different ranges. To achieve this, we sort all insider trades into five quintiles based on the stock's nearness to its 52-week high. Stock price nearness is average closing price over the 30-day window before each insider transaction date, divided by the 52-week high. For each quintile, we calculate the fraction of insider purchases as a percentage of total insider trades. More specifically,

$$Insider\ Purchases\ \% = \frac{Insider\ Purchases}{Insider\ Purchases + Insider\ Sales}$$

We measure insider trading activities along three dimensions: the number of purchases and sales, the number of shares bought and sold, and the dollar volume bought and sold. These dimensions capture different aspects of insider trades and serve as a robustness check. The absence of anchoring bias suggests that insider purchases as a percentage of total insider trades would remain relatively constant when the stock price falls into different quintiles. On the other hand, the existence of anchoring bias implies that the percentage of insider purchases should decrease (increase) as the stock price moves closer to its 52-week high (low).

Table 2 presents the frequency distribution of insider purchases as a fraction of all insider trades for each of the five quintiles.[7] Panels A, B, and C examine the number of trades, total shares traded, and total dollar volume traded, respectively. Quintile 1 consists of insider trades when the stock price is far from its 52-week high (or alternatively, closest to its 52-week low) whereas quintile 5 consists of insider trades when the stock price is closest to the 52-week high (or alternatively, far away from its 52-week low).

As we can see from table 2, insider purchases as a percentage of all insider trades decrease almost monotonically as the stock price rises toward its 52-week high. This pattern is robust to insider trading

[7] In our empirical analysis, we also perform a robustness check by sorting all insider trades into 10 deciles. The pattern documented in table 2 is robust to this alternative sorting procedure.

activity measured by number of trades, number of shares traded, and dollar volume of shares traded.[8] The results in table 2 suggest that as the stock price moves away from its 52-week low and gets closer to its 52-week high, insider purchases account for a lower percentage of overall trading activity. This is consistent with the notion that insiders are less likely to buy (sell) when the stock price approaches (moves away from) its 52-week high. Overall, results in table 2 lend preliminary support to the notion that insiders suffer from anchoring bias.

4.1.2. Multivariate regression tests for anchoring bias

In what follows, we examine how insiders' trading decisions respond to nearness to 52-week highs while controlling for other factors that can affect insiders' decisions to buy or sell.

A key prediction from anchoring bias is that insider purchases (sales) decrease (increase) with respect to nearness to a 52-week high. To test this, we employ a logistics regression framework to examine insiders' decisions on trading direction. Our empirical specification is as follows:

$$logit\left(\frac{Prob(isBuy=1)}{1-Prob(isBuy=1)}\right) = \alpha_0 + \alpha_1 \cdot Near52 + \alpha_2 \cdot IsTopExec + \alpha_3 \cdot IsOfficDir + \alpha_4 \cdot Near52 \cdot IsTopExec + \alpha_5 \cdot Near52 \cdot IsOfficDir + \alpha_6 \cdot PastRet + \alpha_7 \cdot Relshr + \varepsilon$$

IsBuy equals 1 for insider purchases and 0 for insider sales. *Near52* is the stock price nearness to its 52-week high, defined as average closing price over [*t*-30, *t*-1] scaled by 52-week high, where *t* is the insider transaction date. We include a number of variables to control for insider and trade characteristics. *IsTopExec* equals 1 if the insider is a top executive and 0 otherwise; *IsOfficDir* equals 1 if the insider is an officer/director and 0 otherwise; *PastRet* is the raw stock return cumulated over the period from 13 months before to two months before insider trading month. *Relshr* is shares traded by the insider relative to the daily trading volume on the insider transaction date.

[8] Note that because insiders buy more when prices are low (for instance, the number of purchases amounts to 99,592 for quintile 1, whereas it is only 34,434 for quintile 5), the insider purchase percentage is much lower when measured by dollar volume traded.

We interact *IsTopExec* and *IsOfficDir* with *Near52* to examine whether different types of insiders exhibit anchoring bias. *PastRet* is included because the literature documents that corporate insiders follow a contrarian investment style. They buy (sell) more when past stock returns are low (high) (Rozeff and Zaman, 1998; Lakonishok and Lee, 2001; Jenter, 2005; Piotroski and Roulstone, 2005). *Relshr* is included and expected to carry negative signs because we expect that insiders are more likely to sell if their trades account for a larger percentage of trading volume on that day. Our focal variable is *Near52*. A negative sign before *Near52* is consistent with anchoring effect.

Table 3 presents the estimation results. Many firms in our sample have multiple insider trades, hence we calculate firm-clustered standard errors. The results in table 3 indicate that all control variables carry the expected signs and are statistically significant at the 1% level. For instance, insiders are more (less) likely to sell (buy) when past stock returns are higher. More important, *Near52* carries a negative and highly significant parameter estimate. Thus, insiders are less likely to buy (i.e., more likely to sell) as the stock price gets closer to the 52-week high, which is consistent with the predictions of anchoring bias.

On a side note, we also observe that the parameter estimates before the interaction terms among *Near52*, *IsTopExec*, and *IsOfficDir* are negative and strongly significant, suggesting that both top executives and officers/directors are more likely to sell when stock prices get closer to their 52-week highs as compared to large block shareholders.

4.2. Anchoring bias for insider purchases and sales

The analysis so far supports the existence of anchoring bias. We find that when insiders trade, their purchases as a percentage of total insider trades (purchases plus sales) decline monotonically as stock prices move away from their 52-week lows.

We now expand our analysis to examine insider trades in each direction. In particular, we examine whether insider purchases (sales) as a percentage of total insider purchases (sales) are independent of stock price. A detailed analysis of anchoring bias helps clarify how 52-week highs and 52-week lows act as anchoring variables.

To test this intuition, we examine the frequency distribution of insider trades when stock prices fall into different intervals. More specifically, for each insider trade, we first retrieve the highest and lowest stock price in the prior 52 weeks. We then calculate the stock price range for the prior 52 weeks by taking the difference between the 52-week high and the 52-week low. We slice the stock price range into five equal intervals, with the length of each interval being (52-week high – 52-week low)/5. Each insider trade is classified into any of the five intervals based on the reported transaction price. We then calculate the percentage of insider trades in each direction as a fraction of the total number of trades for each interval. Table 4 presents the frequency distributions of insider sales and purchases for each of the five intervals.

If insiders are not subject to anchoring bias, we would expect each interval to contain about 20% of insider sales or purchases. Alternatively, insiders will sell (buy) disproportionally more when stock prices get closer to 52-week highs (lows) if they are prone to the anchoring bias. Thus, higher percentages of insider sales (purchases) concentrated on the higher (lower) end of the intervals supports anchoring bias. This is precisely what table 4 documents.

Panel A shows that as the stock price gets closer to the 52-week high, insiders sell more. Before the stock price moves past the third interval, the percentage of insider sales is consistently less than 15%. As the stock price moves past the third interval and gets closer to its 52-week high, the percentage of insider sales exceeds 20% for the first time and peaks when the stock price is closest to its 52-week high. As a matter of fact, the top two intervals (intervals four to five) subsume around 60% of all insider sales. This pattern is robust to insider sales measured by the number of trades, by the number of shares sold, or by total dollar volume sold.

In panel B, we find that insiders buy the most toward the lower ends of the five intervals. The bottom two intervals collectively account for approximately 60% of all insider purchases. This pattern is robust to alternative measures of insider purchase activities.

Overall, the results in table 4 demonstrate that insiders sell (buy) disproportionally more when the stock price gets closer to its 52-week high (low), consistent with selling (buying) at prices anchored to 52-week highs (lows).

4.3. Return implications of anchoring bias

4.3.1. When insider trades are more informative

The evidence so far supports anchoring bias when insiders trade. We now analyze the economic implications of anchoring bias. After all, unveiling the existence of anchoring bias does not add much value to the investment profession unless it sheds light on whether and what outside investors can learn from insider trades.

We argue that anchoring bias actually lays the foundation for our follow-up analysis of when insider trades are more informative. Availing ourselves of interesting stock return dynamics following trades that are likely driven by anchoring bias and those that are likely driven by private information, we explore insiders' trading motives in more depth and gain additional insights into how outside investors can piggyback on the information-driven trades of corporate insiders.

Broadly speaking, the trading motives for corporate insiders can be classified into two main categories: information reasons and noninformation reasons, such as diversification and liquidity considerations and psychological bias. Although *ex ante* we cannot differentiate these trading motives, such trading motives can have their own implications on trading direction as well as subsequent stock returns. A careful analysis of trading against anchoring bias helps us glean more information about underlying trading motives.

More specifically, if information drives insider trades, we expect insiders to buy if they have positive news and to sell if they have negative news. Consequently, we expect positive stock returns following insider purchases and negative returns following insider sales. On the other hand, anchoring bias is often associated with underreaction when stock prices approach an anchor point. For example, when the stock price moves close to its 52-week high, usually driven by good news, investors are reluctant to bid the stock price higher even if the information warrants it. Thus, there is underreaction to good news. However, the positive information will eventually prevail and the stock price goes up. Thus, there is price continuation. Similarly, when the stock price falls closer to its 52-week low because of bad news, investors

are unwilling to sell at prices that are as low as the information implies. The negative information will eventually prevail and the price goes down.

Some researchers argue that the anchoring effect is strongest when stock prices are either far away from or close to an anchor. Consequently, our analysis focuses on these two extremes. This motivates us to consider the following two-by-two matrix formed by the direction of insider trades as well as stock price proximity to the anchor level. We classify insider trades into purchases and sales, whereas stock price is either far away from or very close to anchor price. We denote each of the four scenarios using the four matrix elements A, B, C, and D, respectively, as indicated below.

		Stock Price Relative to An Anchor Level	
		Far Away from	Very Close To
Direction of Insider Trades	Buy	A	B
	Sell	C	D

Starting with insider sales, where insiders anchor their valuations at a stock's 52-week high, we consider scenario D first. In this extreme case, the stock price is close to its 52-week high. Anchoring bias suggests that insiders are more likely to sell given that the stock price has moved quite close to its anchor and insiders believe it is less likely the stock price will break the anchor level, making it a good time to sell. Alternatively, insiders may sell because they have access to negative private information. Thus, although insider sales occur when the stock price is fairly close to its 52-week high, *ex ante* it is unclear whether negative private information or anchoring bias drives the insider sales.

Negative stock returns should follow insider sales driven by negative information. However, anchoring bias in this case suggests that the stock price might continue to drift up due to the possible underreaction to good news. Thus, return predictions from anchoring bias and private information contradict each other, sending conflicting signals.

Now consider scenario C, where insiders sell when the stock price is far away from its 52-week high. If insiders are subject to anchoring bias, they are less likely to sell given their valuation is anchored to the 52-week high. Thus, if we observe insiders selling when the price is far away from its 52-week high, it is highly likely that insiders have overcome their anchoring bias because they have negative private information. Insider sales driven by negative private information should predict negative subsequent

returns. In addition, the stock price underreaction when the stock price moves far away from its 52-week high suggests subsequent negative returns. Thus, the return predictions from information-driven and bias-driven insider sales reinforce each other, and outside investors can be more confident that insider sales occurring when stock prices are far below their 52-week high are probably driven by insiders who have negative information about the stock and have overcome anchoring bias.

An intuitive way to summarize this discussion is to realize that when insiders sell when stock prices are far from their 52-week high, they probably have negative private information that is compelling enough to overcome their anchoring bias. Thus, the confounding effect of anchoring bias on insider sales suggests that subsequent stock returns should be more negative for scenario C as compared to scenario D.

Insider purchasers anchor their valuations to 52-week lows. For the same reason, we examine the two extreme cases when the stock price is either far away from or close to its 52-week low. We apply the same logic to examine scenario B, where the stock price is very close to its 52-week low. Anchoring bias suggests that insiders should buy because their valuation is anchored to the 52-week low. Alternatively, insiders may buy because they have positive private information about the stock. Thus, *ex ante*, when outside investors observe insider purchases taking place when the stock price is close to its 52-week low, it is unclear whether anchoring bias or private information drive such purchases. The return implications from these two drivers are opposite: bias-driven purchases imply underreaction and hence price will continue to drop, whereas information-driven purchases imply continuous price increase and positive subsequent stock returns.

Scenario A paints a different story. The stock price moves far away from the anchor level (the 52-week low). Thus, anchoring bias implies that insiders will be less likely to buy, because being far above the anchor level implies that the stock price may fall back to the anchor level, making it a bad time to buy. However, if insiders have access to positive private information and thus overcome anchoring bias, insiders will buy. *Ex ante*, when insiders buy even though anchoring bias suggests they should do

otherwise, outside investors can be more confident that such insider purchases are due to positive private information.

To summarize, when insiders buy stocks that are far from their 52-week lows, they are likely overcoming anchoring bias and thereby signaling that they have positive private information. Thus, the confounding effect of anchoring bias on top of insider purchases suggests that subsequent stock returns should be more positive for scenario A as compared to scenario B.

The existence of anchoring bias provides a confounding factor on top of the insider trading signaled by trading direction. Such a factor can facilitate the understanding of subsequent stock price movements. Note that a stock price's proximity to its anchor levels and the trading direction of corporate insiders are public information. This therefore could enable outside investors to piggyback on insiders and reap profits by learning from their trades.

4.3.2. Examining the returns after insider trades

We first sort all insider purchases and sales into five or 10 groups based on the proximity of average stock price in the 30-day window immediately before the insider transaction date, scaled by anchor price (i.e., 52-week low for insider purchases and 52-week high for insider sales). We then focus on the top and bottom quintiles or deciles. To examine the subsequent stock returns, we first calculate the daily abnormal stock returns for each day in the 30-day window following the insider transaction dates. The abnormal returns are then cumulated and averaged over the 30-day window to obtain cumulative average abnormal returns. Our tests focus on the statistical significance of the abnormal returns, as well as the return difference between the top and bottom quintiles or deciles.

Table 5 presents the test results for abnormal returns following insider trades. We focus on insider trades that take place when the stock price is far away from its anchor level or is very close to its anchor level. We calculate abnormal returns by subtracting the return of the corresponding size portfolios from the daily returns (*CAAR1*), or by subtracting the market return from the daily returns (*CAAR2*), or by subtracting the return on a portfolio of similar size, book-to-market ratio, and momentum from the daily

returns (*CAAR3*).[9] The last row in each panel tests for the statistical significance of the return differences. All numbers are statistically significant at the 1% level.

The results in panel A of table 5 clearly indicate that the stock returns following insider sales that take place when the stock price is far away from its 52-week high are worse than those when the stock price is close to its 52-week high. This pattern is robust to alternative measures of abnormal returns. Although the return pattern is also robust to quintile and decile sorting, the decile results are stronger than the quintile results. The *CAAR1* difference using decile sorting is 1.36% in the 30-day time window immediately following the insider transaction dates. In other words, the return difference is larger when the stock price is farther from its 52-week high than when it is closer to its 52-week high. This certainly reinforces our argument that insiders overcome anchoring bias and that private information drives insider sales.

Panel B of table 5 presents the test results for abnormal returns following insider purchases. The anchor variable in this case is the 52-week low. We observe that stock returns following insider purchases that take place when the stock price is far away from its 52-week low (*high buy*) are higher than those that occur when the stock price is close to its 52-week low (*low buy*). This pattern is robust to alternative sorting mechanisms as well as return measurements. Similar to insider sales, the return results are stronger using decile sorting rather than quintile sorting. The *CAAR1* using decile sorting is 4.07% higher in the immediately following 30-day window. Overall, the results in panel B demonstrate that insider purchases are more informative if they occur when the stock price is far away from its 52-week low, thus lending support to our return hypotheses.

Comparing the results in panel B to those in panel A, we notice that the return difference is more pronounced for insider purchases than for insider sales. This is consistent with the notion that insider purchases are generally more informative than insider sales (Seyhun, 1986, 1988, 1998; Lakonishok and Lee, 2001; Jeng, Metrick, and Zeckhauser 2003).

[9] We follow the procedure outlined in Daniel, Grinblatt, Titman, and Wermers (1997) to construct the characteristic-based benchmark portfolios with similar size, book-to-market ratio, and momentum.

We further subject the differential return pattern to a rigorous regression test by controlling for factors that document effects on stock returns following insider trades. Specifically, we estimate the following regression equation:

$$CAR = \beta_0 + \beta_1 \cdot IsHgh + \beta_2 \cdot Size + \beta_3 \cdot Past1y + \beta_4 \cdot Past1m + \beta_5 \cdot BM + \varepsilon$$

CAR is the abnormal return cumulated over the 30-day period immediately following an insider transaction date. *IsHgh* equals 1 if the insider trade is classified as a *high buy* or a *high sell*, and 0 otherwise, using quintile sorting as discussed in table 2. *Size* is the natural log of market capitalization. *Past1y* is the raw stock return cumulated over the previous 12 months (skipping the most recent month). *Past1m* is the one-month lagged return. *BM* is the book-to-market ratio. *Size*, *Past1y*, *Past1m*, and *BM* are well-known determinants of stock returns.

The estimation results are presented in table 6. For both insider purchases and sales, we estimate a total of six models using pooled regression with standard errors clustered at the firm level, allowing for three alternative approaches for abnormal return and month fixed effect where indicated. Panel A presents the results for insider sales and panel B for purchases.

The results show that all the control variables carry the expected signs and are highly statistically significant. For instance, *Size* has a negative slope coefficient estimate, whereas *BM* has a positive slope coefficient estimate. More important, our focal variable *IsHgh* is positive and statistically significant at the 1% level for both insider purchases and sales. It illustrates that when insiders buy high (versus buy low), the subsequent cumulative abnormal return is higher; when they sell low (versus sell high), the subsequent return is lower.

Moreover, the coefficient estimate before *IsHgh* matches very well with the univariate results in table 5. For example, the return difference between the top and bottom insider sales quintiles is 0.9% using the Daniel, Grinblatt, Titman, and Wermers (1997; DGTW) risk adjustment in table 5. In comparison, the slope coefficient estimate before *IsHgh* in panel A averages around 0.70% after controlling for month fixed effects. We observe similar results for insider purchases.

So far, our findings suggest that insider trades conducted when the stock price moves far away from its anchor level are more informative. The return differences between *high buys* versus *low buys* and *high sells* versus *low sells* are consistent with information motives for insider trades. Following this logic, we examine the subsequent returns for these four groups of insider trades across a variety of different return horizons: in the following two months, three months, four months, and so on (up to 12 months). Investigating these alternative return horizons not only serves as an additional robustness check, but also is an additional test of the root cause of the return difference.

If information causes the return differences, the return difference should be permanent and persistent. On the other hand, if other factors such as mispricing cause return differences, such differences should be temporary because it is less likely that mispricing can last for a long period of time.

Figures 1 and 2 plot the event-time returns following insider purchases and sales respectively. All insider purchases (sales) are classified into high (low) buys (sells) based on the average stock price over $[t\text{-}30, t\text{-}1]$, scaled by the lowest (highest) stock price in the past year. We calculate abnormal returns following high (low) groups by subtracting the return on a portfolio of similar size, book-to-market ratio, and momentum from the raw stock returns. We then cumulate abnormal returns over the following 12 months. We employ and present results from using both decile and quintile sorting methods. In each figure, panel A plots the subsequent returns using quintile sorting, whereas panel B plots the subsequent returns using decile sorting. We obtain similar results using all three abnormal return specifications and report the one using DGTW characteristic-based risk adjustments.

In figure 1, positive abnormal returns follow *high sells*, whereas negative abnormal returns follow *low sells*. This pattern is robust to both quintile and decile sorting. In figure 2, we observe an upward trend for abnormal returns following *high buys* in each of the 12 months following insider trades. The abnormal returns remain relatively flat and trend downward for *low buys*. Overall, these results are consistent with the notion that insider purchases are generally more informative.

More important, we focus on whether the return gap between *high buys* versus *low buys* and *high sells* versus *low sells* shrinks or widens over time. Panel A in figure 1 suggests that the return difference between

high sells and *low sells* increases for each of the first five months using both sorting methods before it stabilizes at around 3%. We see similar patterns for decile sorting in panel B. Taken together, the results in figure 1 suggest that inside information causes persistent return gaps; in other words, those gaps will not reverse.

Turning to insider purchases, we notice that in figure 2 the return gaps between *high buys* and *low buys* keep increasing in month one to month 12 under both sorting methods after corporate insider trades. Such an increasing and persistent return gap is certainly consistent with the notion that information causes permanent return differences.

4.3.3. Portfolio returns

Building on the insights from the previous section, we analyze the returns on portfolios formed according to our insider trade classification method based on stock price proximity to anchor level. This analysis further tests the predictive ability of insider trades that occur at times other than what anchoring biases suggest.

To construct our portfolios, we identify insider trades that occur when the stock price is far away from or close to its anchor level each month. We then form *high buy*, *low buy*, *high sell*, and *low sell* portfolios containing these stocks. We hold these stocks over the month following the insider trades. At the end of the month, we rebalance the portfolios based on new insider trades at the two extreme ends of the price spectrum relative to the anchor level.

Before the Sarbanes-Oxley Act of 2002, SEC regulations required reporting insider trades by the tenth day of the following month, implying a maximum reporting lag (number of days between the transaction date and the SEC receipt date) of 40 days. After 2002, all insiders must report their trades within two business days after the transaction date. In our sample, the median reporting lag is three days.[10] Thus, it is reasonable to believe that nearly all of the trades in our sample were reported to the

[10] The median reporting lag of three days is consistent with what Cohen et al. (2012) document in their sample.

SEC within a few days of the trades and that the portfolio strategy we examine here has the necessary portfolio formation information available. Nonetheless, in our robustness check, we rerun our portfolio analysis using returns from month t+1 to month t+2 (rather than from the first day of month t+1 to the last day of month t+1). We obtain quantitatively similar results, indicating that our results are not sensitive to the timing convention we employ.

Table 7 reports raw portfolio returns, risk-adjusted portfolio returns (alphas) for the CAPM, Fama-French three-factor model, Carhart four-factor model, and the five-factor model including a liquidity factor, as well as DGTW characteristic-adjusted returns. Both equal- and value-weighted portfolio returns are reported. Table 7 shows that a portfolio strategy that focuses on insider buy (sell) trades conducted at prices that are far away from the anchor level earns larger (smaller) returns. For example, the equal-weighted portfolio that goes long in the *high buy* portfolio and short in the *low buy* portfolio earns a five-factor alpha of 143 basis points per month (t = 3.49), or over 17.16% per year. Similar abnormal returns are observed on the sell side and for the value-weighted portfolios.

The last column of table 7 shows that longing the *high buy* portfolio and shorting the *low sell* portfolio generates an estimated monthly return of 261 basis points per month, or an annual return of 31.32%. This strategy of "buy high and sell low" is particularly valuable for investment practitioners for two reasons. First, it is new and unconventional. "Buy low, sell high" is arguably the most popular investing adage. However, we illustrate that "buy high and sell low" could be a sound investment strategy, too, should insiders decide to do so. Second, it is easy to implement. In most cases, an insider must report trades to the SEC within two business days. Outside investors can then piggyback profitably on public information.

4.4. Can past stock returns explain the findings?

One may argue that insiders' behavior of buying low and selling high is a manifestation of their contrarian investment style rather than the influence of anchoring bias. The insider trading literature documents that corporate insiders are indeed contrarian investors (Rozeff and Zaman, 1998; Lakonishok and Lee, 2001; Jenter, 2005; Piotroski and Roulstone, 2005) in that they tend to buy (sell) more when past

stock returns are low (high). Indeed, the negative and highly significant coefficient estimate before *PastRet* in table 3 provides additional confirmative evidence.

On the other hand, should an insider buy high and sell low, it is possible that she possesses unusually positive (negative) private information about her company. It is also possible that she wants to ride the price momentum by buying when the stock price rises and selling when it falls. Because we argue that anchoring bias and informational advantages are two main drivers of insider trading, it is important to examine whether and to what extent past stock returns account for the results we document so far.

We perform a series of tests to answer this question. First, we compute sample correlation coefficients between stock price nearness to the 52-week high and stock price momentum, measured by raw stock return cumulated over the previous 12 months (skipping the most recent month). The correlation coefficient between nearness to 52-week high and past year price momentum is 0.0035 (p-value = 0.06) for insider purchases and 0.104 (p-value < 0.0001) for insider sales. Thus, the data suggests that the concern about price momentum explaining insider trading behavior is legitimate, and it is more problematic for insider sales than for insider purchases.

To differentiate the impact of stock price nearness to a 52-week high and that of price momentum on insider trading decisions, we repeat the test in table 2. However, this time we sort by both stock price nearness to 52-week high and price momentum. Specifically, we sort all insider trades into five quintiles by stock price nearness to 52-week high and five quintiles by stock price momentum, independently. We thus have a total of 25 groups. For each group, we calculate insider purchases as a percentage of total insider trades.

The results using this double-sorting are presented in table 8. Panels A, B, and C examine insider trading activities using the number of trades, number of shares traded, and dollar volume traded, respectively. Within each panel, the five rows correspond to stock price nearness, and the five columns are for stock price momentum.

We find that insider purchases as a percentage of all insider trades decrease across the five price-momentum quintiles. For example, in panel A, when stock prices are far away from 52-week highs (the

first row), insider purchases account for 53.06% of total trades when stocks have the lowest momentum (quintile 1). In contrast, the percentage of insider buys drops to only 16.44% for stocks with the highest momentum (quintile 5). This pattern largely holds for each row in all panels, thus validating the contrarian investment style: insiders buy less (sell more) as past stock prices gain more momentum.

Furthermore, within each price momentum quintile, we notice decreasing insider purchases as a percentage of all insider trades as the stock price moves across the five quintiles sorted by stock price nearness to the 52-week high. This decreasing pattern is almost monotonic when we measure insider trading activity by number of trades. Thus, it is hard to argue that stock price momentum fully explains an insider's tendency to buy less (sell more) as the stock price gets closer to a 52-week high.

We further apply the double-sorting technique to table 4 and examine insider purchases (sales) as a percentage of all insider purchases (sales) separately. We group all insider purchases (sales) into five equal price intervals measuring the stock price's proximity to the 52-week high. In addition, we sort all insider purchases (sales) into five quintiles based on stock price momentum. For each of the 25 groups, we then calculate insider purchases (sales) as a percentage of all insider purchases (sales). Tables 9 and 10 present the results for insider sales and purchases respectively.

Some interesting observations are immediately available in table 9. First, in the lowest price momentum quintile, insider sales percentage decreases monotonically as stock price moves closer to a 52-week high. However, this pattern completely reverses for the other four momentum quintiles. This clearly indicates that insiders overcome anchoring bias and sell disproportionally more if stock prices are low relative to their 52-week highs in the presence of very negative past returns. This is precisely what we expect if insiders have negative information about the stock and sell even when the stock price has been "deep underwater," holding stock price momentum constant.

Turning to insider purchases in table 10, we notice that for momentum quintiles 1 to 4, insiders buy less as the stock price moves farther away from the 52-week low. However, for momentum quintile 5, we notice a strongly monotonic increase in insider purchases as a percentage of all purchases, even as the stock price moves away from its 52-week low and gets closer to its 52-week high. Again, this is consistent

with the notion that insiders overcome anchoring bias if they have compelling positive information, and they buy shares more even as the stock becomes more expensive, holding stock price momentum constant.

Taken together, past stock returns explain insider trading behavior partially at most. Although stock price momentum helps us understand insider trading behavior, it cannot explain the monotonically decreasing insider sales percentage in the lowest-momentum quintile in table 9. Neither can it explain the monotonically increasing insider purchase percentage in the highest-momentum quintile in table 10. This is precisely where insiders overcome anchoring bias and trade against the grain.

4.5. Different types of corporate insiders

There is an information hierarchy structure among different types of corporate insiders because of the roles they play in the operations and management of their firms. More specifically, top executives such as CEOs and CFOs are best informed, whereas large shareholders are least informed; officers and directors are in between. Empirical evidence supports this information-hierarchy hypothesis. For instance, trades by top executives are most profitable, whereas the trades by large shareholders have the worst performance.

In view of this literature, we expand our analysis to differentiate between different types of insiders and examine whether the return results in the previous subsection still hold. Because top executives and officers/directors have greater informational advantages over large shareholders who are not actively involved in the firms' day-to-day management, top executives and officers/directors are in a better position to overcome anchoring bias and hence are more likely to buy (sell) when stock prices move far away from their 52-week lows (highs) given their access to positive (negative) information. In other words, we expect insider trades by top executives and officers/directors to be more informative when the stock price moves away from the anchor level.

To test this hypothesis, we repeat our return exercise for each of the three types of insiders for both insider sales and purchases. Our focus is again on the stock returns following such sales and purchases for the two extreme cases where the stock price is either very far away from or very close to its anchor level.

Table 11 presents the return results for different types of insiders. The results using quintile sorting and decile sorting are similar. For the sake of brevity, we only tabulate the cumulative average abnormal returns using decile sorting. All numbers are statistically significant at the 1% level.

For insider sales, it is evident that subsequent stock returns are worse when the stock price is far away from the 52-week high (*low sell*s) than when the stock price is close to its 52-week high (*high sells*). This is true for all three types of insiders. Thus, our main return results are robust when insiders are further classified on the basis of their roles. Interestingly, we notice that the return difference for large shareholders is the largest among the three types of insiders. However, this is partially accounted for by the positive abnormal returns following insider sales when the stock price moves closer to its 52-week high.

For insider purchases, all cumulative returns and return differences are statistically significant at the 1% level. The subsequent stock returns are better for insider purchases when the stock price is far away from the 52-week low than when it is close to its 52-week low. This is also true for all three types of insiders. Thus, our main return results hold for insider purchases as well.

In addition, the return difference is much smaller for large shareholders as compared to top executives and officers/directors. This is consistent with the information-hierarchy hypothesis in that top executives and officers/directors have better access to private information and hence have an informational advantage.

4.6. Routine vs. opportunistic insiders

By classifying corporate insiders into routine or opportunistic traders, Cohen, Malloy, and Pomorski (2012) document that trades by opportunistic insiders are predictive, but trades by routine insiders are not very predictive. It thus appears that opportunistic insiders trade based on private information, whereas other factors drive trades by routine insiders. It is interesting to see whether and how the returns following high versus low buys (sells) differ between routine versus opportunistic traders.

If information drives trades by opportunistic insiders, then the documented differential return patterns following high versus low buys (sells) should be stronger for opportunistic trades than for routine trades. On the other hand, it is likely that both opportunistic and routine corporate insiders have access to private information about their firms due to their active involvement and engagement, and hence they use their private information to overcome anchoring bias and trade at times that contradict anchoring bias.

To analyze the returns of routine versus opportunistic insiders, we follow Cohen, Malloy, and Pomorski (2012) and classify insiders into routine versus opportunistic traders. We focus on insiders who make at least one trade in each of the preceding three years, which purges a lot of insiders from the insider universe. Cohen, Malloy, and Pomorski (2012) define a routine insider as an insider who places a trade in the same calendar month for at least three consecutive years; all others are opportunistic traders. We then classify subsequent trades into one of two categories: "routine trades," which are made by routine traders, and (b) "opportunistic trades," which are made by opportunistic traders. We then perform the same procedure outlined in previous sections and calculate abnormal stock returns over $[t+1, t+60]$ for the routine and opportunistic trades, where t is the insider transaction date.

Table 12 presents cumulative average abnormal returns over the 60 days following both routine and opportunistic insider sales and purchases. Because the return results are similar from both quintile and decile sorting, only decile sorting results are reported.

The subsequent returns are much worse for opportunistic *low sells* than for routine *low sells*. The subsequent returns are both slightly positive for both routine *high sells* and opportunistic *high sells*. The return difference between *high sells* and *low sells* is much larger for the opportunistic group than for the routine group. Our findings suggest that information drives insider sales by opportunistic insiders when the price is far away from the past-year high, which is certainly consistent with and lends further support to Cohen, Malloy, and Pomorski (2012).

Turning to insider purchases, we find that both groups of insiders earn much better returns from their *high buys* than from their *low buys*. Insider purchases by both routine insiders and opportunistic

insiders are accompanied by large and positive abnormal returns if such purchases occur when the stock price is far away from its past-year low.

This is a very interesting contrast with Cohen, Malloy, and Pomorski (2012) on the insider purchase side. Although Cohen, Malloy, and Pomorski (2012) find evidence that purchases by opportunistic insiders predict future stock returns, and trades by routine insiders have very little predictive power, we find that abnormal stock price increases follow even those purchases by routine insiders if those trades occur when the stock price is far away from its past-year low. However, the return difference between high buys and low buys is more striking for opportunistic insiders than for routine insiders.

A possible explanation for the discrepancies between Cohen, Malloy, and Pomorski (2012) and our findings is that their procedure eliminates many insider trades from the sample because it requires the construction of the partitionable universe out of the insider universe. Furthermore, it may be impossible to figure out the true intentions of insiders. As Cohen, Malloy, and Pomorski (2012) point out, *"…Note that this simple algorithm for identifying routine buying or selling by insiders is clearly a noisy proxy for actual routine trading …"*

5. Conclusions

The popular conventional wisdom of buying low and selling high easily makes investors subject to anchoring bias. Like other investors, corporate insiders can certainly suffer from anchoring bias. However, unlike other investors, they have private information about their firms, and we find evidence that private information may overcome their anchoring bias. This holds for both insider purchases and sales.

Although our findings confirm the relevance of anchoring bias in an insider-trading context, they have one major limitation. To a large extent, it remains unclear how insiders or any other type of investors select their anchoring variables. Our paper simply follows existing studies and argues for the use of the 52-week low as the anchor for buying and the 52-week high as the anchor for selling. A deeper understanding of anchor determinants in the financial markets obviously calls for more research in psychology and finance.

In addition, we focus on insiders' trades of shares in their own firms. Maybe an even better setting is to compare insider trades of shares in their own firms to insider trades of shares in other firms when stock prices are at varying distances from anchor levels. Such a comparison can reveal the relative dominance of information versus bias motives for insider trades. This will not be possible unless researchers have unique datasets for all the trading information of insiders, both within and outside their own firms.

This paper's most important contributions to the literature are its findings about when insider trades are more informative. Specifically, we document that insider trades occurring when stock prices are far away from their anchor levels have better returns following insider purchases and worse returns following insider sales. This is consistent with the notion that insiders overcome anchoring bias when they have access to compelling positive and negative private information, and they in turn trade precisely when anchoring bias says they should do otherwise.

Our findings about return differences are certainly interesting to the investment profession. Professional money managers and ordinary public investors can try to mimic insider trades to realize profits, and we find that this "buy high and sell low" long-short trading strategy generates average annual abnormal returns of 23.76% to 31.32% before transaction costs. These findings are new and cannot be fully explained by conventional contrarian or momentum trading strategies.

Regulators can also use these findings to scrutinize insider trades that occur when stock prices move farther away from anchor levels. In this regard, our paper contributes to the investment profession in a very meaningful manner. In addition, although we document striking abnormal returns following insider purchases and sales, it would be interesting to examine whether some kind of real-time investment strategies can be constructed and implemented especially after incorporating realistic constraints such as transaction costs and time lags in observing insider trades. We leave these topics to future research.

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Table 1: Summary Statistics of Insiders Trades 1986–2017

This table presents the summary statistics of insider trades from 1986 to 2017. Insider trading data are from the Thomson Reuters Insider Filing Data Feed (IFDF). We apply a number of filters when constructing the final sample. We only include insider trading records that have a CUSIP matching data from CRSP, are open market transactions in equity securities, have transaction prices that fall within the daily price range recorded in CRSP for the corresponding trading day, and have minimum transaction prices of $1 as well as minimum volumes of 100 shares. We slice the whole sample into three subsamples. For each subsample, as well as the entire sample, we calculate the number of trades, numbers of shares traded, and total dollar volume of shares traded. We also calculate the number of insiders who trade and the number of firms that report insider trades. Panels A and B examine insider purchases and sales respectively.

			Panel A: Insider Purchases		
	No. of Trades	No. of Shares	Dollar Amount of Shares	No. of Insiders	No. of Firms
1986 - 1995	2,694	16,774,401	250,181,890	1,287	761
1996 - 2005	145,736	2,117,297,455	27,245,643,227	34,796	7,885
2006 - 2017	145,558	4,431,206,746	71,467,306,397	29,319	6,463
Total	293,988	6,565,278,602	98,963,131,514	57,178	11,368
			Panel B: Insider Sales		
	No. of Trades	No. of Shares	Dollar Amount of Shares	No. of Insiders	No. of Firms
1986 - 1995	4,503	71,628,310	1,894,513,302	2,007	876
1996 - 2005	377,213	10,528,417,698	352,425,252,494	55,671	7,714
2006 - 2017	481,233	15,028,538,329	526,593,742,826	52,796	6,503
Total	862,949	25,628,584,337	880,913,508,622	91,876	11,021

Table 2: Percentage of Insider Purchases and Stock Price Nearness to 52-Week High

This table presents insider purchases as a percentage of total insider trades when the stock price is at different levels relative to its past 52-week high. We sort all insider trades in the sample into five quintiles based on the stock price's nearness to its 52-week high, defined as average closing price over the 30-day window before each insider transaction date, scaled by 52-week high. Quintile 1 has the lowest stock price nearness to its 52-week high, whereas quintile 5 has the highest stock price nearness to its 52-week high. For each quintile, we calculate the fraction of insider purchases as a percentage of total insider trades. Panels A, B, and C measure insider trading activity using the number of trades, number of shares traded, and the dollar volume traded, respectively.

	Insider Purchases	Insider Sales	% of Purchases and Sales
Panel A: % of Insider Purchases by No. of Trades			
Quintile 1	99,592	131,795	43.04%
Quintile 2	72,414	158,974	31.30%
Quintile 3	50,615	180,772	21.88%
Quintile 4	36,933	194,454	15.96%
Quintile 5	34,434	196,954	14.88%
Panel B: % of Insider Purchases by Shares Traded			
Quintile 1	2,787,630,438	4,847,681,665	17.56%
Quintile 2	1,594,134,599	4,794,268,922	15.08%
Quintile 3	1,017,793,145	4,991,987,712	12.60%
Quintile 4	675,507,050	5,387,074,559	7.00%
Quintile 5	490,213,370	5,607,571,479	4.42%
Panel C: % of Insider Purchases by Dollar Volume Traded			
Quintile 1	24,941,481,580	117,098,174,706	36.51%
Quintile 2	23,956,170,500	134,939,642,828	24.95%
Quintile 3	22,187,670,711	153,957,981,202	16.94%
Quintile 4	15,332,576,585	203,762,410,902	11.14%
Quintile 5	12,545,232,139	271,155,298,984	8.04%

Table 3: Insiders' Propensity to Buy and Stock Price Nearness to 52-Week High

This table examines insiders' propensity to buy as a function of stock price nearness to its 52-week high. We specify the following logistics regression:

$$logit(\frac{Prob(isBuy=1)}{1-Prob(isBuy=1)}) = \alpha_0 + \alpha_1 \cdot Near52 + \alpha_2 \cdot IsTopExec + \alpha_3 \cdot IsOfficDir + \alpha_4 \cdot Near52 \cdot IsTopExec + \alpha_5 \cdot Near52 \cdot IsOfficDir + \alpha_6 \cdot PastRet + \alpha_7 \cdot Relshr + \varepsilon$$

IsBuy equals 1 for insider purchase and 0 for insider sales. *Near52* is the stock price's nearness to its 52-week high, defined as average closing price over $[t\text{-}30, t\text{-}1]$ scaled by the 52-week high, where t is the insider transaction date. We include a number of covariates to control for insider and trade characteristics: *IsTopExec* equals 1 if the insider is a top executive and 0 otherwise; *IsOfficDir* equals 1 if the insider is an officer/director and 0 otherwise; and *PastRet* is the raw return cumulated over previous 12 months (skipping the most recent month). *Relshr* is shares traded relative to daily trading volume on the transaction date.

Variable	Estimate	Std. Err.	Wald ChiSq	Pr > ChiSq
Near52	-0.176	0.016	129.49	<.0001
IsTopExec	2.303	0.029	6207.00	<.0001
IsOfficDir	1.884	0.020	8993.01	<.0001
*Near52*IsTopExec*	-4.108	0.041	10022.08	<.0001
*Near52*IsOfficDir*	-3.526	0.029	14971.89	<.0001
PastRet	-0.510	0.006	6805.81	<.0001
Relshr	-0.289	0.019	223.19	<.0001

Table 4: Frequency Distribution of Insider Trades and Stock Price Nearness to Its 52-Week High

This table presents the frequency distribution of insider sales/purchases when the stock price is at different proximities to its 52-week high. The stock price range in the prior 52 weeks, defined as the difference between the 52-week high and low, is sliced into five equal intervals. The length of each interval equals (52-week high – 52-week low)/5. Interval 1 (5) has the stock price closest to its 52-week low (high). We then classify each insider sale or purchase into one of the five intervals based on the reported transaction price. For each interval, we then calculate insider sales (purchases) as a percentage of total number of sales (purchases) for each interval. We measure insider trading activity by the number of trades, number of shares traded, and the dollar volume of shared traded. Panel A presents the results for insider sales, and panel B presents the results for insider purchases.

Price Interval	No. of Trades	No. of Trades (%)	No. of shares	No. of Shares (%)	Dollar Volume	Dollar Volume (%)
Panel A. Insider Sales						
1	95,642	11.08%	3,620,121,569	14.06%	81,383,363,077	9.19%
2	108,826	12.61%	3,139,554,899	12.19%	90,037,649,203	10.16%
3	127,537	14.78%	3,760,727,869	14.60%	116,559,923,543	13.16%
4	180,969	20.97%	5,042,101,903	19.58%	168,936,173,465	19.07%
5	349,975	40.56%	10,190,468,731	39.57%	428,993,429,600	48.42%
Panel B. Insider Purchases						
1	115,501	39.29%	2,901,464,257	43.99%	32,174,058,057	32.31%
2	56,834	19.33%	1,255,870,738	19.04%	17,596,636,399	17.67%
3	43,173	14.69%	880,057,828	13.34%	16,895,602,387	16.97%
4	39,891	13.57%	711,131,855	10.78%	15,513,547,892	15.58%
5	38,589	13.13%	847,929,797	12.85%	17,412,871,499	17.48%

Table 5: CAARs Following Insider Trades: Quintile and Decile Sorting

This table calculates the cumulative average abnormal returns over $[t+1, t+30]$, where t is the insider trading date. We sort all insider sales (purchases) in the sample into either five or 10 groups based on the average stock price over $[t-30, t-1]$ scaled by its past 52-week high (low). We calculate daily abnormal returns for each day in the 30-day window following the insider trades by subtracting the return of the corresponding size portfolios from the raw stock return, or by subtracting the market return from the raw stock return, or by subtracting the return on a portfolio of similar size, book-to-market ratio, and momentum from the raw stock return. We calculate these three daily abnormal returns and average them across all insider trades to obtain *CAAR1*, *CAAR2*, and *CAAR3*. In panel A, insider sales in quintile 1 or decile 1 take place when the price is far away from its 52-week high, whereas sales in quintile 5 or decile 10 take place when the price is closest to its 52-week high. In panel B, insider purchases in quintile 1 or decile 1 take place when the price is closest to its 52-week low, whereas purchases in quintile 5 or decile 10 take place when the price is far away from its 52-week low. The last row in each panel examines the difference in the CAARs between the top and bottom sorting group. All numbers are statistically significant at the 1% level.

Panel A: Insider Sales

Quintile Sorting				Decile Sorting			
	CAAR1	CAAR2	CAAR3		CAAR1	CAAR2	CAAR3
Quintile 1 (Low Sell)	-0.0080	-0.0044	-0.0090	Decile 1(Low Sell)	-0.0120	-0.0073	-0.0119
Quintile 5 (High Sell)	0.0016	0.0029	0.0000	Decile 10(High Sell)	0.0016	0.0030	0.0002
Quintile 5 – Quintile 1	0.0096	0.0073	0.0090	Decile 10 – Decile 1	0.0136	0.0103	0.0120

Panel B: Insider Purchases

Quintile Sorting				Decile Sorting			
	CAAR1	CAAR2	CAAR3		CAAR1	CAAR2	CAAR3
Quintile 1 (Low Buy)	0.0117	0.0117	0.0095	Decile 1(Low Buy)	0.0093	0.0096	0.0086
Quintile 5 (High Buy)	0.0462	0.0506	0.0375	Decile 10(High Buy)	0.0500	0.0555	0.0417
Quintile 5 – Quintile 1	0.0346	0.0389	0.0280	Decile 10 – Decile 1	0.0407	0.0459	0.0331

Table 6: CAARs Following Insider Trades: Regression Analysis

This table presents the pooled regressions of returns on indicators of high versus low buy (sell) trades in the prior month, over the sample period 1986–2017. We sort all insider purchases (sales) into five quintiles based on the stock price's nearness to the 52-week low (high). We retain only the top and bottom quintiles for the regression analysis. Six models are estimated. The dependent variable in each model is the abnormal return cumulated over $[t+1, t+30]$. *Ishgh* equals 1 if the trade is a high buy (sell). *Size* and *BM* are the natural logarithms of the firm characteristics of market equity and book-to market of the given firm. *Past1m* and *Past1y* are the past month (year) returns of the given firm, skipping the most recent month. We include month fixed effects (month) where indicated. Standard errors clustered at the firm level. The *t*-statistics are shown below the estimates, and 1%, 5%, and 10% statistical significance are indicated with ***,**, and *, respectively. Panel A reports the results for insider sales, and panel B reports the results for purchases.

Panel A: Insider Sales

	(1)	(2)	(3)	(4)	(5)	(6)
	CAAR1	CAAR2	CAAR3	CAAR1	CAAR2	CAAR3
Intercept	0.006***	0.023***	-0.002			
	(2.92)	(10.28)	(-0.74)			
Ishgh	0.008***	0.008***	0.007***	0.010***	0.010***	0.007***
	(13.32)	(12.14)	(11.62)	(13.89)	(14.64)	(9.93)
Size	-0.001***	-0.002***	0.000	-0.001***	-0.002***	0.000*
	(-5.44)	(-11.52)	(-1.52)	(-6.26)	(-11.94)	(-1.77)
Past1y	0.003***	0.003***	0.002***	0.004***	0.004***	0.002***
	(11.22)	(8.39)	(7.67)	(12.02)	(10.98)	(6.72)
Past1m	-0.010***	-0.006***	-0.017***	-0.019***	-0.020***	-0.024***
	(-7.21)	(-4.45)	(-12.83)	(-13.71)	(-14.18)	(-17.65)
BM	-0.003***	-0.003***	-0.005***	-0.003***	-0.003***	-0.004***
	(-6.23)	(-5.64)	(-10.15)	(-5.891)	(-5.93)	(-8.64)
Fixed Effects	No	No	No	Month	Month	Month

Panel B: Insider Purchases

	(1)	(2)	(3)	(4)	(5)	(6)
	CAAR1	CAAR2	CAAR3	CAAR1	CAAR2	CAAR3
Intercept	0.051***	0.058***	0.037***			
	(11.30)	(12.60)	(8.41)			
Ishgh	0.039***	0.044***	0.031***	0.037***	0.037***	0.032***
	(29.92)	(33.06)	(24.07)	(24.99)	(24.46)	(21.66)
Size	-0.003***	-0.004***	-0.002***	-0.003***	-0.003***	-0.002***
	(-9.92)	(-11.40)	(-6.98)	(-9.50)	(-9.17)	(-6.16)
Past1y	-0.006***	-0.009***	-0.004***	-0.006***	-0.006***	-0.006***
	(-8.73)	(-11.38)	(-5.87)	(-7.30)	(-7.86)	(-7.51)
Past1m	-0.050***	-0.039***	-0.041***	-0.043***	-0.046***	-0.043***
	(-18.26)	(-14.03)	(-15.15)	(-15.11)	(-15.84)	(-15.21)
BM	0.002***	0.003***	0.001	0.001**	0.001***	0.001
	(4.23)	(5.944)	(1.08	(2.20)	(2.63)	(1.50)

Fixed Effects	No	No	No	Month	Month	Month

Table 7: Portfolio Returns to High (Low) Buy (Sell) of Insider Trades

This table shows the monthly return to the buy and sell portfolios that follow the high (low) buy (sell) trades from 1995 to 2017. A minimum of 200 insider purchases (sales) is required for a firm to survive the portfolio screening process. Each month, we sort firms into high (low) buy (sell) portfolios based on the stock price's proximity to its past-year low (high). We include a firm in the high (low) buy (sell) portfolio, for example, in month t+1 if the stock price proximity falls into the top (bottom) 10 deciles for all insider purchases (sales) in month t. At the end of month t+1, we rebalance the portfolios based on the stock price proximity of the new insider trades. Below are the monthly percentage returns on these high (low) buy (sell) portfolios, shown for both equal and value weighting. Panel A shows results for equal-weighting, and panel B shows results for value-weighting portfolios. The t-statistics are shown in parentheses. 1%, 5%, and 10% statistical significance is indicated with ***, **, and *, respectively.

	High Buy	Low Buy	L/S Buy	High Sell	Low Sell	L/S Sell	HB - LS
Panel A: Equal-Weighted							
Average Returns	0.0287	0.0147	0.0140	0.0118	0.0030	0.0088	0.0254
Standard Dev.	0.0835	0.0601	0.0622	0.0447	0.0989	0.0833	0.0613
CAPM Alpha	0.0262***	0.0137***	0.0126***	0.0114***	0.0011	0.0103**	0.0248***
	(5.12)	(3.64)	(3.26)	(4.07)	(0.17)	(1.99)	(6.47)
Fama-French Alpha	0.0262***	0.0135***	0.0128***	0.0114***	0.0018	0.0096*	0.0242***
	(5.08)	(3.56)	(3.30)	(4.07)	(0.29)	(1.85)	(6.30)
Carhart Alpha	0.0269***	0.0137***	0.0132***	0.0119***	0.0027	0.0092*	0.0239***
	(5.15)	(3.59)	(3.36)	(4.18)	(0.43)	(1.75)	(6.16)
5-Factor Alpha	0.0282***	0.0139***	0.0143***	0.0117***	0.0017	0.0100**	0.0261***
	(5.08)	(3.44)	(3.49)	(3.86)	(0.26)	(1.77)	(6.37)
DGTW Char Adj.	0.0203***	0.0054**	0.0136**	-0.0007	-0.0059*	0.0053	0.0256***
	(4.75)	(1.94)	(2.72)	(-0.37)	(-1.68)	(1.20)	(6.83)
Panel B: Value-Weighted							
Average Returns	0.0230	0.0087	0.0143	0.0104	0.0037	0.0067	0.0193
Standard Dev.	0.0928	0.0706	0.0953	0.0422	0.0853	0.0733	0.0841
CAPM Alpha	0.0227***	0.0075*	0.0152*	0.0101***	0.0023	0.0078*	0.0204***
	(3.90)	(1.70)	(2.55)	(3.83)	(0.44)	(1.71)	(3.89)
Fama-French Alpha	0.0229***	0.0077*	0.0153**	0.0102***	0.0032	0.0070	0.0198***
	(3.91)	(1.73)	(2.54)	(3.82)	(0.60)	(1.53)	(3.75)
Carhart Alpha	0.0244***	0.0090**	0.0154**	0.0108***	0.0035	0.0073	0.0209***
	(4.13)	(2.02)	(2.53)	(4.06)	(0.65)	(1.59)	(3.93)
5-Factor Alpha	0.0244***	0.0060	0.0184***	0.0107***	0.0030	0.0078	0.0216***
	(3.89)	(1.40)	(3.01)	(3.76)	(0.51)	(1.57)	(3.80)
DGTW Char Adj.	0.0342***	0.0073**	0.0261***	-0.0008	-0.0092**	0.0084**	0.0200***
	(5.75)	(1.97)	(3.63)	(0.39)	(-2.46)	(1.98)	(3.88)

Table 8: Insider Purchases as % of All Insider Trades: Double-Sorting by Stock Price Proximity to 52-Week High and Stock Price Momentum

This table presents the frequency distribution of insider trading activities when insider trades are double-sorted into five quintiles by price nearness to 52-week highs and five quintiles by stock price momentum, measured by raw stock returns cumulated over the previous 12 months (skipping the most recent month). For each of the 25 groups, we calculate insider purchases as a percentage of total insider trades. Panels A, B, and C measure insider trading activities using the number of trades, number of shares traded, and the dollar volume traded respectively. Within each panel, the five rows correspond to stock price nearness sorting, and the five columns are for stock price momentum sorting.

		Stock Price Momentum				
		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Panel A: % of Insider Purchases by No. of Trades						
Stock Price Nearness to 52-Week High	Quintile 1	53.06%	39.16%	28.26%	21.53%	16.44%
	Quintile 2	39.70%	36.73%	29.08%	22.99%	16.98%
	Quintile 3	25.61%	29.24%	23.01%	19.50%	13.10%
	Quintile 4	20.16%	23.47%	17.80%	13.95%	10.30%
	Quintile 5	21.38%	22.52%	16.05%	12.84%	11.46%
Panel B: % of Insider Purchases by Shares Traded						
Stock Price Nearness to 52-Week High	Quintile 1	46.96%	29.41%	21.35%	12.07%	8.98%
	Quintile 2	32.89%	28.21%	27.70%	16.44%	14.50%
	Quintile 3	19.44%	20.46%	16.13%	19.54%	11.50%
	Quintile 4	19.41%	19.62%	10.86%	7.95%	7.39%
	Quintile 5	10.51%	14.24%	8.83%	5.63%	6.62%
Panel C: % of Insider Purchases by Dollar Volume Traded						
Stock Price Nearness to 52-Week High	Quintile 1	32.81%	17.32%	12.04%	5.21%	3.14%
	Quintile 2	23.48%	22.38%	18.42%	5.79%	7.24%
	Quintile 3	11.31%	15.18%	14.29%	16.30%	7.00%
	Quintile 4	17.32%	12.31%	5.85%	5.24%	5.78%
	Quintile 5	8.63%	6.29%	4.34%	3.52%	5.52%

Table 9: Insider Sales as % of All Insider Sales: Double-Sorting

This table examines the frequency distribution of insider sales when the stock price is at different proximity to its 52-week high and stock price momentum, measured by the raw stock returns cumulated over the previous 12 months (skipping the most recent month). We slice the stock price range in the prior 52 weeks, defined as the difference between the 52-week high and low, into five equal intervals. The length of each interval equals (52-week high − 52-week low)/5. Interval 1 (5) includes stock prices closest to their 52-week lows (highs). All insider sales are also independently sorted into five quintiles by stock price momentum. For each of the 25 groups, we calculate insider sales as a percentage of the total number of sales. Panels A, B, and C measure insider trading activities using the number of trades, number of shares traded, and the dollar volume traded, respectively. Within each panel, the five rows correspond to the five price intervals, and the five columns are for stock price momentum sorting.

		Stock Price Momentum				
		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Panel A: % of Insider Sales by No. of Trades						
Stock Price Nearness to 52-Week High	Quintile 1	31.43%	9.46%	5.45%	4.71%	4.37%
	Quintile 2	27.23%	14.30%	7.92%	6.51%	7.09%
	Quintile 3	20.28%	19.45%	13.16%	10.31%	10.70%
	Quintile 4	12.23%	23.92%	23.47%	22.28%	22.96%
	Quintile 5	8.84%	32.87%	50.00%	56.19%	54.88%
	All	*100%*	*100%*	*100%*	*100%*	*100%*
Panel B: % of Insider Sales by Shares Traded						
Stock Price Nearness to 52-Week High	Quintile 1	37.39%	11.31%	7.41%	5.74%	5.51%
	Quintile 2	25.14%	13.15%	6.42%	6.34%	8.15%
	Quintile 3	17.62%	18.25%	11.34%	13.98%	11.11%
	Quintile 4	11.58%	22.51%	22.03%	19.89%	22.71%
	Quintile 5	8.27%	34.79%	52.80%	54.06%	52.53%
	All	*100%*	*100%*	*100%*	*100%*	*100%*
Panel C: % of Insider Sales by Dollar Volume Traded						
Stock Price Nearness to 52-Week High	Quintile 1	28.08%	8.91%	4.73%	5.53%	6.43%
	Quintile 2	25.57%	11.10%	4.94%	5.21%	10.71%
	Quintile 3	20.52%	16.28%	9.06%	12.97%	9.97%
	Quintile 4	15.36%	23.53%	19.93%	16.33%	19.26%
	Quintile 5	10.48%	40.18%	61.34%	59.97%	53.64%
	All	*100%*	*100%*	*100%*	*100%*	*100%*

Table 10: Insider Purchases as % of All Insider Purchases: Double-Sorting

This table examines the frequency distribution of insider purchases when the stock price is at different proximity to its 52-week high and stock price momentum, measured by the raw stock returns cumulated over the previous 12 months (skipping the most recent month). We slice the stock price range in the prior 52 weeks, defined as the difference between the 52-week high and low, into five equal intervals. The length of each interval equals (52-week high – 52-week low)/5. Interval 1 (5) includes stock prices closest to their 52-week lows (highs). All insider purchases are also independently sorted into five quintiles by stock price momentum. For each of the 25 groups, we calculate insider purchases as a percentage of the total number of purchases. Panels A, B, and C measure insider trading activities using the number of trades, number of shares traded, and the dollar volume traded respectively. Within each panel, the five rows correspond to the five price intervals and the five columns are for stock price momentum sorting.

		Stock Price Momentum				
		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Panel A: % of Insider Purchases by No. of Trades						
Stock Price Nearness to 52-Week High	Quintile 1	74.71%	54.39%	36.80%	19.50%	11.04%
	Quintile 2	17.55%	25.17%	24.46%	17.45%	12.04%
	Quintile 3	5.12%	12.13%	17.82%	19.83%	18.53%
	Quintile 4	1.69%	5.76%	12.87%	21.08%	26.46%
	Quintile 5	0.94%	2.56%	8.06%	22.15%	31.93%
	All	*100%*	*100%*	*100%*	*100%*	*100%*
Panel B: % of Insider Purchases by Shares Traded						
Stock Price Nearness to 52-Week High	Quintile 1	76.26%	54.32%	32.03%	23.44%	10.91%
	Quintile 2	16.76%	25.23%	24.55%	16.94%	12.21%
	Quintile 3	4.87%	11.45%	15.75%	18.48%	21.67%
	Quintile 4	1.29%	5.52%	12.61%	17.41%	24.24%
	Quintile 5	0.83%	3.49%	15.07%	23.74%	30.97%
	All	*100%*	*100%*	*100%*	*100%*	*100%*
Panel C: % of Insider Purchases by Dollar Volume Traded						
Stock Price Nearness to 52-Week High	Quintile 1	70.54%	52.73%	30.27%	21.84%	7.59%
	Quintile 2	21.49%	23.41%	23.27%	15.40%	8.82%
	Quintile 3	4.76%	13.99%	18.02%	22.32%	19.08%
	Quintile 4	1.57%	6.17%	14.07%	19.99%	27.69%
	Quintile 5	1.64%	3.71%	14.37%	20.45%	36.82%
	All	*100%*	*100%*	*100%*	*100%*	*100%*

Table 11: CAARs for Different Types of Insiders Following Insider Trades: Decile Sorting

This table calculates cumulative average abnormal returns over $[t+1, t+30]$, where t is the insider trading date. We classify all insider trades in the sample into three categories: trades by top executives, trades by officers and directors, and trades by large shareholders. For each category, we sort insider sales (purchases) into 10 groups based on the proximity of the average stock price over $[t-30, t-1]$, scaled by its past 52-week high (low). For insider sales, trades in decile 1 take place when the price is far away from its 52-week high, whereas sales in decile 10 take place when the price is closest to its 52-week high. For insider purchases, trades in decile 1 take place when the price is closest to its 52-week low, whereas purchases in decile 10 take place when the price is far away from its 52-week low. We calculate daily abnormal returns for each day in the 60-day window following insider trades by subtracting the return of the corresponding size portfolios from the raw stock return, or by subtracting the market return from the raw stock return, or by subtracting the return on a portfolio of similar size, book-to-market ratio, and momentum from the raw stock return. These three daily abnormal returns are then cumulated and averaged across all insider sales to obtain *CAAR1*, *CAAR2*, and *CAAR3*. Panels A, B, and Panel C examine top executives, officers and directors, and large shareholders respectively. The last row in each panel examines the difference of the CAARs between the top and bottom sorting group.

Panel A: Top Executives

Insider Sales				Insider Purchases			
	CAAR1	CAAR2	CAAR3		CAAR1	CAAR2	CAAR3
Decile 1 (Low Sell)	-0.0166	-0.0126	-0.0137	Decile 1 (Low Buy)	0.0130	0.0135	0.0110
Decile 10 (High Sell)	0.0027	0.0038	0.0015	Decile 10 (High Buy)	0.0611	0.0693	0.0529
Decile 10 – Decile 1	0.0194	0.0164	0.0152	Decile 10 – Decile 1	0.0481	0.0558	0.0420

Panel B: Officers and Directors

Insider Sales				Insider Purchases			
	CAAR1	CAAR2	CAAR3		CAAR1	CAAR2	CAAR3
Decile 1 (Low Sell)	-0.0087	-0.0046	-0.0089	Decile 1 (Low Buy)	0.0079	0.0081	0.0059
Decile 10 (High Sell)	0.0012	0.0027	-0.0003	Decile 10 (High Buy)	0.0568	0.0624	0.0482
Decile 10 – Decile 1	0.0098	0.0073	0.0086	Decile 10 – Decile 1	0.0490	0.0543	0.0423

Panel C: Large Shareholders

Insider Sales				Insider Purchases			
	CAAR1	CAAR2	CAAR3		CAAR1	CAAR2	CAAR3
Decile 1 (Low Sell)	-0.0230	-0.0141	-0.0228	Decile 1 (Low Buy)	0.0174	0.0168	0.0209
Decile 10 (High Sell)	0.0083	0.0091	0.0057	Decile 10 (High Buy)	0.0468	0.0512	0.0372
Decile 10 – Decile 1	0.0313	0.0232	0.0286	Decile 10 – Decile 1	0.0294	0.0344	0.0162

Table 12: CAARs Following Routine vs. Opportunistic Insider Sales: Decile Sorting

This table calculates the cumulative average abnormal returns over $[t+1, t+30]$, where t is the insider trading date. We define a partitionable universe of insiders as the subset of insiders who have at least one trade in each of the preceding three years. We classify all insiders in the partitionable universe into routine versus opportunistic traders following Cohen et al. (2012). We then classify all subsequent insider trades into two categories: routine trades versus opportunistic trades. For each category, we sort insider sales (purchases) into 10 groups based on the proximity of average stock price over $[t-30, t-1]$ scaled by its past 52-week high (low). For insider sales, trades in decile 1 take place when the price is far away from its 52-week high, whereas sales in decile 10 take place when the price is closest to its 52-week high. For insider purchases, trades in decile 1 take place when the price is closest to its 52-week low, whereas purchases in decile 10 take place when the price is far away from its 52-week low. We calculate daily abnormal returns for each day in the 60-day window following the insider trades by subtracting the return of the corresponding size portfolios from the raw stock return, or by subtracting the market return from the raw stock return, or by subtracting the return on a portfolio of similar size, book-to-market ratio, and momentum from the raw stock return. These three daily abnormal returns are then cumulated and averaged across all insider sales to obtain *CAAR1*, *CAAR2*, and *CAAR3*. Panels A and B examine routine and opportunistic insiders respectively. The last row in each panel examines the difference in CAARs between the top and bottom sorting group.

Panel A: Routine Insiders

	Insider Sales				Insider Purchases		
	CAAR1	CAAR2	CAAR3		CAAR1	CAAR2	CAAR3
Decile 1(Low Sell)	-0.0051	-0.0019	-0.0057	Decile 1(Low Buy)	0.0049	0.0050	0.0036
Decile 10(High Sell)	0.0019	0.0030	0.0012	Decile 10(High Buy)	0.0515	0.0618	0.0469
Decile 10 – Decile 1	0.0070	0.0049	0.0068	Decile 10 – Decile 1	0.0466	0.0568	0.0433

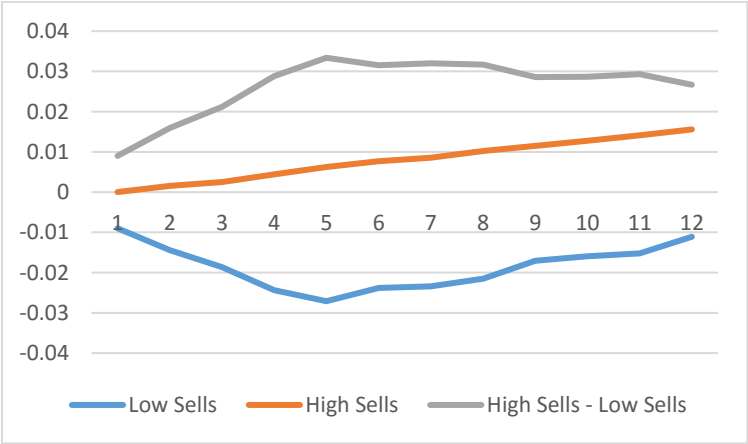
Panel B: Opportunistic Insiders

	Insider Sales				Insider Purchases		
	CAAR1	CAAR2	CAAR3		CAAR1	CAAR2	CAAR3
Decile 1(Low Sell)	-0.0098	-0.0069	-0.0106	Decile 1(Low Buy)	0.0080	0.0082	0.0068
Decile 10(High Sell)	0.0016	0.0030	0.0011	Decile 10(High Buy)	0.0700	0.0800	0.0580
Decile 10 – Decile 1	0.0115	0.0099	0.0117	Decile 10 – Decile 1	0.0620	0.0718	0.0512

Figure 1: Cumulative Abnormal Returns Following High Sells vs. Low Sells

This figure presents the event-time returns following all high (low) buys insider sales. We classify all insider sales into five quintiles (10 deciles) based on stock price proximity to 52-week high, defined as the average stock price over [*t*-30, *t*-1] divided by the highest stock price in the past year. We calculate abnormal returns following the top and bottom sorting groups (i.e., high sells and low sells) by subtracting the return on a portfolio of similar size, book-to-market ratio, and momentum from the raw stock returns. Abnormal returns are then cumulated over the following 12 months. Results from using both decile and quintile sorting methods are employed and presented. Panel A plots the returns following insider sales using quintile sorting, and panel B plots the returns for decile sorting. The x-axis is the month relative to the insider trade month. The y-axis is the cumulative average abnormal return.

Panel A: Insider Sales: Quintile Sorting



Panel B: Insider Sales: Decile Sorting

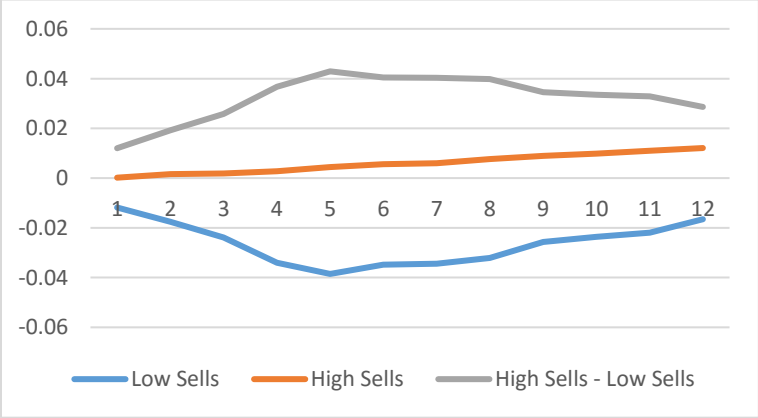
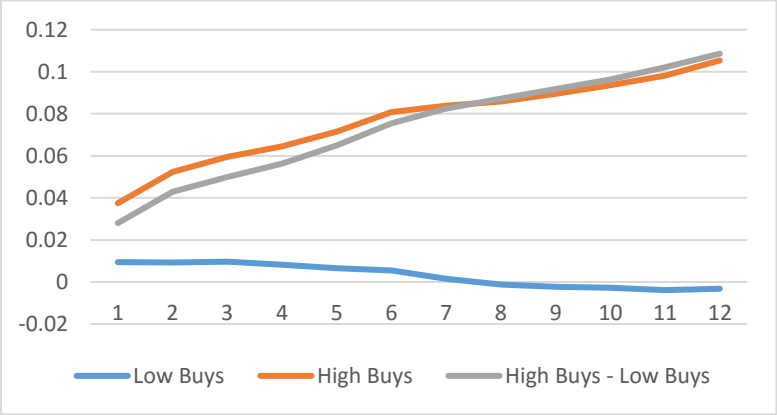


Figure 2: Cumulative Abnormal Returns Following High Buys vs. Low Buys

This figure presents the event-time returns following all high (low) buys insider purchases. We classify all insider purchases into five quintiles (10 deciles) based on stock price proximity to 52-week low, defined as the average stock price over [t-30, t-1] divided by the lowest stock price in the past year. We calculate abnormal returns following the top and bottom sorting groups (i.e., high buys and low buys) by subtracting the return on a portfolio of similar size, book-to-market ratio, and momentum from the raw stock returns. Abnormal returns are then cumulated over the following 12 months. Results from using both decile and quintile sorting methods are employed and presented. Panel A plots the returns following insider purchases using quintile sorting, and panel B plots the returns for decile sorting. The x-axis is the month relative to the insider trade month. The y-axis is the cumulative average abnormal return.

Panel A: Insider Purchases: Quintile Sorting



Panel B: Insider Purchases: Decile Sorting