The Information Content of Sudden Insider Silence*

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Abstract

This paper explores the information content of insider sudden silence. We hypothesize that insiders strategically choose to be silent when they possess private information not yet reflected in stock prices. Consistent with our hypothesis, insider silence following a routine selling (buying) schedule predicts positive (negative) future abnormal returns as well as earnings surprise. The return predictability of insider silence is stronger among firms with worse information environment and facing higher arbitrage costs, suggesting that investors underweight the information conveyed in insider silence. We also find that insider silence forecasts future firm fundamentals (e.g., ROA, cash flows, analyst forecast revisions) and that sophisticated investors trade in the direction predicted by the information of insider silence. A long-short portfolio that exploits insiders' strategic silence behavior generates abnormal returns up to 10.4% annually.

Keywords: Insider Silence, Information Content, Underreaction, Return Predictability

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1 Introduction

Corporate insiders' trades are among the most widely scrutinized activities in the stock market.[1] Regulators, investment managers, media members, and academics continually parse these trades for signs of illicit behavior, and for signals about a company's future prospects. Corporate insiders, by definition, know more about the internal operations and future prospects of their firms, and they thus would be expected to have superior access to private information that outsiders do not have.

Previous literature on the information content of insider trades mostly focuses on corporate insiders' purchasing and selling transactions (Jaffe (1974); Seyhun (1988); Lakonishok and Lee (2001); Piotroski and Roulstone (2005); Cohen, Malloy, and Pomorski (2012), etc.). Our paper, however, takes a different perspective by investigating the information content of insiders' strategic silence, that is, their "no trade" behaviors. Insiders trade for multiple reasons. When driven by non-information reasons, such as liquidity or diversification, their submitted trades are more likely to be routine-based, i.e., occur in the same month each year, to signal to outsiders that they are not trading on private information about the firm. We hypothesize that when an insider who sells routinely in the same calendar month each year, suddenly stops doing so, her silence could signal forthcoming good news. An insider who possesses good news about her firm has incentive to postpone planned selling until the news has been disclosed to the public and the firm's shares have risen in price. The sudden silence following an insider's routine purchases could convey bad information, as she has incentive to purchase the firm's shares later at a lower cost when the bad news hit the market.[2] Comparing with directly buying (selling) the stocks when the insiders possess good (bad) information, being silent offers them the opportunity to take advantage of their private information, and avoid raising suspicion among regulators. While the Securities and Exchange Act of 1934 prohibits agents from trading securities when in possession of material

[1] Corporate insiders are officers with decision-making authority over the operations of the company, all members of the board directors, and beneficial owners of more than 10% of company's stocks.

[2] Routine buys may occur after an insider receives a bonus; since bonuses are often paid out in the same month each year, and since insiders often receive discount plans on their company stock (and hence are more likely to buy the stock), insider buying in the same calendar month is common and often uninformative.

nonpublic information[3], SEC rule 10b-5 explicitly states that "there can be no liability for insider trading under Rule 10b-5 without an actual securities transaction".

Our empirical strategy for identifying insider sudden silence is simple and intuitive. Following Cohen, Malloy, and Pomorski (2012), we analyze each insider's past trading history and look for consistent patterns in the timing of buying or selling. If the insider sells in the same calendar month for two consecutive years, we then check his trades in the same month for the third year. If he continues to sell, then we classify the insider and his trading action in the "SSS" (sell-sell-sell) group. If he does not trade on this month, we then put him and his non-trading action in the "SSN" (sell-sell-no trade) group. We similarly categorize insiders who purchase in the same months for consecutive two years and purchase (PPP-purchase-purchase-purchase) or do not purchase (PPN-purchase-purchase-no trade) in the same month of the third year. Finally, we aggregate the insider-level silence measure at the firm level by defining a firm-month dummy SSN (PPN) equal to one when at least one insider at the firm-month has SSN (PPN) that equals to one and zero otherwise[4].

After classifying the third-year trades, we examine the information content of the sudden silence measure. As corporate insiders are involved in the daily operations of their firms, the information they possess is more likely related to firm fundamentals. As such, sudden silence following routine selling could signal improving firm fundamentals, which is reflected in a firm's rising earnings and cash flows. Silence following routine purchasing could indicate deteriorating firm fundamentals.

Using return on assets (ROA) and operating cash flow (scaled by lagged total assets) as proxies for firm profitability, we find evidence supporting this hypothesis. Firms on average experience 0.37% to 0.65% improvement in quarterly ROA following insider silence after two years of consecutive sells. PPN also predicts decreases in a firm's future ROA and cash flows, although the economic magnitude is smaller and significant only in some specifications.

After establishing that a routine insider's sudden silence behavior is motivated by private

[3]There is some evidence showing that insiders appear to avoid trade before forthcoming news events (Givoly and Palmon (1985)), takeover announcements (Seyhun (1992)), management forecasts of earnings (Noe (1999)), and earnings announcements (Park, Jang, and Loeb (1995)).

[4]In our sample, there are only 414 firm-month observations with both SSN and PPN equal to 1. Setting these firm-months to either 0 or 1 doesn't affect our results.

information related to firm fundamentals, we then examine whether the market underreacts to the valuable information embedded in insider silence. We use Fama and MacBeth (1973) regression to show that, consistent with our hypothesis, insider silence following consecutive sells (buys) predicts future positive (negative) abnormal returns up to 12 months. If the stock falls into the SSN group, the regression predicts that the three-months-ahead cumulative returns are 0.83% (t-statistic=3.28) higher. The coefficient on SSN increases almost monotonically with forecasting horizons, suggesting that the information contained in insider silence (SSN) is not short-lived and does not get incorporated into stock prices in a timely fashion. The predictability of sudden silence following consecutive purchases (PPN) is weaker than that of SSN, and is significant only over the three-month horizon using the full sample. A calendar-time portfolio strategy that longs stocks with SSN in the previous three months[5] and short stocks with PPN in the previous three months yields a value-weighted monthly Carhart (1997) four-factor alpha of 56 basis points (t-statistic=2.13).[6]

Next we examine the type of firm-specific information that insiders are withholding. Because insiders typically are unlikely to trade on a short-term basis due to the "Short Swing" rule,[7] we expect that managers are more likely to be strategically silent for one of the most important news events of the firm, i.e., earnings announcement. Elliott, Morse, and Richardson (1984), Ke, Huddart, and Petroni (2003) and Piotroski and Roulstone (2005) show that insiders have superior knowledge about future earnings performance. We find that an insider's sudden silence following consecutive sells predicts a 0.22% (t-statistic=2.72) more positive three-day earnings announcement cumulative abnormal return (CAR) in the following quarter. The sudden silence following an insider's routine purchases predicts a negative earnings announcement CAR of -0.05% (t-statistic=-0.58). The results support our hypothesis that routine insiders strategically choose to become silent to take advantage of their superior information about their firms' future cash flow realizations.

[5]We tried different versions by varying the holding window from 1 month to 12 month, and the results are qualitatively similar.

[6]We focus on common stocks that are listed on NYSE/Amex/NASDAQ, and we exclude those stocks that have price less than 1 dollar. We also try other versions of excluding stocks that have price less than 5, or market capitalization less than the NYSE bottom decile, the results are similar. Hence, our results are not driven by the small stocks.

[7]The "Short Swing" rule of the 1934 Security Exchange Act enforces insiders to return any profit that is made from making round trading within 6 months to the firm.

Our paper hypothesizes that, when facing private information, some routine insiders choose to be silent instead of trading explicitly on the information for fear of litigation risks associated with insider trading. If this is true, increasing litigation risks should lead to more routine insiders being silent when possessing private information, and the information content of insider silence should be stronger. Using the enactment of the Sarbanes-Oxley Act of 2002 (SOX) as an exogenous shock to litigation risks associated with insider trading, we find evidence supporting our hypothesis. The predictability of insider silence for future firm fundamentals and returns increases significantly in the post-SOX period, with the effect being more pronounced for insider silence following routine purchases. Cross-sectionally, the return predictability of insider silence is concentrated among firms with higher litigation risk, as proxied by the Kim and Skinner (2012) litigation risk measure.

We also conduct several tests to examine how long insiders delay their routine trades. Our strategic silence hypothesis predicts that insiders, who were trading on a routine basis, could suddenly choose not to trade if they possess some private information about their firms. If this is the case, the direction of the next trade following the sudden silence should be consistent with the direction of previous routine trades, given that insiders do not permanently cancel their previous routine trade. Consistent with the hypothesis, we find that 47.63% (47.23%) of insiders delay their trades in the same direction (cancel their trades).[8] Only 5.15% of insiders execute in the opposite direction of their previous routine trades following the sudden silence. Importantly, the abnormal return following insider silence is concentrated in the period from insiders' sudden silence to their next trade, not the period after their next trade. We are also interested in whether other investors or agents in the financial markets are aware of the information embedded in insider silence. We find that hedge funds, who are among the most sophisticated investors in financial markets, increase their long positions by 0.035% (t-statistic=2.50) in the quarter after the insider sudden silence following consecutive sells, but mutual funds trade in the direction opposite to the information content of insider silence. And security analysts also revise up their earnings forecast for SSN firms with pending good news.

[8]We define "cancel" as those insiders who do not trade for the subsequent 24 months following their sudden silence. Defining "cancel" using 12 months or 36 months generate similar results.

Our finding that insider silence predicts future abnormal returns implies that investors fail to fully incorporate information embedded in the timing and pattern of routine insiders' trades. If the return predictability of insider silence is truly driven by market underreacting to less salient signals, the return predictability would be expected to be stronger among firms with more opaque information environment. We do find that the return predictability of insider silence is more pronounced among firms with less analyst coverage and lower institutional ownership. We also find that the return predictability is stronger for firms that are more difficult to arbitrage, using firm size and idiosyncratic volatility as proxies for arbitrage costs. This suggests that frictions to arbitrage prevent arbitrageurs from efficiently incorporating the information of insider silence into stock prices.

Our results are robust with respect to different ways of constructing our insider silence measure and using a more recent sample period. We also conduct several tests to rule out alternative explanations for our results. First, the informativeness of insider silence could be correlated with confounding insider trading signals. We show our results persist after controlling for the existing insider-related predictors such as the opportunistic trades in Cohen, Malloy, and Pomorski (2012), and the net insider demand in Lakonishok and Lee (2001). Second, we exclude the possibility that our silence measure is capturing the effect of known public mispricing signals, by controlling for the five anomaly variables studied in Fama and French (2008). Third, our results remain when we run panel regression with firm by year fixed effect, indicating change in firm-level compensation cannot fully explain our results.

This paper builds on the methodology developed by Cohen, Malloy, and Pomorski (2012) in classifying insiders into routine and opportunistic groups. The focus of their paper is to compare the information content contained in the routine and opportunistic insiders' trades. In doing so, they omit a large fraction of the information as conveyed through the inconsistency of insiders' trades. For example, if an insider sells a firms stock in March of 1998, 1999, and 2000, then based on the Cohen, Malloy, and Pomorski (2012)'s definition, this insider would be classified as a routine trader, and all her subsequent trades would be treated as uninformative. However, suppose this routine insider did not sell any stocks in

March 2001. Then, this sudden silence behavior following previous consecutive selling could signal arrival of good news in March 2001. As a result, she wants to postpone the planned sale until the good news is released. Such information is not included in the Cohen, Malloy, and Pomorski (2012) sample, as by definition, their research focuses on the trades submitted by insiders, not the "no trade" behavior.

Our paper is also related to Jagolinzer (2009), who examines whether insiders trade strategically under SEC rule 10b5-1. This rule, enacted in October 2000, allows an insider to prespecify the timing and amount of her trades when she does not possess material nonpublic information. Jagolinzer (2009) finds that insiders tend to initiate a sales plan before pending negative disclosures and terminate a sales plan early when possessing pending positive news. Different from Jagolinzer (2009), we identify routine insiders based on actual trading history instead of relying on trading plans. Moreover, our evidence pre-dates the existence of these plans, so the trades in the plans do not drive our results.

Gao, Ma, and Ng (2015) also look at the information content of insider silence, but their focus is on the information content of unconditional insider silence, as driven by the fear of litigation risk, while ours is on the sudden silence following insiders' consecutive trades. Also, our insider silence measure, depending on insiders' trading direction, could contain both positive and negative news of the firm, while the insider silence in Gao, Ma, and Ng (2015) conveys only bad news. From a more practical perspective, our long-short strategy generates a value-weighted abnormal return of 0.56% per month, which is much larger than the 0.14% silence-sell spread monthly abnormal return as shown in Gao, Ma, and Ng (2015). As stated by the authors, the main objective of their paper is to point out that insider silence is a more negative signal than insider selling, not to develop a profitable trading strategy based on insider silence.

This study contributes to the extant literature in three unique ways. First, it contributes to the insider trading literature by showing the information content of insider silence. The existing literature mostly focuses on the information content of insider purchases and sells, and very few papers investigate their absence, that is, insider silence. We show that even routine insiders trade strategically. When they expect that good news is on the way, they

postpone or cancel their routine sell. When they expect that bad news is approaching, they delay or cancel their routine purchase.

Secondly, this paper adds to the growing evidence that prices underreact to low saliency signals (e.g., DellaVigna and Pollet (2007); Cohen and Frazzini (2008); Hirshleifer, Hsu, and Li (2013); Giglio and Shue (2014)). In the context of mergers and acquisitions, Giglio and Shue (2014) find that investors underreact to information about deal completion probability contained in the passage of time. Our paper suggests that investors can underweight the information contained in the timing and patterns of insiders' routine trades.

Finally, it adds to the literature examining the link between firm fundamentals and future stock returns. Since financial statements are backward-looking, accounting information may not be timely with respect to changes in firm fundamentals. We show that insider silence in a firm can provide investors with an early indicator of a firms fundamental changes that are not yet reflected in its financial statements and stock prices. In this sense, our paper is also similar in spirit to several papers in the accounting literature examining the information contained in the timing of the release of earnings reports (Penman (1984); Chambers and Penman (1984); Bagnoli, Kross, and Watts (2002)). This literature finds that earnings announced later (earlier) than expected tend to convey bad (good) news. As with our paper, investors seem to not fully understand the implication of late reporters and price drift downward even after the actual earnings are announced.

The remainder of the paper is organized as follows. Section 2 briefly reviews the literature. Section 3 describes our data and presents summary statistics. Section 4 presents the main empirical results on the predictability of insider sudden silence for firm fundamentals and future returns. In Section 5, we provide some additional analysis aimed at isolating the underlying mechanism driving our results. Section 6 conducts robustness checks and rule out alternative explanations. Section 7 concludes the paper.

2 Related Literature

Insiders are privy to private information. A large number of studies examine whether insiders' buy and sell transactions have any cross-sectional as well as time series forecasting

ability for future stock returns (Lorie and Niederhoffer (1968); Jaffe (1974); Seyhun (1986); Seyhun (1988); Rozeff and Zaman (1988); Lin and Howe (1990) and Lakonishok and Lee (2001))[9]. The early studies usually do not differentiate among different types of insiders, and they examine the predictive power by aggregating insider trades at the firm level. The literature, in general, agrees that corporate insiders are informed and their trades contain information about future firm value, especially for insider purchases. For example, Jeng, Metrick, and Zeckhauser (2003) take a performance-evaluation perspective and find that insider purchases earn abnormal returns of more than 6% per year, while insider sales do not earn significant abnormal returns. Lakonishok and Lee (2001) conduct a comprehensive analysis of insider trading both on cross sectional and aggregate stock returns, and find that insider purchases predict positive future stock returns, while their selling transactions have weak or no predicative power.

More recently, researchers have started to take a more micro-level perspective on the informativeness of insider trading by examining the characteristics and trading behavior of individual insiders. Scott and Xu (2004), for example, argue that information-driven insiders can be isolated by conditioning on those insiders who trade a large fraction out of their total ownership in the firm. Cohen, Malloy, and Pomorski (2012) develop a novel approach to tease out informative insider trades based on the insider's previous trading history. They argue that insiders trade for multiple reasons and that those who trade on a routine basis (say, in the same month for the consecutive three years) are more likely to trade for non-information reasons such as diversification and liquidity needs. Based on the past insider trading history, they classify all insiders into two groups—routine and opportunistic traders—and they find that only opportunistic insiders' trades predict future stock return. Ali and Hirshleifer (2015) identify opportunistic insiders based on the profitability of trades prior to quarterly earnings announcement and find that opportunistic trading is associated with various kinds of firm and managerial misconduct. Kelly (2014) finds that insider sales at a loss relative to her reference price is a much more negative signal about future returns than a sale of stock at a gain. Because selling a stock at a loss is more painful due to the burst of utility, an insider

[9]There is also a large literature examining whether allowing for insider trading is beneficial or harmful to the financial market. See Bhattacharya (2014) for an excellent review on this topic.

who sells at a loss must have particularly negative information about future firm value.

While the bulk of the insider trading literature focuses on the information content of insiders' transactions, a few papers consider whether insider silence is also informative about future stock value. Marin and Olivier (2008) find that insider selling in the remote past and insider silence in the recent past predict stock market crashes. Their explanation is that the lack of insider selling reduces the informational content of prices and that uninformed investors require an increase in the risk premium, which leads to a crash. Gao, Ma, and Ng (2015) argue that insiders would not trade when possessing extremely bad news due to litigation risk concerns. They find that insider buy minus silence spread is larger than insider buy minus sell spread, and this pattern is stronger for firms with high litigation risks and poor information environment. To sum, though the literature has made tremendous progress in identifying the information content of insider trading, large room still remains for investigating the information content of insider trades, especially the insider selling and silence.[10]

3 Data, Variables and Summary Statistics

Our sample is based on all NYSE/Amex/NASDAQ common stocks (share code 10 or 11), covered in CRSP/Compustat merged database from January 1988 to December 2013. The insider trading data are from Thomson Reuters Insider Filing Data Feed, in which only open-market transactions are considered.[11] The Securities and Exchange Commission (SEC) mandates that all officers and directors, large shareholders (those who own 10% or more of the outstanding shares), and affiliated shareholders report their transactions to the SEC by the tenth of the month following the transactions (prior to August 2002) or within two business days (since August 2002). The dataset contains the name and position(s) of each insider, the transaction date, the transaction price and quantity, and the date the filing

[10] A recent paper by Alldredge and Cicero (2015) find that some profitable insider selling is motivated by insiders' attentiveness to public information along the customer-supplier chain rather than genuine private information.

[11] We exclude records with cleanse code of "S" or "A". Open market purchases and sales are those with trancode of "P" or "S". Following Sias and Whidbee (2010), private transactions with trancode "K" and "J" prior to April, 1991 are taken as public transactions.

was received by the SEC. Our sample starts in 1988 because two years of consecutive same-month trades are needed to define routine insider. To make sure that microstructure-related issues do not drive our results, we exclude those stocks whose month-end price is below \$1.[12] We also exclude those stocks with negative book value of equity. The accounting variables and earnings announcement data are obtained from Compustat. Analyst forecast and recommendation data are from Institutional Brokers Estimate System (I/B/E/S), and data on institutional holdings are from Thompson Reuters. We also utilize hedge fund and mutual fund holdings data from Thompson Reuter's Institutional Holdings.[13] For each stock in the sample, we compute its quarterly hedge (mutual) fund holdings as the sum of shares held by all hedge (mutual) funds reported at each quarter divided by the total number of shares outstanding.

Our empirical strategy for identifying insider sudden silence is simple and intuitive. Following Cohen, Malloy, and Pomorski (2012), we analyze each insider's past trading history and look for consistent patterns in the timing of buying or selling.[14] If the insider sells (purchases) in the same month for two consecutive years, we look for a sell (purchase) in the same month in the third year. If, in this month, the insider continues to sell (purchase), then we put the insider and his trading action in the SSS (PPP) group. If the insider does not sell (purchase) in this month, then we put him and his non-trading action in the SSN (PPN) group.[15] For example, if insider K sold stock A in January 2000 and in January 2001 but did not trade in January 2002, then insider K and stock A are classified as SSN = 1 for January 2002. Our methodology is different from Cohen, Malloy, and Pomorski (2012) mainly in two ways. First, we condition on the sign of the trade in the definition of two consecutive-year trades, and their definition of routine insider does not. That is, insider K who sells in March 2001 and buys in March 2002 has not conducted consecutive trades by our definition but has according to Cohen, Malloy, and Pomorski (2012). Second, we focus on the no trade

[12]We tried various versions of excluding the small stocks, for example, excluding those with PRC¡5, or market capitalization less than the NYSE 10th percentile breakpoint, the results are similar.

[13]We thank Wenxi Jiang for providing hedge fund holdings data to us. The detailed method to extract hedge fund holdings data can be found in Jiang (2014).

[14]We consider all corporate insiders in our main empirical analyses. The result is similar if we only include officers and directors as corporate insiders.

[15]51% of SSN and 44% of PPN are from officers and directors. CEO comprises 14.8% and 16.3% of SSN and PPN, respectively.

month; Cohen, Malloy, and Pomorski (2012), on the trades of insiders after they have been classified as being either routine or opportunistic. After defining the silence measures (SSN and PPN) at the individual insider level, we aggregate the insider-level measure to the firm level by defining a firm-month dummy SSN (PPN) equal to one when at least one insider at this firm-month has SSN (PPN) equal to one and zero otherwise.[16]

Overall, 15.38% of total insider transactions are associated with an insider to buy or sell in the same month for two consecutive years. Conditioning on consecutive same-month sell, 66.93% of insiders stopped selling in the same month of the third year, which is 26.95% of total consecutive trades observations. Conditioning on consecutive same-month purchase, 66.02% of insiders suddenly stopped buying in the same month of the third year, which is 36.05% of total consecutive trades observations. To be clear, we are not arguing that all insider sudden silence is driven by private information, as insiders could stop trading for many reasons. Instead, we contend that part of this sudden silence behavior is motivated by information reasons.[17]

Panel A of Table 1 presents the summary statistics of our variables. PPN and SSN accounts for 0.63% and 1.73% of the whole universe, respectively. An average firm in our sample has 9 analysts following it and 40% of its shares is held by institutional investors. Panel B shows the characteristics of firms with insider silence SSN and PPN, and compare them with stocks in the entire CRSP universe. On average, SSN firms have larger market capitalization and lower B/M ratio compared to an average stock in CRSP. They are also past losers stocks but heavily traded. Consistent with their large market capitalization, these stocks are covered by greater number of analysts and have higher institutional ownership. In contrast, PPN firms are smaller firms with high past 12-month returns. These stock characteristics indicate that, if anyting, SSN stocks should underperform PPN stocks unconditionally. As we will see in later empirical analysis part, the return predictability of insider silence become stronger after adjusting for value and momentum factor. Panel C of

[16]For insider sales, 74.2% of observations have only one insider becoming silent following routine selling within a firm-month. 81.1% of observations have only one insider becoming silent following routine purchasing within a firm-month.

[17]Insiders could stop selling when they no longer have any stock positions in the firm. However, we verified in our sample that the median insiders have 66,865 shares in the firm before their silence month, which is more than 4 times of the median insider trade size.

Table 1 reports the insider-level characteristics, separately for all the insiders in Thomson Reuters database and our sudden silence universe. There are 8.931 and 25,601 unique insiders become silent following consecutive 2-year buying and selling in our sample, respectively. Insiders in our silence universe conducts more trades on average compared to an average insider in Thomson Reuters database, which is not surprising given our identification of routine insiders. In terms of the number and dollar amount of shares per trade, they are quite similar to the other insiders.

Fig.1 plots the distribution of insider silence observations in calendar month. The figure shows that insider silence observations are fairly distributed across all calendar months, and they are slightly more concentrated in February, May, August and November.

Table 2 reports the number of SSN and PPN observations each year, as well as the monthly total market capitalization of firms associate with insider silence measure (PPN or SSN) as a percentage of the entire U.S stock market capitalization in that month. The number of observations is relatively small in the early years, but it dramatically increases and then stabilizes starting from 1997. Hence, in our robustness tests, we also include a version using the sample period from 1997 to 2013 only. In addition, the insider silence portfolio is economically important in terms of market capitalizations. On average, the percentage of firm-months associated with PPN is 0.54% of U.S stock market value, and for SSN it is 6.24%. For comparison, the "small value" portfolio, which is featured in hundreds of asset pricing papers and which remains one of the most studied anomalies in the literature, is only about 0.50% of the U.S stock market.

4 Information Content of Insider Silence

In this section we examine the informativeness of insider silence by looking at its predictability for future firm fundamentals and stock returns.

4.1 Insider silence and firm fundamentals

Our paper hypothesizes that routine insiders choose to be silent for information-related reasons. As corporate insiders are involved in the day-to-day operations of their firms, the information they possess is more likely related to firm fundamentals. As such, insider silence following routine sells could signal improving firm fundamentals, which is reflected in a firm's rising earnings and cash flows. Silence following routine purchases could indicate deteriorating firm fundamentals. In this subsection, we test our hypothesis by examining the predictability of insider silence for future firm profitability.

We conduct our test using the following regression specification:

$$Prof_{i,t+1} = a + bSSN_{i,t} + cPPN_{i,t} + dX_{i,t} + \epsilon_{i,t} \tag{1}$$

where we regress firm i's profitability in quarter $t+1$ ($Prof_{i,t+1}$) on the insider silence dummy SSN and PPN in quarter t, controlling for other predictors of profitability. We use both the Return-on-Assets (ROA) and operating cash flow (scaled by lagged total assets) as proxies for profitability. SSN (PPN) is a dummy variable equal to one if the firm has any insider who sells (purchases) in the same calendar month for two consecutive years, but did not trade in the same month the third year. We aggregate SSN and PPN to firm-quarter level to align with the dependent variable, which is measured at quarterly frequency. Following Fama and French (2006) and Hou, Van Dijk, and Zhang (2012), we include lagged profitability from the previous quarter and four quarters ago, the level of accruals in the previous fiscal year (Accrual), asset growth, a dummy indicating negative earnings (Negroe), dividends (scaled by totol assets) (Div) and a non dividend-paying dummy (Ndiv). We also control for industry and quarter fixed effects in some specifications, in which industry is defined at two digit SIC code level. Standard errors are double clustered at firm and quarter dimensions, following Petersen (2009).

The results are reported in Table 3. Consistent with our hypothesis, insider sudden silence predicts firm profitability. Columns 1 and 2 present the results when the dependent variable is Return-on-Assets (ROA). The coefficient on SSN is 0.0037 (t=4.08) in Column (1),

which means that, in the quarter following insider silence SSN, the firm experiences 0.37% improvement in its quarterly ROA. The coefficient on PPN is negative, with a magnitude smaller than that of SSN. In Column (2), we add industry and quarter fixed effects. The positive coefficient on SSN is not affected and increases to 0.0065 (t=7.10). The economic magnitude is also quite large. The mean and standard deviation of quarterly ROA in our sample is -0.10% and 4.98%. A firm experiences 0.65% improvement in its ROA in the quarter following insider silence SSN, which is about 13% of the sample standard deviation. The coefficient on PPN, however, lose its power in predicting ROA with more stringent fixed effect controls. In Columns 3 and 4, we replace the ROA with the operating cash flow measure. Cash flow is more difficult to be manipulated by managers, thus could reflect firm's underlying profitability better than ROA.[18] The coefficient on SSN in this case is 0.015, and it is significant at the 1% level under all specifications. The coefficient implies that firm experiences 1.5% improvement in its next quarter's operating cash flow following SSN, which is 13.3% of the sample standard deviation. The coefficient on PPN is negative but not significant, suggesting that the information contained in insider silence PPN is much noisier compared to SSN.

Overall, the evidence that insider silence (especially SSN) predicts future firm profitability supports our assertion that routine insiders' sudden silence behavior is motivated by private information related to firm fundamentals. If market underreacts to the valuable information embedded in insider silence, then abnormal returns should be expected following insider silence. Moreover, the direction of return predictability should be the same as the fundamental predictability.

4.2 Insider silence and future stock returns

The results in previous Subsection 4.1 show that the sudden silence of routine insiders contains value-relevant information about firm fundamentals. However, this does not necessarily imply return predictability as long as investors can immediately figure out the information content of insider sudden silence. There are good reasons to believe that in-

[18] Using a cash flow based profitability measure also helps rule out the possibility that our finding is driven by earnings manipulation from managers to inflate the selling price for their subsequent sells.

vestors may fail to unravel this information quickly, however. Griffin and Tversky (1992) argue that investors tend to underreact to low salience signals. On the empirical side, mounting evidence suggests that market underweight value-relevant information that is less salient, such as demographic-induced demand shocks for certain industries (DellaVigna and Pollet (2007)), corporate earnings announced on Friday (DellaVigna and Pollet (2009)), news about economically-linked firms (Cohen and Frazzini (2008)) and firms' predictable innovation ability (Hirshleifer, Hsu, and Li (2013); Cohen, Diether, and Malloy (2013)). Silence or no news is, by definition, a less visible signal and, hence, could well be ignored by investors when making forecasts on firm value.

4.2.1 Fama-MacBeth Regression

Our test on return predictability employs Fama and MacBeth (1973) regressions of one-month-ahead to twelve-months-ahead excess stock returns on firm-month dummies SSN and PPN indicating insider sudden silence following two consecutive-year transactions—sell and purchase, respectively.[19] In these tests, the universe is all CRSP stocks with price greater than or equal to $1 at the end of the preceding month that have COMPUSTAT data available for the test variables. By including all the stocks, the regression coefficients on SSN/PPN reflect the difference in future returns between having a insider silence signal versus having no insider trading. The standard errors are Newey and West (1987) adjusted.

$$r^e_{i,t+1,t+h} = a + bSSN_{i,t} + cPPN_{i,t} + dX_{i,t} + \epsilon_{i,t} \tag{2}$$

Here, $r^e_{i,t+1,t+h}$ is firm i's excess return from month $t+1$ to $t+h$, $SSN_{i,t}$ ($PPN_{i,t}$) is a dummy variable equal to one if month t is an insider silence month following consecutive two year sell (purchase). X include well-known determinants of cross-sectional stock returns, including size (log of market capitalization), book-to-market (log of book-to-market ratio), one-month lagged returns, and momentum (cumulative returns from month t-12 to t-2).

Table 4 presents the regression results. For all return horizons, insider silence following

[19] All our return predictability results go through if we run pooled regressions with month fixed effects, and standard errors are clustered by month and/or firm.

consecutive sells (SSN=1) strongly predicts positive returns in the future. For example, in the case of three-month-ahead cumulative returns, a stock falling into the SSN group, is predictive of the coming three-month cumulative return being 0.83% (t-statistic=3.28) higher. The coefficient on SSN increases almost monotonically with return horizons, suggesting that the information contained in insider silence (SSN) is not short-lived and does not get reflected into stock prices in a timely fashion. The fact that strong return predictability on SSN is evident beyond the first month following insider silence also alleviates the concern that our strategy is not implementable. Prior to 2002, insider trading reports to SEC could be delayed to the tenth day of the month following the insider trading month, so an investor implementing our strategy would have to wait until one month after the expected insider trading month to confirm an insider silence signal.

The predictability of insider silence following consecutive purchase (PPN=1) is weaker than that of SSN, and is significant only for the three-month horizon. The coefficient means that if the stock falls into the PPN group, it predicts that the coming three-month cumulative return is -0.72% (t-statistic=1.87) lower.

In Fig.2, we plot the cumulative abnormal returns up to 12 months following insider sudden silence month SSN and PPN. The abnormal return is calculated as monthly stock return minus its size, book-to-market and past one-year return matched portfolio return. Consistent with the regression results in Table 4, the monthly CAR following SSN continues to rise for the 12 months, and the monthly CAR following PPN decreases and then levels off after the first six months, both exhibiting no reversals. The magnitude of 12 month cumulative abnormal return following SSN is 4.5%, and the number is -0.9% for PPN. The fact that no reversal is observed suggests that the information being conveyed through the silence of routine insiders is important for firm fundamentals and eventually gets incorporated into stock prices.

The tests on fundamental and return predictability show that SSN has much stronger predictive power than PPN. The weak predictability of PPN is partially due to the small number of observations in the early years as shown in Table 2. In our robustness checks, we also include a version of the sample period starting from 1997, and the statistical signifi-

cance is stronger. Meanwhile, the weak return predictability of PPN compared with SSN is expected. Insiders typically have both human capital and financial wealth concentrated in a single firm. An insider's willingness to purchase or stop selling additional shares would increase risk and thus should be very informative of coming positive news. But the willingness to sell or stop buying is equally likely driven by diversification concerns. For example, insiders could stop routine buying if they feel too much risk concentrated in a single firm after consecutive purchases in previous years. In this sense, the asymmetry of return predictability between SSN and PPN is similar to that between insider buy and sell transactions, with insider purchase being a stronger and more robust predictor of stock return than insider sales.

4.2.2 Portfolio Returns

We also use the calendar-time portfolio approach (Mitchell and Stafford (2000)) to analyze the returns of portfolios formed according to our firm-level insider sudden silence signal. For each month from January 1988 to December 2013, portfolios are formed based on previous insider sudden silence measure. At the end of each month t, we form two portfolios—SSN and PPN—based on whether the current month is the insider silence month following two consecutive-year sells and purchases, respectively.[20] The portfolios are then held over months $t+1$ to $t+k$ ($k = 1, 3, 6$). Portfolio returns are equal weighted or value weighted across their constituent stocks. The average portfolio return for month t is the equal-weighted average month t returns of the strategy implemented in the prior month and the strategies formed in the prior k ($k = 1, 3, 6$) months. Panel A of Table 5 presents the raw portfolio returns, risk-adjusted portfolio returns, and characteristic-adjusted returns for the equal-weighted portfolios in the case of $k = 3$. The Cahart α is obtained by regressing the monthly SSN (or PPN) portfolio excess return on Carhart (1997) four factors:

$$R_{i,t} = \alpha_i + bMktrf_t + cSMB_t + dHML_t + eUMD_t + \epsilon_t \tag{3}$$

[20]Prior to 2002, insider trades can be reported within ten days following the end of transaction month. This raises the question of whether our strategy is implementable in real time. Empirically, most of the trades in our sample are actually reported to the SEC within a few days; the median difference between report date and transaction date is only three days. In addition, the deadline was changed to two days in 2002. Our portfolio results are unaffected using the sample starting from 2002.

The variable Mktrf is the excess return of the value-weighted stock market index over the risk-free rate. SMB is the excess return on the portfolio of small stocks over big stocks. HML is the excess return on the portfolio of stocks with high book-to-market ratio over the portfolio of stocks with low book-to-market ratio. The variable UMD is the return on high-momentum stocks minus the return on low-momentum stocks, where momentum is measured over months (-12, -2). [21] We also compute the characteristic-adjusted return by subtracting the stock's raw return by the return of the benchmark group to which the stock belongs (see, e.g., Daniel, Grinblatt, Titman, and Wermers (1997)). The 5*5*5 benchmark groups are formed at the end of June of each year based on size, book-to-market ratio, and past one-year return.[22]

Consistent with the Fama-MacBeth regression results, the SSN portfolio earns a significant positive four-factor alpha of 43.7 (t-statistic=2.70) basis points per month. The statistical significance of PPN alone is less stable, which is also consistent with our Fama-MacBeth regression results that the predictability of sudden silence following consecutive purchases is in general much weaker in the full sample. In untabulated results, we compare PPN with PPP portfolios, and we find that the spread is much more negative at -33.8 basis points per month. A long-short strategy that longs stocks in the SSN group and shorts stocks in the PPN category yields a monthly Carhart (1997) four-factor alpha of 50.9 (t=2.19) basis points and Sharpe ratio of 0.5. The characteristic-adjusted monthly abnormal return for the long-short portfolio is larger at 63.8 (t=2.59) basis point, with a Sharpe ratio of 0.59. Panel B of Table 5 shows both the value-weighted and equal-weighted monthly alpha of the long-short strategy (SSN - PPN) under different holding periods. The results are robust under different holding horizons for the equal weighted portfolios. The value-weighted return of the long-short portfolio is also positive, though the statistical significance is much weaker. The difference between equal- and value-weighted portfolios suggests that our results are more pronounced in small stocks, which tend to have worse information environment and are also more costly to arbitrage.

[21] The Fama-French three factor and momentum factor are retrieved from Kenneth R. French website: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/

[22] The monthly benchmark returns and stock assignments are obtained from Russ Wermer's website: http://alex2.umd.edu/wermers/ftpsite/Dgtw/coverpage.htm

Appendix Table A1 show the calendar-time portfolio alpha for the sudden silence measure defined based on three consecutive-year trades. Because the sample size is especially small in the early years, we restrict our tests to the sample period of 1998-2013. The results when defining silence using stricter criteria are stronger. The calendar-time 4-factor alpha for the long-short strategy is larger at 86.6 basis points (t-stat=2.61) per month, compared with the 53.1 basis points under the two consecutive years version.

4.2.3 The effect of transaction costs

While the return predictability results show that insider silence predicts future stock returns and predictive power is stronger among small stocks, we do not take into account transaction costs. Transaction costs include the bid-ask spread, commissions paid to a broker, and the price impact of the buy or sell order. Broker commissions have been declining over the past 15 years, with many discount brokers offering very low commissions for an unlimited number of shares per trade. The price impact depends on the trade size and can be substantial for large trades of small-cap stocks. However, a recent paper by Frazzini, Israel, and Moskowitz (2012) estimates that the actual trading costs faced by real-world arbitrageurs are an order of magnitude smaller than previous studies suggest. The mean transaction costs are about 11 bp and 21 bp in large cap and small cap stocks, respectively.

In addition, as institutional investors typically incorporate multiple signals in their trading strategies, transaction costs are shared by these multiple signals, further lowering the transaction costs to implement the strategies. Within this context, we surmise that transaction costs can reduce the profitability of the insider silence strategies if traded alone, and that the strategies are potentially profitable only to institutional investors with low transaction costs and careful execution. However, insider silence signal can add significant value to a portfolio that trades on multiple signals and spreads transaction costs across these signals.

4.3 Insider silence and earnings announcement returns

The results so far suggest that investors fail to fully incorporate the information transmitted by insider sudden silence. If this is true, investors will be systematically surprised when

the relevant information is subsequently disclosed to the market. In this subsection, we test the investor underreaction hypothesis by examining the short-horizon returns around subsequent earnings announcement following insider sudden silence. We focus on earnings news instead of other news events because earnings announcement is one of the highest-profile corporate events that catch investors' attention. Because insiders find trading opportunistically on short-term news difficult, given the "Short Swing" rule, they are more likely to remain silent when possessing material future earnings-related information. Taken together, earnings announcement is a good setting to investigate our strategic silence hypothesis.

We extract quarterly earnings announcement dates from Compustat and calculate three-day announcement period abnormal returns adjusted by return on CRSP value-weighted market returns or size, book-to-market and past 1-year return matched portfolio. We then regress the earnings announcement CAR(-1,+1) on the dummies SSN and PPN and other control variables.

$$CAR(-1,+1)_{i,t} = a + bSSN_{i,t-1} + cPPN_{i,t-1} + dX_{i,t-1} + \epsilon_{i,t} \tag{4}$$

SSN (PPN) is a dummy that equals to one if in the quarter prior to earnings announcement day t, any insider of the firm demonstrates sudden silence following two consecutive years of selling (purchasing). We include lagged earnings announcement return, size, book-to-market ratio and past-year return as control variables. We also include industry and quarter fixed effect in some specifications. Standard errors are double-clustered at the firm and the quarter level. Table 6 shows the regression results. Columns 1 and 2 use market-adjusted CAR as dependent variable. The coefficient on SSN is significantly positive under all specifications. With industry and quarter fixed effects in Column 2, SSN predicts a 22.2 (t-statistic=2.72) basis points abnormal positive return in the three-day earnings announcement window. The economic magnitude is large given the mean 3-day CAR is 15 bp for our sample of stocks. PPN, consistent with our hypothesis, predicts negative abnormal CARs in the earnings announcement window, though it is not significant. Our previous Fama-MacBeth regression results show that SSN predicts 0.83% abnormal positive return over the next three months. This means that about 27% of abnormal return following insider silence after

two consecutive years of selling is concentrated on the three-day window around quarterly earnings announcement, which represents only 5% of all trading days. The fact that abnormal return following insider silence is concentrated on a few information days makes our findings difficult to square with risk-based explanations (LaPorta, Lakonishok, Shleifer, and Vishny (1997)). We find similar results using DGTW-adjusted CAR as dependent variable, as shown in Columns 3 and 4.

Overall, the earnings announcement results are consistent with our hypothesis that insider silence is driven by private information related to firm fundamentals. We find that sudden silence following insider consecutive sells predicts positive earnings news and, to a less extent, that silence following insider consecutive purchases predicts negative earnings surprise. Investors initially fail to unravel the information contained in insider sudden silence, so they are systematically surprised when the relevant information is subsequently disclosed to the market via earnings announcement.

4.4 How long do insiders delay their routine trades?

Our strategic silence hypothesis predicts that an insider, who previously trades on a routine pattern, can suddenly choose not to trade if she possess some private information about the firm. If this is the case, the direction of the insider's next trade following the sudden silence should be consistent with the direction of the consecutive trades, given that routine trades are not canceled. An insider, on the other hand, could permanently cancel the routine trade based upon a belief that the performance of the firm would be continuously sluggish or outperforming. Despite the delay and permanent cancellation of the trades, one should see few observations of an opposite sign of trades following sudden silence, which is not consistent with our story.[23] This motivates us to examine how long insiders delay their routine trades.

Panel A of Table 7 shows the summary statistics of the length of delay for individual insiders[24] displaying sudden silence. We define "cancel" as those insiders who do not trade for

[23] An insider who wants to execute a trade opposite to her previous routine trades doesn't need to delay the trades.

[24] Note here that the summary statistics is based on the individual insider level sudden silence, which is different from the firm level silence measure used in the previous tests. We use insider level sudden silence

the subsequent 24 months following their sudden silence.[25] Consistent with our hypothesis, 47.63% of insiders delay their trades in same direction and 47.23% of insiders permanently cancel their trades.[26] Only 5.15% of the insiders execute a trade opposite to the direction of their previous routine trades following sudden silence. Insiders on average delay their previous routine purchases by a mean of 6.04 months (median of 4 months), and delay their previous routine sells by a mean of 6.51 months (median of 5 months) following the sudden silence month. These numbers are consistent with our previous results that the return predictability of insider silence is strongest in the horizon of three months to six months.[27]

Our hypothesis also predicts that, once the insiders resume their routine trades, the information embedded in their previous silence should already be reflected in the stock price. Hence, the abnormal return as predicted by PPN or SSN should come mostly from the period between insiders' sudden silence to their next trade month, not the period after their next trade. Panel B of Table 7 shows that this is the case. It shows the average size and book-to-market adjusted monthly abnormal return for the period from the silence month (exclusive) to insiders' next trade month (exclusive), the next trade month, and the period from the next trade month (exclusive) to the 24 months after the sudden silence month. We follow Fama and French (1993) to construct the size and book-to-market benchmark portfolios. At the June of each year, we independently construct the NYSE breakpoints for size and book-to-market ratios, and we form equal-weighted 10*5 size and book-to-market portfolios that hold for the subsequent 12 months. The monthly adjusted abnormal return is then the return of the stock minus the portfolio return of the size and book-to-market category that it falls into.The average monthly abnormal return is -0.81% from silence month to next trade period, but it is only -0.39% from the next trade to 24 months end period for the case of PPNP (the insider continues the sudden silence of PPN with a purchase later, purchase-

measure because the length of delay is more straight forward and easy to understand at the individual insider level comparing to the firm level.

[25]We choose 24 months because we believe that it is less likely that insiders would still follow the same trading pattern after two years' silence. However, our results are similar if "cancel" is defined using 12, 36, or 60 months.

[26]Since we also define insiders who do not trade for other reasons (such as leaving the firm or no longer have enough shares to sell) as canceling their trades, our estimation of the percentage of cancel is an over-estimation.

[27]In untabulated results, we find that insiders buy or sell similar amount of shares after resuming their routine trading.

purchase-no trade-purchase). The difference of 0.41% (t=3.79) is statistically significant. For SSNS (the insider continues the sudden silence of SSN with a sell, sell-sell-no trade-sell), the average monthly abnormal return is 1.26% from the silence month to next trade period, but it is only 0.28% from the next trade to 24 months end period. The difference of 0.97% (t=17.69) is also highly significant.[28]

For permanent cancellation, we calculate the average monthly abnormal return for the subsequent 24 months. Consistent with the predictions of our hypothesis, SSNN (sell-sell-no trade-no trade) has a subsequent average monthly abnormal return of 0.31% (t=7.00), and PPNN (purchase-purchase-no trade-no trade) has subsequent average abnormal return of -1.30% (t=13.74). The much rarer cases of SSNP (sell-sell-no trade-purchase) and PPNS (purchase-purchase-no trade-sell), as well as their return predictability are not consistent with our story. Although SSNP and PPNS are not the focus of this paper, the results in Table 7 seems to indicate that those insiders' behaviors are consistent with the previous literature (Lakonishok and Lee (2001); Piotroski and Roulstone (2005)). Insiders in general are contrarian traders who buy (sell) firm stocks when there is strong decline (increase) in the stock return and, after their transactions, the return of the firm then increases (declines).

5 Mechanism

In this section, we provide a series of additional tests aimed at isolating the mechanism driving our main result. In particular, we examine whether variation of litigation risks drives the informativeness of insider silence and also try to pinpoint why the market does not recognize the information in insider silence in a timely manner.

[28]The mean abnormal returns following insider silence conditional on their subsequent trade in the same direction is larger in absolute magnitude than the unconditional abnormal return following insider silence. This is to be expected because our insider silence measure is quite noisy and insider may become silent for reasons unrelated to private information. However, when we observe insiders resume their routine trades following a period of silence, the silence is more likely to be motivated truly by private information.

5.1 Litigation risks and the informativeness of insider silence

Our paper hypothesizes that, when having private information, some routine insiders choose to be silent instead of trading on the information, as doing so avoids suspicion from regulators. In other words, insiders weigh the benefits of making higher profits by explicitly trading on private information and the potential costs of being prosecuted by regulators. If this is true, increasing litigation risks should lead to more routine insiders being silent when possessing private information and, hence, the information content of insider silence should be stronger. In this subsection, we conduct two tests that examine the informativeness of insider silence in subsamples with different litigation risks, one across time and another across firms.

Our first test is based on the Sarbanes-Oxley Act of 2002, which significantly increases the litigation costs associated with insider trading. SOX is the most far-reaching reform of American business practices since actions taken during the Franklin D. Roosevelt administration. The act seeks to enhance corporate responsibility, expand financial disclosures, and combat corporate and accounting fraud. SOX addresses the issue of insider trading disclosure in Section 403, which amends Section 16(b) of the Exchange Act of 1934. In addition to more timely disclosure of insider trades, SOX curtails the use of Form 5, which was used opportunistically by managers to trade on private information (Cheng, Nagar, and Rajan (2007)). Previous research provides evidence suggesting that managers' incentives and opportunities to engage in opportunistic behavior decreased after SOX. For example, Heron and Lie (2007) find that stock return patterns around option grants are less favorable to managers after SOX. Cohen, Dey, and Lys (2008) show a decrease in accrual-based earnings management following enactment of SOX. Brochet (2010) find that, after SOX, insiders are less likely to sell shares immediately prior to negative stock returns and ahead of earnings news that falls short of analyst forecasts. In the wake of corporate scandals contemporaneous to the enactment of SOX, insiders are expected to be less prone to opportunistic trading because of increased scrutiny from investors, the media, and regulators. Thus, on average, insider silence should be motivated by private information to a greater extent after SOX. In addition, insider sales prior to negative news are more exposed to litigation and prosecution

than purchases, so insiders are more likely to become silent when facing negative information.

To test whether the information content of insider silence increases after the enactment of SOX, we construct a dummy variable Post equal to one for the time period after SOX. We then use SSN and PPN and their interaction with Post to predict future firm fundamentals and returns. The results are reported in Table 8. The dependent variables are next quarter return on assets (ROA) in Column 1, operating cash flows in Column 2, CAR(-1,+1) around next quarter's earnings announcement in Column 3 and cumulative three-month return in Column 4. The coefficients of interest are the interaction of SSN and PPN with the Post dummy. According to our hypothesis, the coefficient on SSN*Post should be significantly postive and the coefficient on PPN*Post should be significantly negative. The results are generally consistent with our hypothesis. The coefficient on SSN*Post is positive and statistically significant when the dependent variable is ROA or cash flow. The economic magnitude is also large. For example, SSN predicts an increase of future quarterly ROA by 0.42% in the pre-SOX period, and 0.69% in the post-SOX era, which is 50% larger than the effect in the pre-SOX period. When the dependent variable is earnings announcement or cumulative three-month stock returns, the point estimate is economically large as it implies a 100% increase relative to the pre-SOX period, although it is not statistically significant.

The effect of SOX on the predictability of PPN is more pronounced, as predicted by our hypothesis. The coefficients on PPN*Post are significantly negative for all four dependent variables. The PPN in the pre-SOX period is positive, suggesting that insider silence following routine purchase contains bad news only in the post-SOX period.

Our second test uses the firm-level litigation risk measure developed by Kim and Skinner (2012). We split the sample into two groups based on the KS litigation risk measure and compare the return predictability of insider silence across subsamples. The result is reported in Appendix Table A2. The coefficients on SSN and PPN are always larger in magnitude and more significant for firms with higher litigation risk. For example, SSN predicts 1.13% (t=3.60) higher future three-month return in the high litigation risk sample, and 0.05% (t=0.20) among firms with low litigation risk. Overall, the variation of the informativeness of insider silence is consistent with our hypothesis that insiders choose to be silent when

possessing private information because of litigation risk concerns.

5.2 The reaction of sophisticated investors and analysts

Our results on the return predictability of insider sudden silence raise the question of whether other investors or market participants in the financial markets are aware of the information embedded in sudden insider silence. In this section, we explore whether sophisticated investors (e.g., hedge funds) and security analysts are able to exploit the information revealed by insider sudden silence.

We focus on the trading behavior of hedge funds in response to insider silence signal because hedge funds are among the most sophisticated investors in financial markets. Previous studies find that hedge funds are skilled at stock picking and market timing (Brunnermeier and Nagel (2004)), are able to identify mispriced stocks (Jiao, Massa, and Zhang (2015)), and conduct trades that are more likely to be driven by information (Agarwal, Jiang, Tang, and Yang (2013)). Thus, the evidence that hedge funds change their positions in the direction predicted by the information content of insider silence would strengthen our previous return predictability results. To investigate the link between insider silence and hedge fund trading, we regress the change in quarterly hedge fund holding on insider silence dummies SSN and PPN and a set of control variables in the previous quarter. To make a comparison, we also look at how mutual funds trade in response to insider silence.

Table 9 presents the results of this test. Columns 1 and 2 show the results when the dependent variable is quarterly change in hedge fund holdings. The results suggest that hedge funds trades in the direction consistent with the information in insider silence, especially for the good news contained in SSN. The coefficient on SSN is 0.035 (t-statistics=2.50) in Column 2. Hedge funds significantly increase their long positions on a stock that has pending good news contained in insider silence SSN. The coefficient on PPN is similar in magnitude to that on SSN when we include only quarter fixed effects, with a coefficient of -0.03 (t-statistics=-1.79), but it loses significance when both firm and quarter fixed effects are included. This finding is consistent with our return predictability results that SSN is a more accurate signal about future firm value and has stronger predictive power for future

stock returns than PPN.

Columns 3 and 4 of Table 9 report the regression results when the dependent variable is quarterly change in mutual fund holdings. In sharp contrast, we find that mutual funds trade in the opposite direction predicted by the information contained in insider silence. The coefficient on SSN is negative and significant, indicating that mutual funds decrease their position in stocks with pending good news as predicted by SSN. The coefficient on PPN is positive, but not significant. Our results on mutual fund trades being in the opposite direction of insider silence is consistent with the literature documenting mutual funds being dump money and hedge funds being smart money.

In Table 10, we examine whether security analysts are able to discern the information content of insider sudden silence. Given their strong incentives to generate more accurate earnings forecasts for covered stocks, analysts should revise up (down) their earnings forecast for stocks with SSN (PPN). Moreover, analysts could upgrade (downgrade) their recommendations on these firms when the good (bad) news contained in insider silence deserves such actions. To test this, we regress analyst annual earnings per share forecast revision (scaled by book value per share) on insider silence dummies SSN and PPN in the previous quarter. We control for lagged forecast revisions, size, book-to-market, past one-year return and industry/quarter fixed effects in some specifications. As reported in Columns 1 and 2, the coefficient on SSN is significantly positive under all specifications, suggesting that analysts revise their earnings forecast upward for firms associated with SSN. The coefficient on PPN is also negative, but it is significant only when we control for industry and quarter fixed effects. In Columns 3 and 4, we examine whether insider silence could predict announcement returns around future analyst recommendation changes. Consistent with the forecast revision results, SSN predicts significantly more positive cumulative abnormal returns around next quarter's recommendation change. The point estimates suggest that stocks with SSN in the previous quarter experience 10 to 14 basis points more positive three-day CAR. The coefficient on PPN is also negative but not significant.

5.3 Heterogeneity in information environment and limits to arbitrage

In this subsection, we examine the underlying mechanism of why market didn't quickly incorporate the information in insider silence. If investors are fully rational and have unlimited capacity to analyze all value-relevant information, the information contained in an insider's strategic silence behavior should be reflected in stock prices in a timely fashion. However, our evidence suggests that investors underweight this information in forecasting firm values. If this is true, then the return predictability results should be stronger among firms with more opaque information environment, in which investors are less likely to learn about the information embedded in insider silence through other sources, such as analyst reports and media coverage.

In addition to firms' information environment, we consider how the return predictability varies across our sample with different degrees of arbitrage costs. The evidence indicates that sophisticated investors, such as arbitrageurs, also fail to incorporate the information embedded in insider silence and bring stock prices to full-information value. We thus expect that our results are more pronounced among firms subject to greater limits to arbitrage.

We employ two variables that are commonly used in the literature to proxy for firms' information environment: institutional ownership (Boehmer and Kelley (2009)) and analyst coverage (Hong, Lim, and Stein (2000)). Institutional ownership here is the residual institutional ownership after being orthogonalized with respect to firm size (Nagel (2005)). Analyst coverage is the number of analysts following the firm during the previous fiscal year. Our proxy for arbitrage costs include idiosyncratic volatility (Pontiff (1996); Wurgler and Zhuravskaya (2002)) and firm size. Stocks' idiosyncratic volatility is calculated using weekly return (Wednesday to Wednesday) during the previous year.

To test the prediction, we run Fama-MacBeth regression on subsamples splitted based on the sample median of residual institutional ownership, analyst coverage, idiosyncratic volatility and market capitalization. Panel A of Table 11 presents the subsample results for stocks sorted on information environment proxies. In the short horizon of one month and three months, the return predictability of SSN is similar for the high institutional ownership

and low institutional ownership group. However, in the longer horizons, SSN predicts a much larger positive return for the low institutional ownership stocks than the high institutional ownership sample. SSN=1 predicts 1.75% (t=3.75) higher six-month-ahead return for the subsample that has low residual institutional ownership, and only 0.98% (t=1.83) for the high institutional ownership stocks. SSN in the low analyst coverage sample predicts 2.05% (t=3.27) increase in the six-month cumulative return, and only an insignificant 0.80% (t=1.55) increase for the high analyst coverage stocks. The coefficient on PPN across subsamples is also consistent with our hypothesis, although the statistical significance is much weaker.

Panel B of Table 11 shows the Fama-MacBeth regression results when we split the sample based on two proxies for limits to arbitrage: firm size and idiosyncratic volatility. Regarding the firm size results, although the coefficient on SSN is similar across the two subsamples, the difference in coefficients is much larger for PPN, which contains negative information. Insider silence following consecutive purchases predicts 1.45% (t=2.00) more negative six-month cumulative returns in small stocks. The corresponding coefficient is 0.018% (t=0.03) for big stocks. The evidence is consistent with the idea that short-sale constraints reduce the adjustment speed of prices to negative information (Diamond and Verrecchia (1987)).

The results using idiosyncratic volatility as a proxy for limits to arbitrage is more striking. SSN=1 predicts a 1.96% (t=3.17) increase in the six-month-ahead return for the subsample that has high volatility, and only a 0.55% (t=2.36) for the low volatility subsample. PPN=1 predicts a decrease of 1.48% (t=3.17) in the six-month-ahead return for the high volatility subsample, and only an insignificant 0.55% (t=0.85) for the less volatile subsample.

In sum, the subsample results support our hypothesis that investors underreact to value-relevant information contained in routine insiders' strategic silence behavior. Information in insider silence takes longer time diffusing into price of firms that are smaller, have higher idiosyncratic volatility, have fewer analysts following and are minimally held by institutional investors.

6 Robustness Tests and Alternative Explanations

In this section, we conduct several tests to examine the robustness of our results and to rule out some alternative explanations for our main result.

6.1 Robustness and Extensions

6.1.1 Tests using more recent sample period

Table 2 shows that the number of insider sudden silence observations is small in the early years, but increased dramatically starting from 1997. Hence, to guarantee that outliers in the early years do not drive our results, we rerun our calendar-time portfolio and Fama-MacBeth regressions for the sample period of 1997-2013. Panel A of Table 12 shows our baseline results using the more recent sample period. The results are in general stronger. The Fama-MacBeth regression indicates that SSN predicts a 1.07% increase (t-statistic=3.67) and PPN predicts a -0.98% decline (t-statistic=2.03) for the subsequent three-month return, which is larger than the approximately 0.80% predictability in the whole sample version.

6.1.2 Alternative measures of insider silence

To guarantee that our results are not driven by the specific methodologies that we use to define insider silence, we consider several variations in the construction of the insider sudden silence measure. First, we try to construct the sudden silence measure using previous three years' trading history. In our baseline results, we define sudden silence as a no trade month following two consecutive-year same-month trades. However, determining how many years are enough to classify whether an insider is routine or not is difficult. In other words, that insiders trade in the same month for two consecutive years could be coincidence and no information content could be detected in the following silence. On the one hand, if multiple years of trades in the same month in the same direction are required, then the result could be a very small sample with sudden silence equal to one. On the other hand, if too few years are used to define consecutive trade, then the silence measure could have too much noise. Trading off these two considerations, we add another year in the construction of consecutive

trades, and look at the information content of insider sudden silence following three years of consecutive same-month trades SSSN (sell-sell-sell-no trade) and PPPN (purchase-purchase-purchase-no trade).

Panel B of Table 12 shows the Fama-MacBeth regression for the sudden silence measure defined based on three consecutive-year trades. Because the sample size is especially small in the early years, we restrict our tests to the sample period of 1998-2013. The results when defining silence using stricter criteria are stronger. SSSN predicts 1.32% positive abnormal returns for the subsequent three months and PPPN predicts 1.51% negative abnormal returns. These numbers are larger than the return predictability of SSN and PPN.

We also consider constructing our silence measure directly at the firm level, in which we first aggregate all the insider trades at the firm-month level, and then define SSN and PPN based on the aggregate firm-level insider trades. The results are presented in Panel C of Table 12. Because we do not require consecutive trades at the individual insider level, the measure is a bit noisier, but the results are still qualitatively similar.

6.1.3 Are top managers' silence more informative?

We also look at the informativeness of silence from insiders with differential levels of seniority in the firm. Following Thomson Reuters' definition, we define those insiders who are the Chairman of the Board, CEO, Chief Operating Officer, President or General Counsel as the most senior insiders in the firm. We predict that the sudden silence of these top managers should be more informative about future stock return than the less senior insiders' for two reasons. First, senior managers presumably have better access to material privte information than others and could even make strategic decisions to influence the firm value. Second, the potential litigation risks and reputation losses are larger for these top managers if they trade on insider information and get prosecuted by SEC, so they will more likely stay silent when possessing private information. Appendix Table A3 presents the Fama-MacBeth results when we decompose insider silence signal into those from top managers (SSN_Top and PPN_Top) and those from other insiders (SSN_Low and PPN_Low). Consistent with our prior, the return predictability of insider silence signal is indeed much stronger for top

managers. Insider silence SSN by low-level insiders is followed by a positive return of 63 bp in future three months, while SSN by top insiders is followed by a much larger positive return of 114 bp, almost twice larger than that of low-level managers. The negative return predictability of PPN is also larger for top managers, especially at longer horizons of 6 and 12 months.

6.1.4 Multiple insider silence within firm-month

In our baseline results, we define firm-month dummy SSN or PPN equal to one when at least one insider within the firm becomes suddenly silent following routine trades. Given the large noise contained in our silence measure, multiple insider silence at the same firm-month should be a stronger signal than a single case of insider silence. This is because information should be correlated across insiders within a firm, and noise should not. To test this, we add two dummies MSSN (multiple sell-sell-no trade) and MPPN (multiple purchase-purchase-no trade) equal to one if the firm has more than one insider becoming silent following routine trades at the same firm. We run a Fama-MacBeth regression of future returns on these two dummies along with SSN and PPN. The result is reported in Appendix Table A4. Consistent with our hypothesis, the coefficient on MSSN is mostly positive and MPPN is negative. The economic magnitude is especially large for MPPN (multiple insider silence following routine purchases). For example, the coefficient is -0.49% for PPN and -0.61% for MPPN when the dependent variable is cumulative three-month returns. This implies that the stock return decreases by -1.10% in future three months when more than one insider becomes silent following routine purchases compared with -0.49% in the single insider silence case. Due to the small sample of multiple insider silence cases, however, the coefficients are mostly not significant.

6.2 Alternative Explanations

6.2.1 Confounding insider trading signals

Our results could be driven by the known insider trading signals such as the opportunistic trades in Cohen, Malloy, and Pomorski (2012) and the insider net purchase ratio (NPR)

that has been widely used in the previous literature (Lakonishok and Lee (2001); Sias and Whidbee (2010), etc.). Although, by construction, our insider sudden silence measure and the traditional insider trading variables are unlikely to overlap, as our identification focuses on the "no trade" activity following consecutive trades, Cohen, Malloy, and Pomorski (2012) focus on trades submitted by those opportunistic traders. However, for those firm-months with insider sudden silence, opportunistic insiders at the same firm could trade in the direction of our prediction. To exclude such a possibility, we run our Fama-MacBeth regression, controlling for the opportunistic buy and opportunistic sell dummy of Cohen, Malloy, and Pomorski (2012) and the insider net purchase ratio (NPR) as defined by Lakonishok and Lee (2001). The NPR is calculated as

$$NPR = \frac{\#insider\,buy_{t-1,t-6} \; - \; \#insider\,sell_{t-1,t-6}}{\#Total\,transactions_{t-1,t-6}}.$$

Panel A of Table 13 shows that our results remain when controlling for the these traditional insider trading variables. SSN predicts 0.86% (t-stat=3.38) increase and PPN predicts 0.84% (t-stat=2.23) decrease for the cumulative three-month return. Consistent with the literature, opportunistic buy and net purchase ratio predicit return positively, while the coefficient on opportunistic sell is negative but not significant.

6.2.2 Insider silence in response to mispricing

Our explanation for the return predictability of insider silence is that insiders possess some private information not yet reflected in current stock prices. However, insiders could stop their routine selling (purchasing) if they believe the current stock price is not fair, i.e., it is undervalued (overvalued) relative to fundamental value. The return predictability could be driven by mispricing based on public information, which is different from the private information channel we proposed in this paper. For example, insiders who buy consecutively for two years could stop purchasing after the firm experiences abnormal increases in accruals in the third year. Because firms with high accruals tend to be overvalued by naive investors (Sloan (1996)), our insider sudden silence measure PPN can simply pick up the effect of accruals in predicting negative returns. To address this concern, we reestimate our baseline

Fama-MacBeth regression, controlling for the five anomaly variables as in Fama and French (2008). If our insider sudden silence measure is capturing these public information signals, then the predictability of insider sudden silence should disappear after controlling for them. However, Panel B of Table 13 shows that after controlling for net share issuance, firm profitability, momentum, accruals and asset growth, our results remain and have even become stronger. Both SSN and PPN significantly predict future stock return for the period ranging from three to twelve months. SSN predicts a positive 73.6 basis point increase, and PPN predicts a 102.1 basis point decrease for the subsequent three-month return. Hence, the information embedded in insider sudden silence is distinct from that conveyed by traditional mispricing signals.

6.2.3 Firm-level compensation policy change

A plausible alternative explanation why insider silence predict future stock return is that insider stop trading due to change in firm-level compensation policy, which has information content. For example, insider could stop purchasing shares in one year because the firm he works for stop giving him bonus this year, which indicates some trouble in the firm and hence negative future return. To rule out this alternative, we run panel regression of return on insider silence, controlling for firm*year fixed effect. The idea is that firms usually set their compensation policy annually, while insiders trade in different months within the same year, as shown in figure 1. Hence we could exploit the within firm-year variation of insider silence in prediciting return. Panel C of Table 13 shows the return predictability of insider silence SSN is not affected by adding firm*year fixed effect, suggesting our results cannot be fully explained by firm-level compensation policy change.

7 Conclusion

This paper examines the information content of insiders' strategic silence following their consecutive same-month trades. Insiders trade for multiple reasons, and the non-informative trades as driven by liquidity or diversification motives are more likely to be routine-based. We hypothesize that, when a routine insider suddenly stops trading, in contrast to the

previous trading pattern, this sudden silence can contain value-relevant information about the firm. Consistent with our hypothesis, we find that insider silence following consecutive sells predicts positive abnormal return and, to a lesser extent, the sudden silence following consecutive purchases predicts negative return. A long-short strategy exploiting the strategic behavior of insider silence yields a value-weighted four-factor alpha between 0.50% and 0.86% per month.

To investigate what specific information is embedded in insiders' sudden silence behavior, we consider the predictability of insider silence for firm fundamentals and earnings announcement day returns. The results indicate that insider silence signals valuable information about the firm's future operating performance and that investors fail to incorporate the information contained in insider silence in a timely fashion. They are systematically surprised when the information is disclosed to the market subsequently via earnings announcement.

Our findings contribute to the insider trading literature by showing that the absence of insider trading contains value-relevant information. The existing literature mostly focuses on the information content of insiders' purchasing and selling transactions, with few papers investigating their absence, that is, insider silence. We show that even routine insiders can trade strategically. When they expect that good news is on the way, they postpone or cancel their routine sell. Similarly when they expect that bad news is approaching, they also delay or cancel their routine purchase. Taken together, these results indicate that investors fail to unravel the information embedded in insiders' strategic silence behavior.

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Figure 1: Calendar Month Distribution of Insider Sudden Silence

This figure shows the calendar month distribution of insider sudden silence. SSN (PPN) is a firm-month dummy variable equal to one if the firm has any insider who sells (purchases) consecutively on the same calendar month for the previous two years, but did not trade on the same month the third year. Blue (red) bar represents SSN (PPN).

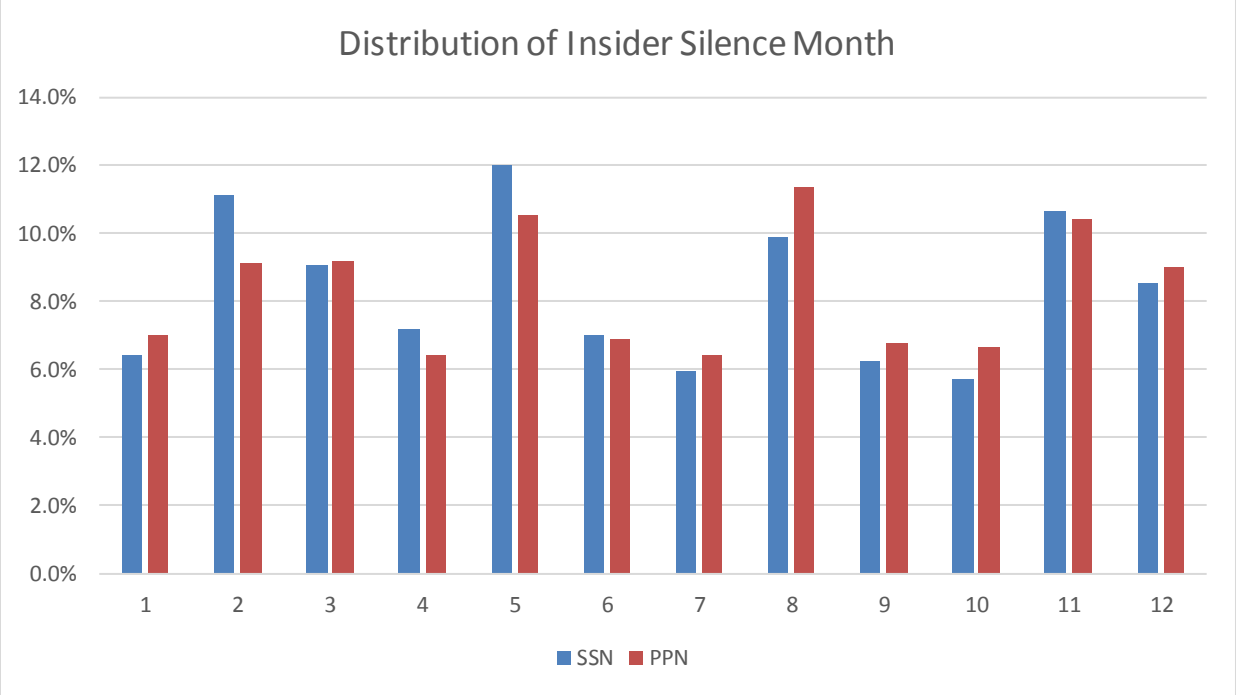

Figure 2: Cumulative Abnormal Return Following Insider Sudden Silence

This figure plots the cumulative abnormal return following insider sudden silence month. SSN (PPN) is a firm-month dummy that equals to one indicating insider sudden silence following consecutive two year selling (purchasing). Abnormal return is calculated as monthly stock return minus its Size, Book-to-Market and past 1-year return matched portfolio return (Daniel, Grinblatt, Titman, and Wermers (1997)). The sample runs from 1988 to 2013.

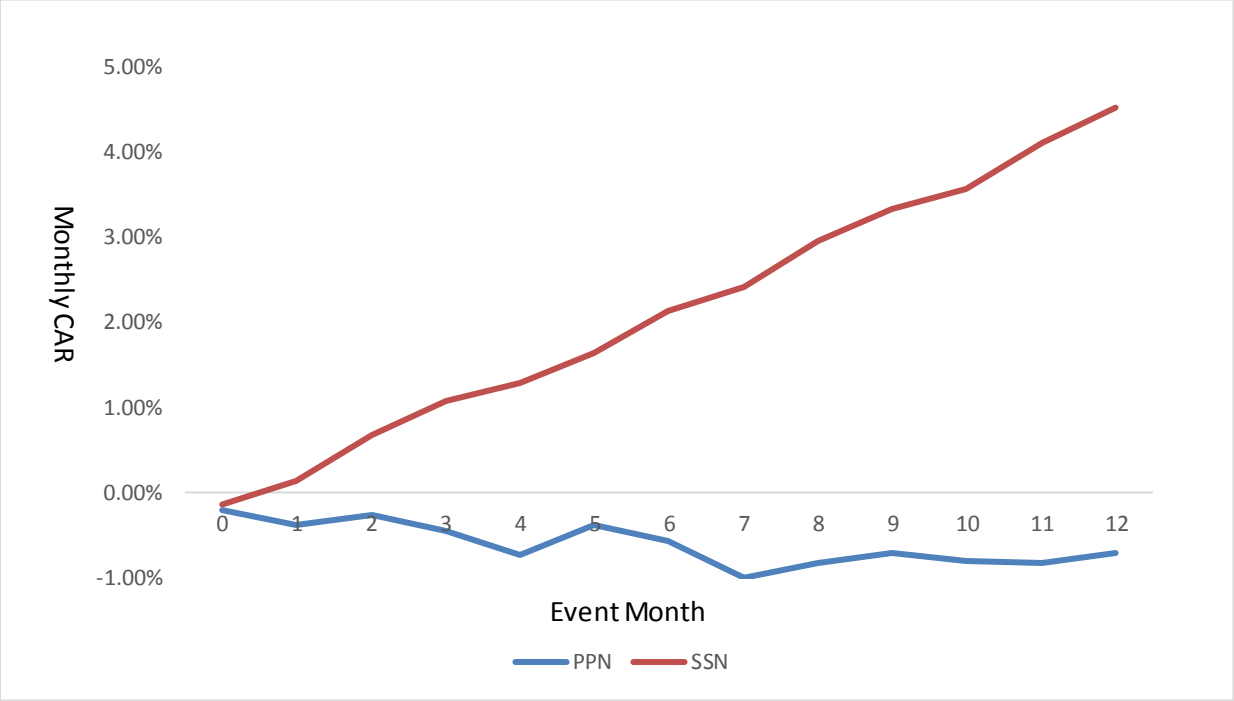

Table 1: Descriptive Statistics

This table presents the descriptive statistics. Panel A reports the full-sample summary statistics of variables from 1988 to 2013, except for hedge fund holding for which the sample period is from 1991 to 2012. SSN (PPN) is a firm-month dummy variable equal to one if the firm has any insider who sells (purchases) consecutively on the same calendar month for the previous two years, but did not trade on the same month this year. Panel B shows the characteristics of firms with insider sudden silence SSN and PPN. Panel C reports insider-level characteristics.

Panel A: Summary Statistics of Variables

Variable	Definition	Mean	Median	Q1	Q3	STD
MOM	Past 1-year return	17.27%	13.73%	-11.74%	40.45%	57.03%
RET1	Past 1-month return	1.63%	0.31%	-6.25%	7.50%	17.70%
LnSize	Log of market capitalization	5.29	5.14	3.78	6.67	2.03
LnBM	Log of Book/Market ratio	-0.63	-0.54	-1.12	-0.06	0.85
CAR(-1,+1)	Earnings Surprise	0.15%	-0.09%	-3.77%	3.75%	8.21%
ROA	Return on Assets	-0.10%	0.64%	-0.35%	1.88%	4.98%
OCF	Operating Cash Flow	2.32%	2.96%	-0.91%	7.42%	11.29%
IOR	Institutional Ownership	40.40%	38.94%	15.92%	62.67%	27.32%
HFH	Hedge Fund Holding	3.24%	1.45%	0.37%	4.18%	4.58%
MFH	Mutual Fund Holding	13.54%	11.78%	3.09%	21.60%	11.38%
Vol	Total Return Volatility	0.64%	0.37%	0.17%	0.78%	0.80%
COV	Analyst coverage	9.1	6	3	13	8.7
PPN	Silence following purchases	0.63%	0	0	0	7.92%
PPP	Consecutive purchases	0.36%	0	0	0	5.96%
SSN	Silence following sells	1.73%	0	0	0	13.03%
SSS	Consecutive sells	0.97%	0	0	0	9.80%

Panel B: Firm-level Characteristics

SSN=1					
Variable	# of Obs	Mean	Median	P25	P75
Mktcap ($Mil)	27987	7022.3	1300.9	407.1	4561.9
Book-to-Market	27987	0.45	0.36	0.21	0.58
1-month Return	27983	0.32%	0.23%	-6.22%	6.54%
12-month Return	27987	2.85%	0.34%	-24.20%	23.94%
IVOL	27987	2.33%	1.83%	1.20%	2.85%
Turnover	25837	0.97%	0.74%	0.39%	1.27%
Coverage	26794	10.08	8.00	4.00	15.00
IO	26795	67.3%	71.9%	51.4%	86.7%

PPN=1					
Variable	# of Obs	Mean	Median	P25	P75
Mktcap ($Mil)	10989	1621.3	153.8	48.3	619.4
Book-to-Market	10989	0.86	0.70	0.44	1.09
1-month Return	10988	0.94%	0.46%	-5.39%	6.39%
12-month Return	10989	13.29%	7.76%	-15.81%	33.19%
IVOL	10989	2.89%	2.16%	1.34%	3.69%
Turnover	10349	0.39%	0.19%	0.08%	0.45%
Coverage	9953	3.72	2.00	0.00	5.00
IO	9955	33.9%	27.6%	10.8%	52.5%

CRSP Sample					
Variable	# of Obs	Mean	Median	P25	P75
Mktcap ($Mil)		1696.7	224.5	56.5	943.7
Book-to-Market		1.63	0.64	0.35	1.06
1-month Return		1.07%	0.22%	-6.32%	7.13%
12-month Return		11.54%	4.29%	-19.75%	30.56%
IVOL		3.23%	2.47%	1.55%	4.03%
Turnover		0.48%	0.33%	0.14%	0.62%
Coverage		5.13	2.54	0.32	7.28
IO		39.8%	38.5%	14.8%	62.2%

Panel C: Insider-level Characteristics

All Insiders Universe			
	All trades	Purchase	Sell
# of unique insiders	155,838	81,696	113,386
total # of trades	1,340,861	392,991	947,870
Median # of trades per insider	3	2	3
Median # of shares per trade	9,600	5,000	10,000
Median value of shares per trade (US$)	136,800	37,125	228,210

Insider Silence Universe			
	PPN+SSN	PPN	SSN
# of unique insiders	33,235	8,931	25,601
total # of trades	736,099	213,576	593,697
Median # of trades per insider	12	9	13
Median # of shares per trade	10,000	7,000	10,000
Median value of shares per trade (US$)	190,331	70,400	247,480

Table 2: Distribution of Insider Sudden Silence by Year

This table shows the number of firm-months with insider sudden silence observations by each year. SSN (PPN) is a firm-month dummy variable equal to one if the firm has any insider who sells (purchases) consecutively on the same calendar month for the previous two years, but did not trade on the same month this year. PPN% (SSN%) represents the monthly total market capitalization of firms associated with insider silence measure PPN (SSN) as a percentage of the entire U.S stock market capitalization in that month.

Year	PPN	SSN	PPN%	SSN%	PPN%+SSN%
1988	10	0	0.02%	0.00%	0.02%
1989	11	0	0.03%	0.00%	0.03%
1990	17	0	0.04%	0.00%	0.04%
1991	64	0	0.18%	0.00%	0.18%
1992	51	1	0.34%	0.00%	0.34%
1993	0	9	0.00%	0.03%	0.03%
1994	14	24	0.01%	0.08%	0.09%
1995	25	34	0.05%	0.08%	0.12%
1996	34	52	0.14%	0.11%	0.25%
1997	138	179	0.29%	0.52%	0.81%
1998	665	1296	0.51%	3.39%	3.90%
1999	880	1404	0.51%	5.87%	6.39%
2000	1149	1156	0.54%	7.37%	7.91%
2001	1089	1173	0.71%	7.25%	7.95%
2002	784	1308	0.64%	5.18%	5.82%
2003	840	1527	0.95%	5.43%	6.38%
2004	617	1550	0.53%	4.84%	5.37%
2005	541	2125	0.45%	7.08%	7.53%
2006	651	2677	0.57%	8.88%	9.45%
2007	631	2623	0.34%	8.62%	8.96%
2008	646	2929	0.74%	9.05%	9.79%
2009	995	2018	0.40%	6.76%	7.17%
2010	931	1473	0.53%	5.88%	6.41%
2011	506	1410	0.47%	5.48%	5.95%
2012	503	1766	0.40%	6.59%	6.98%
2013	661	2036	0.67%	7.95%	8.63%

Table 3: Insider Silence and Firm Fundamentals

This table reports the regression results of quarterly ROA and cash flow (scaled by lagged total assets) on insider sudden silence dummy SSN and PPN in the previous quarter. In Columns 1 and 2, the dependent variable is return on assets (ROA), defined as income before extraordinary items over lagged total assets. In Columns 3 and 4, the dependent variable is operating cash flow, defined as cash flow from operations scaled by lagged total assets. SSN (PPN) is a firm-month dummy variable equal to one if the firm has any insider who sells (purchases) consecutively on the same calendar month for the previous two years, but did not trade on the same month this year. Standard errors are double clustered at firm and quarter level and we include industry and quarter fixed effect as indicated. The sample period runs from 1988 to 2013. 1%, 5%, and 10% statistical significance is indicated with ∗∗∗, ∗∗, and ∗, respectively.

	Return-on-Assets		Operating Cash Flow	
	(1)	(2)	(3)	(4)
SSN	0.0037***	0.0065***	0.0142***	0.0157***
	(4.08)	(7.10)	(5.56)	(7.15)
PPN	-0.0024**	0.0008	-0.0007	-0.0009
	(-1.99)	(0.52)	(-0.31)	(-0.40)
ROA (-1)	0.0767***	0.0688**		
	(2.61)	(2.52)		
ROA (-4)	0.0365**	0.0335**		
	(2.51)	(2.44)		
CF (-1)			0.1708***	0.1611***
			(3.17)	(2.95)
CF (-4)			0.1238***	0.1133***
			(3.44)	(3.30)
Accural	-0.0005	-0.0005	0.0029	0.0028
	(-0.41)	(-0.44)	(0.14)	(0.14)
Asset growth	-0.0000	-0.0000	0.0002	0.0002
	(-0.48)	(-0.52)	(0.13)	(0.13)
Negroe	-0.0413***	-0.0385***	-0.0573***	-0.0561***
	(-16.12)	(-17.46)	(-6.29)	(-6.55)
Div	0.0573***	0.0649***	0.1392***	0.1606***
	(4.26)	(4.22)	(2.92)	(3.08)
Ndiv	-0.0083***	-0.0079***	-0.0122***	-0.0127***
	(-10.89)	(-9.96)	(-5.94)	(-5.99)
Fixed effect	No	Industry/Quarter	No	Industry/Quarter
Ave.R-sq	0.071	0.081	0.287	0.319
N.of Obs.	274728	264779	248011	239005

Table 4: Fama-MacBeth Regression

This table reports the Fama-Macbeth regressions of returns on firm-month dummies SSN (sudden silence following consecutive sell) and PPN (sudden silence following consecutive purchases) in the prior month, over 1988 to 2013 sample period. The dependent variable is future 1st month, future 2nd month, future 3rd month, future cumulative three months, future cumulative 6 months, and future cumulative 12 months returns. SSN is a dummy variable that equal to one if the firm has any insider who sells consecutively on the same calendar month for the previous two years, but did not trade on the last month. Similarly, PPN is a dummy variable equal to one if the firm has any insider who purchases consecutively on the same month for the previous two years, but did not trade on the last month. LnSize and LnBM are the natural logarithms of the firm market capitalization and book-to-market ratio. Past Month (Year) returns are the return of the given firm over the prior month (year, excluding the prior month t-1). *T*-statistics are Newey-West adjusted, and are shown below the estimates in parentheses; 1%, 5%, and 10% statistical significance is indicated with ∗∗∗, ∗∗, and ∗, respectively.

	1st month	2nd month	3rd month	Cumulative 3 months	Cumulative 6 months	Cumulative 12 months
Ret1	-3.047	-0.515	0.574	-3.051	-2.972	0.830
	(-7.05)***	(-1.46)	(1.75)*	(-4.81)***	(-3.37)***	(0.69)
Mom	0.740	0.603	0.358	1.674	2.108	0.310
	(4.42)***	(3.82)***	(2.33)**	(3.84)***	(2.41)**	(0.21)
Price	0.000	0.000	0.000	0.000	0.000	0.001
	(1.00)	(1.55)	(1.62)	(1.75)*	(1.93)*	(1.81)*
LnSize	0.005	-0.003	0.000	0.006	-0.039	-0.22
	(0.12)	(-0.05)	(0.01)	(0.04)	(-0.17)	(-0.53)
LnBM	0.435	0.428	0.390	1.247	2.238	3.491
	(4.58)***	(4.40)***	(3.79)***	(4.34)***	(4.08)***	(3.21)***
SSN	0.210	0.375	0.248	0.833	1.290	2.324
	(1.43)	(2.95)***	(2.11)**	(3.28)***	(3.20)***	(3.66)***
PPN	-0.145	-0.356	-0.238	-0.719	-1.044	-0.989
	(-0.62)	(-1.58)	(-1.09)	(-1.87)*	(-1.47)	(-0.81)
Intercept	1.170	1.154	1.182	3.472	7.21	15.425
	(3.08)***	(2.99)***	(2.99)***	(2.86)***	(3.11)***	(3.54)***
N	1,430,380	1,422,708	1,414,564	1,430,499	1,430,537	1,430,568

Table 5: Portfolio Returns based on Insider Sudden Silence

This table shows the monthly returns and factor-adjusted alphas (in %) to buy and sell portfolios that follow the insider sudden silence. Each month *j* from January 1988 to December 2013, portfolios are formed on preceding insider trading activity and hold for three months. Stocks in the SSN category in month t (those firms that have insiders sell on month t-12, t-24, but did not trade on month t) are held from month t+1 to t+i (i=3 in Panel A, and i=1, 3, 6 in Panel B), and similarly for "PPN". Portfolio returns are equal or value weighted across their constituent stocks. We focus on common stocks that are listed on NYSE/Amex/NASDAQ, and we exclude those stocks that have price less than $1. The overall portfolio return for month *j* is the equal-weighted average month-*j* returns of the strategy implemented in the prior month and strategies formed up to *three* months earlier. Columns "SSN-PPN" in Panel A shows the return to a long/short portfolio that long in stocks with "SSN" and short in stocks with "PPN". Panel B focuses on the return spread of "SSN-PPN" portfolios across different holding windows. 1%, 5%, and 10% statistical significance is indicated with ∗∗∗, ∗∗, and ∗, respectively.

Panel A: Equal Weighted Portfolios Returns for 3 Months Holding Horizon, 1988-2013

	PPN	SSN	SSN-PPN
Raw Return	0.821	1.276	0.455
t-stat	(2.48)**	(3.05)***	(1.65)*
Carhart Alpha	-0.072	0.437	0.509
t-stat	(-0.38)	(2.70)***	(2.19)**
DGTW-Adj.Return	-0.375	0.263	0.638
t-stat	(-1.89)*	(1.72)*	(2.59)***

Panel B: SSN-PPN portfolio for Different Holding Horizons, 1988-2013

	EW			VW		
	1 m	3 m	6 m	1 m	3 m	6 m
Raw Return	0.499	0.455	0.316	0.159	0.365	0.046
	(1.32)	(1.65)*	(1.30)	(0.34)	(1.09)	(0.17)
Carhart Alpha	0.582	0.509	0.368	0.400	0.564	0.122
	(1.67)*	(2.19)**	(1.93)*	(0.93)	(2.13)**	(0.58)
DGTW Adj.	0.777	0.638	0.481	0.284	0.292	0.01
	(2.19)**	(2.59)***	(2.22)**	(0.68)	(1.12)	(0.04)

Table 6: Insider Sudden Silence and Earnings Announcement Return

This table shows the regression results of three-day cumulative abnormal return (in %) around quarterly earnings announcement on insider sudden silence dummy SSN and PPN in the previous quarter. SSN (PPN) is a dummy variable that equals one if in the quarter prior to the earnings announcement, there is any insider of the firm that has a sudden silence following consecutive two year selling (buying) behavior. In Columns 1 and 2, abnormal return is calculated as daily stock return minus return on the CRSP value-weighted portfolio. In Columns 3 and 4, abnormal return is calculated as daily stock return minus the DGTW matched portfolio return. Standard errors are double clustered at firm and quarter level and we include industry and quarter fixed effect as indicated. The sample period runs from 1988 to 2013. 1%, 5%, and 10% statistical significance is indicated with ***, **, and *, respectively.

	Mkt-adjusted CAR(-1,+1)		DGTW-adjusted CAR(-1,+1)	
	(1)	(2)	(3)	(4)
SSN	0.2219***	0.2216***	0.2012***	0.1847**
	(2.78)	(2.72)	(2.61)	(2.24)
PPN	-0.0541	-0.0498	-0.0940	-0.0842
	(-0.56)	(-0.58)	(-0.89)	(-0.86)
Lagged CAR	2.2089***	2.1787***	2.3496***	2.3771***
	(8.55)	(8.13)	(7.13)	(6.93)
LnSize	0.0119	0.0290**	-0.0574***	-0.0487***
	(0.99)	(2.36)	(-4.91)	(-3.91)
LnBM	0.2511***	0.2702***	0.2541***	0.2756***
	(7.93)	(9.77)	(8.93)	(11.30)
Past month return	-0.1566	-0.3726**	-0.5082***	-0.6838***
	(-0.81)	(-2.14)	(-2.85)	(-3.98)
Past year return	0.0568	0.0555	0.0328	0.0062
	(1.25)	(1.43)	(0.80)	(0.16)
Fixed effect	No	Industry/Quarter	No	Industry/Quarter
Ave.R-sq	0.001	0.004	0.002	0.003
N.of Obs.	387911	377287	387911	377287

Table 7: Conditional Results on the Length of Delay

This table shows the length of delay of insider sudden silence (SSN, PPN) at the individual insider level. Each month from 1988 to 2013, we define insider silence based on previous two years' consecutive same month insider trading. The sample in this table includes only insiders firm monthly observations with SSN and PPN, and we look into the number of month gaps and abnormal return between insider's sudden silence month (formation month) and their next trading month (next trade month). Panel A shows the mean and median distributions for the number of months delayed for trading. Panel B shows the average monthly excess return adjusted by size and B/M from the month following the silence month to month before their next trading month, insider's next trading month, and from the month following their next trading month to the 24 months after insider's sudden silence month.

		Panel A: # of Months Delayed				
TYPE	NOBS	Mean	Median	Q1	Q3	Std.
PPNP	8142	6.04	4	2	9	5.75
PPNS	2006	8.98	7	3	14	6.78
PPNN	9398					
SSNS	23162	6.51	5	2	9	5.64
SSNP	1377	8.40	7	3	12	6.16
SSNN	21642					

	Panel B: Average Size and BM Adjusted Monthly Excess Return				
TYPE	Formation to Next trade	Next trade	Next trade to End	Before - After	
PPNP	-0.81%	-0.07%	-0.39%	-0.41%	*(3.79***)*
PPNS	1.66%	2.33%	-0.24%	1.89%	*(6.75***)*
PPNN		-1.30% *(13.74***)*			
SSNS	1.26%	2.55%	0.28%	0.97%	*(17.69***)*
SSNP	-3.38%	-2.63%	0.44%	-3.89%	*(15.17***)*
SSNN		0.31% *(7.00***)*			

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Table 8: The Effect of Sarbanes-Oxley Act on the Information Content of Insider Silence

This table reports the effect of Sarbanes-Oxley Act on the predictability of insider silence for future firm profitability and returns. SSN (PPN) is a firm-month dummy variable equal to one if the firm has any insider who sells (purchases) consecutively on the same calendar month for the previous two years, but did not trade on the same month this year. We aggregate SSN and PPN to firm-quarter level in column (1) to (3). Post is a dummy equal to one for time period starting from the last quarter of 2002 and zero otherwise. We run panel regression and control for industry and quarter fixed effect from column (1) to (3) and cluster standard errors are firm and quarter level. We run Fama-Macbeth (1973) regression in column (4). Coefficients on control variables are omitted. 1%, 5%, and 10% statistical significance is indicated with ***, **, and *, respectively. The sample period is from 1988 to 2013.

	(1)	(2)	(3)	(4)
	ROA	Cash Flow	Earnings CAR (-1, +1)	Cum 3-month Return
SSN	0.0042***	0.0098***	0.1141	0.4416
	(3.48)	(2.98)	(0.67)	(0.58)
SSN*Post	0.0027**	0.0059*	0.1415	0.3652
	(2.34)	(1.71)	(0.74)	(0.41)
PPN	0.0042**	0.0034	0.1718	0.3424
	(2.05)	(1.16)	(1.55)	(0.39)
PPN*Post	-0.0081***	-0.0078*	-0.3554***	-2.5554**
	(-2.86)	(-1.80)	(-3.00)	(-2.51)
Fixed effect	Industry/Quarter	Industry/Quarter	Industry/Quarter	FM
Controls	Yes	Yes	Yes	Yes
Ave.R-sq	0.263	0.313	0.004	0.107
N.of Obs.	264487	239012	377287	1,430,499

Table 9: Predicting Change in Hedge Fund and Mutual Fund Holdings

This table shows the regression results of change in quarterly hedge fund and mutual fund holding (in %) on insider silence dummy SSN and PPN in the previous quarter. Hedge fund (Mutual fund) holding is the total shares held by hedge funds (mutual funds) at each quarter over shares outstanding. SSN (PPN) is a dummy variable equal to one if the firm has any insider who sells (purchases) consecutively on the same calendar month for the previous two years, but did not trade on the same month this year. Standard errors are double clustered at firm and quarter level. The sample runs from 1988 to 2013 for mutual fund sample and from 1991 to 2012 for hedge fund sample. 1%, 5%, and 10% statistical significance is indicated with ***, **, and *, respectively.

	Change in HF holding		Change in MF holding	
	(1)	(2)	(3)	(4)
SSN	0.0332**	0.0350**	-0.0796***	-0.1182***
	(2.36)	(2.50)	(-3.47)	(-4.17)
PPN	-0.0300*	-0.0191	0.0209	0.0295
	(-1.79)	(-0.94)	(0.80)	(0.99)
LnSize	0.0060***	-0.0039	0.0274***	-0.0232
	(8.03)	(-0.58)	(23.74)	(-1.32)
LnBM	0.0034	0.0142***	-0.0241***	-0.0416***
	(1.53)	(2.65)	(-6.95)	(-3.76)
Past month return	0.1182***	0.1078***	0.5656***	0.5424***
	(7.43)	(4.23)	(23.11)	(9.48)
Past year return	-0.0000	-0.0048	0.2707***	0.2614***
	(-0.01)	(-0.82)	(22.37)	(9.24)
Fixed Effect	Quarter	Firm and Quarter	Quarter	Firm and Quarter
Ave.R-sq	0.013	0.034	0.026	0.049
N.of Obs.	394709	394382	465792	465380

Table 10: Insider Silence and Analyst Reactions

This table shows the regression results of analyst EPS forecast revision (scaled by book value per share) (in %) and recommendation CAR (-1, +1) on insider silence dummy SSN and PPN in the previous quarter. In Columns 1 and 2, the dependent variable is the quarterly change in analysts' consensus forecast on annual EPS scaled by book value per share in the end of last fiscal year. In Columns 3 and 4, the dependent variable is 3-day CAR around analyst recommendation change. SSN (PPN) is a dummy variable equal to one if the firm has any insider who sells (purchases) consecutively on the same calendar month for the previous two years, but did not trade on the same month this year. Standard errors are double clustered at firm and quarter level. The sample runs from 1988 to 2013 for EPS forecast revision and from 1993 to 2013 for recommendation CAR. 1%, 5%, and 10% statistical significance is indicated with ***, **, and *, respectively.

	EPS forecast revision		Recommendation CAR	
	(1)	(2)	(3)	(4)
SSN	0.2775***	0.1551***	0.1410***	0.1045*
	(5.93)	(3.93)	(2.62)	(1.99)
PPN	-0.0246	-0.2100**	-0.0493	-0.0694
	(-0.25)	(-2.33)	(-0.40)	(-0.58)
Frev (-1)	0.0288*	0.0277*		
	(1.82)	(1.74)		
LnSize	0.2630***	0.2502***	-0.0671***	-0.7009***
	(20.53)	(17.42)	(-3.69)	(-11.36)
LnBM	0.7181***	0.7389***	0.1469***	0.1068**
	(14.38)	(15.31)	(3.66)	(2.63)
Past month return	1.6596***	1.8420***	-0.0345	-0.9282***
	(7.08)	(6.89)	(-0.13)	(-3.49)
Past year return	0.2696***	0.2949***	0.2599***	0.1245*
	(5.92)	(5.55)	(4.78)	(1.90)
Fixed effect	No	Ind&Qtr	No	Ind&Qtr
Ave.R-sq	0.024	0.035	0.001	0.060
N.of Obs.	322182	318708	253773	252906

Table 11: Heterogeneity in Firms' Information Environment and Limits to Arbitrage

This table reports the subsample Fama-Macbeth regressions of returns on indicators of SSN and PPN in the prior month, over our 1988 to 2013 sample period. We sort all the firms into two groups each year based on the June market capitalization, idiosyncratic volatility, residual institutional ownership, and analyst coverage. The idiosyncratic volatility is estimated using the weekly stock return (Wed. to Wed.) in the past year. The residual institutional ownership is institutional ownership orthogonalized w.r.t. to firm size. The analyst coverage is the number of analysts covering the firm for the last fiscal year. The dependent variable is cumulative three, six, and twelve months ahead returns. SSN (PPN) is a dummy variable equal to one if the firm has any insider who sells (purchases) consecutively on the same month for the previous two years, but did not trade on the last month. Size and BM are the natural logarithms of the firm characteristics market equity and book-to-market. Past Month (Year) Returns are the return of the given firm over the prior month (year, excluding the prior month). *T*-statistics are Newey-West (1987) adjusted, and are shown below the estimates in parentheses; 1%, 5%, and 10% statistical significance is indicated with ∗∗∗, ∗∗, and ∗, respectively.

Panel A: Insider silence and Firms' Information Environment

		Cumulative 3 months		Cumulative 6 months		Cumulative 12 months	
		Var. < median	Var. > median	Var. < median	Var. > median	Var. < median	Var. > median
IOR	SSN	0.803	0.776	1.748	0.893	3.120	1.584
		(2.18)**	(2.88)***	(3.75)***	(1.83)*	(3.85)***	(2.48)**
	PPN	-0.956	-0.809	-1.148	-1.541	-1.200	-1.965
		(2.24)**	(1.60)	(1.52)	(1.67)*	(0.97)	(1.26)
Coverage	SSN	1.130	0.806	2.054	0.800	2.172	2.516
		(2.34)**	(2.54)**	(3.27)***	(1.55)	(2.59)***	(2.68)***
	PPN	-0.578	0.078	-0.696	0.542	-1.114	-0.204
		(1.18)	(0.17)	(0.85)	(0.73)	(0.88)	(0.16)

Panel B: Insider silence and Limits to Arbitrage

		Cumulative 3 months		Cumulative 6 months		Cumulative 12 months	
		Var. < median	Var. > median	Var. < median	Var. > median	Var. < median	Var. > median
Market cap	SSN	0.664	0.806	1.289	1.215	2.170	1.898
		(2.01)**	(3.29)***	(2.30)**	(2.97)***	(2.59)**	(2.59)**
	PPN	-0.693	-0.312	-1.451	0.018	-1.171	0.072
		(1.57)	(0.73)	(2.00)**	(0.03)	(0.94)	(0.07)
Volatility	SSN	0.257	1.595	0.552	1.975	0.857	3.308
		(1.33)	(3.87)***	(2.36)**	(3.17)***	(2.32)**	(2.88)***
	PPN	-0.287	-1.076	-0.546	-1.476	-1.044	-0.481
		(0.85)	(1.75)*	(0.85)	(1.56)	(1.17)	(0.29)

Table 12: Robustness Tests

This table reports Fama-Macbeth regression of future stock returns on insider silence measure under different specifications. The dependent variable is future 1st month, future 2nd month, future 3rd month, future cumulative three months, future cumulative 6 months, and future cumulative 12 months returns. Panel A reports the results for the more recent sample period from 1997 to 2013. Panel B reports the results when insider silence is defined using 3 consecutive years of trades. SSSN (PPPN) is a dummy variable equal to one if the firm has any insider who sells (purchases) consecutively on the same calendar month for the previous three years, but did not trade on the same month this year. Panel C displays the results in which our silence measure is directly defined at the firm level, where we aggregate the all insiders' shares first each month, and then define silence following the previous construction method. *T*-statistics are Newey-West adjusted, and are shown below the estimates in parentheses; 1%, 5%, and 10% statistical significance is indicated with ∗∗∗, ∗∗, and ∗, respectively.

Panel A: Using More Recent Period 1997-2013

	1st month	2nd month	3rd month	Cum 3 months	Cum 6 months	Cum 12 months
SSN	0.219	0.390	0.457	1.065	2.057	3.190
	(1.74)*	(2.69)***	(3.35)***	(3.67)***	(4.49)***	(3.72)***
PPN	-0.300	-0.270	-0.426	-0.983	-1.644	-2.344
	(-1.39)	(-1.43)	(-1.95)*	(-2.03)**	(-1.81)*	(-1.55)

Panel B: Insider Silence Defined Using 3 Consecutive Years of Trades

	1st month	2nd month	3rd month	Cum 3 months	Cum 6 months	Cum 12 months
SSSN	0.429	0.344	0.568	1.323	2.459	4.065
	(1.97)**	(1.32)	(2.20)**	(2.79)***	(3.00)***	(2.93)***
PPPN	-0.942	-0.611	0.067	-1.507	-1.411	-2.505
	(-2.64)***	(-1.55)	(0.18)	(-1.78)*	(-1.09)	(-1.07)

Panel C: Insider silence constructed at firm level

	1st month	2nd month	3rd month	Cum 3 months	Cum 6 months	Cum 12 months
SSN	0.100	0.180	0.311	0.585	1.027	1.728
	(0.91)	(1.29)	(2.51)**	(2.55)**	(2.68)***	(2.69)***
PPN	-0.391	-0.218	-0.221	-0.854	-1.229	-2.073
	(-1.82)*	(-1.07)	(-1.05)	(-1.71)*	(-1.42)	(-1.43)

Table 13: Alternative Explanations

This table rules out several alternative explanations. The dependent variable is future 1st month, future cumulative three months, future cumulative 6 months, and future cumulative 12 months returns. Panel A reports the coefficient estimates for SSN, PPN controlling for the opportunistic buy and opportunistic sell following Cohen et al. (2012) and the insider net purchase ratio (NPR) following Lakonishok and Lee (2001). Panel B shows the results controlling for the five well-known anomalies – net share issuance (NS), firm profitability (Y_B), momentum (already in the baseline regression), accruals (AcB) and asset growth (dA_A), following Fama and French (2008). Panel C report the results when we run panel regression with firm*year fixed effect.

Panel A: Controlling for Oppbuy, Oppsell and NPR

	1st month	Cum 3 months	Cum 6 months	Cum 12 months
SSN	0.210	0.855	1.256	2.182
	(1.42)	(3.38)***	(3.12)***	(3.70)***
PPN	-0.194	-0.844	-1.208	-1.270
	(-0.82)	(-2.23)**	(-1.74)*	(-1.06)
Oppbuy	0.917	1.263	1.300	1.819
	(4.83)***	(3.88)***	(2.89)***	(2.43)**
Oppsell	-0.148	-0.223	-0.215	0.411
	(-1.31)	(-1.04)	(-0.54)	(0.67)
NPR	0.217	0.467	0.616	0.631
	(3.64)***	(3.01)***	(2.38)**	(1.15)

Panel B: Controlling for Five Anomalies in Fama and French (2008)

	1st month	Cum 3 months	Cum 6 months	Cum 12 months
SSN	0.154	0.736	0.958	1.659
	(1.06)	(2.98)***	(2.56)**	(3.27)***
PPN	-0.170	-1.021	-1.854	-2.218
	(-0.67)	(-2.38)**	(-2.08)**	(-1.66)*

Panel C: Panel Regression with Firm*Year fixed effect

	1st month	Cum 3 months	Cum 6 months	Cum 12 months
SSN	0.356	1.146	1.684	1.547
	(1.72)*	(2.91)***	(2.73)***	(1.76)*
PPN	0.221	-0.423	-0.479	0.009
	(0.94)	(-0.90)	(-0.73)	(0.01)

Appendix Table A1: Calendar-time Portfolio Results – Insider Silence Defined Using 3 Consecutive Years of Trades

Each month *j* from January 1998 to December 2013, portfolios are formed on preceding insider trading activity and hold for i (i=1, 3, 6) months. Stocks in the SSSN category in month t (those firms that have insiders sell on month t-12, t-24, t-36, but did not trade on month t) are held from month t+1 to t+i (i=3 in Panel A, and i=1, 3, 6 in Panel B), and similarly for "PPPN" portfolio. Portfolio returns are equal or value weighted across their constituent stocks. We focus on common stocks that are listed on NYSE/Amex/NASDAQ, and we exclude those stocks that have price less than $1. The overall portfolio return for month *j* is the equal-weight average month-*j* returns of the strategy implemented in the prior month and strategies formed up to *three* months earlier in Panel A. The table shows the raw returns and standard deviations, with their Carhart 4-factor alpha, and DGTW adjusted excess returns. Columns "PPPN-SSSN" in Panel A shows the equal weighted portfolio return spread between the "SSSN" and "PPPN" portfolios. Panel B reports the "SSSN-PPPN" portfolio return across different holding windows. 1%, 5%, and 10% statistical significance is indicated with ***, **, and *, respectively.

Panel A: Equal Weighted Portfolios Returns for 3 Months Holding Window, 1998-2013

	PPPN	SSSN	SSSN-PPPN
Raw Return	0.491	1.175	0.684
t-stat	(1.26)	(2.34)**	(1.66)*
Carhart Alpha	-0.258	0.608	0.866
t-stat	(-0.93)	(3.15)***	(2.61)***
DGTW-Adj.Return	-0.559	0.404	0.963
t-stat	(1.83)*	(2.28)**	(2.52)***

Panel B: SSSN-PPPN portfolio for Different Holding Window, 1998-2013

	EW			VW		
	1 m	3 m	6 m	1 m	3 m	6 m
Raw Return	0.856	0.684	0.416	-0.1147	0.191	-0.157
	(1.69)*	(1.66)*	(1.07)	(0.20)	(0.42)	(0.38)
Carhart Alpha	0.913	0.866	0.558	0.06	0.465	0.017
	(2.15)**	(2.61)***	(1.76)*	(0.12)	(1.23)	(0.05)
DGTW Adj.	1.307	0.963	0.574	0.107	0.175	-0.04
	(2.70)**	(2.52)***	(1.64)*	(0.20)	(0.45)	(0.11)

Appendix Table A2: Fama-Macbeth Regression for Subsamples based on Firm-level Litigation Risks

This table reports the Fama-Macbeth (1973) regressions of returns on dummies indicating insider silence month following consecutive trades, over our 1988 to 2013 sample period. The dependent variables are cumulative future 3, 6, and 12 months returns. SSN (PPN) is a dummy variable equal to one if the firm has any insider who sells (purchases) consecutively on the same calendar month for the previous two years, but did not trade on the same month this year. LnSize and LnBM are the natural logarithms of the firm market capitalization and book-to-market ratio. Past Month (Year) Returns are the return over the prior month (year, excluding the prior month). We run the Fama-Macbeth regression separately for subsamples based on firm litigation risk measure following Kim and Skinner (2012). *T*-statistics are Newey-West (1987) adjusted, and are shown below the estimates in parentheses; 1%, 5%, and 10% statistical significance is indicated with ∗∗∗, ∗∗, and ∗, respectively.

	Cumulative 3 months		Cumulative 6 months		Cumulative 12 months	
KS Measure	high	low	high	low	high	low
Ret1	-3.155	-4.180	-2.629	-4.549	1.129	-0.551
	(-4.93)***	(-7.04)***	(-2.89)***	(-5.01)***	(0.90)	(-0.45)
Mom	1.081	2.549	1.103	3.597	-0.586	2.468
	(2.62)***	(5.79)***	(1.32)	(4.06)***	(-0.40)	(1.63)
Price	0.008	-0.002	0.018	-0.002	0.025	-0.005
	(1.89)*	(-0.43)	(2.09)**	(-0.25)	(2.12)**	(-0.37)
LnSize	-0.194	0.025	-0.394	-0.055	-0.652	-0.352
	(-1.18)	(0.22)	(-1.33)	(-0.26)	(-1.26)	(-0.90)
LnBM	1.166	1.018	2.125	1.763	3.479	2.752
	(3.63)***	(5.45)***	(3.48)***	(4.78)***	(2.93)***	(3.60)***
SSN	1.125	0.050	1.64	0.492	2.927	1.049
	(3.60)***	(0.20)	(3.65)***	(1.12)	(3.41)***	(2.25)**
PPN	-1.195	-0.506	-2.213	-0.662	-2.372	-0.990
	(-2.05)**	(-1.35)	(-2.29)**	(-1.19)	(-1.37)	(-1.13)
Intercept	4.735	3.181	9.529	6.89	18.511	15.413
	(2.72)***	(3.14)***	(3.01)***	(3.38)***	(3.37)***	(3.80)***
R2	0.04	0.03	0.04	0.03	0.04	0.03
N	661,078	660,973	661,101	660,983	661,119	660,992

Appendix Table A3: Fama-MacBeth Regression – Insider Silence with Differential Seniority

This table reports the Fama-Macbeth (1973) regressions of returns on dummies indicating insider silence month following consecutive trades, over our 1988 to 2013 sample period. The dependent variable is future 1st month, 3rd month, cumulative 3, 6, and 12 months returns. SSN _Top (PPN_Top) is a dummy variable equal to one if the firm has at least one senior-level insider who sells (purchases) consecutively on the same calendar month for the previous two years, but did not trade on the same month this year. SSN_Low (PPN_Low) is a dummy variable equal to one if the firm has low-level insider who sells (purchases) consecutively on the same calendar month for the previous two years, but did not trade on the same month this year. LnSize and LnBM are the natural logarithms of the firm market capitalization and book-to-market ratio. Past Month (Year) Returns are the return over the prior month (year, excluding the prior month). *T*-statistics are Newey-West (1987) adjusted, and are shown below the estimates in parentheses; 1%, 5%, and 10% statistical significance is indicated with ∗∗∗, ∗∗, and ∗, respectively.

	1st month	Cum 3 month	Cum 6 month	Cum 12 month
Ret1	-3.049	-3.058	-2.981	0.824
	(7.05)***	(4.83)***	(3.39)***	-0.68
Mom	0.74	1.676	2.112	0.318
	(4.42)***	(3.84)***	(2.42)**	(0.22)
Price	0.000	0.000	0.000	0.001
	-1.00	(1.75)*	(1.93)*	(1.81)*
Lnsize	0.006	0.004	-0.042	-0.225
	(0.12)	(0.03)	(-0.18)	(-0.54)
LnBM	0.435	1.249	2.244	3.502
	(4.59)***	(4.35)***	(4.09)***	(3.23)***
SSN_Top	0.218	1.138	2.163	3.655
	(1.12)	(2.64)***	(3.79)***	(3.75)***
SSN_Low	0.131	0.630	0.873	1.895
	(0.90)	(2.51)**	(2.26)**	(3.19)***
PPN_Top	-0.366	-0.782	-1.716	-3.472
	(-1.47)	(-1.73)*	(-1.86)*	(-2.69)***
PPN_Low	-0.195	-0.631	-0.686	-0.953
	(-1.20)	(-1.73)*	(-1.08)	(-0.84)
Intercept	1.171	3.480	7.226	15.460
	(3.08)***	(2.86)***	(3.12)***	(3.55)***
R2	0.03	0.03	0.03	0.03
N	1,430,380	1,430,499	1,430,537	1,430,568

Appendix Table A4: Fama-MacBeth Regression – Multiple Insider Silence within Firm-Month

This table reports the Fama-Macbeth (1973) regressions of returns on dummies indicating insider silence month following consecutive trades, over our 1988 to 2013 sample period. The dependent variable is future 1st month, 2nd month, 3rd month, cumulative 3, 6, and 12 months returns. SSN (PPN) is a dummy variable equal to one if the firm has at least one insider who sells (purchases) consecutively on the same calendar month for the previous two years, but did not trade on the same month this year. MSSN (MPPN) is a dummy variable equal to one if the firm has more than one insider who sells (purchases) consecutively on the same calendar month for the previous two years, but did not trade on the same month this year. LnSize and LnBM are the natural logarithms of the firm market capitalization and book-to-market ratio. Past Month (Year) Returns are the return over the prior month (year, excluding the prior month). *T*-statistics are Newey-West (1987) adjusted, and are shown below the estimates in parentheses; 1%, 5%, and 10% statistical significance is indicated with ∗∗∗, ∗∗, and ∗, respectively.

	1st month	Cumulative 3 months	Cumulative 6 months	Cumulative 12 months
Ret1	-3.048	-3.051	-2.974	0.825
	(7.05)***	(4.81)***	(3.38)***	(0.69)
Mom	0.740	1.675	2.109	0.313
	(4.42)***	(3.84)***	(2.42)**	(0.22)
Price	0.000	0.000	0.000	0.001
	(1.00)	(1.75)*	(1.93)*	(1.81)*
LnSize	0.006	0.006	-0.040	-0.221
	(0.12)	(0.04)	(0.17)	(0.53)
LnBM	0.435	1.247	2.239	3.495
	(4.58)***	(4.34)***	(4.08)***	(3.22)***
SSN	0.223	0.802	1.182	2.038
	(1.44)	(3.13)***	(2.92)***	(3.50)***
PPN	-0.069	-0.488	-0.929	-0.737
	(0.28)	(1.15)	(1.30)	(0.58)
MSSN	-0.066	0.079	0.516	1.420
	(0.31)	(0.24)	(1.18)	(1.57)
MPPN	-0.311	-0.610	-0.419	-1.934
	(1.10)	(1.27)	(0.57)	(1.93)*
Intercept	1.169	3.473	7.212	15.434
	(3.07)***	(2.85)***	(3.11)***	(3.54)***
R^2	0.03	0.03	0.03	0.03
N	1,430,380	1,430,499	1,430,537	1,430,568