Forthcoming, *Journal of Finance*

Insider Investment Horizon

May 2018

Ferhat Akbas[§], Chao Jiang[†], and Paul D. Koch[‡]

ABSTRACT

We examine the relation between the investment horizons of insiders and the information content of their trading activity regarding future stock returns. We conjecture that an insider's investment horizon establishes a benchmark for expected patterns of continued trading behavior, and thus helps to identify unexpected insider trades, which should be more informative in efficient markets. Consistent with this conjecture, the trades of short horizon insiders are both more unexpected and more informed than those of long horizon insiders, on average. Short horizon insiders and their firms also tend to display attributes that are associated with a greater focus on short-termism.

Key Words: Insider trading, investment horizon, unexpected insider trades, information asymmetry, short-termism.

JEL Classification: G12, G14, G18

*[§]University of Illinois at Chicago, College of Business Administration; ferhat@uic.edu. [†]University of South Carolina, Darla Moore School of Business; chao.jiang@moore.sc.edu. [‡]University of Kansas, School of Business; pkoch@ku.edu. We acknowledge the helpful comments of an anonymous referee, Christopher Anderson, Jim Barth, Henk Berkman, George Bittlingmayer, James Brown, Yongqiang Chu, David Cicero, David Emanuel, Suzanna Emelio, Egemen Genc, John Hackney, Jim Hilliard, Minjie Huang, Ozgur Ince, Namho Kang, Hugh Kim, David Lont, Helen Lu, Dimitris Margaritis, Alastair Marsden, Felix Meschke, Stefan Nagel (the Editor), Scott Schaput, Avanidhar Subrahmanyam, Eric Tan, Li Wang, Jide Wintoki, Jeffrey Wurgler, and seminar participants at Auburn, Canterbury, Iowa State, Mississippi State, Ohio, Alabama, Alabama at Birmingham, Auckland, Dayton, Kansas, New Hampshire, Otago, South Carolina, Wilfrid Laurier, and the 2017 SFS Finance Cavalcade Conference. We also thank Minjie Huang for providing executive pay duration data and Rajendra Srivastava (*SeekEdgar LLC*) for support regarding the 10-K data. None of the coauthors received any financial support for the particular research described in this article, and they have nothing further to disclose with regards to the Journal of Finance Disclosure Policy.

A large literature explores how the investment horizon of certain groups of investors, such as financial institutions, is associated with corporate policies and stock prices.[1] One unique group of investors whose trades are under scrutiny by regulators and other market participants is corporate insiders. These individuals can influence the firm's policies, performance, and stock prices, and they have privileged access to material private information. Yet despite their important role in financial markets, we know little about how the investment horizon of insiders is associated with the information content of their trades.

This article introduces the concept of an insider's investment horizon, and examines its connection with the information content of insider trades regarding future returns. We define an insider's investment horizon as the average annual net order flow in his or her own company's stock over the past ten years. Specifically, annual net order flow is defined as inside shares purchased minus shares sold, scaled by total shares traded. This measure ranges from −1 for insiders who only sell to +1 for insiders who only buy during a given year. A larger absolute value of net order flow (closer to +1 or −1) means that an insider is more persistent in either buying or selling over time, which suggests less of an inclination to realize profits in a timely fashion and thus a longer investment horizon. For example, William Clay Ford made multiple

[1] For example, Yan and Zhang (2009) show that the well known positive relation between institutional ownership and future stock returns is driven by asset managers with a short investment horizon (i.e., high portfolio turnover). See also Bushee (1998, 2001), Cella, Ellul, and Giannetti (2013), Chen, Harford, and Li (2007), Cremers and Pareek (2015), Derrien, Kecskes, and Thesmar (2013), Gaspar, Massa, and Matos (2005), Gaspar et al. (2012), and Ke and Petroni (2004).

purchases of Ford stock each year from 1988 to 2005, while never selling a single share. As another case, Bill Gates made hundreds of sales and no purchases in Microsoft stock from 1996 to 2013.

In contrast, a value of net order flow closer to zero involves switching more frequently between buying and selling, which indicates that those insiders update their positions to realize profits in a more timely manner and thus signals a shorter investment horizon. For example, Figure 1 plots the insider trading activity of an anonymous insider in our sample who switched between buying and selling his company's shares frequently. From their revealed insider trading patterns, we infer that both Mr. Ford and Mr. Gates are more likely to maintain a focus on long-term trading goals, and thus can be viewed as long horizon (LH) insiders. On the other hand, the anonymous insider in Figure 1 is more likely to be interested in short-term objectives and therefore should be classified as a short horizon (SH) insider.

-Figure 1-

There are diverse theoretical incentives for insiders to trade, which could lead to heterogeneity in both their investment horizons and the information content of their trades. Similar to institutional investors, the trading behavior and investment horizons of corporate insiders may vary due to differences in investment styles (e.g., a focus on short-term versus long-term information), the need for liquidity or diversification, access to information, concern about legal restrictions, a desire to minimize taxable distributions or acquire corporate control, and other personal attributes, experiences, and behavioral biases.

On the other hand, insiders have some unique trading incentives that are not applicable to other investors such as delegated asset managers. For example, the trading behavior of insiders is

likely to be influenced by the horizon of their compensation contracts.[2] Many insiders accumulate substantial shareholdings through their compensation packages or by founding the company, and thus have a strong incentive to repeatedly sell shares in an ongoing effort to diversify or meet liquidity needs. Insiders may also benefit from their privileged access to private information, as well as their strategic disclosure preferences, by timing their purchases and sales to maximize trading profits (Cheng and Lo (2006)). Finally, insider trading is subject to additional regulations, firm level restrictions, and scrutiny. For example, the short swing rule prohibits insiders from making profits through round-trip transactions within six months, and thereby institutes a six-month lower bound on the insider's investment horizon.[3]

We conjecture that an insider's investment horizon sheds light on the information content of insider trades, because it reveals the most likely motivation(s) for the insider to trade from the list of incentives discussed above, and thus offers a benchmark for establishing expected patterns of continued insider trading behavior. First consider the trading motives for LH insiders like Bill Gates or William Clay Ford. They appear to focus more on long-term goals, suggesting that their motivations to invest are long-term in nature and thus unlikely to change in the short-term. As a

[2] See Cadman and Sunder (2014), Gopalan et al. (2014), Cziraki and Groen-Xu (2017), Edmans, Fang, and Lewellen (2017), and Gonzalez-Uribe and Groen-Xu (2017).

[3] See Huddart, Ke, and Shi (2007) and Jeng, Metrick, and Zeckhauser (2003). In addition, corporate insiders must report changes in ownership to the SEC within two business days (https://www.sec.gov/fast-answers/answersform345htm.html). Firms also routinely impose their own restrictions on insider trading activity (See, for example, Bettis, Coles, and Lemmon (2000); Jagolinzer, Larcker, and Taylor (2011)).

result, their persistent patterns of either buying or selling lead to a stronger expectation for the next trade to continue the same pattern. By continuing this persistent, expected pattern of either buying or selling, the LH insider reveals that his or her motivation to trade has not changed, and is unlikely to be related to material information.

Next consider the trading motives of SH insiders. These individuals appear to focus more on dynamic short-term information flows that compel them to switch between buying and selling more frequently, in order to realize trading profits in a timely manner. Such behavior implies a less persistent pattern of buying or selling, and thus a weaker expectation for the next trade to be either a purchase or a sale. Hence, the typical trade for SH insiders is more likely to be unexpected than the typical persistent, expected trade of LH insiders. In an efficient market, it is the unexpected insider trades that should be more likely to reveal information about future returns when compared to predictable insider trades.

Two hypotheses emerge from this conjecture. First, the typical trade by SH insiders should tend to be more informative because it is more likely to be unexpected, on average, when compared with the typical persistent, expected trade of LH insiders. Second, on the rare occasions when LH insiders deviate from their well-established trading patterns, these trades are likely to be even more unexpected and thus contain more information, compared with the more typical (unexpected) trades of SH insiders.

We begin the discussion of our main findings by considering the extent to which insider investment horizon varies across individuals. Surprisingly, there are many LH insiders like Mr. Ford or Mr. Gates who only buy or only sell over long periods of time. In particular, roughly half

of all insider trades are made by individuals who only buy or only sell over the prior ten years. Such a widespread persistent trading pattern is unusual among other groups of informed traders, such as financial institutions or short sellers.[4] This remarkable prevalence of LH insiders may reflect their widespread preferences toward long-term investment goals, such as selling for liquidity or diversification, or buying to signal optimism or attain corporate control. It may also be a consequence of firms designing compensation policies that bestow substantial shareholdings on insiders to align their interests with those of the firm. Alternatively, the reluctance of many insiders to turnover their shareholdings may be a sign of credible deterrence of informed trading by regulators.

Our main findings document the association between insider investment horizon and the information content of insider trades. We show that the average purchases and sales of SH insiders are more informative about future stock returns for up to one year later, compared with the analogous trades of LH insiders. For example, a long-short tradable strategy that replicates the recent strong purchases and sales of SH insiders earns an average risk adjusted return of 2.08% in the following month. In contrast, a similar strategy that mimics the trades of LH insiders earns just 0.77% per month. This result is robust to alternative definitions of insider investment horizon, risk adjusted returns, methodologies, and additional controls at the firm level and the insider level.

[4] See Ke and Petroni (2004), Yan and Zhang (2009), and Boehmer, Jones, and Zhang (2008).

We explore *why* the typical trades of SH insiders contain more predictive informative about future returns, by investigating our conjecture that their trades are more unexpected, on average. This investigation requires that we specify a measure of the extent to which a given insider trade is unexpected (i.e., how far a given purchase or sale deviates from the benchmark expectation established by the insider's investment horizon). Consistent with our conjecture, the typical trades of SH insiders are indeed more unexpected relative to the typical trades of LH insiders. In contrast, only 2.6% of all trades by LH insiders deviate from their persistent patterns of only buying or only selling over the prior ten years. Furthermore, on the rare occasions when LH insiders do deviate from their persistent trading patterns, such trades are significantly more informative than the more typical (unexpected) trades of SH insiders. For example, a hedge portfolio that duplicates the rare unexpected strong purchases and sales of LH insiders generates an extraordinary monthly alpha of 4.25%, which is significantly greater than the analogous monthly alpha of 2.08% for SH insiders. This evidence further supports our conjecture about unexpected trading.

We next consider *who* is more likely to be an SH insider, by comparing the attributes and behavior of SH insiders versus LH insiders, as well as the respective firms that they manage. SH insiders are more likely to be male and have MBAs, and less likely to have PhDs; they tend to hold prominent offices such as CEO, CFO, or Chair of the Board, and are more likely to make non-routine trades (Cohen, Malloy, and Pomorski (2012), hereafter CMP (2012)) and be persistently opportunistic (Cline, Gokkaya, and Liu (2017); Ali and Hirshleifer (2017)). Across the sample of all insider sales, the compensation packages of SH insiders have lower pay-

performance sensitivity (delta) and risk taking incentives (vega), combined with a shorter pay duration. Moreover, SH insiders tend to work for firms with weaker corporate governance, greater information asymmetry, and higher ownership by short-term institutional investors. Finally, SH insiders are associated with firms that exhibit more earnings management, conduct less R&D, and include fewer words related to "long-term" in their 10-K's, suggesting a greater penchant for pursuing short-term management objectives.

We further examine *how* the trades of SH insiders convey more predictive information, relative to those of LH insiders, by relating the trading activity of each group to upcoming firm-specific information events. We show that the trades of SH insiders better predict earnings surprises and large price changes, suggesting that their superior average trading performance is related to material non-public information about imminent firm-specific events. In addition, we delve into *when* SH insiders tend to focus their trading activity, by relating their trades to time-varying litigation risk. We find that SH insiders make fewer trades following periods of intensified SEC enforcement activity regarding illegal insider trading cases. This finding suggests that the average SH insider is more reluctant to make aggressive insider trades that might be interpreted as exploiting private information during periods with higher litigation risk (see CMP (2012) and Del Guercio, Odders-White, and Ready (2017)).

This paper unites two strands of literature on the investment horizons of different groups of investors and the information content of insider trades. The first strand documents that the investment horizon of institutional investors is associated with the information content of their trades, as well as with firm policies such as earnings management, R&D, takeovers, dividend

payouts, repurchases, firm investment, and equity financing.[5] We introduce the concept of an insider's investment horizon and show that the typical trades of SH insiders tend to be more informed than those of LH insiders. Since corporate insiders are directly involved in the firm's operations and decision-making, this work should inspire further research about the association between insider investment horizon and various aspects of the firm's policies.

There is also a bountiful literature on the information content of insider trades with regard to future stock returns.[6] For example, CMP (2012) distinguish between "routine" insiders who traded in the same calendar month of the previous three years, versus "non-routine" or "opportunistic" insiders who traded in different calendar months of the previous three years. They find that the trades of non-routine insiders contain predictive information about future stock returns, while the trades of routine insiders do not.

We emphasize that our measure of insider investment horizon is fundamentally different from the concept of "non-routine" or "opportunistic" insiders as defined by CMP (2012). An insider with a short (or long) investment horizon could be classified as either a routine or a non-routine insider by CMP (2012), depending only on whether he or she traded in the same month in

[5] For references to the literature on the investment horizon of delegated asset managers, see footnote 1.

[6] See Manne (1966), Jaffe (1974), Seyhun (1986), Aboody and Lev (2000), Lakonishok and Lee (2001), Jeng, Metrick, and Zeckhauser (2003), Frankel and Li (2004), Piotroski and Roulstone (2005), Fidrmuc, Goergen, and Renneboog (2006), Marin and Olivier (2008), Ravina and Sapienza (2010), Cohen, Malloy, and Pomorski (2012), Wang, Shin, and Francis (2012), Cziraki, De Goeij, and Renneboog (2014), Cline, Gokkaya, and Liu (2017), Biggerstaff, Cicero, and Wintoki (2015), and Ali and Hirshleifer (2017).

each of the prior three years. The concept of non-routine insiders has nothing to do with whether the insider only buys or sells, or does both over time. For example, an insider who only made three sales in the past three years, say, in January of 2015, March of 2016, and May of 2017, is a non-routine insider whose trades should be *more* informed according to CMP. However, this insider is an LH seller whose trades should tend to be *less* informed according to our analysis. Most notably, CMP focus on unexpectedness in trade timing; trades by non-routine insiders are "unexpected" in the sense that they are more likely to be made outside the usual trading dates for an insider. In contrast, we focus on unexpectedness in trade direction; trades by SH insiders are "unexpected" in the sense that they are made outside the usual trading direction of the insider.

Furthermore, when we control for the distinction between routine versus non-routine insiders, we find that insider investment horizon still provides significant incremental information about future returns. This evidence establishes that an insider's investment horizon represents a unique attribute that is useful for both market participants and regulators to help strip away less valuable information from the large volume of insider trading activity, and thereby enable a focus on subsets of insiders and their trades that are more informative.

I. Data, Methodology, and Sample Statistics

A. Data and Variables

A.1. Sample Construction

We obtain insider transaction data from the Thomson Reuters Insider Filings database. The sample is limited to open market purchases and sales of common stocks by company insiders. We aggregate purchases and sales by an individual insider to obtain net shares bought

or sold during a given month, so that our unit of measurement is an insider trading month. Following the previous literature, the final sample excludes small trades of less than 100 shares. Firm financial statement data are taken from Compustat and stock return data are from CRSP. Our main sample spans the period between January 1996 and December 2013.[7]

A.2. Measuring Insider Investment Horizon

For any given month (*t*), we define the investment horizon of an insider as his or her average annual net insider order flow over the ten calendar years prior to month *t* (the identification period), as follows:

$$\mathrm{HOR}_{i,j,t} = \left|\frac{\sum_{y=T-10}^{year(t-1)} \mathrm{IOF}_{i,j,y}}{N}\right| \times (-1),$$

where $\mathrm{IOF}_{i,j,y}$ is the annual net insider order flow of insider *i* at firm *j* in year *y*, defined as $\frac{P_{i,j,y} - S_{i,j,y}}{P_{i,j,y} + S_{i,j,y}}$, where P is the number of shares purchased during year *y*, S is the number of shares sold, and N is the number of calendar years the insider traded in the ten years prior to month *t*. The numbers of shares traded are adjusted for stock splits using the adjustment factor from CRSP (*CFACSHR*). We require the insider to trade in at least four of the past ten years to be included in our sample.

[7] The starting point of our main sample begins ten years after the first available data on insider trading in 1986, because our measure of insider investment horizon requires an identification period of ten years. In Internet Appendix Table A.VI, we document robust results when we begin the sample in 1989 (using a 3-year identification period), 1991 (using a 5-year identification period), and 1993 (using a 7-year identification period). For additional filters, see Jeng, Metrick, and Zeckhauser (2003).

Note that, if an LH insider (like William Clay Ford) makes only insider purchases in any given year (*y*) over the past ten years, then S = 0 and $IOF_{i,j,y}$ = P/P = +1 for each year he traded. Alternatively, if an LH insider (like Bill Gates) makes only sales, P = 0 and $IOF_{i,j,y}$ = −S/S = −1. Instead, if an SH insider's purchases and sales exactly offset one another in a given year (*y*), then $IOF_{i,j,y}$ = 0. Thus, the insider's net order flow in any given year may range from −1 to +1. When we average this annual net order flow across the past ten years, and then take the absolute value of this annual average, the resulting measure ranges from 0 to +1. Finally, we multiply this resulting measure by (−1), to make *HOR* range from −1 to 0.

According to this final measure, insiders whose purchases and sales do not offset each other over time have a larger average absolute net order imbalance per year, and thus have a longer investment horizon (i.e., *HOR* is closer to −1). In contrast, insiders whose purchases and sales more closely offset each other over time have a smaller average absolute net order imbalance per year, and thus have a shorter investment horizon (i.e., *HOR* is closer to 0). In the extremes, HOR is equal to −1 for insiders who *either* buy or sell over the past ten years, while it is equal to 0 for insiders who *both* buy and sell an equal number of shares in a typical year. Note that the cross sectional variation in this variable offers a straightforward interpretation: a one-unit increase in *HOR*, from −1 to 0, reflects a comparison of all LH insiders (who only buy or only sell) with SH insiders whose purchases and sales exactly offset one another.

One possible shortcoming of our analysis is that insiders may receive shares as part of their compensation package, or as founders of a company. Insiders with such stock grants can sell part of their accumulated holdings to realize gains or losses, without previously buying the

security in the open market. Hence, one could argue that our measure of investment horizon based on both open market purchases and sales might misclassify some insiders as LH sellers, if they accumulate substantial holdings of company shares through their compensation packages and choose to only sell over time. However, we emphasize that even with substantial shareholdings, a true SH insider should still be tempted to buy more shares on occasion if she expects good news about the company over the short-term. Consequently, we maintain that an insider who only sells over long periods of time is more likely to be focused on a long horizon in her own personal investment strategies. Moreover, we note that our classification scheme enables us to measure the investment horizons of insiders based on their true intentions, as revealed by their trading in the open market.

Another possible shortcoming is that our measure (*HOR*) is limited to trading in the stock of the insider's own company, and thus may not capture the turnover in the insider's entire personal portfolio. We suggest that, despite our inability to observe the insider's turnover in his or her entire portfolio, it is still useful and appropriate to focus on net order flow in the insider's own stock for two reasons. First, for many insiders (in particular the top managers), their inside holdings constitute the bulk of their entire portfolio and thus are of first order importance. Second, insiders are likely to be particularly informed about their own firms. Hence, it is appropriate to focus on the information content of the net order flow in their own company's stock. Nonetheless, this issue raises the possibility that an omitted variable could be driving both the trading patterns and abnormal returns of the SH versus LH insiders that we observe. We

attempt to address this issue by controlling for numerous attributes of both the firm and the insider, and our results are robust.

A.3. Measuring Insider Trading Strength

We also measure the *strength* of the signal revealed through an insider's trading activity, by constructing an alternative measure of the magnitude of the insider's order flow during any given month, as a proportion of total trading volume in the stock. Specifically, for insider *i* of firm *j* in month *t*, the insider's trading strength is defined as:

$$\mathrm{STR}_{\mathrm{i,j,t}} = \frac{\mathrm{P}_{\mathrm{i,j,t}} - \mathrm{S}_{\mathrm{i,j,t}}}{\mathrm{VOL}_{\mathrm{j,t}}},$$

where $P_{i,j,t}$ is the number of shares purchased by insider *i* at firm *j* in month *t*, $S_{i,j,t}$ is the number of shares sold, and $VOL_{j,t}$ is the total share volume by all investors in firm *j* during month *t*.

Next we construct the scaled rank of insider trading strength, as follows. First, in each month the cross section of insiders who trade (across all insiders (*i*) and firms (*j*)) is ranked into quintiles by the continuous measure of insider trading strength ($STR_{i,j,t}$), and the individuals in each quintile are assigned the values, $0 - 4$. Second, these quintile ranks are divided by 4 to make the scaled rank, *STR_RK*, range from 0 (for the lowest quintile with strong insider sales) to +1 (for the highest quintile with strong insider purchases). This scaled rank variable also offers a straightforward interpretation: a one-unit increase in *STR_RK* ranges from the quintile of insiders making strong sales (SS) to the quintile making strong purchases (SP) during month *t*.

Following CMP (2012), we also consider a number of monthly control variables. The main control variables include the firm's market capitalization (*SIZE*), book-to-market ratio

(*B/M*), lagged one month stock return ($RET_{j,t-1}$), and cumulative stock return during the past twelve months, excluding month $t-1$ ($RET_{j,t-12,t-2}$). In addition, we control for other firm attributes that have also been shown to be associated with the cross section of stock returns, including asset growth (*ASSETGR*), profitability (*PROFIT*), and stock return volatility (*RET_STD*). All continuous independent variables are winsorized at the 1% and 99% levels. Appendix Table AI provides further details regarding the construction of all variables used in the paper.

B. Sample Statistics

Panel A of Table I presents summary statistics, while Panel B provides the correlations of our measures of insider investment horizon and insider trading strength with the other variables. We first calculate the cross sectional statistics every month, and then compute the time series means of these cross sectional statistics across all months in the sample.

-Table I-

There are 146,345 observations (i.e., insider trading months) with complete data on the main variables over the sample period, 1996 to 2013. The mean and median values for insider investment horizon (*HOR*) are −0.79 and −0.997, respectively. It is somewhat surprising that the median value of *HOR* is close to −1, indicating that nearly half of all insider trading months in the sample involve insiders who only buy or only sell over the previous ten years. For the remaining insiders, there is substantial variation in their investment horizons across the possible values ranging from −1 to 0. The mean trading strength is -3.3×10^{-3}, indicating that the average insider has monthly net order flow that is slightly negative (i.e., a net seller). This outcome reflects the fact that insiders are more likely to make sales, given that they often obtain shares as

a part of their compensation as well as through open market purchases. The typical firm has a market value of 7.2 billion dollars, with firm size ranging from $14 million to $143 billion. In all analysis below, we follow previous work and take the natural log of the firm's book-to-market ratio and market value.

In Panel B of Table I, insider investment horizon reveals a fairly low correlation with the other key variables. The two key variables that display the largest (absolute) correlation with investment horizon are firm size and stock return volatility. These two correlations indicate a tendency for firms subject to greater information asymmetry (i.e., smaller size or greater return volatility) to have insiders with a shorter investment horizon. We discuss other firm and insider level characteristics in Section IV below, when we compare the attributes of LH versus SH insiders, as well as the attributes of their respective firms.

Since the median value of *HOR* is close to −1, we next investigate the sample composition in more detail. We begin by independently partitioning the cross section of insiders who trade in any given month along two dimensions: the insider's trading direction (into sales versus purchases) and investment horizon (into insiders with a long versus medium versus short horizon). First, an insider trading month is labeled a sale (or purchase) if the insider makes net sales (or purchases) during this time frame. Second, we make a simple classification of all insiders who trade during the month into three groups, according to their investment horizons. The first group only buys or only sells during the previous ten year period (i.e., $HOR = -1$), and is thus labeled *LH* insiders. All remaining insiders both purchase and sell their company's stock sometime over the previous ten years (i.e., *HOR* ranges between −1 and 0), and they are

partitioned into two smaller categories, above or below the median value of insider investment horizon for this group of remaining insiders (this median value of *HOR* is −0.53). Insiders in the remaining group with an investment horizon below the median (i.e., *HOR* is closer to −1) tend to mostly buy or mostly sell, and are thus labeled *medium horizon* insiders. Those with an investment horizon above the median (i.e., *HOR* is closer to zero) make purchases and sales that tend to offset each other, and are thus labeled *SH* insiders.

In Panel C of Table I, we report the total and relative frequencies of insider purchases and sales for the resulting three groups of long, medium, and short horizon insiders, respectively. First consider the category of LH insiders. Column 3 indicates a total of 84,778 insider trading months for insiders who only buy or sell during the previous ten years. These LH insiders account for 58% of the entire sample of insider trading months (59% of the sales in column 1 and 48% of all purchases in column 2).[8] Second consider the groups of short and medium horizon insiders, respectively. Column 3 reveals that 20% of the entire sample is comprised of medium horizon insiders while 22% are SH insiders.

II. Main Results: Trading Performance of SH versus LH Insiders

This section examines the trading performance of insiders, conditioned on their

[8] This outcome indicates that *more* than half of all insider trading months involve LH insiders. However, the median value of *HOR* provided in Panel A of Table I is −0.997, which suggests that slightly *less* than half of all insider trading months involve LH insiders. This apparent discrepancy in Table I is a result of first obtaining the median value of *HOR* each month, and then computing the time series mean across monthly medians.

investment horizon and trading strength. We measure the insider's trading performance using stock returns during the months following insider trades.

A. Portfolio Approach: Short Run Trading Performance

In this subsection, for each month (*t*) we first sort all insider trades into five groups based on the insider's trading strength, ranging from strong sales (SS) to strong purchases (SP). Second, we follow the partitioning scheme in Panel C of Table I, and independently group insider trades into three portfolios that include the stocks of: (i) LH insiders (i.e., $HOR = -1$), (ii) medium horizon insiders (i.e., *HOR* below the median of remaining insiders, closer to −1), and (iii) SH insiders (i.e., *HOR* above the median, closer to 0). The resulting 15 portfolios from this 5×3 partitioning scheme are then held for one month, during month $t+1$.[9]

-Table II-

Panel A of Table II reports the mean raw returns for these 15 portfolios, as well as the risk adjusted abnormal returns from the Fama-French four-factor model (Carhart (1997)).[10] First consider the right column, which presents the differential performance across the trades of insiders with an SH versus those with an LH (i.e., SH − LH), for each quintile by trading strength (*STR*). This column shows that SH insiders outperform LH insiders for both purchases and sales. For example, in the month after *strong purchases* (SP), the four factor alphas in the

[9] Section I shows that LH insiders (with $HOR = -1$) account for roughly half of all insider trading months. Thus, in Internet Appendix Table A.I we also perform 2×2 and 5×2 sorts based on trading strength (purchases versus sales, or strong purchases versus strong sales) and investment horizon (LH insiders versus all others). Results are similar.

[10] In Panel C of Internet Appendix Table A.I, we find similar results when we use the Fama-French 3-factor or 5-factor model (Fama and French (1993, 2015)).

bottom half of Panel A indicate that SH insiders outperform LH insiders by an average alpha of 0.80% (*t*-ratio = 3.18). This monthly differential performance accumulates to about 10% per year. Likewise, when SH insiders make *strong sales* (SS), they outperform LH insiders by an average alpha of −0.50% per month (*t*-ratio = −2.91), or roughly 6% per year. Combining the performance of strong purchases and strong sales, SH insiders earn 1.31% per month more than LH insiders (*t*-ratio = 4.16), implying a differential performance of roughly 16% per annum.

Next consider the bottom row in Panel A of Table II, which presents the average monthly return on a hedge portfolio that mimics the strong purchases and strong sales of insiders (i.e., SP − SS), for each category by insider investment horizon (*HOR*). This row shows that strong purchases significantly outperform strong sales for both LH and SH insiders, but the mean return on this hedge portfolio is significantly greater for SH insiders. For example, the four factor alphas in the bottom row indicate that the one-month-ahead return from a hedge portfolio comprised of strong purchases minus strong sales by LH insiders is 0.77% (*t* = 3.09). In contrast, the analogous hedge portfolio of purchases minus sales by SH insiders earns a significantly larger alpha of 2.08% (*t*-ratio = 5.69) per month. The differential performance across these two hedge portfolios is again 1.31% (*t* = 4.16) per month.

The results for insider sales within Panel A of Table II are of special interest. Consider the risk adjusted abnormal returns from the 4-factor model, in the top right corner of the bottom half of Panel A. The alphas of these three portfolios represent the performance of sales by medium or short horizon insiders, and are highlighted in **bold**. They reveal negative abnormal returns that are at least marginally significant, at −0.28% (*t*-ratio = −1.39), −0.37% (*t*-ratio =

−2.11), and −0.50% (*t*-ratio = −2.76). This evidence contrasts with much of the previous literature on insider trading, which generally concludes that insider sales are not informative.[11]

We note that the negative alphas in Panel A of Table II become more significant when a larger number of stocks are assigned to fewer portfolios in a 2×2 sorting analysis. For example, in Panel A of Internet Appendix Table A.I, sales by SH insiders generate a mean monthly four-factor alpha of −0.35% (*t*-ratio = −3.66). Similar results are found in the 5×2 sorting analysis of Panel B in Internet Appendix Table A.I.

In Panel B of Table II we apply the same analysis to the subsets of large firms and small firms separately (i.e., above or below the median firm size each month). In the bottom row of each sorting scheme in Panel B, the performance of hedge portfolios that duplicate the strong purchases and strong sales (SP − SS) of both LH and SH insiders is substantially greater when we focus on small firms. However, the differential performance across LH and SH insiders (in the right column of Panel B) remains significant, and similar for both large firms and small

[11] Early studies find that both insider purchases and sales contain predictive information about future returns (e.g., see Jaffe (1974) and Seyhun (1986)). More recent work finds that only insider purchases contain positive information about future stock returns, since sales are more likely made for liquidity or diversification purposes (e.g., Jagolinzer, Larcker, and Taylor (2011); Jeng, Metrick, and Zeckhauser (2003); Jiang, Wintoki, and Xi (2018); and Lakonishok and Lee (2001)).

firms. This analysis indicates that both purchases and sales made by SH insiders are more informative about future stock returns.[12]

B. Regression Approach: Short Run Trading Performance

This subsection compares the short run trading profitability of insiders with an SH versus those with an LH, using a panel regression approach. Here we regress the one-month-ahead stock return on the scaled rank of insider trading strength (*STR_RK*), investment horizon (*HOR*), their interaction, and other control variables, as follows:

$$RET_{j,t+1} = \alpha_t + \beta_{STR}\, STR\_RK_{i,j,t} + \beta_{HOR}\, HOR_{i,j,t} + \beta_{STR*HOR}\, STR\_RK_{i,j,t} \times HOR_{i,j,t} + Controls_{j,t} + \varepsilon_{i,j,t}. \quad (1)$$

The dependent variable, $RET_{j,t+1}$, is the leading one-month-ahead stock return for the insider's firm (*j*) in month *t+1*. We multiply $RET_{j,t+1}$ by 100 to reflect the performance in percentage terms. $STR\_RK_{i,j,t}$ is the scaled rank of trading strength for insider *i* in firm *j* during month *t*, and $HOR_{i,j,t}$ is our measure of the insider's investment horizon. Monthly fixed effects (α_t) are included and standard errors are clustered by time at the monthly level.

-Table III-

In Panel A of Table III, we present six columns of regression results that include various combinations of the independent variables in Equation (1). In column 1 of Panel A, we only include the scaled rank of insider trading strength (*STR_RK*) along with the main control

[12] In Internet Appendix Table A.II, we present somewhat weaker results when we examine the value-weighted performance. However, we show that these weaker value-weighted results are driven by a very small portion of the largest firms that dominate the value-weighted returns for certain portfolios. In Panel B of Internet Appendix Table A.II, we exclude the top 5% of the largest firms each month and find much stronger value-weighted results.

variables. The coefficient of *STR_RK* is 0.81% (*t*-ratio = 3.51), indicating that insider trading strength by itself has significant predictive power with regard to future stock returns. This outcome is consistent with the portfolio analysis in Table II and the previous literature on insider trading. In column 2 of Panel A, we extend the model in column 1 to include the measure of insider investment horizon (*HOR*) by itself. The coefficient of insider investment horizon is close to zero and insignificant. This result indicates that the insider's investment horizon, by itself, does not contain any substantive incremental predictive information about future stock returns beyond that provided by the insider's trading strength.

In column 3 of Panel A in Table III, we include insider trading strength, investment horizon, and their interaction, all of which now have significant coefficients. The coefficient of the interaction term ($\beta_{STR*HOR}$) tests whether one hedge portfolio, made up of the strong purchases minus the strong sales (SP – SS) by SH insiders, outperforms the analogous hedge portfolio by LH insiders. This coefficient is analogous to the difference between the two hedge portfolio returns in the bottom right corner of Panel A in Table II, comprised of the strong purchases minus strong sales by SH insiders versus LH insiders.

To see this result, consider the influence of trading strength on future returns implied by Equation (1): $\frac{\partial \mathrm{RET}}{\partial \mathrm{STR\_RK}} = \beta_{\mathrm{STR}} + \beta_{\mathrm{STR*HOR}} \mathrm{HOR}$. This partial derivative shows that, for SH insiders (i.e., *HOR* = 0), a one-unit increase in trading strength from strong sales to strong purchases (i.e., changing *STR_RK* from 0 to +1), is associated with a change in $RET_{j,t+1}$ of β_{STR} percent. In contrast, for LH insiders (i.e., *HOR* = −1), a change from strong sales to strong purchases is associated with a change in $RET_{j,t+1}$ of ($\beta_{STR} - \beta_{STR*HOR}$) percent. Thus, $\beta_{STR*HOR}$ measures the

difference in the return on two hedge portfolios that mimic the strong purchases minus strong sales of insiders, $\frac{\partial \text{RET}}{\partial \text{STR\_RK}}$, when we consider a change from LH insiders ($HOR = -1$) to SH insiders whose purchases and sales exactly offset ($HOR = 0$).

Given this interpretation of the panel regression coefficients, consider the implications of the significant coefficients, β_{STR}, β_{HOR}, and $\beta_{STR*HOR}$ in column 3 of Panel A in Table III. The coefficient of the interaction term ($\beta_{STR*HOR}$) indicates that the one-month-ahead return from a hedge portfolio made up of strong purchases minus strong sales by SH insiders is 1.46% (*t*-ratio = 3.57) larger than the analogous hedge portfolio of purchases minus sales by LH insiders (after controlling for other firm attributes). Once again, to see this result observe that the hedge portfolio for strong purchases minus strong sales made by SH insiders (i.e., for $HOR = 0$) earns $\beta_{STR} = 1.94\%$ per month (*t*-ratio = 4.21). However, the analogous hedge portfolio return is reduced to 0.48% per month ($= \beta_{STR} - \beta_{STR*HOR} = 1.94\% - 1.46\%$, *t*-ratio = 2.26) for LH insiders (i.e., for $HOR = -1$). The difference between these two hedge portfolio returns is again $\beta_{STR*HOR} = 1.46\%$ (*t*-ratio = 3.57).[13]

We obtain similar results in columns 4 to 6 of Panel A in Table III, when we include the additional control variables in the regression specification. This regression analysis confirms that

[13] As expected, the coefficient, $\beta_{STR*HOR}$ (1.46%, *t*-ratio = 3.57), is comparable to the difference in hedge portfolio returns in the bottom right corner of Panel A in Table II (1.31%, *t*-ratio = 4.16). We note that this interpretation of $\beta_{STR*HOR}$ may overstate the implications of our findings, because it measures a one unit change in HOR while the standard deviation of HOR is only 0.30. As an alternative interpretation, a one-standard deviation (0.30) change in HOR implies a 0.44% ($= \beta_{STR*HOR} \times \Delta HOR = 1.46\% \times 0.30$) difference between the two hedge portfolio returns.

our findings in the portfolio analysis of Table II are robust when we include various other control variables in a regression framework.

C. Long Run Trading Performance

In this subsection, we examine the longer run trading performance of SH insiders versus LH insiders. We estimate a revised version of Equation (1) that replaces $RET_{j,t+1}$ as the dependent variable with $RET_{j,t+a,t+b}$, defined as the longer run cumulative return that extends further into the future, from month $t+a$ through month $t+b$.

In Panel B of Table III, we present three columns of results that analyze subsequent insider trading performance over each of the next three years, respectively. The first column of Panel B indicates that the trades of SH insiders continue to outperform those of LH insiders beyond one month, for up to one year following their trades. In particular, the differential performance in cumulative stock returns across SH versus LH insiders for the remainder of the first year (i.e., over months +2 through +12) is $\beta_{STR*HOR}$ = 4.86% (*t*-ratio=2.55). However, in columns 2 and 3, $\beta_{STR*HOR}$ declines in magnitude and is no longer significant, suggesting that the trades of SH insiders do not continue to significantly outperform those of LH insiders in the longer run beyond one year.

The analysis in this section provides strong evidence that SH insiders earn significantly higher returns than LH insiders for up to twelve months following their trades, both when they buy and when they sell. Importantly, we find no evidence to suggest that LH insiders outperform SH insiders over any time frame, either in the short run or the long run.

III. Insider Investment Horizon, Unexpected Insider Trades, and Trading Performance

In this section, we examine our conjecture that insider investment horizon matters because it establishes a benchmark for expected patterns of continued trading, and thus helps to identify unexpected insider trades, which should be more informative in efficient markets. Two hypotheses emerge from this conjecture. First, the typical trades of SH insiders should be more unexpected and more informed relative to those of LH insiders, on average. This hypotheses is based on the view that LH insiders are expected to continue their persistent patterns of only buying or selling in the past, because the motives to trade behind their long investment horizons are less likely to change in the short run. In contrast, the average trade of SH insiders is more likely to deviate from the insider's recent pattern (as evidenced by purchases and sales that tend to offset one another), and thus be unexpected. Second, on the rare occasions when LH insiders deviate from their well-established trading patterns, these trades are even more unexpected and thus more likely to contain material information, compared with the more typical (unexpected) trades of SH insiders. We test these two hypotheses in this section.

A. Measuring the Extent to which Insider Trades are Unexpected

We begin by specifying a measure of the extent to which a given insider trade is unexpected (i.e., how far a given purchase or sale deviates from the benchmark expectation associated with the insider's investment horizon). Specifically, our measure of unexpected insider trading (*UNEXP*) is defined as the difference between an indicator variable for the current month's trading direction and the average annual net insider order flow across all calendar years (y) that the insider traded in the ten years prior to month t (the identification period), as follows:

$$\text{UNEXP}_{i,j,t} = \text{CURRENT}_{i,j,t} - (\text{Mean IOF})_{i,j,t} = \text{CURRENT}_{i,j,t} - \frac{\sum_{y=T-10}^{year(t-1)} \text{IOF}_{i,j,y}}{N},$$

where $\text{CURRENT}_{i,j,t}$ = +1 (or −1) if insider *i* has net purchases (or sales) of stock *j* in month *t*, and $\text{IOF}_{i,j,y}$ is the annual net insider order flow, $\frac{P_{i,j,y} - S_{i,j,y}}{P_{i,j,y} + S_{i,j,y}}$, for insider *i* at firm *j* in year *y*, as defined above in Section I.A.2. Once again, P is the number of shares purchased during year *y*; S is the number of shares sold; and N is the number of calendar years the insider traded during the ten years prior to month *t*.[14]

Recall from Section I.A.2 that, if an LH insider makes only insider purchases in any given year (*y*) over the past ten years, then S = 0, $\text{IOF}_{i,j,y}$ = P/P, and the Mean IOF = +1. Alternatively, if an LH insider makes only sales, P = 0, $\text{IOF}_{i,j,y}$ = −S/S, and the Mean IOF = −1. Instead, if an SH insider's purchases and sales exactly offset one another during any given year, then the Mean IOF = 0. Thus, the insider's average annual net insider order flow across the past ten years (Mean IOF) may range from −1 for LH sellers, to +1 for LH buyers.

As a result, our measure of unexpected insider trading in a given month (*UNEXP*) ranges from −2 to +2. If the insider *buys* in month *t*, *UNEXP* will range from (0, +2). A value of zero

[14] We emphasize that the conditioning information on which the "expectation" of trade direction is taken consists only of the insider's past trade history (i.e., Mean IOF). Presumably market participants can potentially improve upon their inferences made from an insider's investment horizon by also considering other types of conditioning information (at the firm, individual, or trade level). However, this concern is mitigated by our analysis in Appendix Table A.VI, which shows that the predictive information contained in insider investment horizon is not subsumed by other attributes of insiders, their firms, or their trades.

indicates another *expected* purchase by an LH buyer (i.e., *CURRENT* = +1 and Mean IOF = +1), while a value of +2 reflects an *unexpected* purchase by an LH seller (i.e., *CURRENT* = +1 and Mean IOF = −1). Likewise, if the insider *sells* in month *t*, *UNEXP* will range from (−2, 0). Now a value of zero indicates another *expected* sale by an LH seller (i.e., *CURRENT* = −1 and Mean IOF = −1), while a value of −2 reflects an *unexpected* sale by an LH buyer (i.e., *CURRENT* = −1 and Mean IOF = +1). Thus, a larger negative value for *UNEXP* (closer to −2) means a more unexpected sale, while a larger positive value (closer to +2) implies a more unexpected purchase, relative to the insider's own investment horizon.

B. Information Content of Unexpected Insider Trades

In this subsection we investigate whether insider purchases (or sales) that are more unexpected contain more positive (or negative) informative about future returns. In Panel A of Table IV, we conduct a one-way sorting analysis where we partition all insider trades each month into terciles based on *UNEXP*. For a given month, the lowest tercile contains stocks with the most unexpected insider sales (i.e., *UNEXP* closer to −2), while the highest tercile contains stocks with the most unexpected insider purchases (i.e., *UNEXP* closer to +2). The middle tercile contains the stocks of insiders whose purchases and sales are the least unexpected (i.e., *UNEXP* close to 0). Panel A indicates that the tercile of insider purchases with a more positive surprise has an alpha of 1.64% (*t*-ratio = 6.72) in the following month, while the tercile of insider sales with a more negative surprise has an alpha of −0.32% (*t*-ratio = −3.25). Furthermore, the tercile of insider trades with a more positive surprise outperforms the tercile with a more negative

surprise by an alpha of 1.96% (*t*-ratio = 8.12) in the following month.[15]

-Table IV-

In Panel B of Table IV, we analyze insider purchases and sales separately, and we further control for insider trading strength using a two-way sorting scheme based on both our measures of unexpected trades (*UNEXP*) and insider trading strength (*STR*). For the sample of insider purchases (where *UNEXP* ranges from 0 to +2), every month (*t*) we first sort stocks into three portfolios, as in Panel A. Now the lowest tercile of purchases (with *UNEXP* close to 0) contains the subset of insider purchases that are least unexpected, while the highest tercile (with *UNEXP* close to +2) has the group of purchases that are most unexpected. We then independently sort stocks into strong purchases or weak purchases that are either above or below the median value of *STR*. Finally, we repeat this sorting process for the sample of insider sales, so that the lowest (highest) tercile by *UNEXP* contains the most (least) unexpected sales.

Consider the results for the purchases sample in the right column of Panel B in Table IV. Within the subset of strong (or weak) purchases, the most unexpected purchases outperform the least unexpected purchases by an alpha of 1.73% (or 1.35%) in the next month, with a *t*-ratio of 4.93 (or 4.27). The results are somewhat weaker for the sales sample. For example, the tercile of strong sales with a more negative surprise has an alpha of −0.35% (*t*-ratio = −2.46), which underperforms the tercile of strong sales with a less negative surprise by an alpha of 0.27% (*t*-

[15] In Panels A and B of Table IV, we again highlight in **bold** the alphas for unexpected sales, to emphasize that unexpected sales are significantly informed. Similar to our findings of informed sales by SH insiders in Table II, this evidence contrasts with much previous literature, which generally concludes that insider sales are not informative.

ratio = 1.77). Overall, these results indicate that insider trades that are more unexpected are more informative about future returns.[16]

C. How Unexpected Are Trades by SH Insiders versus LH Insiders?

Next we further test the implications of our conjecture, by examining whether the typical trades of SH insiders are more unexpected relative to the typical trades of LH insiders, on average. Panel A of Table V presents the average value of the extent to which purchases or sales are unexpected (*UNEXP*), for insiders with different investment horizons (*HOR*). Similar to Tables I and II, every month we partition all purchases or sales into three groups according to whether the insider has a short, medium, or long investment horizon. Recall that our measure of unexpected trades (*UNEXP*) ranges from −2 to +2. A larger negative (positive) value indicates a more unexpected sale (purchase), while a value close to zero indicates a trade that is less unexpected (i.e., more expected).

-Table V-

Panel A of Table V indicates that, for the sample of insider sales, the average value of *UNEXP* for LH insiders is −0.04 (*t*-ratio = −8.77). While this result is significantly different from zero, it is economically close to zero. This outcome indicates that most LH sellers do not deviate from their persistent patterns of selling (i.e., where *UNEXP* = 0), as expected. In contrast, the average value of *UNEXP* for SH sellers is −0.83 (*t*-ratio = −108.64), and the difference in mean

[16] This evidence becomes stronger when we partition insider sales into four groups instead of two groups based on insider trading strength. See Internet Appendix Table A.III for details. In addition, in Internet Appendix Table A.IV, we report results from panel regression analysis using our measure of unexpected trades, which confirms the finding in Table IV that insider trades that are more unexpected are significantly more informed.

values for *UNEXP* across SH versus LH sellers is −0.79 (*t*-ratio = −195.52). This result indicates that the average sale by SH insiders is significantly more unexpected, relative to the typical sale by LH sellers. We find similar patterns for the sample of insider purchases.

D. Information Content of Unexpected Trades by LH versus SH Insiders

According to our conjecture, in an efficient market the information content of insider trades should depend on the degree to which the trades are unexpected. The two groups of insider trades that are most unexpected are sales made by LH buyers (*UNEXP* = −2) and purchases made by LH sellers (*UNEXP* = +2). These two groups of unexpected trades by LH insiders should be both extremely rare and even more informed, when compared with the typical (unexpected) trades by SH insiders.

We investigate these implications of our conjecture in Panel B of Table V. First we apply the 5 × 3 sorting scheme from Panel A of Table II, to consider five rows of portfolios by trading strength (*STR*) and three columns by insider investment horizon (*HOR*). Then we expand the first column of all trades by LH insiders into two new columns with: (i) the subset of rare trades that deviate from their LH expected patterns (*UNEXP* = −2 or *UNEXP* = +2), and (ii) all remaining trades that continue their LH expected patterns of buying or selling (*UNEXP* = 0). The result is a 5 × 4 sorting scheme that allows us to compare the *unexpected* or *expected* trades of *LH* insiders (LHU or LHE in column 1 or 2) with the average trades of insiders with a medium or short investment horizon (in column 3 or 4). For each portfolio in this 5 × 4 sorting scheme, we then provide the average raw returns in the top half of Panel B, and the Fama-French 4-factor alphas in the bottom half.

We begin by discussing the relative frequencies of *unexpected* versus *expected* trades by *LH* insiders (LHU or LHE in column 1 or 2), provided in square brackets in Panel B of Table V. For example, just 3.8% of the subset of strong sales made by *LH* insiders are *unexpected* (i.e., sales by LH buyers), while the remaining 96.2% are *expected* (i.e., continued sales by LH sellers). The other cells in columns 1 and 2 of Panel B similarly reveal that such *unexpected* sales or purchases by *LH* insiders are extremely rare, consistent with our conjecture and the evidence in Panel A of Table V. When we combine all purchases and sales by LH insiders, only 2.6% deviate from their persistent patterns of buying or selling over the prior ten years. These results confirm that *unexpected* trades by *LH* insiders are exceedingly rare.

Next we discuss the portfolio returns in Panel B of Table V. We focus on a comparison of the typical (unexpected) trades by SH insiders (SH in column 4) versus the subsets of *unexpected* and *expected* trades by LH insiders (LHU and LHE in columns 1 and 2). For example, consider the evidence toward the bottom of Panel B. Column 1 indicates that, when *LH* sellers make rare *unexpected* strong purchases (*UNEXP* = +2), they earn a large monthly alpha of 3.39% (*t*-ratio = 4.68). In contrast, column 2 shows that the *expected* strong purchases of *LH* buyers (LHE) earn an alpha of just 0.73% per month (*t*-ratio = 3.19), while column 4 reveals that the strong purchases by SH insiders (SH) earn a monthly alpha of 1.71% (*t*-ratio = 5.05). Column 5 shows that this latter group of strong purchases by SH insiders (SH) significantly ***under***perform the rare *unexpected* strong purchases of *LH* sellers (LHU) by a hedge portfolio alpha (SH – LHU) of −1.67% (= 1.71% − 3.39%; *t*-ratio = −1.98). In contrast, column 6 reveals that these same strong

purchases of SH insiders (SH) ***out***perform the *expected* strong purchases of *LH* buyers (LHE) by 0.98% (= 1.71% − 0.73%; *t*-ratio = 3.91). We find similar but weaker evidence for strong sales.

Next consider the hedge portfolio alphas when we mimic the strong purchases and sales for each group of insider trades (SP – SS), in the bottom row of Panel B in Table V. For example, in column 1, the hedge portfolio that duplicates the rare *unexpected* strong purchases and sales of *LH* insiders generates an extraordinary monthly alpha of 4.25% (*t*-ratio = 4.31). In comparison, the analogous (SP – SS) hedge portfolio for SH insiders in column 4 generates an alpha of 2.08% per month (*t*-ratio = 5.69). Column 5 documents that this latter (SP – SS) hedge portfolio for SH insiders (SH) ***under***performs the analogous (SP – SS) hedge portfolio in column 1 (LHU) by −2.17% (= 2.08% − 4.25%; *t*-ratio = −2.01). In sharp contrast, column 6 shows that the same (SP – SS) hedge portfolio for SH insiders in column 4 (SH) ***out***performs the analogous hedge portfolio that duplicates the *expected* strong purchases and sales of *LH* insiders (LHE) by 1.49% (= 2.08% − 0.59%; *t*-ratio = 4.75).

Overall, this analysis documents that the typical trades of SH insiders outperform the typical trades of LH insiders because they tend to be more unexpected, on average. When we delve deeper, we find that these same typical (unexpected) trades of SH insiders significantly ***under***perform the rare *unexpected* trades of *LH* insiders (LHU), while they significantly ***out***perform the more common *expected* trades of *LH* insiders (LHE). Thus, on the rare occasions when LH insiders change their persistent trading patterns, those trades are even more unexpected and more informative than the typical (unexpected) trades of SH insiders. Altogether, our findings in this section provide consistent and corroborating support for our conjecture that

insider investment horizon matters because it offers a benchmark for establishing expected patterns of continued insider trading behavior, and thereby helps to identify unexpected trades that are more informed.

IV. Insider Investment Horizon, Insider Characteristics, and Managerial Short-Termism

A. Characteristics of SH versus LH Insiders and the Firms They Manage

In Table VI, we explore the differential characteristics of insiders and their firms across LH and SH insiders (as defined in Table I).[17] Panel A presents the evidence for all insider trades, while Panel B provides the analysis for purchases and sales separately. The top portion of each panel in Table VI presents results for the key independent variables. First, we find significant variation in the average investment horizon (*HOR*) across these two groups of insiders. We also document that SH insiders tend to be associated with firms that are subject to greater information asymmetry, with smaller size and higher stock return volatility.

-Table VI-

Next, we compare additional attributes of the firms managed by SH insiders versus LH insiders. Here we examine measures of corporate governance, ownership by short-term institutions, and textual analysis of the firm's 10-Ks. SH insider trades are associated with firms that tend to have weaker corporate governance, as measured by a significantly higher

[17] In Internet Appendix Table A.V, we further explore the association between insider investment horizon and the attributes of insiders and their firms, using a probit regression framework. Due to the potential "incidental parameters problem" when estimating probit models with fixed effects (see Greene (2004)), we also estimate a linear probability model. The findings are similar to those in Table VI.

entrenchment index of Bebchuk, Cohen, and Ferrell (2009), although this evidence is somewhat weaker for the governance index of Gompers, Ishii, and Metrick (2003). The firms of SH insiders also have greater ownership by short-term institutional investors (Bushee (2001)). While the results for *IO_SHORT* in Panel B of Table VI suggest this finding is driven by insider purchases, these results become stronger for both purchases and sales in the regression analysis provided in Internet Appendix Table A.V. Finally, the firms of SH insiders also make fewer references to long-term goals and objectives in their 10-K filings.[18]

Lastly, we compare the attributes of the insiders themselves. SH insiders are more likely to be high ranking officials in the company, with positions as CEO, CFO, and Chair of the Board. In addition, SH insiders are more likely to have MBAs, and less likely to have PhDs or be female. They are more likely to make non-routine trades (CMP (2012)) and persistently opportunistic trades (Cline, Gokkaya, and Liu (2017); Ali and Hirshleifer (2017)). For the subset of purchases, insiders with an SH tend to be younger in age, although they have a longer tenure with the firm. In contrast, for the sample of sales, SH insiders tend to be older and have a shorter tenure. Along another dimension, SH insiders tend to be more experienced in terms of *years* of trading as an insider, but less experienced in terms of their total insider trading *activity*. There are

[18] In the spirit of Malmendier and Tate (2008), our textual based measure of the firm's investment horizon is obtained from from its 10-K filings. First we search for references to the words, "long-term" and "long-run," and we construct a measure (*LONGTM10K*), which is the ratio of all such references to the total number of words in the firm's 10-K (we ignore references to "long-term assets, liabilities, or debt"). We also construct an alternative measure (*LONGTM10K1*), which only includes words related to "long-term interests, success, value, objective, etc."

two possible reasons for this latter outcome. First, the SEC's short swing rule requires company insiders to return any profits made from the purchase and sale of company stock if both transactions occur within a six-month period. This timing constraint may lead to fewer trades *per year* by SH insiders, on average, while it does not apply to LH insiders who only buy or sell. Second, this outcome may reflect a tendency for LH insiders to either repeatedly purchase shares over time due to long-term goals, perhaps to build a position to gain corporate control, or repeatedly sell shares for diversification or liquidity.

An insider's compensation structure is also likely to affect his or her investment horizon. For the subset of insiders whose compensation data are available from ExecuComp or Incentive Lab, we examine three aspects of their compensation package, including delta (pay-performance sensitivity), vega (risk taking incentives), and a measure of the extent to which their compensation is short- or long-term in nature (pay duration). Higher delta, vega, and a longer pay duration are associated with greater needs for selling to achieve diversification or liquidity. Thus, for the sample of sales (purchases), we expect LH insiders who only sell (buy) in the past ten years to have higher (lower) delta and vega, and a longer (shorter) pay duration. Another possibility is that executives who are willing to accept longer term contract incentives might tend to have a longer investment horizon. In this case, we should expect a positive relation between pay duration and insider investment horizon. Consistent with these expectations, we find that LH insiders tend to have higher delta and vega, and a longer pay duration, which is driven by the sales sample.

Finally, we construct two measures of insider pessimism. First, *DEPRESS* is an indicator

for insiders who were born prior to the great depression. Previous literature shows that depression babies tend to be more pessimistic about future stock returns, less willing to take financial risk, and less likely to use external financing (e.g., Malmendier and Nagel (2011); Malmendier, Tate, and Yan (2011)). Second, *PESSIMISM* is a dummy variable that identifies insiders who tend to exercise their options at low levels of moneyness, following Campbell et al. (2011). This latter measure of pessimism is the opposite of the overconfidence measure of Malmendier and Tate (2005), who find that managerial overconfidence leads to corporate investment distortions. We expect these two indicators of insider pessimism to have divergent relations with insider investment horizon for the samples of purchases versus sales, because pessimistic insiders are less likely to continue buying over time, but more likely to continue selling. Consistent with this view, we find that pessimistic insiders are indeed less likely to be LH (persistent) buyers, while they are more likely to be LH (persistent) sellers.

B. Insider Investment Horizon and Managerial Short-Termism

In this subsection, we examine whether our empirical measure of insider investment horizon (*HOR*), based on the insider's trading activity, is associated with measures of short-term managerial behavior at the insider's firm. Bushee (1998) shows that firms owned by short-term (transient) institutional investors tend to display short-term managerial behavior, such as a tendency to focus on short-term profitability by cutting R&D expenditures and engaging in earnings management. In the spirit of Bushee (1998), we examine how a firm's earnings management (i.e., accruals) and R&D expenditures are related to the investment horizon of the firm's insiders.

Table VII reports results from estimating the following panel regression model that relates a firm's future earnings management or R&D expenditures to the trading strength (STR_RK) and investment horizon (*HOR*) of the firm's insiders, along with other controls:

$$DEP_{j,y+1} = \alpha_y + \alpha_{IND} + \beta_{STR} STR\_RK_{i,j,t} + \beta_{HOR} HOR_{i,j,t} + Controls_{j,t} + \varepsilon_{i,j,t}. \quad (2)$$

In column (1) of Table VII, the dependent variable ($DEP_{j,y+1}$) is the discretionary accruals of the insider's firm (*j*) in the year following the insider trade (*y+1*). We construct the discretionary accruals measure from the modified Jones (1991) model following DeFond and Park (1997). In column (2), the dependent variable is the firm's future R&D expenditure. In this analysis, we include yearly and industry (two-digit SIC code) fixed effects (α_y and α_{IND}), and standard errors are clustered at the industry level.

-Table VII-

The evidence in Table VII indicates that a shorter investment horizon for the firm's insiders (i.e., a higher value of *HOR*, closer to zero) is associated with significantly greater earnings management and less R&D expenditure. This evidence indicates that insiders with a shorter investment horizon tend to manage firms with a greater focus on short-term policies, and suggests that our measure of investment horizon based on the insider's trading activity also captures the investment horizon of the policies pursued by these managers at the firm level.

V. Sources of the Information Advantage for SH Insiders

In this section, we examine the relative predictive information contained in the trading activity of SH versus LH insiders, prior to important corporate information events such as quarterly earnings announcements and large price changes.

A. Insider Trading and Earnings Surprises

One of the most important regular information events for public firms is the quarterly earnings announcement. Insiders have access to information about forthcoming earnings well before the public release of this information. Thus, a natural question is whether one source of the outperformance of trading by SH insiders is a propensity to trade in the same direction as the next quarterly earnings surprise.

We examine this issue by estimating another revised version of Equation (1) that replaces the dependent variable with a measure of the next quarterly earnings surprise, as follows:

$$\text{Surprise}_{j,q} = \alpha_t + \beta_{STR}\,\text{STR\_RK}_{i,j,t} + \beta_{HOR}\,\text{HOR}_{i,j,t} + \beta_{STR*HOR}\,\text{STR\_RK}_{i,j,t} \times \text{HOR}_{i,j,t} + \text{Controls}_{j,t} + \varepsilon_{i,j,t}, \quad (3)$$

where $Surprise_{j,q}$ is the earnings surprise at the next quarterly earnings announcement that occurs in quarter q, following insider trades that occur during month t. In our design, this next earnings announcement may occur anytime beginning one day after the insider trade and extending up to three months after the trade (i.e., until the next quarterly announcement). In addition to the control variables in Equation (1), we also include the one-quarter lagged earnings surprise.

We examine two alternative measures of the quarterly earnings surprise, namely the accounting based measure of standardized unexpected earnings ($SUE_{j,q}$) proposed by Bernard and Thomas (1990), and a market-based measure of the 3-day cumulative abnormal return around the earnings announcement, $CAR(-1,+1)_{j,q}$. In this panel regression analysis, monthly fixed effects (α_t) are included and standard errors are clustered by time at the monthly level.

-Table VIII-

The results of this panel regression are presented in Table VIII. For both the *SUE* and the *CAR*, the interaction term between insider's trading strength and investment horizon is

significantly positively related to the subsequent earnings surprise, in a manner that is consistent with the return analysis in Table III. These results demonstrate that the trades of SH insiders have significantly higher predictive power regarding the information content of the next future earnings surprise, relative to the trades of LH insiders.

B. Insider Trading and Large Stock Price Changes

Following Ravina and Sapienza (2010), we also examine the relative information content of trades by SH versus LH insiders that are made in the days before large stock price changes. Our sample of large price change events is identified as follows. First, for each firm (*j*), we compute the three-day cumulative abnormal return (CAR) around every trading day (*t*) in the sample. If the *CAR* for a given day (*t*) is among the top (bottom) 10% among all trading days in that calendar year, then that day (*t*) is identified as having a large positive (negative) stock price change. If such a large price increase (decrease) occurs within 10 days following an insider trade in the stock (*j*), the dummy variable $+\Delta P$ ($-\Delta P$) is assigned a value of one, or zero otherwise. Similar to all analyses above, this test is performed at the monthly level. If an insider makes multiple transactions in a given month, we use the last transaction day as the insider's trading day for that month.

For large price changes that occur following trades made by insider *i* of firm *j* in month *t*, we specify the following panel probit model:

$$\Phi^{-1}(+/-\Delta P_{j,t}) = \alpha_t + \lambda_{STR}\,STR\_RK_{i,j,t} + \lambda_{HOR}\,HOR_{i,j,t} + \lambda_{STR*HOR}\,STR\_RK_{i,j,t}\times HOR_{i,j,t} + Controls_{j,t} + \varepsilon_{i,j,t}, \quad (4)$$

where $\Phi(.)$ represents the cumulative distribution function for the standard normal distribution. We also control for time fixed effects (α_t) and we cluster standard errors by time at the monthly level.[19] Table IX reports the results from this panel probit analysis. Columns 1 and 2 present the probit model coefficients and their respective *z*-statistics for the analysis of large price increases, while columns 3 and 4 give the analogous results for large price declines.

-Table IX-

In the first two (last two) columns of Table IX, the coefficient of the interaction term, $\lambda_{STR*HOR}$, is significantly positive (negative). This evidence indicates that the hedge portfolio of strong purchases minus strong sales by SH insiders possesses significantly greater predictive power regarding an imminent large price increase (decrease), relative to the analogous trades of LH insiders. At the bottom of Table IX, we provide two measures of the marginal *economic effect* of insider trading strength (*STR_RK*) on the likelihood of these events, conditional on the insider's investment horizon (*HOR*), that are implied by this analysis (these *economic effects* are described in Table IX). Together, this evidence indicates that the trades of SH insiders are more likely to be followed by large stock price changes in the same direction as the insider's trade, relative to the trades of LH insiders. This result is consistent with the analysis of returns in Table III and earnings surprises in Table VIII.

VI. Insider Investment Horizon, Insider Trading, and SEC Investigations

[19] Again, we note that this analysis is subject to the potential "incidental parameters problem" when estimating probit models with fixed effects (See, for example, Greene (2004)). Thus, in Internet Appendix Table A.VIII, we also estimate a linear probability model, and obtain similar results.

When insiders exploit private information by trading ahead of major events in this fashion, they face litigation risk. Such litigation risk is elevated at times when the SEC is in a mode of heightened enforcement activity against illegal insider trading. In the spirit of CMP (2012) and Del-Guercio, Odders-White, and Ready (2017), we examine whether SH and LH insiders reveal different propensities to limit their trading activity following periods with more SEC investigations against insider trading.

Similar to CMP (2012), for each month (*t*) we first calculate the fraction of all insider transactions in a given month that are made by medium or short horizon insiders (i.e., not by LH insiders). This monthly proportion is then regressed on the number of SEC insider trading investigations in each of the previous three months, as follows:

$$PCT_t = \alpha + \beta_1 INVESTIGATE_{t-1} + \beta_2 INVESTIGATE_{t-2} + \beta_3 INVESTIGATE_{t-3} + \beta_4 MKTRET_{t-1} + \beta_5 MKTRET_{t-13,\,t-2} + \varepsilon_t . \quad (5)$$

The dependent variable is the percentage of all insider trades that are made by short or medium horizon insiders during month *t*. The independent variables of interest include three monthly lagged values of the numbers of SEC investigations against insider trading during months *t−1*, *t−2*, and *t−3*, respectively (i.e., $INVESTIGATE_{t-k}$, k = 1 − 3). In addition, the model includes the one-month lagged market return (i.e., $MKTRET_{t-1}$), and the cumulative market return from month *t−13* through month *t−2* (i.e., $MKTRET_{t-13,\,t-2}$).

-Table X-

The results are presented in Table X, and reveal significant negative coefficients on all three monthly lags for the number of SEC investigations. This outcome indicates that the proportion of all insider trades made by medium and short horizon insiders declines significantly

during the three months following an increase in SEC enforcement activity. The economic significance of these results is also large. For example, in column 1 of Table X, one additional SEC investigation in month $t-1$ is associated with a 3% reduction in the proportion of all insider trades entered by medium and short horizon insiders in month t (t-ratio = −5.12). In addition, this negative relation builds and accumulates over the three months following an increase in SEC activity. This evidence shows that, when compared with LH insiders, medium and short horizon insiders tend to trade less frequently when the litigation risk associated with their trading activity is relatively high.

VII. Insider Investment Horizon versus the Concept of Non-Routine Insiders

In this section we establish that our measure of insider investment horizon offers incremental predictive information about future returns, beyond that provided by the concept of routine versus non-routine insiders set forth in CMP (2012). They define routine insiders as those who traded in the same calendar month in each of the three previous years. The remaining insiders who trade in each of the three previous years are labeled as non-routine or opportunistic insiders. CMP (2012) find that the trades of non-routine insiders contain predictive information about future stock returns, while the trades of routine insiders do not.

We begin by emphasizing that the distinction between routine and non-routine insiders by CMP (2012) depends only on whether the insider traded in the same calendar month of the previous three years. This distinction has nothing to do with the insider's investment horizon (i.e., whether the insider only bought or only sold, or did both in the past). For example, an insider who only made three sales in the past three years, say, in January of 2015, March of

2016, and May of 2017, is a non-routine insider whose trades should be *more* informed according to CMP. However, this insider is an LH seller whose trades should tend to be *less* informed according to our analysis. We note that CMP (2012) focus on trade timing. Trades by non-routine insiders are "unexpected" (i.e., opportunistic) in the sense that they are more likely to be made outside the usual trading dates for an insider. In contrast, our analysis of insider investment horizon focuses on trade direction. Trades by SH insiders are "unexpected" in the sense that they are made outside the usual trading direction of the insider.

Next, we empirically analyze the differential information provided by insider investment horizon (*HOR*) versus the distinction between routine and non-routine trades, in several ways. First, in Table VI we compare the mean values of an indicator variable for the trades of non-routine insiders (*NON_ROUTINE*) across the subsets of LH or SH insiders. These mean values represent the proportions of all trades by each group of LH or SH insiders that are non-routine trades. This evidence shows that both SH and LH insiders make a substantial number of non-routine trades. Although the proportion of non-routine trades is higher for SH insiders versus LH insiders, the difference is fairly small in economic terms (76% versus 65%).

Second, in Panel B of Table I we show that the Pearson correlation between our horizon measure (*HOR*) and the indicator variable for non-routine trades (*NON_ROUTINE*) is only 8% (7% for Spearman). This result implies that our measure of investment horizon captures information about insiders that is substantially different from their distinction as non-routine insiders, even though SH insiders are more likely to make non-routine trades.

Third, we demonstrate here that our main regression results in Table III are unchanged when we control for the differential performance of non-routine trades on future returns. These results are provided in Table XI, where we re-estimate the key models in Table III after including two new control variables: the indicator for non-routine trades (*NON_ROUTINE*) and its interaction with our measure of insider trading strength (*STR_RK*×*NON_ROUTINE*). The evidence in Table XI establishes that the interaction between insider investment horizon and trading strength (*HOR*×*STR_RK*) still provides significant incremental information about future returns, beyond that offered by the indicator for non-routine trades (or its interaction with *STR_RK*).[20]

-Table XI-

This battery of tests establishes that insider investment horizon is a unique attribute of insiders, which offers significant incremental predictive information about future returns beyond that provided by the concept of non-routine insiders from CMP (2012).

VIII. Robustness Tests

A. Additional Control Variables

[20] The sample analyzed in Table XI is smaller than that in Table III, because CMP (2012) only consider routine or non-routine insiders who traded in each of the prior three years. We also note that the coefficients of *NON_ROUTINE* and the interaction term, *STR_RK*×*NON_ROUTINE*, are not significant in Table XI. When we use the same sample as CMP (2012), we are able to replicate their findings (i.e., both *NON_ROUTINE* and *STR_RK*×*NON_ROUTINE* are significant). The discrepancy in our findings is likely due to different samples that result from different sample periods and restrictions.

In this section, we investigate whether our main findings in Table III might be due to the differential attributes of SH versus LH insiders or their firms, which we document in Table VI. We conduct this analysis by adding each attribute as a separate control variable, as well as its interaction with insider trading strength (*STR_RK*), in the regression framework of Equation (1). The implications for the resulting coefficients of these additional variables and their interaction terms are analogous to the coefficients for insider investment horizon and its interaction with trading strength (i.e., β_{STR}, $\beta_{STR*HOR}$, and their difference, ($\beta_{STR} - \beta_{STR*HOR}$)), from Equation (1).

The results are presented in the different columns of Panel A in Internet Appendix Table A.VI. In every column, we include another characteristic of the insider or the firm, one kind at a time, because several characteristics are not available for the full main sample (e.g., over half of the main sample is lost in columns 9 to 12). In these expanded specifications, we are most interested in the results for the interaction term between insider trading strength and insider investment horizon ($\beta_{STR*HOR}$). Across all columns in Panel A, $\beta_{STR*HOR}$ remains significantly positive. This evidence corroborates the results in Table III, indicating that SH insiders continue to significantly outperform LH insiders, whether or not we control for these additional characteristics of the insider or the firm.

B. Alternative Methodologies, Sub-Periods, and Identification Periods for Insider Horizon

In Panel B of Internet Appendix Table A.VI, we present additional robustness tests. First, in column 1 of Panel B, we estimate the panel regression in Equation (1) using two-way clustered standard errors based on firm (*j*) and month (*t*). Second, column 2 further controls for industry fixed effects using 2-digit SIC codes. Third, in column 3 we follow Brennan, Chordia,

and Subrahmanyam (1998), and use the alphas from the Fama-French four-factor model as our dependent variable, to ensure that well known risk factors do not drive our results. Fourth, columns 4 and 5 estimate the model over the sub-periods before and after implementation of Sarbanes-Oxley, respectively.

Finally, in columns 6 through 10 of Panel B we assess the robustness of the results to alternative definitions of insider investment horizon. Column 6 uses a discrete measure of insider investment horizon because LH insiders, who only buy or only sell, account for roughly half of all insider trades. Specifically, we combine the two groups of short and medium term insiders (to include any insiders who both buy and sell the stock sometime over the past ten years), and compare this expanded group of medium and short horizon insiders versus the remaining group of LH insiders (who only buy or sell). Next, columns 7, 8, and 9 use a three year, five year, and seven year identification period, respectively, to calculate the insider's investment horizon. In column 10, we include the current month in the former ten year identification period to generate the insider's investment horizon.

Once again, throughout Panel B the coefficient of the interaction term ($\beta_{STR*HOR}$) remains positive and significant, indicating that trades by SH insiders are more informed than those by LH insiders.

C. Insider Investment Horizon and Future Stock Returns at the Firm Level

Internet Appendix Table A.VII presents an alternative panel regression analysis that is conducted at the firm level, rather than for the individual insider. In this analysis, the measure of insider trading strength (*STR*) for firm *j* in month *t* is constructed as aggregate net purchases (i.e.,

shares purchased – shares sold) across all insiders at firm *j*, scaled by total trading volume in the stock of firm *j* by all investors during month *t*. Similarly, the firm-level measure of insider investment horizon (*HOR*) is constructed as the trading volume-weighted average of the measures of investment horizon, across all insiders at firm *j* who trade in month *t*. Once again, the coefficient of the interaction term ($\beta_{STR*HOR}$) remains positive and significant, indicating that trades by SH insiders are more informed than those by LH insiders when we measure insider trading and investment horizon at the firm level.

IX. Summary and Conclusions

We show that the investment horizon of an insider is associated with the information content of the insider's trades. We define an insider's investment horizon as the average annual net order flow based on past insider trading activity. This construct is grounded in the premise that those insiders who tend to mostly buy or mostly sell the company's stock over time have a longer investment horizon, in comparison with other insiders who tend to realize their insider trading gains or losses in a more timely fashion by both buying and selling periodically.

We document that SH insiders outperform LH insiders in the short run, for up to twelve months following the insider trades, but not in the longer run beyond one year. Moreover, this outperformance of SH versus LH insiders manifests itself on both the buy side and the sell side. In addition, the trades of SH insiders have greater predictive power with respect to forthcoming firm-specific information events, such as quarterly earnings surprises and large stock price changes.

We conjecture that the trades of SH insiders are more informed because they tend to be more unexpected. The vast majority of trades by LH insiders continue their persistent, expected pattern of buying or selling. In contrast, for SH insiders whose past purchases and sales tend to offset each other, either a new purchase or a new sale will tend to be more unexpected by other market participants. We document that insider trades that are more unexpected are also more informed. In addition, the typical trades of SH insiders are more unexpected than the typical trades of LH insiders, on average. Finally, on the rare occasions when LH insiders deviate from their persistent and expected patterns of buying or selling, these trades are even more unexpected and more informed than the typical (unexpected) trades of SH insiders.

We also examine the relative attributes of SH insiders versus LH insiders. We find that SH insiders are more likely to hold important managerial positions such as CEO, CFO, or Chair of the Board. They are more likely to hold an MBA and less likely to hold a PhD. They are less likely to be female, and they display more opportunistic behavior. They also tend to work in firms that have weaker corporate governance, greater information asymmetry, higher ownership by short-term institutional investors, fewer words related to "long-term" in their 10-Ks, and pursue policies that are more short-term in nature.

This paper should be of interest to market participants, who may attempt to glean more predictive information from insider trades by focusing on the insider's investment horizon. Likewise, the regulators may consider applying an added level of scrutiny to insiders with a short investment horizon. The trades of SH insiders account for a relatively small portion of all insider transactions, but we show that they are more likely to convey private information. In addition,

some added scrutiny of LH insiders may be warranted when they deviate from their past trading patterns.

Potentially fruitful areas of future inquiry include the implications of insider investment horizon for different aspects of corporate policies and governance. The investment horizon of a firm's insiders may shed new light on the nature and consequences of the firm's decision-making process. We leave analyses of these and other related questions to future research.

References

Aboody, David, and Baruch Lev, 2000, Information asymmetry, R&D and insider gains, *Journal of Finance* 55, 2747-2766.

Ali, Usman, and David A. Hirshleifer, 2017, Opportunism as a managerial trait: Predicting insider trading profits and misconduct, *Journal of Financial Economics* 126 (3), 490-515.

Bebchuk, Lucian A., Alma Cohen, and Allen Ferrell, 2009, What matters in corporate governance? *Review of Financial Studies* 22 (2), 783-827.

Bernard Victor L., and Jacob K. Thomas, 1990, Evidence that stock prices do not fully reflect the implications of current earnings for future earnings, *Journal of Accounting and Economics* 13, 305-340.

Bettis, J. Carr, Jeffrey L. Coles, and Michael L. Lemmon, 2000, Corporate policies restricting trading by insiders, *Journal of Financial Economics* 57 (2), 191-220.

Biggerstaff, Lee, David C. Cicero, and M. Babajide Wintoki, 2015, Insider trading patterns. Working paper.

Boehmer, Ekkehart, Charles M. Jones, and Xiaoyan Zhang, 2008, Which shorts are informed? *The Journal of Finance* 63, 491-527.

Brennan, Michael J., Tarun Chordia, and Avanidhar Subrahmanyam, 1998, Alternative factor specifications, security characteristics, and the cross-section of expected stock returns, *Journal of Financial Economics* 49 (3), 345-373.

Bushee, Brian J., 1998, The influence of institutional investors on myopic R&D investment behavior, *The Accounting Review* 73 (3), 305-333.

Bushee, Brian J., 2001, Do institutional investors prefer near-term earnings over long-run value? *Contemporary Accounting Research* 18 (2), 207-246.

Cadman, Brian, and Jayanthi Sunder, 2014, Investor horizon and CEO horizon incentives, *The Accounting Review* 89 (4), 1299-1328.

Campbell, T. Colin, Michael Gallmeyer, Shane A. Johnson, Jessica Rutherford, and Brooke W. Stanley, 2011, CEO optimism and forced turnover, *Journal of Financial Economics* 101 (3), 695-712.

Carhart, Mark M., 1997, On persistence in mutual fund performance, *Journal of Finance* 52 (1), 57-82.

Cella, Christine, Andrew Ellul, and Mariassunta Giannetti, 2013, Investors' horizons and the amplification of market shocks, *Review of Financial Studies* 26 (7), 1607-1648.

Chen, Xia, Jarrad Harford, and Kai Li, 2007, Monitoring: Which institutions matter? *Journal of Financial Economics* 86 (2), 279-305.

Cheng, Qiang, and Kin Lo, 2006, Insider trading and voluntary disclosures, *Journal of Accounting Research* 44 (5), 815-848.

Cline, Brandon N., Sinan Gokkaya, and Xi Liu, 2017, The persistence of opportunistic insider trading, *Financial Management* 46 (4), 919-964.

Cohen, Lauren, Christopher Malloy, and Lukasz Pomorski, 2012, Decoding inside information, *Journal of Finance* 67, 1009-1043.

Coles, Jeffrey L., Naveen D. Daniel, and Lalitha Naveen, 2006, Managerial incentives and risk-taking, *Journal of Financial Economics* 79, 431-468.

Cremers, Martijn, and Ankur Pareek, 2015, Short-term trading and stock return anomalies: Momentum, reversal, and share issuance, *Review of Finance* 19 (4), 1649-1701.

Cziraki, Peter, Peter De Goeij, and Luc Renneboog, 2014, Corporate governance rules and insider trading profits, *Review of Finance* 18 (1), 67-108.

Cziraki, Peter, and Moqi Groen-Xu, 2017, CEO turnover and risk taking under long-term employment contracts. Working Paper.

DeFond, Mark L., and Chu W. Park, 1997, Smoothing income in anticipation of future earnings, *Journal of Accounting & Economics* 23 (2), 115-139.

Del Guercio, Diane, Elizabeth R. Odders-White, and Mark J. Ready, 2017, The deterrence effect of the Securities and Exchange Commission's enforcement intensity on illegal insider trading: Evidence from run-up before news events, *Journal of Law and Economics* 60 (2), 269-307.

Derrien, Francois, Ambrus Kecskes, and David Thesmar, 2013, Investor horizons and corporate policies, *Journal of Financial and Quantitative Analysis* 48 (6), 1755-1780.

Edmans, Alex, Vivian W. Fang, and Katharine A. Lewellen, 2017, Equity vesting and investment, *The Review of Financial Studies* 30 (7), 2229-2271.

Edmans, Alex, Xavier Gabaix, and Augustin Landier, 2009, A multiplicative model of optimal CEO incentives in market equilibrium, *Review of Financial Studies* 22, 4881-4917.

Fama, Eugene F., and Kenneth R. French, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33 (1), 3-56.

Fama, Eugene F., and Kenneth R. French, 2015, A five-factor asset pricing model, *Journal of Financial Economics* 116 (1), 1-22.

Fidrmuc, Jana P., Marc Goergen, and Luc Renneboog, 2006, Insider trading, new releases and ownership concentration, *Journal of Finance* 61 (6), 2931-2973.

Frankel, Richard, and Xu Li, 2004, Characteristics of a firm's information environment and the information asymmetry between insiders and outsiders, *Journal of Accounting and Economics* 37 (2), 229-259.

Gaspar, José-Miguel, Massimo Massa, and Pedro Matos, 2005, Shareholder investment horizons and the market for corporate control, *Journal of Financial Economics* 76, 135-165.

Gaspar, José-Miguel, Massimo Massa, Pedro Matos, Rajdeep Patgiri, and Zahid Rehman, 2012, Payout policy choices and shareholder investment horizons, *Review of Finance* 17 (1), 261-320.

Gompers, Paul A., Joy L. Ishii, and Andrew Metrick, 2003, Corporate governance and equity prices, *The Quarterly Journal of Economics* 118 (1), 107-156.

Gonzalez-Uribe, Juanita, and Moqi Groen-Xu, 2017, CEO contract horizon and innovation, Working Paper.

Gopalan, Radhakrishnan, Todd T. Milbourn, Fenghua Song, and Anjan V. Thakor, 2014, Duration of executive compensation, *The Journal of Finance* 69 (6), 2777-2817.

Greene, William, 2004, The behavior of the maximum likelihood estimator of limited dependent variable models in the presence of fixed effects, *Econometrics Journal* 7 (1), 98-119.

Huddart, Steven, Bin Ke, and Charles Shi, 2007, Jeopardy, non-public information, and insider trading around SEC 10-K and 10-Q filings, *Journal of Accounting & Economics* 43 (1), 3-36.

Jaffe, Jeffrey F., 1974, Special information and insider trading, *Journal of Business* 47 (3), 410-428.

Jagolinzer, Alan D., David F. Larcker, and Daniel J. Taylor, 2011, Corporate governance and the information content of insider trades, *Journal of Accounting Research* 49 (5), 1249-1274.

Jeng, Leslie A., Andrew Metrick, and Richard J. Zeckhauser, 2003, Estimating the returns to insider trading: A performance-evaluation perspective, *Review of Economics and Statistics* 85 (2), 453-471.

Jiang, Chao, M. Babajide Wintoki, and Yaoyi Xi, 2018, Insider Trading and the Legal Expertise of Corporate Executives, Working Paper.

Jones, Jennifer J., 1991, Earnings management during import relief investigations, *Journal of Accounting Research* 29 (2), 193-228.

Ke, Bin, and Kathy Petroni, 2004, How informed are actively trading institutional investors? Evidence from their trading behavior before a break in a string of consecutive earnings increases, *Journal of Accounting Research* 42 (5), 895-927.

Lakonishok, Josef, and Inmoo Lee, 2001, Are insider trades informative? *Review of Financial Studies* 14 (1), 79-111.

Malmendier, Ulrike, and Stefan Nagel, 2011, Depression babies: Do macroeconomic experiences affect risk taking? *The Quarterly Journal of Economics* 126 (1), 373-416.

Malmendier, Ulrike, and Geoffrey Tate, 2005, CEO overconfidence and corporate investment, *Journal of Finance* 60 (6), 2661-2700.

Malmendier, Ulrike, and Geoffrey Tate, 2008, Who makes acquisitions? CEO overconfidence and the market's reaction, *Journal of Financial Economics* 89 (1), 20-43.

Malmendier, Ulrike, Geoffrey Tate, and Jon Yan, 2011, Overconfidence and early-life experiences: The effect of managerial traits on corporate financial policies, *Journal of Finance* 66 (5), 1687-1733.

Manne, Henry G., 1966, *Insider Trading and the Stock Market*. Free Press, New York.

Marin, Jose M., Jacques Olivier, 2008, The dog that did not bark: Insider trading and crashes, *Journal of Finance* 63 (5), 2429-2476.

Piotroski, Joseph D., and Darren T. Roulstone, 2005, Do insider trades reflect both contrarian beliefs and superior knowledge about future cash flow realizations? *Journal of Accounting and Economics* 39 (1), 55-81.

Ravina, Enrichetta, and Paola Sapienza, 2010, What do independent directors know? Evidence from their trading, *Review of Financial Studies* 23 (3), 962-1003.

Seyhun, H. Nejat, 1986, Insiders' profits, costs of trading, and market efficiency, *Journal of Financial Economics* 16 (2), 189-212.

Wang, Weimin, Yong-Chul Shin, and Bill B. Francis, 2012, Are CFOs' trades more informative than CEOs' trades? *Journal of Financial and Quantitative Analysis* 47 (4), 743-762.

Yan, Xuemin (Sterling), and Zhe Zhang, 2009, Institutional investors and equity returns: Are short-term institutions better informed? *Review of Financial Studies* 22 (2), 893-924.

Table I. Summary Statistics, Correlations, and Sample Composition

Panels A and B present the time series averages of monthly cross sectional summary statistics and correlations for the variables used in this paper. *HOR* is our monthly measure of insider investment horizon. *STR* is the insider's monthly net insider order imbalance scaled by total trading volume. *B/M* is the book-to-market ratio. *SIZE* is the market capitalization. $RET_{j,\,t-1}$ is the stock return for the insider's firm (*j*) in month $t-1$. $RET_{j,\,t-12,\,t-2}$ is the cumulative return from month $t-12$ to $t-2$. PROFIT is firm gross profitability. *ASSETGR* is asset growth. *STD_RET* is the stock return volatility. *E_INDEX* and *G_INDEX* are corporate governance measures. *IO_SHORT* is the percentage of shares owned by transient institutional investors based on Bushee (2001). *LONGTM10K* is the percentage of text related to "long-term" in the company's 10-K filings. *LONGTM10K1* is an alternative measure of *LONGTM10K*. *CEO*, *CFO*, and *CB* are indicator variables that take a value of one if the insider holds the office of CEO, CFO, or Chair of the Board, respectively. *MBA* and *PhD* are dummy variables that characterize the insider's education background. *NON_ROUTINE* is an indicator variable for opportunistic insiders, following CMP (2012). *PO* is an indicator variable for persistently opportunistic insiders, following Cline, Gokkaya, and Liu (2017). *FEMALE* is a dummy variable for female insiders. *EXP_YEAR* is the number of years of prior trading experience as an insider. *EXP_TRADE* is the total number of previous trading months. *AGE* is the insider's age. *TENURE* is the insider's tenure at the firm. *DELTA* is a measure of pay-performance sensitivity, and *VEGA* is a measure of risk taking incentives. *PAYDUR* is a measure of pay duration in terms of months. *DEPRESS* is an indicator variable for insiders who were depression babies. *PESSIMISM* is an indictor variable for pessimistic insiders. Panel C presents information about the composition of the main sample of insider trading months. All variables are described in Appendix Table AI. The sample period covers January 1996 through December 2013. The *t*-statistics are based on Newey-West robust standard errors with 12 lags. For the correlations in Panel B, numbers highlighted in **bold** indicate significance at the .05 level.

Table I, continued

Panel A. Summary Statistics

VARIABLE	MEAN	STDDEV	MIN	P25	MEDIAN	P75	MAX	N
Key Variables								
HOR	-0.79	0.30	-1.00	-1.00	-0.997	-0.60	0.00	146,345
STR×10^3	-3.33	26.30	-114.13	-4.98	-1.14	-0.01	125.02	146,345
B/M	0.53	0.53	0.04	0.22	0.38	0.65	3.46	146,345
SIZE (million $)	7,242	20,491	14	392	1,249	4,369	142,882	146,345
$RET_{j, t-1}$ %	3.01	12.34	-27.12	-4.15	2.16	9.04	45.14	146,345
$RET_{j, t-12, t-2}$ %	26.74	54.89	-57.63	-5.88	16.11	45.13	271.04	146,345
PROFIT %	38.14	25.94	-23.19	20.32	35.43	52.16	119.72	146,345
ASSETGR %	19.59	37.45	-33.18	1.60	10.84	25.14	221.36	146,345
STD_RET %	2.91	1.58	0.85	1.83	2.53	3.56	9.41	146,345
Other Firm Level								
E_INDEX	2.34	1.24	0.19	1.39	2.26	3.07	5.04	63,243
G_INDEX	8.87	2.59	3.48	6.95	8.87	10.70	15.26	63,056
IO_SHORT	0.16	0.11	0.00	0.08	0.14	0.22	0.48	144,262
LONGTM10K×10^4	1.45	1.31	0.00	0.50	1.07	2.03	6.35	125,976
LONGTM10K1×10^4	0.16	0.29	0.00	0.00	0.02	0.18	1.56	125,976
Insider Level								
CEO	0.17	0.37	0.00	0.00	0.00	0.00	1.00	146,345
CFO	0.07	0.24	0.00	0.00	0.00	0.00	1.00	146,345
CB	0.12	0.32	0.00	0.00	0.00	0.00	1.00	146,345
MBA	0.29	0.45	0.00	0.00	0.00	0.92	1.00	99,689
PhD	0.10	0.30	0.00	0.00	0.00	0.00	1.00	99,689
FEMALE	0.06	0.24	0.00	0.00	0.00	0.00	1.00	121,640
NON_ROUTINE	0.67	0.46	0.00	0.17	1.00	1.00	1.00	64,698
PO	0.44	0.50	0.00	0.00	0.06	1.00	1.00	127,370
EXP_YEAR	9.37	4.02	4.08	6.05	8.51	11.98	19.17	146,345
EXP_TRADE	16.79	11.65	5.00	8.86	13.08	20.70	65.25	146,345
AGE	56.04	9.07	36.86	49.47	55.68	62.15	78.41	120,529
TENURE	17.72	10.66	3.65	9.47	14.90	23.80	48.66	20,499
DELTA	0.29	0.90	0.01	0.04	0.07	0.16	6.63	41,596
VEGA	0.03	0.04	0.00	0.01	0.02	0.03	0.24	42,347
PAYDUR	20.72	11.87	0.15	13.39	20.57	26.95	57.44	20,489
DEPRESS	0.03	0.15	0.00	0.00	0.00	0.00	1.00	120,529
PESSIMISM	0.19	0.39	0.00	0.00	0.00	0.06	1.00	56,303

Table I, continued

Panel B. Correlations of Insider Investment Horizon and Trading Strength with the Other Variables

VARIABLE	PEARSON		SPEARMAN	
Key Variables	HOR	STR	HOR	STR
HOR	**1.00**	**-0.07**	**1.00**	**-0.07**
STR	**-0.07**	**1.00**	**-0.07**	**1.00**
B/M	**0.07**	0.01	**0.08**	0.02
SIZE (million $)	**-0.20**	0.05	**-0.21**	**0.14**
$RET_{j, t-1}$ %	0.00	**-0.04**	-0.01	**-0.12**
$RET_{j, t-12, t-2}$ %	**0.04**	**-0.06**	0.01	**-0.14**
PROFIT %	**-0.03**	**-0.07**	**-0.04**	**-0.13**
ASSETGR %	**0.02**	0.01	-0.01	0.00
STD_RET %	**0.10**	**0.05**	**0.11**	**0.07**
Other Firm Level				
E_INDEX	**0.06**	0.00	**0.06**	0.00
G_INDEX	0.01	0.00	0.01	**0.03**
IO_SHORT	0.02	0.02	**0.03**	-0.02
LONGTM10K×10^4	**-0.04**	**0.02**	**-0.04**	**0.03**
LONGTM10K1×10^4	**-0.02**	**0.02**	**-0.03**	**0.04**
Insider Level				
CEO	**0.08**	**-0.04**	**0.10**	**-0.09**
CFO	**0.02**	0.01	**0.02**	0.00
CB	**0.05**	**-0.03**	**0.06**	**-0.09**
MBA	**0.04**	-0.01	**0.03**	-0.01
PhD	**-0.04**	0.00	**-0.04**	0.00
FEMALE	**-0.06**	**0.01**	**-0.07**	**0.05**
NON_ROUTINE	**0.08**	**-0.04**	**0.07**	**-0.06**
PO	**0.04**	**-0.05**	**0.04**	**-0.05**
EXP_YEAR	**0.04**	**-0.04**	**0.09**	**-0.10**
EXP_TRADE	**-0.14**	**0.06**	**-0.10**	0.00
AGE	0.02	-0.01	0.03	0.00
TENURE	**-0.07**	**-0.14**	**-0.06**	**-0.20**
DELTA	**-0.03**	**-0.14**	-0.02	**-0.19**
VEGA	**-0.04**	**-0.03**	**-0.06**	-0.04
PAYDUR	**-0.07**	**0.06**	**-0.06**	**0.07**
DEPRESS	**0.02**	**-0.02**	**0.01**	**-0.02**
PESSIMISM	**-0.03**	**0.04**	**-0.03**	**0.04**

Table I, continued

Panel C. Sample Composition

Insider Horizon (HOR)		(1) **Sales**	(2) **Purchases**	(3) **Total**
Long Horizon (*HOR* = -1)	# of insider trading months	75,482	9,296	84,778
	% of total trading months	51.58	6.35	57.93
	% of total for row	89.03	10.97	100
	% of total for column	59.48	47.80	-
Medium Horizon (*HOR* closer to -1)	# of insider trading months	25,173	4,445	29,618
	% of total trading months	17.20	3.04	20.24
	% of total for row	84.99	15.01	100
	% of total for column	19.84	22.85	-
Short Horizon (*HOR* closer to 0)	# of insider trading months	26,241	5,708	31,949
	% of total trading months	17.93	3.90	21.83
	% of total for row	82.13	17.87	100
	% of total for column	20.68	29.35	-
Total	# of insider trading months	126,896	19,449	146,345
	% of total trading months	86.71	13.29	100
	% of total for column	100	100	-

Table II. Insider Investment Horizon and Future Stock Returns: Portfolio Analysis

This Table presents results from the two-way sorting analysis. For each month (*t*), stocks are first grouped into five portfolios based on the insiders' trading strength (*STR*), ranging from strong sales (SS) to strong purchases (SP). Then stocks are independently partitioned into three portfolios based on insider investment horizon (*HOR*), resulting in fifteen portfolios. Each portfolio is then held for one month (*t+1*). In Panel A, we report the resulting monthly equally-weighted average returns in percentage terms, along with the Fama-French 4-factor alphas. In Panel B, we present similar analysis applied to the subsets of large firms and small firms each month (i.e., above and below the median firm size each month). All variables are described in Table AI. The *t*-statistics are based on White adjusted standard errors. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

Panel A. Full Sample Analysis

STR	**HOR**			
Raw Returns	**Long**	**Medium**	**Short**	**SH − LH**
Strong Sales	1.15	0.63	0.63	**-0.51*** **
	(3.12)	(1.74)	(1.64)	**(-3.08)**
2	1.01	0.95	0.60	**-0.41** **
	(2.54)	(2.25)	(1.48)	**(-2.26)**
3	0.86	0.87	1.17	**0.31**
	(2.07)	(1.85)	(2.53)	**(1.39)**
4	0.81	0.99	1.05	**0.24**
	(2.00)	(2.08)	(2.12)	**(0.94)**
Strong Purchases	1.63	2.22	2.44	**0.81*** **
	(4.64)	(4.67)	(4.88)	**(3.12)**
SP – SS	**0.49***	**1.58*** **	**1.81*** **	**1.32*** **
	(1.95)	**(4.73)**	**(4.90)**	**(4.24)**
4-Factor Alphas	**Long**	**Medium**	**Short**	**SH − LH**
Strong Sales	0.13	**-0.28**	**-0.37**	**-0.50*** **
	(1.08)	**(-1.39)**	**(-2.11)**	**(-2.91)**
2	0.00	-0.07	**-0.50**	**-0.50*** **
	(0.00)	(-0.41)	**(-2.76)**	**(-2.71)**
3	-0.11	-0.28	0.18	**0.29**
	(-0.75)	(-1.40)	(0.76)	**(1.20)**
4	-0.06	0.10	0.20	**0.26**
	(-0.35)	(0.43)	(0.84)	**(1.06)**
Strong Purchases	0.91	1.41	1.71	**0.80*** **
	(4.21)	(4.55)	(5.05)	**(3.18)**
SP − SS	**0.77*** **	**1.70*** **	**2.08*** **	**1.31*** **
	(3.09)	**(5.54)**	**(5.69)**	**(4.16)**

Table II, continued

Panel B. Subsample Analysis: Large Firms versus Small Firms

STR	**HOR**			
4-Factor Alphas	***Large Firms***			
	Long	**Medium**	**Short**	**SH − LH**
Strong Sales	-0.03 (-0.18)	-0.43 (-1.95)	-0.29 (-1.38)	**-0.27** **(-1.12)**
2	-0.12 (-0.82)	-0.17 (-0.69)	-0.71 (-2.89)	**-0.59**** **(-2.54)**
3	-0.06 (-0.42)	-0.38 (-1.32)	0.03 (0.10)	**0.1** **(0.29)**
4	-0.17 (-0.99)	-0.48 (-1.91)	-0.19 (-0.66)	**-0.02** **(-0.07)**
Strong Purchases	-0.20 (-1.28)	0.38 (1.51)	0.59 (2.09)	**0.79***** **(2.87)**
SP – SS	**-0.18** **(-0.89)**	**0.81**** **(2.43)**	**0.88***** **(2.62)**	**1.06***** **(2.72)**
4-Factor Alphas	***Small Firms***			
	Long	**Medium**	**Short**	**SH − LH**
Strong Sales	0.12 (0.62)	-0.22 (-0.75)	-0.21 (-0.82)	**-0.33** **(-1.23)**
2	0.31 (1.47)	-0.13 (-0.39)	-0.30 (-1.25)	**-0.61**** **(-2.31)**
3	0.21 (0.90)	0.06 (0.22)	0.39 (1.19)	**0.18** **(0.55)**
4	0.84 (2.62)	0.90 (2.59)	1.90 (3.95)	**1.05***** **(2.79)**
Strong Purchases	0.97 (4.11)	1.58 (3.82)	1.69 (4.91)	**0.73**** **(2.18)**
SP − SS	**0.84***** **(2.86)**	**1.80***** **(4.29)**	**1.90***** **(4.76)**	**1.05**** **(2.44)**

Table III. Insider Investment Horizon and Future Stock Returns: Regression Analysis

This Table reports results from the following panel regression of the future one-month-ahead stock return on insider trading strength (STR_RK), insider investment horizon (*HOR*), their interaction, and other controls:

$$RET_{j,\,t+1} \text{ or } RET_{j,\,t+a,\,t+b} = \alpha_t + \beta_{STR}\,STR\_RK_{i,j,t} + \beta_{HOR}\,HOR_{i,j,t} + \beta_{STR*HOR}\,STR\_RK_{i,j,t}\times HOR_{i,j,t} + Controls_{j,t} + \varepsilon_{i,j,t}. \quad (1)$$

In Panel A, the dependent variable is the future one-month-ahead stock return in percentage terms ($RET_{j,\,t+1}$). In Panel B, we replace $RET_{j,\,t+1}$ with longer term stock returns that cover non-overlapping periods that span three years in the future. The key variables of interest are *STR_RK* and the interaction term between *STR_RK* and *HOR*. According to this specification, the effect of insider trading strength on future returns is: $\frac{\partial RET}{\partial STR\_RK} = \beta_{STR} + \beta_{STR*HOR}\,HOR$. This partial derivative shows that, for short horizon insiders (i.e., for *HOR* = 0), a one-unit increase in insider trading strength from strong sales to strong purchases (i.e., changing *STR_RK* from 0 to +1), is associated with a change in $RET_{j,t+1}$ of β_{STR} percent. In contrast, for long horizon insiders (i.e., for *HOR* = −1), a change from strong sales to strong purchases is associated with a change in $RET_{j,\,t+1}$ of ($\beta_{STR} - \beta_{STR*HOR}$) percent. Thus, $\beta_{STR*HOR}$ tests whether one hedge portfolio, made up of the strong purchases minus the strong sales by *short horizon insiders*, outperforms the analogous hedge portfolio of purchases minus sales by *long horizon insiders*. All variables are described in Table AI. The sample period covers January 1996 through December 2013. Monthly fixed effects (α_t) are included, and standard errors are clustered by time at the monthly level. The *t*-statistics are provided in parentheses. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

Table III, continued

Panel A. Dependent Variable: One-Month-Ahead Future Stock Returns, $RET_{j, t+1}$

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)
STR_RK	0.806***	0.805***	1.935***	0.822***	0.823***	1.930***
	(3.51)	(3.49)	(4.21)	(4.28)	(4.26)	(4.89)
HOR		-0.056	-0.745***		0.008	-0.668***
		(-0.36)	(-3.38)		(0.05)	(-3.04)
STR_RK * HOR			**1.458*** (3.57)**			**1.428*** (3.65)**
B/M	31.013**	31.021**	31.243**	30.580**	30.580**	30.502**
	(2.26)	(2.26)	(2.28)	(2.02)	(2.02)	(2.01)
SIZE	-26.297***	-26.465***	-26.092***	-22.668***	-22.643***	-22.394***
	(-3.43)	(-3.46)	(-3.43)	(-3.49)	(-3.49)	(-3.46)
$RET_{j, t-1}$	-0.070	-0.069	-0.039	-0.131	-0.131	-0.101
	(-0.05)	(-0.05)	(-0.03)	(-0.09)	(-0.09)	(-0.07)
$RET_{j, t-12, t-2}$	0.184	0.186	0.194	0.132	0.132	0.140
	(0.51)	(0.51)	(0.53)	(0.36)	(0.36)	(0.38)
PROFIT				0.527	0.527	0.506
				(1.49)	(1.48)	(1.42)
ASSETGR				-0.996***	-0.996***	-0.999***
				(-4.28)	(-4.28)	(-4.29)
STD_RET				5.310	5.308	5.107
				(0.29)	(0.29)	(0.28)
Monthly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Clustered by Month	Yes	Yes	Yes	Yes	Yes	Yes
N	146,345	146,345	146,345	146,345	146,345	146,345
Adj. R^2	0.154	0.154	0.154	0.155	0.155	0.155

Table III, continued

Panel B. Dependent Variable: Long-Term Future Stock Returns, $RET_{j,\,t+a,\,t+b}$

VARIABLE	(1) $RET_{j,\,t+2,\,t+12}$	(2) $RET_{j,\,t+13,\,t+24}$	(3) $RET_{j,\,t+25,\,t+36}$
STR_RK	6.190***	4.493***	2.160
	(3.61)	(2.63)	(1.13)
HOR	-1.439	0.722	1.979
	(-1.29)	(0.62)	(1.56)
STR_RK * HOR	**4.858****	**1.849**	**0.218**
	(2.55)	**(0.97)**	**(0.10)**
Controls	Yes	Yes	Yes
Monthly Fixed Effects	Yes	Yes	Yes
Clustered by Month	Yes	Yes	Yes
N	130,681	113,981	99,559
Adj. R^2	0.153	0.162	0.167

Table IV. Unexpected Insider Trades and Future Stock Returns

This Table presents the sorting analysis based on our measure of unexpected insider trades (*UNEXP*). By construction, *UNEXP* ranges from −2 to 0 (0 to +2) for insider sales (purchases). Panel A presents the one-way sorting analysis, where we partition stocks each month (*t*) into three portfolios based on *UNEXP*. The lowest (highest) tercile contains stocks with the most unexpected sales (purchases). The middle tercile contains the stocks with purchases or sales that are least unexpected (or most expected).

Panel B presents the two-way sorting analysis based on both *UNEXP* and insider trading strength (*STR*). Here we conduct the sorting analysis for purchases and sales separately. For example, every month (*t*), the stocks *bought* by insiders are first partitioned into three portfolios based on *UNEXP*, and then independently sorted into two groups based on insider trading strength (*STR*). We then repeat the above sorting procedure for the sample of insider *sales*. Note that for *purchases*, the lowest (highest) tercile by *UNEXP* contains the least (most) unexpected trades. In contrast, for *sales*, the lowest (highest) tercile by *UNEXP* contains the most (least) unexpected trades. For both Panels A and B, each portfolio is held for one month (*t+1*). We report the resulting monthly equally-weighted average returns and four-factor alphas in percentage terms (with *t*-ratios in parentheses). All variables are described in Table AI. The *t*-statistics are based on White adjusted standard errors. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

Panel A. One-Way Sorting Portfolio Analysis

	UNEXP			
Average Raw Returns	**1** Unexpected Sales	**2** Expected Trades	**3** Unexpected Buys	**3 – 1**
Month t+1	0.70	0.98	2.48	**1.78*** **
	(1.82)	(2.73)	(5.26)	**(6.06)**
4-Factor Alphas	**1**	**2**	**3**	**3 – 1**
Month t+1	**-0.32**	0.07	1.64	**1.96*** **
	(-3.25)	(0.81)	(6.72)	**(8.12)**

Table IV, continued

Panel B. Two-Way Sorting Portfolio Analysis

	STR	UNEXP			
Purchases		**1:** Least Unexp (close to 0)	**2**	**3:** Most Unexp (close to +2)	**3 – 1**
Avg Raw Returns *Month t+1*	**Weak Purchases**	1.57 (3.86)	1.35 (2.35)	2.90 (4.60)	**1.34***** **(3.41)**
	Strong Purchases	1.76 (4.37)	2.62 (4.50)	3.54 (5.86)	**1.78***** **(4.67)**
4-Factor Alphas *Month t+1*	**Weak Purchases**	0.70 (3.06)	0.51 (1.24)	2.05 (6.13)	**1.35***** **(4.27)**
	Strong Purchases	1.07 (3.99)	1.80 (4.20)	2.80 (7.49)	**1.73***** **(4.93)**
Sales		**1:** Most Unexp (close to -2)	**2**	**3:** Least Unexp (close to 0)	**3 – 1**
Avg Raw Returns *Month t+1*	**Weak Sales**	0.63 (1.35)	0.67 (1.34)	0.69 (1.52)	**0.06** **(0.33)**
	Strong Sales	0.60 (1.51)	0.48 (0.97)	0.90 (2.20)	**0.30**** **(2.12)**
4-Factor Alphas *Month t+1*	**Weak Sales**	**-0.36** **(-2.23)**	-0.30 (-1.30)	-0.17 (-1.19)	**0.19** **(0.99)**
	Strong Sales	**-0.35** **(-2.46)**	-0.50 (-1.63)	-0.08 (-0.73)	**0.27*** **(1.77)**

Table V. Insider Investment Horizon and Unexpected Trades

Panel A of this Table presents a one-way sorting analysis that provides the average value of our measure of unexpected trades (*UNEXP*) for insiders with different investment horizons (*HOR*). Similar to Tables I and II, we partition all insiders into three *HOR* groups. We then analyze the samples of insider sales and purchases separately. For each group of insider trades, we compute the average value of *UNEXP* as the time series mean of the cross sectional averages for every month. Our measure (*UNEXP*) ranges from −2 to +2; a larger negative value indicates a more unexpected sale, while a larger positive value indicates a more unexpected purchase.

Panel B presents a two-way sorting analysis of the performance of insider trades, based on both insider investment horizon (*HOR*) and trading strength (*STR*). First, we apply the 5 × 3 sorting scheme from Panel A of Table II, to consider five rows of portfolios by trading strength (*STR*) and three columns by insider investment horizon (*HOR*). Then we expand the first column of all trades by long horizon insiders into two new columns that contain: (1) the subset of rare trades that deviate from their long horizon expected patterns (LHU: *UNEXP* = −2 or *UNEXP* = +2), and (2) all remaining trades that continue their long horizon expected patterns of buying or selling (LHE: *UNEXP* = 0). Finally, the right two columns in Panel B give the hedge portfolio returns that compare the performance of the typical (unexpected) trades by short horizon insiders (SH in column 4) versus the *unexpected* or *expected* trades of *long* horizon insiders (LHU or LHE in column 1 or 2).

In columns 1 and 2 of Panel B, in square brackets we also provide the percentage of each group of trades by *long* horizon insiders that are either *expected* or *unexpected* (LHU or LHE). For example, at the top of columns 1 and 2, we show that just 3.8% of the subset of strong sales made by *long* horizon insiders are *unexpected*, while the remaining 96.2% are *expected*.

The sample period covers January 1996 through December 2013. The *t*-statistics provided in round parentheses in Panel A (or Panel B) are based on Newey-West robust standard errors with 12 lags (or White adjusted standard errors). All variables are described in Table AI. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

Panel A. Average Measure of Unexpected Trades for Insiders with Different Investment Horizons

Average UNEXP for:	**HOR**			
	Long	**Medium**	**Short**	**SH − LH**
Sales	-0.04 (-8.77)	-0.37 (-25.25)	-0.83 (-108.64)	**-0.79***** **(-195.52)**
Purchases	0.11 (10.40)	0.54 (26.49)	0.90 (130.96)	**0.78***** **(106.69)**

Table V, continued

Panel B. Performance of Unexpected and Expected Trades by LH Insiders versus the Trades of SH Insiders

STR	**HOR**					
Raw Returns	**Long Horizon**		**Medium**	**Short**	**SH – LHU**	**SH – LHE**
	Unexpected(1)	**Expected(2)**	**(3)**	**(4)**	**(4) – (1)**	**(4) – (2)**
Strong Sales	0.29	1.15	0.63	0.63	**0.35**	**-0.52****
	(0.43)	(3.14)	(1.74)	(1.64)	**(0.63)**	**(-3.08)**
	[3.8%]	[96.2%]				
2	0.96	1.00	0.95	0.60	**-0.36**	**-0.41****
	(1.29)	(2.52)	(2.25)	(1.48)	**(-0.51)**	**(-2.22)**
	[1.8%]	[98.2%]				
3	1.52	0.81	0.87	1.17	**-0.34**	**0.36**
	(2.14)	(1.97)	(1.85)	(2.53)	**(-0.55)**	**(1.56)**
	[1.4%]	[98.6%]				
4	2.92	0.64	0.99	1.05	**-1.87***	**0.41**
	(2.61)	(1.66)	(2.08)	(2.12)	**(-1.88)**	**(1.45)**
	[2.3%]	[97.7%]				
Strong Purch.	4.10	1.46	2.22	2.44	**-1.65****	**0.99*****
	(4.81)	(4.20)	(4.67)	(4.88)	**(-2.05)**	**(3.78)**
	[3.8%]	[96.2%]				
SP – SS	**3.81*****	**0.31**	**1.58*****	**1.81*****	**-2.00***	**1.50*****
	(3.94)	**(1.19)**	**(4.73)**	**(4.90)**	**(-2.01)**	**(4.77)**
4-Factor α	**Long Horizon**		**Medium**	**Short**	**SH – LHU**	**SH – LHE**
	Unexpected(1)	**Expected(2)**	**(3)**	**(4)**	**(4) – (1)**	**(4) – (2)**
Strong Sales	-0.87	0.14	-0.28	-0.37	**0.50**	**-0.51*****
	(-1.46)	(1.14)	(-1.39)	(-2.11)	**(0.84)**	**(-2.90)**
2	0.25	-0.01	-0.07	-0.50	**-0.75**	**-0.49*****
	(0.34)	(-0.07)	(-0.41)	(-2.76)	**(-1.01)**	**(-2.63)**
3	0.55	-0.15	-0.28	0.18	**-0.37**	**0.34**
	(0.90)	(-1.05)	(-1.40)	(0.76)	**(-0.60)**	**(1.37)**
4	2.68	-0.23	0.10	0.20	**-2.48****	**0.44***
	(2.21)	(-1.38)	(0.43)	(0.84)	**(-2.06)**	**(1.72)**
Strong Purch.	3.39	0.73	1.41	1.71	**-1.67****	**0.98*****
	(4.68)	(3.19)	(4.55)	(5.05)	**(-1.98)**	**(3.91)**
SP – SS	**4.25*****	**0.59****	**1.70*****	**2.08*****	**-2.17****	**1.49*****
	(4.31)	**(2.17)**	**(5.54)**	**(5.69)**	**(-2.01)**	**(4.75)**

Table VI. Insider Investment Horizon and the Attributes of Insiders and their Firms

This Table compares the personal attributes of insiders with long versus short investment horizons, as well as the attributes of the respective firms that they manage. *HOR* is our monthly measure of insider investment horizon. *STR* is the insider's monthly net insider order imbalance scaled by total trading volume. *B/M* is the book-to-market ratio. *SIZE* is the market capitalization. $RET_{j,\,t-1}$ is the stock return for the insider's firm (*j*) in month $t-1$. $RET_{j,\,t-12,\,t-2}$ is the cumulative return from month $t-12$ to $t-2$. PROFIT is firm gross profitability. *ASSETGR* is asset growth. *STD_RET* is the stock return volatility. *E_INDEX* and *G_INDEX* are corporate governance measures. *IO_SHORT* is the percentage of shares owned by transient institutional investors based on Bushee (2001). *LONGTM10K* is the percentage of text related to "long-term" in the company's 10-K filings. *LONGTM10K1* is an alternative measure of *LONGTM10K*. *CEO*, *CFO*, and *CB* are indicator variables that take a value of one if the insider holds the office of CEO, CFO, or Chair of the Board, respectively. *MBA* and *PhD* are dummy variables that characterize the insider's education background. *NON_ROUTINE* is an indicator variable for opportunistic insiders, following CMP (2012). *PO* is an indicator variable for persistently opportunistic insiders, following Cline, Gokkaya, and Liu (2017). *FEMALE* is a dummy variable for female insiders. *EXP_YEAR* is the number of years of prior trading experience as an insider. *EXP_TRADE* is the total number of previous trading months. *AGE* is the insider's age. *TENURE* is the insider's tenure at the firm. *DELTA* is a measure of pay-performance sensitivity, and *VEGA* is a measure of risk taking incentives. *PAYDUR* is a measure of pay duration in terms of months. *DEPRESS* is an indicator variable for depression babies. *PESSIMISM* is an indictor variable for pessimistic insiders. All variables are described further in Appendix Table AI. The sample period covers January 1996 through December 2013. The *t*-statistics (in parentheses) are based on Newey-West robust standard errors with 12 lags. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

Table VI, continued
Panel A. Full Sample

VARIABLE	Full Sample			
Key Variables	Long HOR	Short HOR	SH − LH	t-stat
HOR	-1.00	-0.30	0.70***	(126.29)
STR×10^3	-2.48	-5.99	-3.51***	(-8.23)
B/M	0.50	0.58	0.08***	(6.35)
SIZE (million $)	9,638	3,226	-6,412***	(-15.61)
$RET_{j, t-1}$ %	3.04	2.99	-0.05	(-0.24)
$RET_{j, t-12, t-2}$ %	25.11	30.04	4.93**	(2.12)
PROFIT %	38.76	36.82	-1.94***	(-5.06)
ASSETGR %	19.33	20.85	1.52	(1.62)
STD_RET %	2.78	3.17	0.38***	(11.77)
Firm Level				
E_INDEX	2.28	2.45	0.18***	(4.96)
G_INDEX	8.87	8.93	0.07	(1.27)
IO_SHORT	0.15	0.16	0.01*	(1.83)
LONGTM10K×10^4	1.49	1.37	-0.12***	(-5.94)
LONGTM10K1×10^4	0.17	0.15	-0.01**	(-2.30)
Insider Level				
CEO	0.13	0.21	0.08***	(10.97)
CFO	0.06	0.07	0.01***	(3.10)
CB	0.10	0.14	0.04***	(9.58)
MBA	0.28	0.32	0.04***	(7.00)
PhD	0.11	0.08	-0.03***	(-6.22)
FEMALE	0.07	0.04	-0.04***	(-16.61)
NON_ROUTINE	0.65	0.76	0.11***	(7.07)
PO	0.42	0.47	0.05***	(6.04)
EXP_YEAR	9.12	9.41	0.29***	(2.72)
EXP_TRADE	17.41	13.52	-3.89***	(-13.67)
AGE	55.86	56.38	0.51	(1.52)
TENURE	17.87	15.89	-1.98***	(-5.17)
DELTA	0.31	0.21	-0.10***	(-3.47)
VEGA×10	0.28	0.24	-0.04***	(-3.28)
PAYDUR	21.13	19.11	-2.05***	(-3.75)
DEPRESS×10	0.29	0.35	0.05**	(2.14)
PESSIMISM	0.21	0.16	-0.04***	(-6.28)

Table VI, continued
Panel B. Purchases Sample and Sales Sample

VARIABLE	Purchases				Sales			
Key Variables	**Long HOR**	**Short HOR**	**SH − LH**	**t-stat**	**Long HOR**	**Short HOR**	**SH − LH**	**t-stat**
HOR	-1.00	-0.29	0.71***	(105.01)	-1.00	-0.30	0.70***	(128.64)
STR×10^3	20.48	14.71	-5.77***	(-6.74)	-6.89	-12.24	-5.35***	(-11.47)
B/M	0.83	0.78	-0.04**	(-2.06)	0.44	0.52	0.07***	(6.96)
SIZE (million $)	2,928	2,658	-270	(-0.62)	10,785	3,568	-7,217***	(-13.76)
$RET_{j, t-1}$ %	-1.11	-1.89	-0.77**	(-2.10)	3.85	4.69	0.84***	(6.34)
$RET_{j, t-12, t-2}$ %	8.71	3.55	-5.16***	(-3.03)	28.70	38.15	9.45***	(4.89)
PROFIT %	29.11	34.67	5.56***	(9.62)	40.41	37.47	-2.93***	(-7.92)
ASSETGR %	13.33	19.60	6.27**	(2.43)	20.35	20.93	0.59	(0.63)
STD_RET %	3.46	3.84	0.38***	(3.66)	2.67	2.95	0.27***	(17.18)
Firm Level								
E_INDEX	2.28	2.31	0.06	(0.78)	2.26	2.47	0.23***	(7.51)
G_INDEX	8.81	8.81	0.00	(0.01)	8.85	8.96	0.11**	(2.02)
IO_SHORT	0.08	0.12	0.03***	(14.80)	0.16	0.17	0.01	(1.58)
LONGTM10K×10^4	1.46	1.32	-0.14***	(-3.30)	1.50	1.39	-0.11***	(-4.86)
LONGTM10K1×10^4	0.17	0.14	-0.02**	(-2.31)	0.17	0.16	-0.01	(-1.43)
Insider Level								
CEO	0.21	0.28	0.07***	(3.59)	0.12	0.19	0.07***	(7.64)
CFO	0.03	0.05	0.02***	(3.86)	0.06	0.08	0.01***	(3.46)
CB	0.15	0.18	0.03*	(1.75)	0.10	0.13	0.04***	(6.73)
MBA	0.25	0.31	0.05***	(3.05)	0.28	0.31	0.04***	(5.48)
PhD	0.09	0.07	-0.02***	(-2.61)	0.12	0.08	-0.03***	(-5.67)
FEMALE	0.06	0.02	-0.03***	(-5.25)	0.08	0.04	-0.04***	(-15.16)
NON_ROUTINE	0.58	0.74	0.16***	(4.47)	0.66	0.75	0.09***	(6.01)
PO	0.41	0.49	0.08***	(2.89)	0.43	0.46	0.03***	(3.40)
EXP_YEAR	8.41	9.95	1.54***	(7.17)	9.21	9.30	0.09	(0.75)
EXP_TRADE	19.01	14.22	-4.79***	(-9.06)	17.19	13.36	-3.83***	(-13.79)
AGE	59.66	57.67	-2.00***	(-8.09)	55.40	56.18	0.79**	(2.52)
TENURE	14.06	18.45	3.43**	(2.24)	17.99	15.56	-2.43***	(-6.74)
DELTA	0.39	0.30	-0.12	(-1.21)	0.31	0.20	-0.11***	(-3.32)
VEGA×10	0.18	0.22	0.03	(1.34)	0.28	0.24	-0.04***	(-3.01)
PAYDUR	17.70	19.66	1.68	(0.78)	21.21	18.94	-2.28***	(-4.24)
DEPRESS×10	0.33	0.49	0.16**	(2.54)	0.28	0.33	0.05	(1.40)
PESSIMISM	0.07	0.20	0.11***	(5.01)	0.21	0.15	-0.05***	(-8.39)

Table VII. Insider Investment Horizon, Earnings Management, and R&D

This Table reports results from estimating the following panel regression model that relates a firm's future earnings management or R&D expenditures to the trading strength (STR_RK) and investment horizon (*HOR*) of the firm's insiders who trade, along with the other control variables:

$$DEP_{j,\,y+1} = \alpha_y + \alpha_{IND} + \beta_{STR}\,STR\_RK_{i,j,t} + \beta_{HOR}\,HOR_{i,j,t} + Controls_{j,t} + \varepsilon_{i,j,t}. \qquad (2)$$

In column (1), the dependent variable ($DEP_{j,y+1}$) is the leading one year earnings management of the insider's firm (*j*), measured by discretionary accruals (ACC). We construct the discretionary accruals measure from the modified Jones (1991) model following DeFond and Park (1997). For column (2), the dependent variable is the firm's future R&D expenditure. The control variables are the same as those in our main model specification from Equation (1), including B/M, SIZE, $RET_{j,\,t-1}$, $RET_{j,\,t-12,\,t-2}$, PROFIT, ASSETGR, and STD_RET. All variables are described in Appendix Table AI. The sample period covers 1996 through 2013. Yearly and industry (two-digit SIC code) fixed effects (α_y and α_{IND}) are included, and standard errors are clustered at the industry level. The *t*-ratios are provided in parentheses. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

VARIABLE	(1) ACC	(2) R&D
STR_RK	-0.008***	0.010**
	(-3.09)	(2.54)
HOR	**0.003****	**-0.011*****
	(2.54)	**(-2.69)**
Controls	Yes	Yes
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Clustered by Industry	Yes	Yes
N	96,629	114,522
Adj. R^2	0.019	0.275

Table VIII. Insider Investment Horizon and the Future Earnings Surprise

This Table reports the following panel regression analysis:

$$\text{Surprise}_{j,q} = \alpha_t + \beta_{STR}\,\text{STR\_RK}_{i,j,t} + \beta_{HOR}\,\text{HOR}_{i,j,t} + \beta_{STR*HOR}\,\text{STR\_RK}_{i,j,t}\times\text{HOR}_{i,j,t} + \text{Controls}_{j,t} + \varepsilon_{i,j,t}. \quad (3)$$

The dependent variable is the firm's future earnings surprise for the next earnings announcement in quarter *q*, following insider trades in month *t*. The earnings surprise is measured in two ways, by standardized unexpected earnings (*SUE*), and by the 3-day cumulative abnormal return around the earnings announcement (*CAR*). Similar to Table III, the key variables of interest are *STR_RK* and the interaction term between *STR_RK* and *HOR*. As before, the association between insider trading strength and the future earnings surprise is: $\frac{\partial \text{Surprise}}{\partial \text{STR\_RK}} = \beta_{STR} + \beta_{STR*HOR}\,\text{HOR}$. This partial derivative shows that, for short horizon insiders (i.e., for *HOR* = 0), a one-unit increase in insider trading strength from strong sales to strong purchases (i.e., changing *STR_RK* from 0 to +1), is associated with a change in the next earnings surprise of β_{STR}. In contrast, for long horizon insiders (i.e., for *HOR* = −1), a change from strong sales to strong purchases is associated with a change in the next earnings surprise of ($\beta_{STR} - \beta_{STR*HOR}$). Thus, $\beta_{STR*HOR}$ captures the "difference-in-differences" while controlling for other firm attributes. A positive coefficient ($\beta_{STR*HOR}$) indicates that the differential upcoming earnings surprise following strong purchases versus strong sales by *short horizon* insiders is larger than that for *long horizon* insiders. The control variables are the same as those in our main model in Equation (1), including B/M, SIZE, $\text{RET}_{j,\,t-1}$, $\text{RET}_{j,\,t-12,\,t-2}$, PROFIT, ASSETGR, and STD_RET. All variables are described in Appendix Table AI. The sample covers 1996 through 2013. Monthly fixed effects (α_t) are included, and standard errors are clustered by time at the monthly level. The *t*-ratios are provided in parentheses. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

VARIABLE	(1) SUE	(2) SUE	(3) CAR	(4) CAR
STR_RK	0.056*	0.058*	0.258***	0.251***
	(1.73)	(1.86)	(3.14)	(3.04)
HOR	-0.126***	-0.101***	-0.185***	-0.184***
	(-5.83)	(-5.00)	(-3.07)	(-3.04)
STR_RK * HOR	**0.173*** (4.88)**	**0.138*** (4.02)**	**0.259** (2.57)**	**0.253** (2.50)**
LAG(Surprise)		0.340***		-1.340*
		(42.28)		(-1.74)
Controls	Yes	Yes	Yes	Yes
Monthly Fixed Effects	Yes	Yes	Yes	Yes
Clustered by Month	Yes	Yes	Yes	Yes
N	86,014	85,340	88,222	87,898
Adj. R^2	0.059	0.163	0.007	0.008

Table IX. Insider Investment Horizon and Future Large Stock Price Changes

This Table presents the results of probit regression analysis that relates insider trading strength (STR_RK), insider investment horizon (*HOR*), and their interaction to the likelihood of an imminent large stock price change in the next ten trading days following an insider trade. The sample of large price change events is identified as follows. First, for each firm we compute the three-day cumulative abnormal return (CAR) around every trading day during a given year. If the CAR for a given day is among the top (bottom) 10% among all trading days in the year, that day is identified as having a large positive (negative) price change. If such a large price increase (decrease) occurs within 10 days following an insider trade, the dummy variable $+\Delta P$ ($-\Delta P$) is assigned a value of one, and zero otherwise. For insider *i* of firm *j* in month *t*, the probit model is specified as follows:

$$\Phi^{-1}(+/-\Delta P_{j,t}) = \alpha_t + \lambda_{STR}\,STR\_RK_{i,j,t} + \lambda_{HOR}\,HOR_{i,j,t} + \lambda_{STR*HOR}\,STR\_RK_{i,j,t}\times HOR_{i,j,t} + Controls_{j,t} + \varepsilon_{i,j,t}. \quad (4)$$

$\Phi(.)$ represents the cumulative distribution function for the standard normal distribution. The *economic effect* of insider investment horizon (*HOR*) on the likelihood of a large price change is measured in two ways. First, $\Delta Prob(\Delta P|\ HOR=0)$ is the *change* in the probability of a large price change, across purchases versus sales made by *short horizon* insiders. Second, $\Delta Prob(\Delta P|\ HOR=-1)$ is the analogous *change* in the probability of an imminent large price change event, across purchases versus sales made by *long horizon* insiders. These two *economic effects* are analogous to the partial derivatives, β_{STR} and $(\beta_{STR} - \beta_{STR*HOR})$, in the former linear regression model from Equation (1). Thus, $\lambda_{STR*HOR}$ captures the difference in changes of probabilities. All variables are described in Appendix Table AI. The sample period covers January 1996 through December 2013. Monthly fixed effects (α_t) are included, and standard errors are clustered by time at the monthly level. The *z*-statistics are shown in parentheses. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

VARIABLE	(1) $+\Delta P$	(2) $+\Delta P$	(3) $-\Delta P$	(4) $-\Delta P$
STR_RK	0.327***	0.225***	-0.101***	-0.179***
	(11.00)	(7.48)	(-3.29)	(-5.82)
HOR	-0.044**	-0.037*	0.067***	0.066***
	(-2.08)	(-1.72)	(3.18)	(3.08)
STR_RK * HOR	**0.171*** (4.95)**	**0.149*** (4.27)**	**-0.133*** (-3.74)**	**-0.146*** (-4.05)**
ΔProb(ΔP| HOR = -1)	0.057*** (10.20)	0.027*** (4.70)	0.012** (2.01)	-0.012** (-1.97)
ΔProb(ΔP| HOR = 0)	0.121*** (11.11)	0.082*** (7.52)	-0.038*** (-3.30)	-0.066*** (-5.87)
Controls:				
SIZE, $RET_{j,\,t-1}$, $RET_{j,\,t-12,\,t-2}$	Yes	Yes	Yes	Yes
Additional Controls:				
PROFIT, ASSETGR, STD_RET	No	Yes	No	Yes
Monthly Fixed Effects	Yes	Yes	Yes	Yes
Clustered by Month	Yes	Yes	Yes	Yes
N	146,345	146,345	146,345	146,345
Pseudo R^2	0.031	0.042	0.031	0.036

Table X. Insider Investment Horizon and SEC Investigations

This Table estimates a time series regression model to analyze whether the proportion of all insider trading in a given month (*t*) that is conducted by short or medium horizon insiders (i.e., not long horizon insiders) is sensitive to the extent of recent SEC enforcement activity regarding insider trading abuse. The dependent variable is the percentage of all insider trades that are made by short or medium horizon insiders during month *t*. The independent variables of interest include three monthly lagged values of the numbers of SEC investigations against insider trading during months *t−1*, *t−2*, and *t−3*, respectively (i.e., $INVESTIGATE_{t-k}$, k = 1 − 3). In addition, the model includes the one-month lagged stock market return (i.e., $MKTRET_{t-1}$), and the previous cumulative stock market return from month *t−13* through month *t−2* (i.e., $MKTRET_{t-13,\,t-2}$). The model is specified as follows:

$$PCT_t = \alpha + \beta_1 INVESTIGATE_{t-1} + \beta_2 INVESTIGATE_{t-2} + \beta_3 INVESTIGATE_{t-3} + \beta_4 MKTRET_{t-1} + \beta_5 MKTRET_{t-13,\,t-2} + \varepsilon_t . \quad (5)$$

The sample period is determined by the availability of SEC investigation data, and covers 1997 through 2012. Newey-West adjusted *t*-ratios appear in parentheses (with 12 lags). *, **, and *** indicates statistical significance at the .10, .05, and .01 levels, respectively.

VARIABLE	(1)	(2)	(3)	(4)
$INVESTIGATE_{t-1}$	**-0.030*** (-5.12)**			**-0.015*** (-4.18)**
$INVESTIGATE_{t-2}$		**-0.036*** (-6.04)**		**-0.022*** (-8.51)**
$INVESTIGATE_{t-3}$			**-0.032*** (-4.50)**	**-0.014*** (-4.22)**
$MKTRET_{t-1}$	-0.243*** (-5.39)	-0.273*** (-6.56)	-0.262*** (-4.14)	-0.264*** (-6.00)
$MKTRET_{t-13,\,t-2}$	-0.060* (-1.78)	-0.058* (-1.72)	-0.054 (-1.64)	-0.057* (-1.75)
N	189	188	187	187
Adj. R^2	0.301	0.342	0.275	0.443

Table XI. Insider Investment Horizon versus the Concept of Non-Routine Trades

This Table considers the influence of the classification of non-routine insider trades on the predictive relation between insider investment horizon (*HOR*) and future returns, by estimating an expanded version of Equation (1) that includes the dummy variable for non-routine trades (*NON_ROUTINE*), along with it's interaction with our measure of insider trading strength (*NON_ROUTINE*×*STR_RK*), as follows:

$$RET_{j,\,t+1} = \alpha_t + \beta_{STR}\,STR\_RK_{i,j,t} + \beta_{HOR}\,HOR_{i,j,t} + \beta_{STR*HOR}\,STR\_RK_{i,j,t}\times HOR_{i,j,t}$$
$$+ \beta_{NR}\,NON\_ROUTINE_{i,j,t} + \beta_{STR*NR}\,STR\_RK_{i,j,t}\times NON\_ROUTINE_{i,j,t} + Controls_{j,t} + \varepsilon_{i,j,t}.$$

In columns (1) and (3), we replicate the estimation of Equation (1) without the dummy variable, *NON_ROUTINE*, or its interaction with *STR_RK*, using the subsample of trades with non-missing values for *NON_ROUTINE*. These results are provided in columns (3) and (6) of Table III for the full sample of 146,345 insider trading months. *NON_ROUTINE* is a dummy variable that takes a value of one if the trade is made by a non-routine insider, as defined in CMP (2012). In columns (2) and (4), we include the two additional variables: *NON_ROUTINE* and its interaction with our measure of trading strength (*STR_RK*×*NON_ROUTINE*). All variables are described in Appendix Table AI. The sample period covers January 1996 through December 2013. Monthly fixed effects (α_t) are included, and standard errors are clustered by time at the monthly level. The *t*-statistics are provided in parentheses. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

VARIABLE	(1)	(2)	(3)	(4)
STR_RK	2.072***	1.754**	2.056***	1.796**
	(2.86)	(2.41)	(2.89)	(2.48)
HOR	-1.140***	-1.098**	-1.052**	-1.015**
	(-2.66)	(-2.56)	(-2.45)	(-2.36)
STR_RK	**1.843****	**1.764****	**1.826****	**1.764****
× HOR	**(2.49)**	**(2.40)**	**(2.47)**	**(2.40)**
NON_ROUTINE		-0.232		-0.217
		(-1.39)		(-1.31)
STR_RK		0.381		0.310
× NON_ROUTINE		(1.29)		(1.06)
Controls:				
SIZE, $RET_{j,\,t-1}$, $RET_{j,\,t-12,\,t-2}$	Yes	Yes	Yes	Yes
Additional Controls:				
PROFIT, ASSETGR, STD_RET	No	No	Yes	Yes
Monthly Fixed Effects	Yes	Yes	Yes	Yes
Clustered by Month	Yes	Yes	Yes	Yes
N	64,698	64,698	64,698	64,698
Adj. R^2	0.164	0.164	0.165	0.165

Figure 1. Plot of Insider Trading Activity by an Anonymous Insider — Mr. A

Appendix

Table AI. Descriptions and Construction of the Key Variables

Variable Name	Description & Construction
ACC	ACC is the discretionary accruals for the insider's firm, from the modified Jones (1991) model following DeFond and Park (1997).
AGE	AGE is the insider's age.
$AR_{j,t+1}$	$AR_{j,t+1}$ is the leading one month (*t+1*) risk adjusted abnormal stock return (i.e., Fama-French 4-factor alpha) for the insider's firm. The risk adjustment is based on the Fama-French three-factor model augmented with a momentum factor. The adjustment procedure closely follows Brennan, Chordia, and Subrahmanyam (1998). For each firm in a given month, $AR = RET - (rf + \beta_1 \times MKT\_RF + \beta_2 \times SMB + \beta_3 \times HML + \beta_4 \times UMD)$, where RET is the raw monthly stock return in the current month; rf is the risk free rate; MKT_RF, SMB, and HML are the Fama-French three factors; UMD is the momentum factor. β_1, β_2, β_3, β_4 are the factor loadings estimated using monthly data over the previous 36 months based on the Fama-French three-factor model augmented with the momentum factor. We require at least 24 months of non-missing data for the estimation.
ASSETGR	Annual asset growth for the insider's firm, defined as $(AT_t - AT_{t-1})/AT_{t-1}$, where AT is total assets.
B/M	The book-to-market ratio for the insider's firm. We take the natural log in the analysis.
CAR	Three-day cumulative abnormal return around day 0 for the insider's firm. It is calculated as $\frac{1}{3}\sum_{t=-1}^{+1}(RET_{i,t} - VWRETD_t)$, where $RET_{i,t}$ is the stock return for firm *i* on day *t*; $VWRETD_t$ is the value-weighted market return; and $t = 0$ is the event date.
CB	CB is an indicator variable that takes a value of one if the insider is Chair of the Board of the firm.
CEO	CEO is an indicator variable that takes a value of one if the insider is CEO of the firm.
CFO	CFO is an indicator variable that takes a value of one if the insider is CFO of the firm.
DELTA	DELTA is an annual measure of the insider's pay-performance sensitivity, based on Coles, Daniel, and Naveen (2006). It is defined as the insider's dollar change in wealth associated with a 1% change in the firm's stock

	price, divided by the insider's total compensation, following Edmans, Gabaix, and Landier (2009).
DEPRESS	DEPRESS is an indicator variable for depression babies who were born between 1920 and 1929, following Malmendier and Nagel (2011) and Malmendier, Tate, and Yan (2011).
E_INDEX	E_INDEX is the management entrenchment index for the insider's firm, from Bebchuk, Cohen, and Ferrell (2009). Higher values for E_INDEX indicate weaker corporate governance.
EXP_TRADE	EXP_TRADE is the total number of previous trading months for the insider in the sample.
EXP_YEAR	EXP_YEAR is the number of years of experience since the insider's first year of trading.
FEMALE	FEMALE is a dummy variable that takes a value of one if the insider is female, and zero otherwise.
G_INDEX	G_INDEX is the corporate governance index for the insider's firm, from Gompers, Ishii, and Metrick (2003). Higher values for G_INDEX indicate weaker corporate governance.
HOR	The insider investment horizon measure. For insider *i* of firm *j* in month *t*, the insider's investment horizon is calculated as the average annual net insider order flow across all years that the insider traded during the previous 10 years (the identification period), as follows: $\mathrm{HOR}_{\mathrm{i,j,t}} = \frac{\lvert\sum_{\mathrm{y=T-10}}^{\mathrm{year(t-1)}} \mathrm{IOF}_{\mathrm{i,j,y}}\rvert}{\mathrm{N}} \times (-1)$, where $\mathrm{IOF}_{\mathrm{i,j,y}}$ is the annual net insider order flow of insider *i* at firm *j* in year *y*, defined as $\frac{\mathrm{P_{i,j,y}} - \mathrm{S_{i,j,y}}}{\mathrm{P_{i,j,y}} + \mathrm{S_{i,j,y}}}$, and where P is the number of shares purchased during year *y*, S is the number of shares sold, and N is the number of calendar years the insider traded, from year *T−10* through month *t−1*. HOR takes a value of −1 for all long horizon insiders who *either* buy or sell over the past ten years, and a value of 0 for short horizon insiders whose purchases and sales exactly offset one another, and it ranges between −1 and 0 for insiders who *both* purchase and sell but their trades do not exactly offset one another over time.
IO_SHORT	IO_SHORT is the percentage of total shares outstanding for the insider's firm that are owned by transient institutional investors, based on Bushee (2001).
LONGTM10K	LONGTM10K is the percentage of text related to "long-term" in the 10-K filings of the insider's company. First we search for references to the words, "long-term" and "long-run." We ignore references to "long-term assets,

	liabilities, or debt." Then, LONGTM10K is constructed as the ratio of all such references to the total number of words in the firm's 10-K filings.
LONGTM10K1	LONGTM10K1 is the percentage of text related to "long-term interests, successes, benefit, value, objective, impact, and outlook" and "over the long-term" in the 10-K filings of the insider's company. It is a refined measure of LONGTM10K, and it is constructed following a similar methodology.
MBA	MBA is a dummy variable that takes a value of one if the insider holds an MBA degree.
NON_ ROUTINE	NON_ROUTINE is an indicator variable for opportunistic (non-routine) insiders, following Cohen, Malloy, and Pomorski (2012). It takes a value of zero if the insider made routine trades in the same calendar month in each of the past three years, and one otherwise.
PAYDUR	PAYDUR is an annual measure of the insider's pay duration in terms of months, from Gopalan et al. (2014).
PESSIMISM	PESSIMISM is an indictor variable for pessimistic insiders, as defined in Campbell et al. (2011). Specifically, a pessimistic (or low-optimism) insider is one who exercises stock options that are less than 30% in the money and does not hold other exercisable options that are greater than 30% in the money. According to Malmendier and Tate (2005), an overconfident CEO holds deep in the money options too long. Therefore, PESSIMISM is the opposite of the overconfidence measure of Malmendier and Tate (2005).
PhD	PhD is a dummy variable that takes a value of one if the insider holds a PhD degree.
PO	PO is an indicator variable for persistently opportunistic insiders, defined as in Cline, Gokkaya, and Liu (2017). It takes a value of one if over half of the insider's trades in the past three years earned positive abnormal returns, and zero otherwise.
PROFIT	Firm profitability measured by gross profitability for the insider's firm, measured as (SALES − COGS)/AT.
R&D	R&D expenditure scaled by total assets for the insider's firm.
$RET_{j,t+1}$	$RET_{j,t+1}$ is the leading one month ($t+1$) raw return for the insider's firm (j).
$RET_{j,t-1}$	$RET_{j,t-1}$ is the lagged one month ($t-1$) raw return for the insider's firm (j).
$RET_{j,\ t-12,\ t-2}$	$RET_{j,\ t-12,\ t-2}$ is the previous cumulative stock return from month $t-12$ to $t-2$ for the insider's firm (j).

SIZE	Market capitalization (SIZE) is the total number of shares outstanding (SHROUT) for the insider's firm multiplied price per share (abs(PRC)). We take the natural log in the analysis.
STD_RET	Volatility of daily stock returns for the insider's firm in month *t*.
STR	The measure of insider trading strength. For insider *i* of firm *j* in month *t*, it is defined as: $STR_{i,j,t} = \frac{P_{i,j,t} - S_{i,j,t}}{VOL_{j,t}}$, where $P_{i,j,t}$ is the number of shares purchased by insider *i* at firm *j* in month *t*, $S_{i,j,t}$ is the number of shares sold, and $VOL_{j,t}$ is the total trading volume by all investors in firm *j* during month *t*.
STR_RK	The scaled rank of STR. In each month *t*, STR is ranked into quintiles that are assigned values from 0 to 4, respectively. Then the ranks are scaled by 4 to obtain STR_RK, which ranges from 0 to +1.
SUE	Standardized unexpected earnings (SUE) for the insider's firm (*j*) in quarter *q*, calculated following Bernard and Thomas (1990), as follows: $SUE_{j,q} = \frac{EPS_{j,q} - EPS_{j,q-4} - \mu_{q-7,q}}{\sigma_{q-7,q}}$, where $\mu_{q-7,q}$ and $\sigma_{q-7,q}$ are the mean and standard deviation of $(EPS_{i,q} - EPS_{i,q-4})$, respectively, for the past 8 quarters.
TENURE	*TENURE* is the insider's tenure at the firm.
UNEXP	A measure of the extent to which a given insider trade is unexpected (i.e., how far a purchase or sale deviates from the benchmark expectation associated with the insider's investment horizon). Specifically, for insider *i* of firm *j* in month *t*, *UNEXP* is defined as the difference between an indicator variable for the current month's trading direction and the average annual net insider order flow across all calendar years (*y*) that the insider traded in the previous 10 years prior to month *t* (the identification period), as follows: $UNEXP_{i,j,t} = CURRENT_{i,j,t} - (\text{Mean } IOF)_{i,j,t} = CURRENT_{i,j,t} - \frac{\sum_{y=T-10}^{year(t-1)} IOF_{i,j,y}}{N}$, where $CURRENT_{i,j,t} = +1$ (or -1) if insider *i* has net purchases (or sales) of stock *j* in month *t*; and $IOF_{i,j,y}$ is the annual net insider order flow of insider *i* at firm *j* in year *y*, $\frac{P_{i,j,y} - S_{i,j,y}}{P_{i,j,y} + S_{i,j,y}}$, where P is the number of shares purchased during year *y*, S is the number of shares sold, and N is the number of years the insider traded in the ten years prior to month *t*.
VEGA	VEGA is a measure of the insider's risk taking incentives, based on Coles, Daniel, and Naveen (2006). It is defined as the dollar change in the insider's wealth associated with a 0.01 change in the standard deviation of the firm's returns, divided by the insider's total compensation.

Internet Appendix for "Insider Investment Horizon"*

Internet Appendix Table A.I. Insider Investment Horizon and Future Stock Returns: Portfolio Analysis Using Alternative Groups and Risk Factor Models

Panels A and B present the results from a 2 × 2 or 5 × 2 portfolio approach, respectively, based on trading strength (*STR*) and insider investment horizon (*HOR*). In Panel A (or B), for each month (*t*), the stocks are first grouped into two (or five) portfolios, ranging from sales to purchases (or strong sales to strong purchases) based on insider trading strength, *STR*. We further independently sort stocks into two groups based on whether the transaction is made by a long horizon insider (who only buys or sells over the previous ten years, so that *HOR* = −1) or a medium or short horizon insider (who both buys and sells, so that *HOR* is between −1 and 0). We then hold each portfolio during the next month, *t+1*. In Panel C, we replicate our main analysis (Panel A of Table II) using alternative Fama-French three and five factor models. We report the average monthly results based on equally-weighted portfolio returns. All variables are described in Table AI. The *t*-statistics are based on White adjusted standard errors. * indicates significance at the .10 level; ** at the .05 level; and *** at the .01 level.

Panel A. 2×2 Sorting Analysis

STR	**HOR**		
Average Raw Return	**Long**	**Short or Medium**	**SH − LH**
SALES	0.87	0.67	**-0.20****
	(2.26)	(1.77)	**(-2.02)**
PURCHASES	1.85	2.57	**0.72*****
	(5.24)	(5.46)	**(3.43)**
SP − SS	**0.98*****	**1.90*****	**0.92*****
	(3.60)	**(6.17)**	**(3.99)**
Fama-French 4-Factor Alphas	**Long**	**Short or Medium**	**SH − LH**
SALES	-0.09	**-0.35**	**-0.26****
	(-0.97)	**(-3.66)**	**(-2.45)**
PURCHASES	1.07	1.72	**0.65*****
	(5.81)	(6.79)	**(3.47)**
SP − SS	**1.16*****	**2.07*****	**0.91*****
	(5.24)	**(7.97)**	**(4.41)**

*Akbas, Ferhat, Chao Jiang, and Paul D. Koch, Internet Appendix to "Insider Investment Horizon," *Journal of Finance* [DOI STRING]. Please note: Wiley is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing material) should be directed to the authors.

Internet Appendix Table A.I, continued

Panel B. 5×2 Sorting Analysis

STR	**HOR**		
Average Raw Return	**Long**	**Short or Medium**	**SH − LH**
Strong Sales	1.15 (3.12)	0.64 (1.77)	**-0.51***** **(-3.48)**
2	1.01 (2.54)	0.78 (1.96)	**-0.23** **(-1.53)**
3	0.86 (2.07)	1.03 (2.27)	**0.17** **(1.08)**
4	0.81 (2.00)	1.05 (2.25)	**0.25** **(1.30)**
Strong Purchases	1.63 (4.64)	2.29 (4.98)	**0.66***** **(3.30)**
SP − SS	**0.49*** **(1.95)**	**1.66***** **(5.62)**	**1.17***** **(4.81)**
Fama-French 4-Factor Alphas	**Long**	**Short or Medium**	**SH − LH**
Strong Sales	0.13 (1.08)	**-0.32** **(-2.13)**	**-0.46***** **(-2.97)**
2	0.00 (0.00)	-0.27 (-1.90)	**-0.27*** **(-1.79)**
3	-0.11 (-0.75)	-0.05 (-0.29)	**0.06** **(0.34)**
4	-0.06 (-0.35)	0.16 (0.94)	**0.22** **(1.27)**
Strong Purchases	0.91 (4.21)	1.53 (5.34)	**0.62***** **(3.28)**
SP – SS	**0.77***** **(3.09)**	**1.85***** **(6.71)**	**1.07***** **(4.55)**

Internet Appendix Table A.I, continued

Panel C. Alternative Risk Factor Models

STR	**HOR**			
Fama-French 3-Factor Alphas	**Long**	**Medium**	**Short**	**SH − LH**
Strong Sales	0.18	-0.29	-0.37	**-0.55*** **
	(1.46)	(-1.53)	(-2.20)	**(-3.23)**
2	0.05	-0.03	-0.41	**-0.45** **
	(0.40)	(-0.15)	(-2.24)	**(-2.49)**
3	-0.08	-0.19	0.14	**0.22**
	(-0.57)	(-0.95)	(0.64)	**(0.94)**
4	-0.14	-0.03	-0.04	**0.10**
	(-0.88)	(-0.15)	(-0.15)	**(0.39)**
Strong Purchases	0.73	1.11	1.38	**0.64** **
	(3.52)	(3.55)	(4.06)	**(2.55)**
SP – SS	**0.55** **	**1.40*** **	**1.75*** **	**1.20*** **
	(2.19)	**(4.28)**	**(4.70)**	**(3.85)**
Fama-French 5-Factor Alphas	**Long**	**Medium**	**Short**	**SH − LH**
Strong Sales	0.12	**-0.31**	**-0.41**	**-0.53*** **
	(0.93)	**(-1.58)**	**(-2.34)**	**(-2.97)**
2	0.01	0.02	**-0.43**	**-0.44** **
	(0.04)	(0.11)	**(-2.21)**	**(-2.19)**
3	-0.04	-0.22	0.15	**0.19**
	(-0.27)	(-1.11)	(0.62)	**(0.68)**
4	-0.14	-0.13	-0.08	**0.07**
	(-0.82)	(-0.52)	(-0.27)	**(0.24)**
Strong Purchases	0.75	1.23	1.41	**0.65** **
	(3.23)	(3.34)	(3.55)	**(2.35)**
SP − SS	**0.63** **	**1.54*** **	**1.81*** **	**1.19*** **
	(2.19)	**(4.24)**	**(4.26)**	**(3.71)**

Internet Appendix Table A.II. Insider Investment Horizon and Future Stock Returns: Value Weighted Results from Portfolio Analysis

This Table presents value-weighted return performance from our main portfolio analysis in Table II. In Panel A, we report the value-weighted portfolio performance results in month *t+1* for all firms, and in Panel B we report the analogous value-weighted results when the top 5% largest firms are excluded each month, to mitigate the effect of outliers. All variables are described in Appendix Table AI. The *t*-statistics are based on White adjusted standard errors. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

Panel A. Value-Weighted Returns for All Firms

STR	**HOR**			
Raw Returns	**Long**	**Medium**	**Short**	**SH − LH**
Strong Sales	1.18	0.81	0.49	**-0.70****
	(2.83)	(1.96)	(1.16)	**(-2.01)**
2	1.04	0.86	0.46	**-0.58****
	(2.77)	(2.01)	(1.19)	**(-2.08)**
3	0.66	0.49	0.74	**0.09**
	(1.77)	(1.12)	(1.62)	**(0.29)**
4	0.72	0.70	0.66	**-0.05**
	(1.74)	(1.63)	(1.39)	**(-0.15)**
Strong Purchases	0.96	1.29	1.29	**0.33**
	(2.57)	(2.55)	(2.55)	**(0.86)**
SP – SS	**-0.23**	**0.47**	**0.81***	**1.03****
	(-0.61)	**(1.02)**	**(1.74)**	**(2.09)**
4-Factor Alphas	**Long**	**Medium**	**Short**	**SH − LH**
Strong Sales	0.27	-0.17	-0.56	**-0.83****
	(1.04)	(-0.68)	(-2.26)	**(-2.40)**
2	0.26	-0.09	-0.46	**-0.72****
	(1.21)	(-0.30)	(-2.01)	**(-2.56)**
3	-0.10	-0.48	-0.23	**-0.13**
	(-0.62)	(-1.96)	(-0.82)	**(-0.42)**
4	-0.01	-0.16	-0.18	**-0.18**
	(-0.04)	(-0.57)	(-0.59)	**(-0.49)**
Strong Purchases	0.23	0.53	0.39	**0.17**
	(0.85)	(1.35)	(1.11)	**(0.40)**
SP – SS	**-0.04**	**0.71**	**0.95****	**0.99***
	(-0.11)	**(1.52)**	**(2.18)**	**(1.83)**

Internet Appendix Table A.II, continued

Panel B. Value-Weighted Returns—Excluding the Top 5% of the Largest Firms

STR	**HOR**			
Raw Returns	**Long**	**Medium**	**Short**	**SH − LH**
Strong Sales	1.08	0.81	0.54	**-0.53****
	(2.93)	(2.00)	(1.31)	**(-2.06)**
2	0.77	0.97	0.61	**-0.15**
	(2.18)	(2.35)	(1.62)	**(-0.69)**
3	0.78	0.93	0.97	**0.20**
	(1.98)	(2.01)	(2.08)	**(0.65)**
4	0.49	0.53	1.10	**0.60****
	(1.19)	(1.16)	(2.26)	**(2.23)**
Strong Purchases	1.09	1.49	1.71	**0.62**
	(2.93)	(3.00)	(3.37)	**(1.64)**
SP – SS	**0.01**	**0.68**	**1.16****	**1.15****
	(0.03)	**(1.53)**	**(2.56)**	**(2.44)**
4-Factor Alphas	**Long**	**Medium**	**Short**	**SH − LH**
Strong Sales	0.17	-0.18	-0.50	**-0.67*****
	(0.94)	(-0.77)	(-2.05)	**(-2.69)**
2	-0.11	0.00	-0.35	**-0.24**
	(-0.67)	(0.00)	(-1.67)	**(-1.14)**
3	-0.03	-0.11	-0.08	**-0.05**
	(-0.16)	(-0.40)	(-0.26)	**(-0.16)**
4	-0.35	-0.35	0.24	**0.59****
	(-1.69)	(-1.33)	(0.81)	**(2.05)**
Strong Purchases	0.28	0.71	0.81	**0.52**
	(1.10)	(1.89)	(2.26)	**(1.27)**
SP – SS	**0.11**	**0.89****	**1.31*****	**1.20****
	(0.36)	**(2.03)**	**(3.04)**	**(2.39)**

Internet Appendix Table A.III. Unexpected Insider Trading and Future Stock Returns: Alternative Two-Way (4 × 3) Sorting Scheme for the Sales Sample

This Table replicates the two-way (2 × 3) sorting analysis based on insider trading strength (*STR*) and *UNEXP* for the sales sample from the bottom of Panel B in Table IV. However, now for each month (*t*), the stocks sold by insiders are first partitioned into four rows based on *STR*, ranging from strong sales to weak sales (instead of two rows as in Panel B of Table IV). Then these stocks are independently partitioned into three portfolios based on our measure of the degree to which insider trades are unexpected (*UNEXP*). We then hold each portfolio in this 4 × 3 sorting scheme during the next month, *t+1*, and we report the results for each portfolio based on equally-weighted returns. All variables are described in Appendix Table AI. The *t*-statistics are based on White adjusted standard errors. * indicates significance at the .10 level; ** at the .05 level; and *** at the .01 level.

STR	**UNEXP**			
Average Raw Returns	**1** Most Unexp	**2**	**3** Least Unexp	**3 – 1**
Strong Sales	0.50 (1.20)	0.59 (1.17)	1.01 (2.44)	**0.51***** **(2.73)**
2	0.59 (1.36)	0.62 (1.25)	0.71 (1.64)	**0.13** **(0.60)**
3	0.75 (1.49)	0.85 (1.57)	0.76 (1.65)	**0.01** **(0.04)**
Weak Sales	0.30 (0.63)	0.55 (0.96)	0.51 (1.07)	**0.21** **(0.83)**
	1	**2**	**3**	**3 – 1**
4-Factor Alphas	Most Unexp		Least Unexp	
Strong Sales	-0.39 (-2.02)	-0.35 (-1.05)	0.07 (0.46)	**0.46**** **(2.28)**
2	-0.36 (-1.87)	-0.29 (-0.96)	-0.22 (-1.55)	**0.14** **(0.60)**
3	-0.23 (-1.10)	-0.15 (-0.49)	-0.09 (-0.61)	**0.13** **(0.57)**
Weak Sales	-0.59 (-2.74)	-0.23 (-0.69)	-0.25 (-1.44)	**0.34** **(1.39)**

Internet Appendix Table A.IV. Unexpected Trades and Future Stock Returns: Regression Analysis

This Table reports results from the following panel regression of the future stock return against our measure of unexpected insider trading (*UNEXP*), along with insider trading strength (STR_RK) and the other control variables:

$$RET_{j,\,t+1} \text{ or } RET_{j,\,t+a,\,t+b} = \alpha_t + \beta_{UNEXP} UNEXP_{i,j,t} + \beta_{STR} STR\_RK_{i,j,t} + Controls_{j,t} + \varepsilon_{i,j,t}, \quad (A.1)$$

In Panel A, the dependent variable in this model is the future one-month-ahead stock return in percentage terms ($RET_{j,\,t+1}$). In Panel B, we replace $RET_{j,\,t+1}$ with non-overlapping longer term future stock returns that extend over each of the next three years, and we only present the results for the key variables, *UNEXP* and *STR*. All variables are described in Appendix Table AI. The sample period covers January 1996 through December 2013. Monthly fixed effects (α_t) are included, and standard errors are clustered by time at the monthly level. The *t*-statistics are provided in parentheses. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

Panel A. Dependent Variable: One-Month-Ahead Future Stock Returns, $RET_{j,\,t+1}$

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)
UNEXP		**0.861*** (5.47)**	**0.759*** (5.12)**		**0.833*** (5.95)**	**0.728*** (5.08)**
STR_RK	0.806*** (3.51)		0.426** (1.99)	0.822*** (4.28)		0.459** (2.38)
B/M	31.013** (2.26)	31.487** (2.28)	30.779** (2.24)	30.580** (2.02)	29.896* (1.97)	29.353* (1.94)
SIZE	-26.297*** (-3.43)	-24.341*** (-3.36)	-25.729*** (-3.36)	-22.668*** (-3.49)	-20.578*** (-3.36)	-22.625*** (-3.48)
$RET_{j,\,t-1}$	-0.070 (-0.05)	0.083 (0.06)	0.169 (0.11)	-0.131 (-0.09)	0.016 (0.01)	0.103 (0.07)
$RET_{j,\,t-12,\,t-2}$	0.184 (0.51)	0.242 (0.66)	0.252 (0.69)	0.132 (0.36)	0.182 (0.50)	0.199 (0.55)
PROFIT				0.527 (1.49)	0.384 (1.10)	0.444 (1.25)
ASSETGR				-0.996*** (-4.28)	-0.985*** (-4.22)	-0.984*** (-4.22)
STD_RET				5.310 (0.29)	6.208 (0.34)	4.430 (0.24)
Monthly F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Clustered by Month	Yes	Yes	Yes	Yes	Yes	Yes
N	146,345	146,345	146,345	146,345	146,345	146,345
Adj. R^2	0.154	0.154	0.155	0.155	0.155	0.156

Internet Appendix Table A.IV, continued

Panel B. Dependent Variable: Long-Term Future Stock Returns

VARIABLE	(1) $RET_{j, t+2, t+12}$	(2) $RET_{j, t+13, t+24}$	(3) $RET_{j, t+25, t+36}$
UNEXP	**2.097*** **	**0.937**	**-0.442**
	(3.44)	**(1.57)**	**(-0.91)**
STR_RK	1.331*	2.528***	2.156***
	(1.75)	(3.15)	(2.74)
Controls	Yes	Yes	Yes
Monthly Fixed Effects	Yes	Yes	Yes
Clustered by Month	Yes	Yes	Yes
N	130,681	113,981	99,559
Adj. R^2	0.153	0.162	0.167

Internet Appendix Table A.V. Insider Investment Horizon and Insider / Firm Characteristics: Regression Analysis of Probability Models

This Table examines how the tendency for insider transactions to be made by short or medium horizon insiders depends upon the characteristics of the insiders trading and their firms, using probit regressions (Panels A, B, and C) and linear probability models (Panels D, E, and F). The dependent variable is an indicator that takes a value of one if a trade is made by a short or medium horizon insider (i.e., not a long horizon insider). *G_INDEX* is the corporate governance index from Gompers, Ishii, and Metrick (2003). Higher values for *G_INDEX* indicate weaker corporate governance. *IO_SHORT* is the percentage of shares owned by short-term (transient) institutional investors, based on Bushee (2001). *LONGTM10K* is the percentage of all words that are related to "long-term" in the company's 10-K filings. *CEO*, *CFO*, and *CB* are indicator variables that take a value of one if the insider holds the office of CEO, CFO, or Chair of the Board, respectively, or zero otherwise. *MBA* and *PhD* are dummy variables that characterize the insider's education background. *FEMALE* is a dummy variable that takes a value of one if the insider is female, and zero otherwise. *NON_ROUTINE* is an indicator variable for opportunistic insiders, following Cohen, Malloy, and Pomorski (2012). *PO* is an indicator variable for persistently opportunistic insiders, defined as in Cline, Gokkaya, and Liu (2017). *EXP_YEAR* is the number of years of experience since the insider's first year of insider trading. *EXP_TRADE* is the total number of previous trading months for the insider. *AGE* is the insider's age. *TENURE* is the insider's tenure at the firm. *DELTA* is a measure of pay-performance sensitivity in the insider's compensation package, and *VEGA* is a measure of risk taking incentives based on Coles, Daniel, and Naveen (2006). *PAYDUR* is a measure of pay duration in terms of months, from Gopalan et al. (2014). *DEPRESS* is an indicator variable that takes a value of one if the insider was a depression baby who was born prior to the great depression. *PESSIMISM* is an indictor variable for pessimistic insiders, as defined in Campbell et al. (2011). It is the opposite of the overconfidence measure of Malmendier and Tate (2005). All independent variables are described in Appendix Table AI. The sample period covers January 1993 through December 2013. Monthly fixed effects (α_t) are included. Standard errors are clustered by time at the month level. The *z*-statistics (*t*-statistics) are shown in parentheses in Panels A, B, and C (Panels D, E, and F). *, **, and *** indicates statistical significance at the .10, .05, and .01 levels, respectively.

Panel A. Full Sample: Probit Models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	G_INDEX	*IO_SHORT*	*LONGTM10K*	*CEO*	*MBA*	*FEMALE*	*NON_ROUTINE*	*EXP_YEAR*	*AGE*	*DELTA*	*PAYDUR*	*DEPRESS*	*PESSIMISM*
	0.015***	0.897***	-0.020***	0.285***	0.076***	-0.303***	0.144***	0.037***	0.005***	-0.010*	-0.021**	-0.025	-0.061***
	(6.76)	(18.91)	(-6.49)	(27.15)	(9.31)	(-20.36)	(10.66)	(29.16)	(4.30)	(-1.72)	(-1.97)	(-0.98)	(-4.26)
				CFO	*PhD*		*PO*	*EXP_TRADE*	*TENURE*	*VEGA*			
				0.140***	-0.124***		0.031***	-0.010***	-0.000	0.211			
				(9.00)	(-8.65)		(2.76)	(-25.82)	(-0.02)	(1.46)			
				CB									
				0.132***									
				(11.19)									
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mth F. E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mth Cluster	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	63,056	144,262	125,976	146,345	99,689	121,640	63,868	146,345	18,881	41,596	20,489	120,529	56,303
Pseudo R^2	0.039	0.049	0.046	0.053	0.049	0.048	0.037	0.056	0.058	0.050	0.049	0.046	0.053

Internet Appendix Table A.V, continued

Panel B. Purchases Sample: Probit Models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	G_INDEX	*IO_SHORT*	*LONGTM10K*	*CEO*	*MBA*	*FEMALE*	*NON_ROUTINE*	*EXP_YEAR*	*AGE*	*DELTA*	*PAYDUR*	*DEPRESS*	*PESSIMISM*
	0.001	2.499***	-0.042***	0.247***	0.080***	-0.507***	0.304***	0.075***	-0.002	0.007	0.062	0.116*	0.418***
	(0.08)	(18.66)	(-5.39)	(11.39)	(3.01)	(-9.77)	(8.14)	(23.87)	(-0.23)	(0.28)	(0.87)	(1.82)	(4.33)
				CFO	*PhD*		*PO*	*EXP_TRADE*	*TENURE*	*VEGA*			
				0.239***	-0.195***		0.134***	-0.015***	0.022***	1.774			
				(4.78)	(-4.35)		(3.54)	(-16.09)	(3.19)	(1.45)			
				CB									
				0.001									
				(0.03)									
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mth F. E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mth Cluster	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	6,058	18,418	14,598	19,449	11,708	14,606	6,813	19,449	774	2,083	566	14,340	2,911
Pseudo R^2	0.083	0.049	0.034	0.034	0.048	0.039	0.049	0.066	0.134	0.088	0.133	0.034	0.077

Panel C. Sales Sample: Probit Models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	G_INDEX	*IO_SHORT*	*LONGTM10K*	*CEO*	*MBA*	*FEMALE*	*NON_ROUTINE*	*EXP_YEAR*	*AGE*	*DELTA*	*PAYDUR*	*DEPRESS*	*PESSIMISM*
	0.015***	0.682***	-0.019***	0.292***	0.073***	-0.277***	0.116***	0.031***	0.006***	-0.014**	-0.023**	-0.066**	-0.078***
	(6.58)	(13.33)	(-5.64)	(24.27)	(8.61)	(-18.51)	(8.95)	(22.92)	(4.96)	(-2.13)	(-2.04)	(-2.19)	(-5.23)
				CFO	*PhD*		*PO*	*EXP_TRADE*	*TENURE*	*VEGA*			
				0.132***	-0.117***		0.008	-0.008***	-0.002*	0.108			
				(8.33)	(-7.76)		(0.66)	(-21.53)	(-1.79)	(0.78)			
				CB									
				0.164***									
				(11.63)									
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mth F. E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mth Cluster	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	56,998	125,844	111,378	126,896	87,981	107,034	57,055	126,896	17,882	39,407	19,744	106,189	53,321
Pseudo R^2	0.043	0.055	0.053	0.062	0.058	0.056	0.042	0.060	0.059	0.050	0.049	0.054	0.052

Internet Appendix Table A.V, continued

Panel D. Full Sample: Linear Probability Models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	G_INDEX	*IO_SHORT*	*LONGTM10K*	*CEO*	*MBA*	*FEMALE*	*NON_ROUTINE*	*EXP_YEAR*	*AGE*	*DELTA*	*PAYDUR*	*DEPRESS*	*PESSIMISM*
	0.005***	0.321***	-0.008***	0.108***	0.028***	-0.106***	0.047***	0.013***	0.002***	-0.004*	-0.008**	-0.010	-0.023***
	(6.76)	(17.24)	(-6.72)	(26.96)	(9.12)	(-20.29)	(10.62)	(28.32)	(4.18)	(-1.83)	(-2.02)	(-0.98)	(-4.41)
				CFO	*PhD*		*PO*	*EXP_TRADE*	*TENURE*	*VEGA*			
				0.052***	-0.045***		0.011***	-0.003***	-0.000	0.063			
				(8.69)	(-8.57)		(2.78)	(-25.95)	(-0.04)	(1.32)			
				CB									
				0.050***									
				(11.20)									
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mth F. E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mth Cluster	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	63,056	144,262	125,976	146,345	99,689	121,640	63,868	146,345	18,881	41,595	20,489	120,529	56,303
Adj. R^2	0.048	0.063	0.059	0.068	0.063	0.061	0.040	0.071	0.064	0.060	0.053	0.059	0.064

Panel E. Purchases Sample: Linear Probability Models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	G_INDEX	*IO_SHORT*	*LONGTM10K*	*CEO*	*MBA*	*FEMALE*	*NON_ROUTINE*	*EXP_YEAR*	*AGE*	*DELTA*	*PAYDUR*	*DEPRESS*	*PESSIMISM*
	-0.000	0.936***	-0.016***	0.095***	0.030***	-0.188***	0.108***	0.028***	-0.001	0.002	0.014	745	0.127***
	(-0.04)	(20.03)	(-5.41)	(11.42)	(3.00)	(-10.41)	(8.17)	(25.81)	(-0.35)	(0.31)	(0.65)	0.082	(4.54)
				CFO	*PhD*		*PO*	*EXP_TRADE*	*TENURE*	*VEGA*			
				0.091***	-0.074***		0.050***	-0.005***	0.006***	0.421**			
				(4.85)	(-4.35)		(3.61)	(-16.80)	(3.06)	(1.98)			
				CB									
				0.001									
				(0.10)									
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mth F. E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mth Cluster	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	6,058	18,418	14,598	19,449	11,708	14,606	6,813	19,449	999	2,188	745	14,340	2,982
Adj. R^2	0.082	0.054	0.031	0.035	0.047	0.037	0.031	0.076	0.066	0.034	0.082	0.031	0.035

Internet Appendix Table A.V, continued

Panel F. Sales Sample: Linear Probability Models

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	G_INDEX	*IO_SHORT*	*LONGTM10K*	*CEO*	*MBA*	*FEMALE*	*NON_ROUTINE*	*EXP_YEAR*	*AGE*	*DELTA*	*PAYDUR*	*DEPRESS*	*PESSIMISM*
	0.005***	0.235***	-0.007***	0.109***	0.026***	-0.096***	0.037***	0.011***	0.002***	-0.005**	-0.009**	-0.025**	-0.029***
	(6.54)	(11.87)	(-5.85)	(23.92)	(8.39)	(-18.63)	(8.91)	(22.26)	(4.77)	(-2.30)	(-2.08)	(-2.18)	(-5.40)
				CFO	*PhD*		*PO*	*EXP_TRADE*	*TENURE*	*VEGA*			
				0.048***	-0.041***		0.004	-0.003***	-0.001*	0.026			
				(8.03)	(-7.62)		(0.87)	(-22.16)	(-1.80)	(0.56)			
				CB									
				0.061***									
				(11.62)									
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mth F. E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mth Cluster	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	56,998	125,844	111,378	126,896	87,981	107,034	57,055	126,896	17,882	39,407	19,744	106,189	53,321
Adj. R^2	0.052	0.069	0.067	0.078	0.073	0.071	0.045	0.076	0.064	0.058	0.052	0.068	0.062

Internet Appendix Table A.VI. Insider Investment Horizon and Future Stock Returns: Robustness Tests

This Table conducts a series of robustness tests with regard to the estimation of Equation (1) in Table III. The dependent variable (except for column 3 of Panel B) is the future one-month stock return ($RET_{j,\,t+1}$) in percentage terms. In Panel A, additional control variables are included in Equation (1). For each additional control variable, we also include its interaction with trading strength (*STR_RK*). Column 1 includes two measures of corporate governance: the *E_INDEX* (entrenchment index) and the *G_INDEX* (governance index). Column 2 includes shares owned by transient institutional investors as defined by Bushee (2001). In column 3, we account for the percentage (*LONGTM10K*) of appearances of text related to "long-term" in the company's 10-K filings. In column 4, we control for the managerial positions held by the insider, by including dummy variables for *CEO*, *CFO*, and Chair of the Board (*CB*). Column 5 includes two dummy variables that characterize the insider's educational background (*MBA* and *PhD*). Column 6 controls for the gender of the insider. Column 7 further controls for possible differential behavior for routine vs. non-routine insiders, as in Cohen, Malloy, and Pomorski (2012). Column 8 accounts for the presence of persistently opportunistic (*PO*) insiders, as in Cline, Gokkaya, and Liu (2017). In column 9, we control for the insider's experience (*EXP_YEAR* and *EXP_TRADE*). Column 10 includes insider age and job tenure. Column 11 accounts for pay-performance sensitivity (*DELTA*) and risk taking incentives (*VEGA*) from Coles, Daniel, and Naveen (2006). In column 12 we control for pay duration (*PAYDUR*) from Gopalan et al. (2014). Column 13 includes two measures of pessimistic insiders: *DEPRESS*, an indicator variable for depression babies who were born prior to the great depression, and *PESSIMISM*, an indictor variable for pessimistic insiders as defined in Campbell et al. (2011).

Panel B presents the results from additional robustness tests that explore alternative methodologies, sub-periods, and definitions of insider investment horizon. In column 1, we cluster the standard errors on both the firm level and the month level. Column 2 includes industry (2-digit SIC code) fixed effects (α_{IND}). Column 3 analyzes risk adjusted abnormal returns ($AR_{j,\,t+1}$) as the dependent variable, in which stock returns are adjusted for risk factors based on the Fama-French 4-factor model, following the procedure proposed by Brennan, Chordia, and Subrahmanyam (1998). In columns 4 and 5, we conduct sub-period analysis based on the periods before and after implementation of Sarbanes-Oxley, in 2002. Column 6 uses a dummy variable that combines medium and short horizon insiders into one group, as an alternative discrete measure of long versus short (or medium) insider investment horizon. In columns 7, 8, and 9, we use alternative 3-year, 5-year, or 7-year identification periods to construct the insider's investment horizon. Column 10 further modifies the identification period for construction of the insider's investment horizon by including the current month (*t*). The sample period covers January 1996 (or 1989, 1991, and 1993 for columns 7, 8, and 9 in Panel B) through December 2013. The *t*-ratios are shown in parentheses. *, **, and *** indicates significance at the .10, .05, and .01 levels, respectively.

Internet Appendix Table A.VI, continued

Panel A. Additional Control Variables

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(10)	(12)
STR_RK	1.578*	2.510***	1.912***	1.835***	1.729***	1.605***	1.909***	2.307***	3.213	2.566***	0.437	2.475***
	(1.78)	(5.21)	(4.24)	(4.50)	(3.87)	(3.91)	(4.27)	(4.18)	(1.54)	(3.47)	(0.49)	(3.74)
HOR	-0.460	-0.632***	-0.523**	-0.661***	-0.533**	-0.448*	-0.801***	-0.643***	-0.622	-0.528	-0.728*	-0.606*
	(-1.32)	(-2.91)	(-2.21)	(-3.00)	(-2.08)	(-1.96)	(-3.33)	(-2.94)	(-1.35)	(-1.47)	(-1.68)	(-1.92)
STR_RK * HOR	**1.604*** (2.86)**	**1.362*** (3.55)**	**1.323*** (3.14)**	**1.379*** (3.50)**	**1.247*** (2.65)**	**1.163*** (2.68)**	**1.600*** (3.70)**	**1.417*** (3.54)**	**2.624*** (2.74)**	**2.676*** (3.59)**	**2.502*** (2.90)**	**2.264*** (3.35)**
	E_INDEX	*IO_SHORT*	*LONGTM10K*	*CEO*	*MBA*	*FEMALE*	*PO*	*EXP_YEAR*	*AGE*	*DELTA*	*PAYDUR*	*DEPRESS*
	0.032	2.434**	0.076	0.079	0.220	0.085	-0.196	0.005	0.004	0.019	-0.042	-0.395
	(0.25)	(2.46)	(1.46)	(0.55)	(1.54)	(0.34)	(-1.23)	(0.29)	(0.27)	(0.18)	(-0.29)	(-0.58)
	STR_RK E_INDEX*	*STR_RK* IO_SHORT*	*STR_RK* LONGTM10K*	*STR_RK* CEO*	*STR_RK* MBA*	*STR_RK* FEMALE*	*STR_RK * PO*	*STR_RK* EXP_YEAR*	*STR_RK* AGE*	*STR_RK* DELTA*	*STR_RK* PAYDUR*	*STR_RK* DEPRESS*
	-0.042	-4.849***	-0.116	0.060	-0.167	-0.338	0.241	-0.028	-0.021	0.157	0.477**	0.019
	(-0.23)	(-2.82)	(-1.53)	(0.17)	(-0.64)	(-0.86)	(1.10)	(-1.02)	(-0.62)	(0.61)	(2.06)	(0.01)
	G_INDEX			*CFO*	*PhD*			*EXP_TRADE*	*TENURE*	*VEGA*		*PESSIMISM*
	0.023			-0.243	-0.029			0.005	-0.013	-0.816		-0.185
	(0.38)			(-1.10)	(-0.09)			(1.01)	(-0.97)	(-0.50)		(-0.82)
	STR_RK G_INDEX*			*STR_RK* CFO*	*STR_RK* PhD*			*STR_RK* EXP_TRADE*	*STR_RK* TENURE*	*STR_RK* VEGA*		*STR_RK* PESSIMISM*
	0.039			0.398	-0.040			-0.007	0.024	-2.878		-0.516
	(0.41)			(1.00)	(-0.08)			(-0.83)	(0.99)	(-0.78)		(-1.35)
				CB								
				0.025								
				(0.15)								
				STR_RK CB*								
				0.417								
				(0.98)								
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mth F. E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mth Cluster	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	61,486	144,262	125,976	146,345	99,689	121,640	127,370	146,345	18,881	41,595	20,489	50,987
Adj. R^2	0.185	0.161	0.168	0.155	0.173	0.167	0.156	0.155	0.223	0.210	0.228	0.208

Internet Appendix Table A.VI, continued

Panel B. Alternative Regression Methodologies, Sub-Periods, and Identification Periods for Constructing Insider Investment Horizon

VARIABLE	(1) Two-Way Cluster	(2) 2-Digit SIC F.E.	(3) Risk Adj. Return	(4) Pre-SOX 1996-2001	(5) Post-SOX 2002-2013	(6) Discrete Horizon	(7) 3-Year Ident. Period	(8) 5-Year Ident. Period	(9) 7-Year Ident. Period	(10) Alt. Ident.
STR_RK	1.930***	1.898***	2.351***	4.312***	1.029***	0.499**	2.238***	2.212***	2.078***	2.146***
	(5.00)	(4.82)	(5.70)	(4.71)	(2.70)	(2.50)	(3.82)	(4.24)	(4.82)	(5.15)
HOR	-0.668***	-0.663***	-0.890***	-2.064***	-0.187	-0.376***	-1.064***	-0.731**	-0.684***	-0.556***
	(-3.09)	(-3.12)	(-3.81)	(-4.29)	(-0.84)	(-2.85)	(-3.13)	(-2.48)	(-2.76)	(-2.62)
STR_RK * HOR	**1.428*** **	**1.374*** **	**1.591*** **	**3.196*** **	**0.783* **	**0.709*** **	**1.537*** **	**1.614*** **	**1.525*** **	**1.596*** **
	(3.73)	**(3.54)**	**(3.69)**	**(3.49)**	**(1.93)**	**(2.95)**	**(2.62)**	**(3.08)**	**(3.50)**	**(3.87)**
B/M	30.502**	36.275**	13.643	65.778	18.457	30.435**	25.283*	26.455*	25.594*	31.433**
	(2.03)	(2.38)	(0.92)	(1.60)	(1.31)	(2.01)	(1.74)	(1.78)	(1.80)	(2.04)
SIZE	-22.394***	-23.249***	-20.242***	-29.370**	-17.321**	-22.544***	-22.037***	-21.572***	-21.990***	-23.269***
	(-3.45)	(-3.54)	(-3.57)	(-2.16)	(-2.53)	(-3.48)	(-3.40)	(-3.23)	(-3.47)	(-3.36)
$RET_{j, t-1}$	-0.101	-0.125	-0.133	0.216	-0.197	-0.114	0.543	0.338	-0.203	-0.227
	(-0.07)	(-0.08)	(-0.09)	(0.07)	(-0.15)	(-0.08)	(0.47)	(0.24)	(-0.15)	(-0.14)
$RET_{j, t-12, t-2}$	0.140	0.146	-0.052	0.664	-0.171	0.137	0.306	0.156	0.126	0.167
	(0.39)	(0.40)	(-0.21)	(0.94)	(-0.57)	(0.38)	(0.91)	(0.44)	(0.36)	(0.47)
PROFIT	0.506	0.630*	0.656	0.313	0.588*	0.511	0.465	0.606*	0.563*	0.549
	(1.44)	(1.75)	(1.57)	(0.33)	(1.87)	(1.44)	(1.44)	(1.87)	(1.81)	(1.64)
ASSETGR	-0.999***	-1.007***	-0.673***	-1.036***	-0.921***	-0.996***	-0.866***	-0.889***	-0.994***	-1.098***
	(-4.65)	(-4.40)	(-3.29)	(-3.22)	(-2.79)	(-4.28)	(-4.42)	(-4.01)	(-4.51)	(-4.57)
STD_RET	5.107	5.608	3.574	3.254	8.147	5.219	8.774	3.964	6.131	6.618
	(0.28)	(0.31)	(0.34)	(0.09)	(0.46)	(0.28)	(0.51)	(0.23)	(0.35)	(0.34)
Monthly F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered by Month	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	146,345	146,345	133,881	34,541	111,804	146,345	155,664	121,733	142,983	172,845
Adj. R^2	0.155	0.156	0.012	0.124	0.177	0.155	0.149	0.152	0.151	0.149

Internet Appendix Table A.VII. Insider Investment Horizon and Future Stock Returns at the Firm Level

This Table replicates estimation of Equation (1) from Table III at the firm level, instead of at the finer level of the individual insider trading month. Specifically, for each firm (*j*) in month *t*, the model is specified as:

$$RET_{j,\,t+1} = \alpha_t + \beta_{STR}\,STR\_RK_{j,t} + \beta_{HOR}\,HOR_{j,t} + \beta_{STR*HOR}\,STR\_RK_{j,t}\times HOR_{j,t} + Controls_{j,t} + \varepsilon_{j,t}. \quad (A.2)$$

The dependent variable is the future one-month-ahead stock return ($RET_{j,\,t+1}$) for the insider's firm (*j*). In this analysis, trading strength (*STR*) for firm *j* in month *t* is constructed as the *aggregate* net purchases (i.e., purchases − sales) across all insiders at firm *j*, scaled by the total trading volume at firm *j* by all investors in month *t*. Similar to the insider level analysis in Table III, firm-level trading strength is then ranked into quintiles each month (i.e., assigned the values, 0 − 4), and these values are divided by 4 to obtain the scaled rank variable, *STR_RK*. Similarly, the firm level measure of insider investment horizon (*HOR*) is constructed as the trading volume weighted average of the measures of the individual insiders' investment horizons, across all insiders at firm *j* who trade in month *t*. All other variables are described in Appendix Table AI. The sample period covers January 1996 through December 2013. Monthly fixed effects (α_t) are included, and standard errors are clustered by time at the month level. The *t*-statistics are shown in parentheses. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)
STR_RK	0.870***	0.868***	2.212***	0.908***	0.907***	2.210***
	(3.97)	(3.95)	(4.52)	(4.58)	(4.56)	(5.10)
HOR		-0.104	-0.973***		-0.030	-0.873***
		(-0.58)	(-3.68)		(-0.17)	(-3.34)
STR_RK * HOR			**1.774*** **			**1.720*** **
			(3.65)			**(3.70)**
B/M	27.968**	27.988**	28.324**	28.183**	28.187**	28.046*
	(2.04)	(2.04)	(2.07)	(1.98)	(1.98)	(1.97)
SIZE	-25.368***	-25.667***	-25.537***	-22.331***	-22.418***	-22.476***
	(-3.47)	(-3.52)	(-3.51)	(-3.67)	(-3.69)	(-3.70)
$RET_{j,\,t-1}$	-0.119	-0.117	-0.092	-0.204	-0.204	-0.178
	(-0.08)	(-0.08)	(-0.06)	(-0.14)	(-0.14)	(-0.12)
$RET_{j,\,t-12,\,t-2}$	0.178	0.181	0.190	0.134	0.135	0.144
	(0.54)	(0.55)	(0.57)	(0.41)	(0.41)	(0.44)
PROFIT				0.672**	0.671**	0.634*
				(1.99)	(1.98)	(1.88)
ASSETGR				-0.982***	-0.981***	-0.986***
				(-4.14)	(-4.13)	(-4.15)
STD_RET				2.920	2.926	2.639
				(0.17)	(0.17)	(0.16)
Monthly F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Clustered by Month	Yes	Yes	Yes	Yes	Yes	Yes
N	92,135	92,135	92,135	92,135	92,135	92,135
Adj. R^2	0.145	0.145	0.146	0.146	0.146	0.146

Internet Appendix Table A.VIII. Insider Investment Horizon and Future Large Stock Price Changes: Linear Probability Models

This Table replicates Table IX using linear probability models. It relates insider trading strength (STR_RK), insider investment horizon (*HOR*), and their interaction to the likelihood of an imminent large stock price change in the next ten trading days following an insider trade. The sample of large price change events is identified as follows. First, for each firm we compute the three-day cumulative abnormal return (CAR) around every trading day during a given year. If the CAR for a given day is among the top (bottom) 10% among all trading days in the year, that day is identified as having a large positive (negative) price change. If such a large price increase (decrease) occurs within 10 days following an insider trade, the dummy variable $+\Delta P$ ($-\Delta P$) is assigned a value of one, and zero otherwise. All variables are described in Table AI. The sample period covers January 1996 through December 2013. Monthly fixed effects (α_t) are included, and standard errors are clustered by time at the monthly level. The *t*-statistics are shown in parentheses. *, **, and *** indicate significance at the .10, .05, and .01 levels, respectively.

VARIABLE	(1) $+\Delta P$	(2) $+\Delta P$	(3) $-\Delta P$	(4) $-\Delta P$
STR_RK	0.123*** (11.15)	0.084*** (7.62)	-0.038*** (-3.30)	-0.067*** (-5.84)
HOR	-0.017** (-2.18)	-0.014* (-1.79)	0.025*** (3.19)	0.025*** (3.12)
STR_RK * HOR	**0.065*** (5.08)**	**0.056*** (4.39)**	**-0.050*** (-3.76)**	**-0.055*** (-4.09)**
Controls: **SIZE, $RET_{j,\,t-1}$, $RET_{j,\,t-12,\,t-2}$**	Yes	Yes	Yes	Yes
Additional Controls: **PROFIT, ASSETGR, STD_RET**	No	Yes	No	Yes
Monthly Fixed Effects	Yes	Yes	Yes	Yes
Clustered by Month	Yes	Yes	Yes	Yes
N	146,345	146,345	146,345	146,345
Adj. R^2	0.039	0.053	0.039	0.046