What insiders know about future earnings and how they use it: evidence from insider trades

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Abstract

This paper provides evidence that insiders possess, and trade upon, knowledge of specific and economically-significant forthcoming accounting disclosures as long as two years prior to the disclosure. Stock sales by insiders increase three to nine quarters prior to a break in a string of consecutive increases in quarterly earnings. Insider stock sales are greater for growth firms, before a longer period of declining earnings, and when the earnings decline at the break is greater. Consistent with avoiding an established legal jeopardy, there is little abnormal selling in the two quarters immediately prior to the break.

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1. Introduction

A robust result of the literature on insider trading is that insiders subject to the filing requirements of section 16 of the U.S. Securities and Exchange Act of 1934 earn abnormal stock returns on their trades.[1] The fact that abnormal stock returns follow insider trades indicates that insiders possess private information that is not impounded in stock price at the time they trade, but does not identify the nature of insiders' informational advantage. There is relatively little evidence linking these trades to particular types of private information. In this study, we test whether insiders' trades are consistent with foreknowledge of future earnings by examining insiders' trading over a period of consecutive earnings increases.

Define a sequence of consecutive quarters in which quarterly earnings are increasing as a "string." Earnings increases and decreases are measured relative to the same quarter of the previous year. Thus, a string ends when earnings in the current quarter are less than earnings for the same quarter of the previous year. We refer to the event that ends a string as a "break." Barth, Elliott, and Finn (1999) and DeAngelo, DeAngelo, and Skinner (1996) show that breaks are associated with economically- and statistically-significant stock price drops. Insiders therefore have an incentive to sell stock in advance of breaks. Prior research suggests that the stock price drop associated with a break is greater for growth firms, when the break follows a longer string, and when the earnings decline at the break is greater. In turn, this suggests

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[1] Insiders routinely trade in the stock of the company with which they are affiliated. While some insider trades are due to insiders' liquidity needs and portfolio rebalancing objectives, a component of insider trades is driven by insiders' informational advantage over other market participants. This advantage has been demonstrated in several studies that find significant abnormal stock returns following insider trades. For example, see Jaffe (1974), Finnerty (1976), Seyhun (1986), Rozeff and Zaman (1988), Lin and Howe (1990), and Lakonishok and Lee (2001). The evidence is consistent with insiders selling stock when it is overvalued and buying stock when it is undervalued. Seyhun (1992) presents compelling evidence that such trades are legal, widespread, increasing in volume, and yield abnormal returns.

insiders' incentives to sell stock before a break are higher in such cases. Further, if insiders can distinguish among breaks according to the length of the period of declining earnings that follows (which we call the length of the break), then there may be more selling prior to longer breaks. Accordingly, we investigate the trading behavior of insiders in the quarters preceding a break and how this behavior varies according to whether the firm is growth or value, the length of the string, the magnitude of the earnings decline, and the length of the break.

We find an increase in the frequency of net insider sales in the ninth through third quarters before the break for our sample firms. This selling pattern is stronger for firm-quarters drawn from growth firms that precede a longer break or a greater earnings decline at the break. Remarkably, we find little unusual insider transactions in the two quarters immediately preceding the announcement of a break. Not trading immediately before the break may reflect insiders' desire to avoid the appearance of exploiting inside information and the associated costs stemming from adverse publicity or litigation.

Despite the constraints that limit insider trade, we find that the typical insider who sells in the quarters prior to an earnings break avoids a loss he would suffer were he to postpone the sale until after the announcement of the break. Specifically, for firms with insiders that sell prior to a break, median buy-and-hold abnormal returns measured from the time insiders trade until the break are negative for quarters -8 to -1 relative to the break. Moreover, the abnormal returns following firm-quarters where insiders sell are significantly lower than the abnormal returns following firm-quarters where insiders buy.

This study improves our understanding of the specific nature of the private information that insiders possess, and the use insiders make of that information. It offers strong evidence that insiders anticipate earnings trends up to two years in the future and trade to profit from this

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information. Further, the evidence points to interactions between legal constraints on trade and

the timing of insider trades.[2] These findings should be of interest to regulators who build models

to identify situations that arouse the suspicion of improper trade, and market analysts who seek

to infer price relevant information from insiders' trades. Further, the potential link between legal

jeopardies and the timing of insider trade may interest jurists studying how individuals' actions

change in response to statute, case law, and regulation. For future research on the association

between insider trades and accounting disclosure, this study suggests that the window of time

during which insider trading takes place may extend much earlier than the few months prior to

the disclosure considered in some previous studies. In addition, the finding that insider

purchases are more informative than insider sales (e.g., Seyhun, 1998) may be related to our

finding that insider sales prompted by earnings breaks precede the break by nine months to two

years. To the extent that insider purchases occur closer to the time good news is disclosed, the

difference in the informativeness of purchases and sales may be related to the window over

which trades are examined.

The remainder of this paper is organized as follows. In the next section, we relate

previous research on insider trading and accounting earnings to this study. In section 3, we

describe the data. Section 4 describes our empirical methods and results. Section 5 concludes the

paper.

2. Related literature and predictions

Insider trade has previously been linked to management's foreknowledge of corporate

events, including bankruptcy (Seyhun and Bradley, 1997), dividend initiations (John and Lang,

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[2] We limit ourselves to consideration only of legal, publicly-disclosed insider trades rather than illegal insider trading considered by Meulbroek (1992).

1991), seasoned equity offerings (Karpoff and Lee, 1991), stock repurchases (Lee, Mikkelson and Partch, 1992), and takeover bids (Seyhun, 1990). Taken together, these studies suggest insiders know of forthcoming price-relevant events months and even years before public disclosure of these events. Furthermore, abnormal trade by insiders generally is found to concentrate in the two quarters prior to the disclosure.

In contrast, studies of the relationship between insider trading and subsequent earnings disclosures generally find either no or inconsistent evidence that insider trading is associated with subsequently-disclosed accounting earnings. Elliott, Morse, and Richardson (1984) analyze trading behavior in the twelve months before large unexpected changes in annual earnings.[3] They find less selling by insiders before both good news and bad news earnings disclosures. As a result, they do not draw conclusions on whether insiders use their knowledge of future earnings in their trading decisions. Givoly and Palmon (1985) analyze trading behavior around 1,427 corporate events reported by the *Wall Street Journal*. Earnings announcements make up approximately 60% of the total events in their sample. In the four to five months before the event announcement, they find no tendency for insiders to purchase stock prior to good news or to sell stock prior to bad news. Sivakumar and Waymire (1994) consider trading activity in the quarter preceding an earnings announcement, although the focus of their study is on trading after quarterly earnings announcements. They find that trading by insiders within one quarter is not correlated with errors in analysts' forecasts of next quarter's earnings. Noe (1999) builds on previous research by Penman (1982) examining insider trading and management earnings forecasts. Noe finds that increases in insider trade in the twenty days prior to disclosure are not correlated with management earnings forecast errors. In summary, these studies find little, if any, association between insider trade and the next earnings announcement, raising the puzzling

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question: Why does insider trading before earnings announcements differ from the general pattern observed before other corporate events?

One explanation may be that insiders who trade to profit from information about a forthcoming earnings announcement face specific legal jeopardizes that do not apply to other kinds of information. These jeopardies evolve over time as statutory provisions change and case law accumulates. The SEC has successfully prosecuted insiders for trades in advance of an earnings announcement in violation of the antifraud provisions of the Securities and Exchange Act of 1934, especially section 10(b). This provision is relatively easy to apply to a corporate insider who secretly trades in his own company's stock while in possession of advance knowledge of a forthcoming earnings disclosure.[4] In 1984 and in 1988, Congress adopted laws that made it easier to prosecute and penalize improper insider trading: the Insider Trading Sanctions Act of 1984 imposed penalties equal to three times the amount of insider profits, raised criminal penalties, and imposed jail sentences; the Insider Trading and Securities Fraud Enforcement Act of 1988 (ITSFEA) created a bounty program for informants, held top management responsible for employees' illegal trading, and raised criminal penalties. Consistent with the notion that passage of these laws constrains insider trade, Garfinkel (1997) reports that trades by insiders in the 30 days prior to an earnings announcement are less frequent after the passage of ITSFEA than before.

Admittedly, the number of insider trading cases related to foreknowledge of earnings information is small: a review of the SEC's Annual Reports to Congress from 1983 to 1993 indicates that the SEC brought 334 insider trading cases, or an average of 30 per year. Moreover, these actions mainly are against employees, brokers and related persons who traded in

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[3]They also consider large dividend changes, bond rating changes, mergers, and bankruptcies.
[4] A relevant case in this area is SEC v. Lipson, No. 97-CV-2661, 129 F. Supp. 2d 1148.

the context of a corporate restructuring.[5] However, even a small risk of a large penalty may

deter insiders from trading before the release of bad news. Consistent with this view, legal

advice that corporate policy should (i) confine insider trades to a period of time after the release

of quarterly earnings, (ii) prohibit insider trades if management is aware that disappointing news

may be forthcoming, and (iii) require corporate counsel to review and approve proposed trades

by senior executives to ensure the executives are not trading when the company is in possession

of undisclosed material inside information, is widespread.[6] Moreover, insiders' legal exposure is

not limited to SEC enforcement actions. Civil suits seeking damages also are a factor. One

widely-quoted industry observer describes a surge in shareholder class-action suits filed in the

wake of insider selling ahead of bad news.[7] Likewise, Grundfest and Perino (1997) report that

allegations of accounting irregularities and insider trading underlie the lion's share of federal

securities law class-action litigation.

It is thus possible that U.S. law has had the effect of discouraging insiders from trading

on foreknowledge of the next earnings announcement, particularly if the news in that

announcement is bad.[8] An interesting question then is whether insiders do not trade on the basis

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[5] Daniel Beneish furnished this analysis.

[6] Bettis, Coles, and Lemmon (2000) and Roulstone (2001) describe trading and corporate policies restricting trading by insiders.

[7] See Bob Gabele, "The Inside Story: Increased scrutiny makes interpreting their trades tougher," Barron's (April 6, 1998). Recent examples are the suits filed by law firms seeking class-action status on behalf of Cisco and Enron investors in complaints alleging that top executives misled investors over periods during which the companies reported consecutive earnings increases and insiders sold stock. In such periods, Cisco executives received $595 million from selling Cisco stock while Enron insiders received more than $1 billion. See Dan Goodin, "Holder Suit Alleges Cisco Violated Securities Laws," *The Wall Street Journal* (April 20, 2001); the class action complaint in the matter of Amalgamated Bank et al. vs. Kenneth L. Lay et al. in the United States District Court for the Southern District of Texas, Houston Division (Civil Action No. H 01-4198); and, the Business Wire press release dated April 24, 2001 by Stull, Stull & Brody.

[8] Seyhun (1992, 151) writes: "In contrast to the statutory changes, case law in the 1980s had an important effect on insider trading. Case law in effect defined illegal trading as trading immediately prior to takeovers and earnings announcements and other important corporate announcements. Evidence shows that insiders were less likely to trade immediately before earnings announcements and corporate takeovers in the 1980s." In this regard, it is worth noting that Seyhun's (1990) evidence that insiders purchase more stock and sell less stock in the 6 months before a takeover is only marginally significant.

of foreknowledge of earnings at all, or trade at times when the risks from regulatory action, shareholder class-action suits, and adverse publicity are smaller. Likely, all these risks are smaller the further removed such trades are from the principal informational event, which suggests insider trading based on foreknowledge of future earnings announcements ought to be examined over a long window.

While prior research detects essentially no relation between insider trade and the next earnings announcement, there is some evidence that earnings disclosures and insider trades are related over longer windows. Noe (1999) documents a significant positive association between net insider purchases made within twenty days after a management earnings forecast and a measure of growth in earnings measured over the next three to five years. This result suggests that insiders base their trading decisions on forecasts of earnings a year or more in the future, rather than earnings to be announced in the next quarter. Beneish (1999) analyzes insider trades after announcements of earnings that subsequently are shown to be overstated by an SEC enforcement action. He finds that insiders sell more of their stock than expected in the period after the earnings announcement but prior to the discovery and public disclosure of the overstatement.[9] This suggests an interesting and important interaction between earnings disclosures and stock trades by insiders in a position to influence those disclosures: at least in extreme cases, insiders manipulate earnings to postpone bad news, and profit from trades they make before the bad news is revealed. Evidence confirming this view is provided by Beneish, Press, and Vargus (2001), who conclude that insiders manage earnings to sell stock at higher prices and delay debt covenant default.

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[9] The mean interval between the date of the first reporting violation and discovery of the violation is 28 months. Beneish (1999) does not examine the timing of insider trades within this interval.

These considerations lead us to examine the relationship between insider trading and earnings over a longer time period and in relation to a less common and more extreme event, namely, a break in a string of quarterly earnings increases. We examine the trading behavior of insiders in each quarter of a string because breaks appear to be events that are of greater economic importance than routine earnings announcements.[10] Whereas previous research focuses on trading between one and twelve months before earnings announcements, our analysis allows us to detect unusual trading behavior up to 16 quarters before the break. If insiders possess superior ability to predict future earnings realizations, we predict that insider selling should increase toward the end of a string but then stop sometime prior to the break as the risks that attend trade (i.e., the risks of regulatory action, shareholder class-action suits, and adverse publicity) increase.

Some previous research suggests that the patterns of insider trading may be more evident for certain subsets of firms. As a result, we test four different predictions regarding the types of firms that should experience more insider selling prior to a break. First, we predict that the pattern of selling by insiders should be most evident for growth firms. Skinner and Sloan (2000) report that growth stocks exhibit a more negative response to negative earnings surprises than value stocks. Correspondingly, the incentive for insiders to sell is stronger. Second, we predict that the incentive for insiders to sell stock is stronger if the period of earnings declines after the break is longer. We believe that insiders are able to predict longer periods of earnings declines since Kasznik and Lev (1995) report that firms issue warnings only for long breaks.[11] Third, we predict that insider selling is more intense when the earnings decline at the break (and, hence, the

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[10] DeAngelo et al. (1996) document that firms breaking a pattern of consistent earnings growth experience an average 14% negative abnormal stock return in the year the pattern is broken.

associated stock price drop) is larger. Fourth, we predict that the incentives for insiders to sell stock will be increasing in the length of the string because Barth et al. (1999) show that (i) price-earnings multiples increase fairly monotonically with the length of the increasing annual earnings pattern, and (ii) by two years after a break, the increased multiple essentially disappears. This suggests that the negative stock price response to a break is increasing in the length of the string.

3. Sample and descriptive statistics

The insider trading records are the transactions of persons subject to the disclosure requirements of Section 16(a) of the Securities and Exchange Act of 1934 reported on Forms 4 and 5. The data include transactions by directors and officers (including CEOs, CFOs, chairmen of the board, directors, and officers) and others, such as non-management shareholders holding more than 10% of the shares. In our analysis, we only include trades by insiders identified as directors or officers. There are 309,190 trades reported by insiders at firms that appear on CRSP. Data for the years 1989 to 1993, inclusive, comes from First Call/Thomson Financial Insider Research Services Historical Files. Data for the years 1994 to 1997, inclusive, are from the daily newswire of the Dow Jones News Retrieval Service that contains SEC filings published by Federal Filings, Inc., a wholly-owned subsidiary of Dow Jones & Co., Inc.[12]

The sample includes all firms that had at least eight consecutive quarters of quarterly earnings per share during the fiscal years 1989 through 1997. To measure the length of the earnings string and the length of break, we use quarterly earnings data as needed from the period

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[11] Kasznik and Lev (1995) assess the permanence of the earnings declines based on the revision in the forecast of $t+1$ earnings made when earnings for period t are released. In concept, their definition is similar to the measure used here.

[12] In the United States, section 16 of the Securities and Exchange Act of 1934 defines a class of persons designated as insiders whose trades are subject to specific limitations and reporting requirements. These individuals must

1981 to 1999 taken from the 1999 COMPUSTAT files (including the research files). We include all firm-quarters during the fiscal years 1989 through 1997 for which the data necessary to estimate the primary regression model (described later) are available on CRSP and COMPUSTAT, with two exceptions. First, firm-quarters that are part of a string that ends after 1999 are excluded because we need to identify when the string ends to determine where prior firm-quarters lie within the string; we cannot make this identification for ongoing strings. Second, to avoid complications related to delayed earnings announcements, we only include firm-quarters in which the earnings announcement is made within 60 days after the fiscal quarter end. The final sample contains 80,215 firm-quarters for 4,179 unique firms in the calendar years 1989 to 1997. This sample provides a large number of long strings for a broad set of firms: There are 4,070 instances of strings of length five or more (at 2,770 distinct firms) and 1,110 instances of strings of length ten or more (at 1,004 distinct firms).

Our inquiry is directed at determining when insiders gain foreknowledge of earnings breaks and what use they make of that information. For this purpose, we seek a measure of insider trade that is sensitive to insider information, as revealed by their trading decisions. In our analysis, we use the number of open market purchase transactions less the number of open market sales transactions. An advantage of this aggregator of insider information is that it weights equally the daily decisions of each insider at a firm whether to buy or sell stock. Hirschey and Zaima (1989) note that value-weighted measures obscure the information in small trades. Further, popular practitioner publications compute indicators of insider trading intensity based on the number of insider buy and sell decisions, suggesting that investors consider such measures to be informative. Since some other researchers use value weighting, we also consider

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report their trades to the SEC by the tenth day of the month following the month in which the trade takes place. In turn, the SEC makes the record of insider trade available to the public.

two value-weighted measures: the dollar value of net purchases in a quarter, scaled by the total

dollar value of all insider trades over the entire sample period; and the net number of shares

purchased in a quarter, scaled by the total shares traded by insiders over the entire sample period.

Results (not reported) are similar across these alternative choices of dependent variable.[13]

By considering only open market purchases and sales, we exclude from the definition of

a "purchase" stock grants and option grants. This is consistent with our goal of constructing a

measure of insider trade that is sensitive to insider information since the quantity and timing of

grants of stock-based compensation are not entirely at the discretion of the insider who receives

them. The definition also excludes option exercise events from the definition of either a

"purchase" or a "sale." Since stock option exercise is often followed by sale of the stock

acquired on exercise of the option (which *is* counted as an open market sale), counting the

exercise as a "purchase" would result in no net trade. On the other hand, counting the option

exercise as a "sale" would result in the disposition of stock being counted twice.

Blackout periods, when corporate policy prohibits insiders from trading, generally

prevent insiders from trading except in a month-long window after earnings announcements. In

our sample, more than 65% of all trades in each quarter occur in a 30-day window following

earnings announcements. Accordingly, we measure insider trade over this period. By

construction, this period does not straddle an earnings announcement and so does not combine

trade before and after corporate news is made public. Results reported below are not sensitive to

the period following the earnings disclosure over which insider trades are cumulated; similar

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[13] The results are not sensitive to the choice of value or equal weighting because we focus on transactions by officers
and directors only. If transactions by large stockholders (defined as holders of at least ten percent of the outstanding
common stock) are also included and NETBUY is value-weighted, the transactions of the non-manager stockholders
will dwarf the transactions by officers and directors (Lorie and Nieferhoffer, 1968). In these instances, the selection
of the weighting scheme may be critical to drawing proper inferences.

results obtain using trading windows of 15, 30, 45, or all days following the announcement, but before the end of the next quarter.

There is more insider trading (both purchases and sales) as the number of insiders at the firm increases, and there is substantial variation in the number of insiders across firms. Accordingly, in constructing the dependent variable, NETBUY, we scale the open market purchases less the open market sales transactions by the number of insiders in each firm that traded in the firm's stock over the 1989–1997 period.[14] This scaling controls for differences in trading activity driven by differences in the number of insiders across firms. Since the range of the variable resulting from this scaling is a small interval around zero, we multiply the variable by 100 to preserve significant digits of the coefficient estimates on the explanatory variables.

[TABLE 1]

Panel A of table 1 presents descriptive statistics on NETBUY. Over all firm-quarters, the mean value of NETBUY is –1.980, indicating open market transactions by insiders are predominantly sales. The distribution of NETBUY is concentrated at zero: for 66% of the firm-quarters, there is no net insider trading in the first thirty days after the earnings announcement date. The standard deviation of NETBUY is 26.410 and the extreme values are –1010.00 and 1800.000. The standard deviation and the extreme values together suggest that there is some important variation across firms in the number of insider transactions following earnings announcements despite the fact that NETBUY is zero for most observations.

The sample contains firms that vary greatly in size. The mean (median) market value of equity (MV) across quarters is $1,282 million ($150 million) with a standard deviation of $4,907 million. The mean (median) book-to-market ratio (BM) for sample firm-quarters is 63% (55%). DUR is the number of quarters since the string began, inclusive of the observation firm-quarter.

DUR has a mean of 2.98, which is nearly three times its median of 1, indicating the length of the string prior to an observation is right-skewed.

Since stock returns are explanatory variables in the regression analysis that follows, we also provide basic descriptive statistics on these variables. The average raw return over the twelve months ending on the last day of the month prior to the month of the earnings announcement (i.e., months −12 to −1), PRIORRET, is 20%. The average raw return for the period starting two days before to one day after the earnings announcement date (EVENTRET) is 1%. The raw return for the first six months after the earnings announcement month (i.e., months +1 to +6), POSTRET6, and for the next six months after the earnings announcement month (i.e., months +7 to +12), POSTRET12, have very similar distributions. Combined, they are similar to PRIORRET.

Panel B describes the 13,858 earnings strings for which necessary data on firm attributes are available.[15] Recall that data on the characteristics of the string, if the string began prior to 1989, were obtained from the 1999 Compustat files. Therefore, the length of the string is determined over a period extending from 1981 to 1999. A string's length (LENSTRING) is defined as the number of consecutive quarters in which earnings in the quarter is greater than earnings for the same quarter of the prior year. A series of q successive quarters where earnings increase in every quarter is a string of length q. The shortest string has a length of one. This occurs if earnings in a quarter are above earnings for the same quarter of the prior year, and earnings in the next quarter and the previous quarter are both lower than earnings in the corresponding quarter of the prior year. The length of a string has a mean of just over four

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[14] Conclusions drawn from the regression are similar if NETBUY is not scaled.
[15] In panel B of table 1, descriptive statistics are computed on strings for which the variables needed for the regressions in table 2 are available. From the full sample of 16,404 strings, 2,546 are lost because variables are missing.

quarters, and is followed by just over two quarters of consecutive decreases in earnings, LENBREAK.

UE is the change (from the same quarter of the previous year) in quarterly split-adjusted primary EPS before extraordinary items, scaled by the average of total assets at the end of the quarter and at the end of the same quarter of the previous year. Of course, the difference between earnings for the quarter of the break and the same quarter of the previous year scaled by total assets is negative. The decline in earnings that ends a break averages 1.7% of total assets. Consistent with previous research, there is a large negative stock price response in the month of the break. The mean (median) abnormal return for the period thirty trading days before to one day after the announcement of a break, AR30, is –4.3% (–4.1%). Abnormal returns are calculated as the difference between the announcing firm's returns and the value-weighted market returns over the same period. In addition, the mean (median) abnormal return for a window starting two days before to one day after the announcement of a break, AR4, is –1.8% (–1.2%), suggesting that the break is not fully anticipated by the market prior to the earnings disclosure.[16]

4. Empirical methods and results

4.1 Stock price response to breaks

The empirical analysis in this paper focuses on insider trading before a break. Accordingly, we first analyze the stock price response to all earnings announcements in our sample period 1989 to 1997 that are breaks. Table 2 reports the results of two regressions of the abnormal returns in the period just preceding and including the announcement of the break. The

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[16] In contrast to the abnormal return at the subset of earnings announcements that mark the end of a string, which is strongly negative, the mean and median raw returns over the typical earnings announcement (i.e., EVENTRET in panel A of table 1) are positive and zero, 0.01 and 0.00, respectively.

explanatory variables are: BM; LENBREAK; UE; LENSTRING; and the natural log of firm

size at the end of the previous quarter, $ln(MV_{t-1})$. We use the logarithm of market value in the

regression to reduce the skewness of this explanatory variable. We measure abnormal returns

over two windows: a 4-day window, AR4; and a 30-day window, AR30. The 30-day window is

chosen because Skinner and Sloan (2000) show that firms sometimes preannounce bad news in

this period before the earnings announcement. Cook's (1977) distance statistic reveals 792

outliers in the regression with dependent variable AR4, and 753 outliers in the regression with

dependent variable AR30. Results excluding outliers are reported. Results are similar when

outliers are included, except that the coefficient estimate on variable BM is insignificant in the

regression with dependent variable AR4.[17]

[TABLE 2]

Results for both event windows are consistent with expectations. First, there is a

significant positive coefficient on UE, which demonstrates the robust finding that unexpected

earnings and returns around the earnings announcement are positively correlated. The

significant positive coefficient on $ln(MV)$ provides evidence that there is a more negative stock

price response to a break for smaller firms. This may be because smaller bad news firms make

fewer disclosures that warn of impending bad news, a finding of Kasznik and Lev (1995). The

significant positive coefficient on BM, is consistent with the finding in Skinner and Sloan (2000)

that firms with a low BM, or high growth firms, experience more negative stock price responses

to a break. As expected, the coefficient on LENBREAK is significantly negative; longer breaks

are associated with more negative stock price responses. This suggests that investors can predict

the length of the break at the start of the break. In part, investors' predictions may be based on

management's explicit disclosures about the nature of the break. The significant negative

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[17]   For the dependent variable AR30, there are 13 fewer observations than for the dependent variable AR4.

coefficient on LENSTRING demonstrates that firms with longer strings have a more negative stock price response during the month of the break consistent with Barth et al. (1999).

Table 2 reveals that insiders stand to gain substantially from selling prior to an earnings reversal. The coefficients imply that the mean abnormal return for a growth firm with a book-to-market ratio of 0.34 (the 25th percentile of the distribution) and values of UE, MV, LENSTRING, and LENBREAK equal to the population medians is –4.6% over the window from 30 days before to 1 day after announcing a break.

4.2 Pattern of insider trades

Having established that breaks are associated with large negative stock price reactions, we next conduct a preliminary univariate examination of how insiders trade in every quarter of a string at a subset of firm-quarters where we expect the incentive to sell stock is strong. Table 2 suggests that negative abnormal stock returns occur at growth firms before large earnings declines and long breaks. For the 6,928 firm-quarters that are part of strings with these characteristics, figure 1 presents the mean value of NETBUY in the quarters before the break. Since strings vary in length, the number of observations that contribute to the mean of NETBUY is greatest for quarters just before the break, and declines monotonically for quarters that are further removed from the break. The mean value of NETBUY is negative in every quarter, indicating that, on average, open market sales outnumber open market purchases in each quarter. This is to be expected given that some of the principal transactions through which insiders acquire stocks—grants of stock and stock options—are excluded from our definition of a purchase, as explained earlier. There is substantial variation in the mean value of NETBUY over quarters: the value in quarter –5 is about 5 times larger in absolute value than the value in quarter –15. Overall, the pattern of NETBUY over the sixteen quarters prior to the break is U-

shaped. The most intense frequency of sales transactions clusters in quarters –9 to –3 relative to

the break. Before and after this period, insider sales are generally lower—quarter –14 is the sole

exception.

[FIGURE 1]

Since insiders profit from stock sales prior to price declines and since price declines may

occur at times other than the announcement of a break, it is natural to examine the pattern of

stock returns over the quarters prior to the break.   Accordingly, figure 1 also presents the mean

buy-and-hold abnormal return across firms that contribute observations of NETBUY to a quarter.

The mean buy-and-hold return for the period from the beginning of quarter $-q$ to the end of the

month in which the break is announced is plotted along the right vertical axis above quarter $-q$.

This is the average return one would receive from holding the stock from the first day of the

quarter through the end of the month in which the break is announced. Thus, the abnormal

return from holding a stock over the last 16 quarters of a string prior to a break is 184%, while

the abnormal return from holding a stock over the last three quarters prior to a break is –24%.

The slope of the line connecting buy-and-hold returns in consecutive quarters indicates the return

over the quarter; a negative slope indicates a positive return while a positive slope indicates a

negative return. The steepest slope is furthest from the break when quarter-over-quarter

abnormal returns are positive and large. Gradually, these returns moderate as the break

approaches; they then become negative in the two quarters prior to the break. The overall pattern

is hook-shaped.[18] Consistent with Myers and Skinner (2000), the abnormal returns over the three

quarters prior to the break are negative, while the abnormal returns over each quarter from –16 to

–3 are generally positive. This suggests that insider selling may be driven by a desire to avoid

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price declines that occur in the two quarters prior to a break or by a desire to realize profits from a recent stock price run-up, rather than a desire to avoid the price decline documented in table 2 that is closely associated with the announcement of the break. Therefore, in examining how insiders' trades may be related to the forthcoming announcement of a break, it is important to control for stock returns that follow the observation quarter and also returns that precede the observation quarter.

To more carefully examine the relationship between insider trade and breaks suggested by figure 1, we undertake an event study where the event is defined as the start of the break. Firm-quarter observations are arranged in event time according to the length of the period by which they precede the break. Instead of measuring stock price reactions surrounding the event, this study considers the amount of insider trade prior to the event. We estimate the following multivariate regression with observations pooled both in time series and cross-section (firm subscripts are omitted):

$$\text{NETBUY}_t = \alpha_t + \beta_0 \text{BREAK}_t + \sum_{q=1}^{16} \beta_q \text{STRING}q_t + \beta_{17}\text{BEGSTRING}_t + \beta_{18}ln(\text{MV})_{t-1} + \beta_{19}\text{BM}_{t-1}$$
$$+ \beta_{20}\text{DUR}_t + \beta_{21}\text{PRIORRET}_t + \beta_{22}\text{EVENTRET}_t + \beta_{23}\text{POSTRET6}_t + \beta_{24}\text{POSTRET12}_t + \varepsilon_t.$$

We control for quarter- and firm-specific fixed effects.[19] NETBUY, MV, BM, DUR, PRIORRET, EVENTRET, POSTRET6 and POSTRET12 are defined above. BREAK is equal to

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[18] In figure 1 the *ending* point over which returns are computed (i.e., the break) is the same for every plotted point. This is different from some graphs of buy-and-hold returns cumulated over varying periods where the *starting* point over which returns are computed is the same for every plotted point.

[19] Controlling for firm-specific fixed effects is indicated because Huddart and Ke (2001) find evidence of systematic variation in insider trading across firms. While we are unaware of regulatory changes or other matters that might

1 if the earnings string ends in the quarter, i.e., earnings in the quarter are below earnings for the same quarter of the prior year, and zero otherwise. The coefficients on a set of dummy variables capture differences in insider selling related to the time before breaks. For a given firm experiencing a string of length q or more, STRINGq_t is equal to 1 if firm-quarter t is q quarters before the break in earnings; otherwise STRINGq_t is equal to zero. To summarize insider trading more than 16 quarters before the break, BEGSTRING$_t$ is equal to 1 if the firm-quarter is an observation from a string and falls more than 16 quarters before the break. Thus, for each firm-quarter that is part of a string, exactly one of the STRING dummy variables is 1 and the rest are zero. Given this specification, a negative coefficient on β_7, for example, indicates that for firms with a string of at least seven consecutive earnings increases, there is more inside selling activity in the 7th quarter before the break relative to the mean selling in firm-quarters that are not part of a string.

We include BREAK to allow us to observe if there is any systematic trading activity in the 30 trading days immediately after the announcement of a break. BEGSTRING allows us to observe systematic behavior of insiders during the earlier stages of a long string. MV and BM control for the impact of firm size and the book-to-market ratio may have on insider trading. We predict that the coefficient on MV to be negative since Lakonishok and Lee (2001) find that insiders are more active traders in larger firms and that insiders sell more than they buy. Following Rozeff and Zaman (1998), we predict the coefficient on BM to be positive.

The probability of a break in a string of earnings increases in any period may be a function of the length of the string to that point. In a study of earnings management at banks, Beatty, Ke, and Petroni (2002) report strong evidence that the likelihood of a string breaking

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induce systematic variation in insider trades over time, we nevertheless also control for quarter-specific fixed effects.

escalates as the string becomes longer. The variable DUR serves as a parsimonious control for the effect of prior string length on the stock trading decisions of insiders. We predict insiders realize that breaks are more likely as strings grow longer. To avoid the stock price drop that coincides with the break, insiders must sell before the break, hence we predict a negative coefficient on DUR.

PRIORRET and EVENTRET are included to control for the finding in previous studies that insiders are contrarian investors (Rozeff and Zaman, 1998; and Lakonishok and Lee, 2001). We expect the coefficients on these returns to be negative because insider purchases after an earnings announcement should be negatively correlated with the stock returns preceding the announcement, PRIORRET, and the stock returns surrounding the announcement, EVENTRET.

Seyhun (1998) reports that the stock price reaction subsequent to insider trades continues for at least 12 months following the trades. This general pattern is not conditioned on a particular informational event and therefore represents an average outcome over insider trade in response to many different kinds of informational asymmetries. Significance of the coefficient estimates on the STRING variables in the presence of control variables POSTRET6 and POSTRET12 is consistent with the view that insider trade incrementally is driven by specific foreknowledge of the break, and not simply a variety of other (unidentified) bits of private information that drive the general result described by Seyhun. Also, in a sample of firms with at least 17 consecutive quarterly increases in earnings, Myers and Skinner (2000) find that these firms' stocks substantially outperform the market starting in the third year before the break and ending 11 months before the break. During the 11 months preceding the break, these stocks underperform the market by 27 percent. Myers and Skinner argue that before earnings actually decline, EPS growth slows and management often discloses the expected decline to market

participants prior to announcing an earnings disappointment, consistent with the findings of Skinner (1994) and Kasznik and Lev (1995). Including POSTRET6 and POSTRET12 in the regression allows us to assess whether selling well in advance of the break is driven by the break, controlling for declining stock prices that may begin well in advance of the break. Since net purchases by informed insiders should increase prior to price run-ups and decrease prior to price declines, we predict positive coefficients on POSTRET6 and POSTRET12. One might worry that inclusion of the returns before and after the earnings announcement could capture the entire effect on insider selling of the negative returns associated with breaks. Insiders may avoid these negative returns by selling well before breaks, potentially confounding our analysis. The sign and significance of the coefficient estimates on STRINGq, however, are not sensitive to the inclusion or exclusion of these stock return variables.

Table 3 reports results of the estimation of the regression. Cook's (1977) distance statistic identifies 2,000 outliers in the full sample. These outliers are omitted from the reported regression and from the analyses reported in tables 4 and 5. Qualitatively similar results obtain if outliers are included.   Our primary model has an adjusted R^2 of 4.5%. The coefficients on the control variables are all statistically significant and consistent with expectations. The coefficients on MV, PRIORRET, EVENTRET, POSTRET6, and POSTRET12 suggest that larger firms and firms with better ex ante performance and worse ex post performance have more net insider sales. The coefficient estimate for BM is significantly positive suggesting that insider selling is increasing in the growth opportunities of the stock. The coefficient estimate for DUR is significantly negative, indicating that insider selling increases as the string of prior earnings increases grows longer.

[TABLE 3]

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The coefficient on BREAK is significantly positive, indicating that insiders engage in significantly (at the 5% level using a two-tailed test) more stock purchases after the announcement of a break, relative to other quarters where earnings decrease. In contrast, the coefficients on STRINGq suggest that insiders engage in significantly more stock sales in the third through seventh quarter before the break: the coefficient estimates on STRING3, STRING4, STRING5, and STRING7 are significantly negative. The other coefficients on STRINGq are insignificant suggesting that insider trading is insignificantly different from firms without earnings increases during other quarters of a string. Apparently, insiders are able to predict the break in time to avoid the appearance of trading on this information and to avoid the negative stock price response associated with breaks. Our test for abnormal trading q quarters prior to a break is a test of whether STRINGq is significantly different from zero. A failure to find significance is due either to the lack of a relationship or to a lack of power. Since there are fewer long strings than short strings, the power to detect abnormal trading is lower for quarters long before the break because STRINGq mostly takes the value of 0 for large q. On the other hand, the power to detect abnormal trading shortly before the break is high. Seen in this light, the insignificant coefficient estimates on STRING1 and STRING2 are notable. To ensure that the inclusion of shorter strings is not confounding our analysis, we also re-estimated our regressions excluding observations drawn from short strings. In one re-estimation, we deleted observations from strings less than four quarters long. In a second, we deleted observations from strings less than eight quarters long. Conclusions are similar.

To ascertain whether and how the tendency to sell prior to a break varies with firm characteristics, we next examine insider trade in subsets of the data. We predict that insider selling before a break is greater for growth firm-quarters, firm-quarters followed by a longer

break or a larger earnings decline at the break, or firm-quarters preceded by a longer string of past earnings increases. To examine how insider trade may depend on these factors, we estimate the regression model on each of eight subsets of the observations. These subsets correspond to observations drawn from (1) growth firms, (2) value firms, (3) firms-quarters followed by a long break, (4) firms-quarters followed by a short break, (5) firm-quarters that precede a large earnings decline, (6) firm-quarters that precede a small earnings decline (7) firm-quarters that are preceded by a long string, and (8) firm-quarters that are preceded by a short string. To form the samples for these regressions, we first identify each quarterly earnings announcement as either an increase or decrease relative to the announcement for the same quarter of the previous year. Firm-quarters where earnings decrease are included in each of the eight regressions. A firm-quarter where earnings increase is included in four of the eight regressions depending on characteristics of the firm, the string, and the break. If at the time of the earnings announcement the book-to-market ratio in the previous quarter is less (greater) than the median book-to-market ratio of all sample firms with positive earnings increases the observation is included in the growth (value) regression. If the break that ends the string is no longer than the median break (i.e., the break is one or two quarters long) then the observation is included in the short break regression; otherwise it is included in the long break regression. If the firm quarter precedes a break where the earnings decline is more than (less than) the median decline over all breaks, the observation is included in the large (small) decline regression. If the firm-quarter is preceded by at least (less than) three earnings increases, the observation is included in the long (short) string regression.

Table 4 reports the regression results for the eight regressions. In six of the regressions, the coefficient estimate on BREAK is significantly positive, while in the remaining two

regressions, (4) and (6), the coefficient estimate is positive but not significant. These coefficient estimates are consistent with the significantly positive coefficient on BREAK in table 3. In regression (3), the coefficient on STRING1 is significantly positive (indicating less selling in the quarter prior to a long break, relative to periods that are not part of a string), while in the other seven regressions it is insignificant. In regression (1) the coefficient on STRING2 is significantly negative (indicating more selling two quarters prior to a break at growth firms, relative to periods that are not part of a string), while in the other seven regressions it is insignificant. Overall, the coefficient estimates on STRING1 and STRING2 do not suggest systematically strong abnormal insider selling in the two quarters prior to an earnings break. The exception is growth firms, where there is evidence of significant selling two quarters before the break, but not immediately prior to the break. At periods further removed from the earnings break, abnormal insider selling is evident. Broadly, the relationship varies with the book-to-market ratio, the length of the string, the severity of the decline, and the length of the break, and is consistent with our predictions. The coefficients on STRING3 through STRING9 are significantly negative, at the 10% level or better, for 22 of the 28 coefficient estimates in regressions (1), (3), (5), and (7), which correspond to observations on growth firms, longer breaks, larger earnings declines, and longer strings, respectively. Across regressions (2), (4), (6), and (8), only the coefficients on STRING5 and STRING7 in regression (8) are significant at the 10% level or better using a two-tailed test. Consequently, we conclude that insiders sell more stock in anticipation of an earnings break at growth firms, if the break is longer, if the earnings decline is more severe, and if the break follows a longer string. Ten or more quarters prior to the break, none of the coefficient estimates on the STRING dummies are significant. We conclude there is no evidence of abnormal insider trade more than 9 quarters prior to a break.

[TABLE 4]

Table 5 reports regression estimates of the incremental impact on insider selling intensity, NETBUY, of growth stock status, a longer break, a larger earnings decline, and a longer string. Because table 4 suggests insider selling in advance of breaks is concentrated in quarters –9 to –3, we replace dummy variables STRING3 through STRING9 with dummy variable STRING3-9 defined as 1 if the firm-quarter is 3 to 9 quarters before a break, and zero otherwise. Similarly, we replace STRING10 through STRING16 and BEGSTRING with the variable STRING10UP, and we replace STRING1 and STRING2 with the variable STRING1-2. We interact STRING3-9 with dummy variables GROWTH, LONGBREAK, LARGEDECLINE, and LONGSTRING, which capture characteristics of the firm-quarters. For firm-quarters that are part of a string, (i) GROWTH is a dummy variable equal to 1 if the firm-quarter has a book-to-market ratio that is less than the median book-to-market ratio for all firm-quarters that are part of string, (ii) LONGBREAK is a dummy variable equal to 1 if the period of earnings decreases that ends the string of earnings increases is long (i.e., the break is at least three quarters long), (iii) LARGEDECLINE is a dummy variable equal to 1 if the earnings decline that ends the string is larger than the median decline across all breaks,, and (iv) LONGSTRING is a dummy variable equal to 1 if the firm-quarter is part of a string of earnings increases and is preceded by at least three consecutive quarterly earnings increases. In other cases, GROWTH, LONGBREAK, LARGEDECLINE, and LONGSTRING are set equal to zero.

[TABLE 5]

The coefficient estimates of the interactions of STRING3-9 with GROWTH, LONGBREAK, and LARGEDECLINE are significantly negative, suggesting that each of these characteristics is incrementally important in explaining insider trades. The coefficient estimate

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on the interaction with LONGSTRING is negative, as predicted, but not significant. Note, too, that the coefficient estimate on DUR is significantly negative. This confirms that the likelihood an insider sells stock is increasing in the length of the prior string, but the effect is not significantly stronger in the period 3 to 9 quarters before the break than at other times. Of these coefficient estimates, STRING3-9*GROWTH is largest in magnitude, suggesting it is the most important, followed by LONGBREAK, then LARGEDECLINE. Consistent with expectations, the highest level of selling precedes longer breaks and larger declines following longer strings of consecutive earnings increases for growth firms. Since the coefficient estimate on STRING3-9 alone is significantly positive, we conclude that for value firms facing a short break and a small earnings decline, there are more insider stock purchases three to nine quarters before a break than in firm-quarters that are not part of a string.

In an untabulated analysis, we also included the interactions of GROWTH, LONGBREAK, LARGEDECLINE, and LONGSTRING with both STRING1-2 and STRING10UP. None of the coefficient estimates on these interactions is significantly different from zero at the 10% level. Also, a test of whether the sum of the coefficients on these four interactions with STRING1-2 is the same as the sum of the coefficients on the four interactions with STRING3-9 is rejected (*p*-value 0.0002), as is a test of whether the sum of the coefficients on these four interactions with STRING10UP is the same as the sum of the coefficients on the four interactions with STRING3-9 (*p*-value 0.0047). These findings are further evidence that abnormal selling for firms with the characteristics captured by GROWTH, LONGBREAK, LARGEDECLINE, and LONGSTRING is concentrated in quarters −3 to −9.

4.3 Returns to insider trades

The evidence presented to this point makes a strong case that insider selling is higher three to nine quarters before a break in a string of quarterly earnings increases than at other times. For insiders to find it worthwhile to shift their trades in the manner suggested by this finding, it should be the case that insiders are better off selling in this time period than they would be if the sale were postponed until after the break is announced.

The positive coefficient estimates on POSTRET6 and POSTRET12 in table 5 indicate that, on average, insiders buy (sell) prior to positive (negative) stock returns. Thus, in some firm-quarters insiders may purchase stock before a break because of good news reflected in stock returns and unrelated to the break. Hence, in an analysis of abnormal returns subsequent to insider trade, we expect returns to be greater when insiders buy than when they sell. Because the regression analysis implies that insider selling intensity is stronger in quarters -9 to -3 relative to a break, we further expect that when insiders sell in this period the abnormal return from the time of trade until the announcement of the break is negative. Otherwise, insiders would earn higher returns by postponing their stock sales until after the break is announced. However, when insiders purchase stock (i.e., NETBUY is positive) in this period, abnormal returns could be positive.

Accordingly, we now examine the buy-and-hold abnormal returns that are associated with insider trades, computed over the period from the time of trade until the break. Specifically, for insider trade measured q quarters prior to the break, abnormal returns are computed over the $3 \times q$ calendar months that follow the earnings announcement in quarter $-q$. For each firm-quarter that is part of a string, we compute the abnormal return. We then group these abnormal returns according to the number of quarters by which the firm-quarter precedes the break. Each of these groups is further divided into three subgroups based on whether NETBUY for the firm-quarter is

positive, zero, or negative. Thus, the abnormal returns when NETBUY is positive (negative) is

the return realized (avoided) by an insider who purchased (sold) stock during the observation

quarter rather than waiting to undertake the transaction until the break is publicly announced.

[TABLE 6]

[FIGURE 2]

Table 6 and figure 2 report the median abnormal returns that follow insider trade.

Consistent with our prediction, the median abnormal return is negative when NETBUY is

negative for the quarters –8 to –3 relative to the break. For these quarters, the typical insider

who sells stock in this period avoids a loss, consistent with our prediction.   Moreover, the

returns that follow insider selling are economically significant: the median abnormal return

following insider selling six quarters prior to the break is -8.8%; three quarters prior to the break,

it is -13.9%. These results suggest the stock price drops are large enough to motivate insider

trade.[20] The abnormal returns closer to the break also require some interpretation. Although the

median abnormal returns in table 6 are negative in quarters –1 and –2, the insignificant

coefficient on STRING1-2 in table 5 indicates that the values of NETBUY in quarters –1 and –2

are not significantly different from the values for firm-quarters that are not part of a string,

consistent with the argument that the risks of regulatory action, shareholder class-action suits,

and adverse publicity dissuade insiders from entering an unusual number of sales transactions in

this period, despite the losses that could be avoided by selling in these quarters. Long before the

string breaks, the situation is different. When NETBUY is negative in quarter -9, the median

abnormal return is small but positive, 2.8%, and is between the values in quarters –8 and –10.

The median abnormal returns 10 or more quarters prior to the break are positive for all three

subgroups—NETBUY<0, NETBUY=0, and NETBUY>0. The insignificant coefficient on STRING10UP in table 5 indicates no unusual buying or selling relative to firm quarters that are not part of a string in periods more 10 or more quarters before a break. That there is no abnormal selling is consistent with the positive median abnormal stock returns that obtain over the period between the observation quarter and the break, as well as the opportunity insiders have to benefit from a rising stock price until some time closer to the break.

Table 6 also makes it clear that insider selling is not equally intense at each firm, and subsequent abnormal returns vary depending on whether insiders buy or sell stock. In every quarter, there is a clear monotonic relationship in median abnormal returns across the three subgroups. The median abnormal return is smallest for the group where insiders engage in net sales transactions (i.e, NETBUY<0), largest when insiders engage in net purchase transactions (i.e, NETBUY>0), and intermediate when insiders neither buy nor sell (i.e, NETBUY=0). For example, when insiders sell 8 quarters before a break, the median abnormal stock return is -2.5%; however, some insiders buy and at those firms the corresponding median abnormal return is 13.8%. This is consistent with insiders adapting their trading to the severity of the expected price drop over the period until the break.

5. Concluding remarks

In this study, we analyze the trading patterns of insiders in the quarters leading up to a break in a series of consecutive earnings increases. We hypothesize that insiders sell stock well in advance of the break to avoid the appearance of taking advantage of insider information and to avoid the negative stock returns that occur in the months preceding a break. Multivariate

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[20] Abnormal returns alone are not sufficient to prompt insider trade. Recall from table 5 that the values of NETBUY in quarters –1, -2, and before –9 are not significantly different from the values for firm-quarters that are not part of a string even though the median abnormal return in these quarters is non-zero.

regression analyses of the trading patterns in the 16 quarters prior to earnings breaks for different samples of firms indicates little unusual insider trading in the two quarters immediately preceding the announcement of a break. We do find, however, an increase in the frequency of net insider sales in the third through ninth quarters preceding the break for a subset of the sample firms. This pattern is present after controlling for stock returns subsequent to the trade, which indicates that insiders do not trade solely on information, the specific nature of which is unidentified by the researcher and that is reflected in price gradually over time. Instead, we infer that insider trades are motivated in part by specific foreknowledge of the break.

An analysis of stock returns over the four trading days surrounding the announcement of a break and the 30 trading days prior to and including the break announcement indicates abnormal returns (and hence incentives for insiders to sell stock) at the announcement are increasing in the firm's book-to-market ratio; and decreasing in the length of the string, the magnitude of the earnings decline at the break, and the length of the break. Our empirical findings are consistent with the view that insider selling intensity responds to changes in each of these factors. Since abnormal returns over the month before and the four days surrounding the announcement are economically and statistically significantly negative, it appears that insider selling in advance of a break does not fully preempt the disclosure of the break.[21]

An analysis of abnormal returns over the period from the time insiders trade until the break in earnings is announced shows that the returns that follow insider selling are economically significant. The typical insider who sells stock as early as to two years before a break in earnings avoids a loss he would incur if he held the stock until the announcement of the break.

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[21] Insider trades themselves are information. Damodaran and Liu (1993) show that the market adjusts security prices in response to the announcement of insider trades.

The observed trading pattern is consistent with the interpretation that insiders avoid risks stemming from regulatory actions, shareholder class-action suits and adverse publicity, but continue to profit from their private information by shifting their trades to an earlier time. Corroboration for this view comes from several related studies. In a situation where one would expect regulatory scrutiny, Seyhun and Bradley (1997) find no trades by executives in the 30 days prior to a Chapter 11 bankruptcy filing. Conversely, in situations where trading by plausibly informed parties is not constrained by legal precedents or a credible mechanism for tracking informed trades, transactions take place much closer to the time bad news becomes public: Huddart and Lang (2002) report that non-section 16 employees exercise stock options one to six months prior to significant stock price drops; Yermack (1997) finds that grants of stock options to executives often precede public disclosure of favorable earnings surprises by less than one week; similarly, Aboody and Kasznik (2000) find that executive stock option grants follow voluntary disclosures of bad news and precede good news, also by a matter of days.

A break in a pattern of consecutive earnings increases is an interesting accounting event for several reasons. First, such breaks are associated with economically significant stock price drops. Second, the strong relationships documented here suggest that outsiders can make more powerful inferences about firm prospects by relating disparate facts. For instance, insider net sales are greater before a long earnings break than a short one. Thus, given a break has occurred, the nature of a break may be revealed by the insider trades that preceded it. Third, section 16 insiders, who must publicly disclose their trades, are typically responsible for reporting corporate earnings. A large body of literature supports the notion that managers manipulate earnings reports. In particular, there is evidence that earnings are managed to prolong strings of consecutive earnings increases (Burgstahler and Dichev, 1997; Degeorge, Patel, and Zeckhauser,

1999; and Ke, 2001). The fact that insider trades are strongly related to breaks in earnings raises the possibility that top executives coordinate personal stock trades and earnings management activities in a broader set of firms than the handful of firms subject to SEC enforcement actions studied by Beneish (1999). Furthermore, we conclude from this and other studies on related questions that the timing of trades in relation to the informational event appears to be importantly affected by variation in the risks of legal action and adverse publicity attending trade. These are rich areas for further exploration.

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Table 1

Descriptive statistics for 4,179 sample firms during calendar years 1989 to 1997[a]

Variable	Mean	Standard Deviation	25%	Median	75%
Panel A: All 80,215 firm-quarters					
NETBUY	-1.980	26.410	0.000	0.000	0.000
MV	1,282	4,907	43	150	666
BM	0.630	0.440	0.340	0.550	0.820
DUR	2.980	4.990	0	1	4
PRIORRET	0.200	0.540	-0.120	0.120	0.390
EVENTRET	0.010	0.080	-0.030	0.000	0.040
POSTRET6	0.080	0.330	-0.110	0.050	0.220
POSTRET12	0.080	0.340	-0.120	0.050	0.230
Panel B: 13,858 firm-quarters that break a string of consecutive earnings increases					
LENSTRING	4.012	4.227	1	3	5
LENBREAK	2.657	2.155	1	2	4
UE	-0.017	0.036	-0.015	-0.004	-0.001
AR30	-0.043	0.166	-0.125	-0.041	0.033
AR4	-0.018	0.081	-0.050	-0.012	0.018

[a]Panel A reports firm-quarter descriptive statistics. NETBUY is the number of insider purchase transactions less the number of insider sale transactions in the period (up to) thirty days after the date quarterly earnings are announced, but before the end of the next quarter, scaled by the number of insiders at that firm over the 1989 to 1997 sample period and multiplied by 100. MV is the market value of equity at the end of the quarter, in millions of dollars. BM is the ratio of book value to the market value of equity at the end of the quarter. DUR is the number of quarters since the string began, inclusive of the observation firm-quarter. PRIORRET is the return for the six-month period ending on the last day of the month prior to the month of the earnings announcement. EVENTRET is the return over the period from two days before to one day after the earnings announcement. POSTRET6 is the stock return over the six months following the earnings announcement month. POSTRET12 is the stock return from the beginning of seventh month to the end of the twelfth month after the earnings announcement month. Panel B reports descriptive statistics on the 13,858 strings of consecutive earnings increases of various lengths comprised of firm-quarters described in panel A with available data on string length and break length. LENSTRING is the length, in quarters, of the string of consecutive quarterly earnings increases. LENBREAK is the length, in quarters, of the consecutive quarterly earnings decreases following a string of earnings increases. UE is split-adjusted earnings per share (EPS) before extraordinary items in the quarter of the break less the EPS for the same quarter of the previous year, divided by the average of total assets per share at the end of those quarters. AR30 is the abnormal return for the period from 30 days before to one day after the announcement of a break. Abnormal returns are

calculated as the difference between the announcing firm's buy-and-hold return and the buy-and-hold return on a value-weighted market returns over the same period. AR4 is the abnormal return for the period from two days before to one day after the announcement of a break.

Table 2
Regression of abnormal returns around the disclosure of a break in a string of consecutive earnings increases on explanatory variables[a]

Variable	Predicted Sign	AR4		AR30	
		Coefficient estimate	p-value	Coefficient estimate	p-value
BM	$+$	0.364	0.006	2.597	0.000
LENBREAK	$-$	-0.286	0.000	-1.078	0.000
UE	$+$	5.996	0.000	32.983	0.000
LENSTRING	$-$	-0.033	0.002	-0.067	0.004
ln(MV)	$+$	0.412	0.000	0.674	0.000
Constant	$-$	-3.025	0.000	-6.317	0.000
R^2		0.028		0.055	
N		13,066		13,092	

[a]Variables are defined as in table 1, except ln(MV) is the logarithm of the market value of equity at the end of the previous quarter, and BM is the ratio of book value to the market value of equity at the end of the prior quarter. These observations are lost because the returns data needed to compute AR30 is unavailable. Reported p-values are based on two-tailed significance levels. As discussed in the text, results exclude outliers identified using Cook's (1977) distance statistic.

Table 3
Fixed-effects regression of NETBUY on dummy variables denoting the time between the observation quarter and the subsequent break in a string of consecutive earnings increases and control variables[a]

Variable	Predicted Sign	Coefficient estimate	p-value
BREAK	?	0.297	0.021
STRING1	?	0.222	0.110
STRING2	?	-0.032	0.837
STRING3	?	-0.380	0.027
STRING4	?	-0.401	0.028
STRING5	?	-0.886	0.000
STRING6	?	-0.210	0.373
STRING7	?	-0.754	0.005
STRING8	?	-0.360	0.228
STRING9	?	-0.655	0.052
STRING10	?	0.056	0.880
STRING11	?	-0.378	0.358
STRING12	?	0.294	0.517
STRING13	?	0.266	0.600
STRING14	?	-0.424	0.447
STRING15	?	-0.182	0.769
STRING16	?	-0.693	0.325
BEGSTRING	?	-0.117	0.780
ln(MV)	−	-1.302	0.000
BM	+	1.145	0.000
DUR	−	-0.063	0.000
PRIORRET	−	-1.800	0.000
EVENTRET	−	-13.937	0.000
POSTRET6	+	1.860	0.000
POSTRET12	+	0.674	0.000

[a]In the regressions ln(MV) and BM are as of the end of the observation quarter. STRINGq is a dummy variable equal to one if the observation is part of a string at least q quarters long and is q quarters before the break of that string; otherwise zero. BREAK is a dummy variable equal to one if the observation marks the end of the string (i.e., the earnings change relative to the same quarter of previous year is negative, and the previous quarter's earnings change is positive); otherwise zero. BEGSTRING is equal to one for observations that are part of a string and are more than 16 quarters before the break. All other variables are defined in table 1. The adjusted R^2 of the regression is 0.045. There are 78,215 firm-quarter observations. Reported p-values are based on two-tailed significance levels. As discussed in the text, results exclude outliers identified using Cook's (1977) distance statistic.

Table 4
Fixed-effects regressions of NETBUY on dummy variables denoting the time between the observation quarter and the break and control variables, where observations are broken down by firm type, break length, magnitude of earnings decline at the break, and string length[a]

Variable	Firm type				Break length				Earnings decline				String length			
	Growth (1)		Value (2)		Long (3)		Short (4)		Large (5)		Small (6)		Long (7)		Short (8)	
BREAK	0.320	**	0.296	**	0.679	***	0.171		0.519	***	0.107		0.311	**	0.366	***
STRING1	0.255		0.236		0.418	**	0.179		0.253		0.275		0.256		0.102	
STRING2	-0.554	**	0.354	*	0.016		0.007		-0.171		0.160		-0.112		-0.139	
STRING3	-1.161	***	0.195		-0.429	*	-0.236		-0.488	**	-0.208		-0.934	***	-0.169	
STRING4	-0.982	***	0.031		-0.428		-0.327		-0.706	***	-0.122		-0.835	***	-0.314	
STRING5	-1.783	***	-0.104		-1.376	***	-0.340		-1.372	***	-0.359		-0.926	***	-1.031	***
STRING6	-1.013	***	0.444		-0.743	**	0.284		-0.371		0.025		-0.447		-0.104	
STRING7	-1.241	***	-0.529		-1.227	***	-0.162		-1.252	***	-0.270		-0.736	*	-0.882	**
STRING8	-0.647		-0.272		-0.774	*	0.069		-0.567		-0.132		-0.304		-0.587	
STRING9	-1.550	***	0.106		-0.935	*	-0.262		-1.156	**	-0.225		-0.903	*	-0.664	
STRING10	-0.596		0.568		0.757		-0.027		-0.046		0.208		0.201		-0.583	
STRING11	-0.398		-0.370		-0.017		-0.265		-0.251		-0.425		-0.381		-0.876	
STRING12	-0.095		0.478		0.083		0.592		0.518		0.198		0.297		-0.156	
STRING13	0.036		0.202		0.583		0.466		-0.106		0.663		0.390		-0.258	
STRING14	-0.050		-1.214		-0.555		0.006		-0.466		-0.360		-0.291		-0.869	
STRING15	-0.248		-0.256		0.052		-0.109		0.251		-0.726		-0.060		-0.495	
STRING16	-0.636		-0.816		-0.530		-0.426		-1.171		-0.383		-0.881		-0.102	
BEGSTRING	-0.052		-0.099		-0.938		0.447		0.648		-0.965	*	0.070		-0.670	
ln(MV)	-1.326	***	-0.878	***	-1.113	***	-1.194	***	-1.118	***	-1.107	***	-1.214	***	-1.134	***
BM	1.154	***	0.988	***	1.282	***	1.007	***	1.062	***	1.393	***	1.220	***	0.954	***
DUR	-0.030	*	-0.102	***	-0.057	***	-0.062	**	-0.088	***	-0.069	***	-0.055	***	0.011	
PRIORRET	-1.782	***	-1.924	***	-1.963	***	-1.853	***	-1.926	***	-1.807	***	-1.915	***	-1.976	***
EVENTRET	-14.521	***	-11.307	***	-12.949	***	-12.220	***	-12.680	***	-12.318	***	-13.773	***	-12.054	***
POSTRET6	2.093	***	1.755	***	2.230	***	1.884	***	1.942	***	2.162	***	1.971	***	1.877	***
POSTRET12	0.718	***	0.668	***	0.858	***	0.669	***	0.730	***	0.733	***	0.734	***	0.646	***
Adjusted R^2	0.053		0.031		0.049		0.039		0.050		0.036		0.050		0.037	
Observations	52,643		56,693		42,282		52,643		47,538		49,692		52,627		56,709	
Firms	4,103		4,100		3,643		3,970		3,820		3,964		4,124		4,117	

Table 4 (continued)

[a]To form the samples for each regression, we first identify each quarterly earnings announcement as either an increase or decrease relative to the announcement for the same quarter of the previous year. Firm-quarters where earnings decrease are included in each of the eight regressions. Each firm-quarter with available data and for which earnings increase is included in four of the eight regressions depending on characteristics of the firm, the string, and the break. If at the time of the earnings announcement the book-to-market ratio in the previous quarter is less (greater) than the median book-to-market ratio of all sample firms with positive earnings increases, the observation is included in the growth (value) regression. If the break that ends the string is one or two (three or more) quarters long, the observation is included in the short break (long break) regression. If the earnings decline at the break is greater than (less than) the median earnings decline, the observation is included in the large decline (small decline) regression. If the firm-quarter is preceded by at least (less than) three earnings increases, the observation is included in the long string (short string) regression. All variables are as defined in tables 1 and 3. Significance levels of 10%, 5%, and 1%, based on two-tailed tests, are denoted by *, **, and ***, respectively.

Table 5
Fixed-effects regression of NETBUY on dummy variables denoting the time between the observation quarter and the break (interacted with firm type, string length, magnitude of earnings decline, and break length) and control variables[a]

Variable	Coefficient estimate	p-value
BREAK	0.304	0.020
STRING1-2	0.053	0.685
STRING3-9	0.392	0.030
STRING3-9*GROWTH	-0.853	0.000
STRING3-9*LONGBREAK	-0.543	0.001
STRING3-9*LARGEDECLINE	-0.387	0.020
STRING3-9*LONGSTRING	-0.274	0.118
STRING10UP	-0.135	0.545
ln(MV)	-1.247	0.000
BM	1.066	0.000
DUR	-0.047	0.001
PRIORRET	-1.736	0.000
EVENTRET	-14.008	0.000
POSTRET6	1.857	0.000
POSTRET12	0.666	0.000

[a]STRING1-2 is equal to the sum of STRING1 and STRING2. STRING3-9 is equal to the sum of STRING3, STRING4, STRING5, STRING6, STRING7, STRING8, and STRING9. STRING10UP is equal to the sum of STRING10, STRING11, STRING12, STRING13, STRING14, STRING15, STRING16 and BEGSTRING. GROWTH is 1 if the firm-quarter is part of a string at a growth firm, and is 0 otherwise. LONGBREAK is 1 if the firm-quarter is part of a string that ends with a break longer than two quarters, and is 0 otherwise. LARGEDECLINE is 1 if the earnings decline that ends the string is larger than the median decline, and is 0 otherwise. LONGSTRING is 1 if the firm-quarter corresponds to an earnings increase that follows three or more previous quarters of earnings increases, and is 0 otherwise. All other variables are as defined in tables 1 and 3. The adjusted R^2 of the regression is 0.046. There are 76,550 quarterly observations for 4,131 firms. Reported p-values are based on two-tailed significance levels.

Table 6
Median abnormal returns from the end of the observation quarter until the break, by direction of insider of trade[a]

| Quarter relative to the break | Median abnormal return from the observation quarter to the break | | | Ranksum test of difference in medians p-value | | |
	NETBUY < 0 Sell	NETBUY $= 0$ No trade	NETBUY > 0 Buy	Sell .vs no trade	No trade .vs buy	Buy .vs sell
-1	-0.076	-0.057	-0.031	0.00	0.00	0.00
-2	-0.120	-0.075	-0.038	0.00	0.00	0.00
-3	-0.139	-0.076	-0.051	0.00	0.03	0.00
-4	-0.108	-0.069	-0.048	0.00	0.05	0.00
-5	-0.115	-0.026	0.007	0.00	0.04	0.00
-6	-0.088	-0.003	0.106	0.00	0.00	0.00
-7	-0.056	0.057	0.067	0.00	0.62	0.00
-8	-0.025	0.085	0.138	0.00	0.27	0.00
-9	0.028	0.092	0.250	0.03	0.01	0.00
-10	0.057	0.170	0.247	0.01	0.72	0.13

[a]Firm-quarter observations are grouped according to the number of quarters until the break. The observations are further subdivided according to whether the value of NETBUY for the firm-quarter is positive (net insider purchase transactions), zero (net no trade), or negative (net insider sales transactions). For each subgroup, the median abnormal return is computed. Abnormal returns are calculated as the difference between the buy-and-hold raw return and the buy-and-hold return on an equally-weighted market index. For insider trade measured q quarters prior to the break, abnormal returns are computed over the $3 \times q$ calendar months that follow the earnings announcement in quarter $-q$. NETBUY is defined in table 1.

Figure 1

Insider trading intensity and returns preceding a break in a string of earnings increases
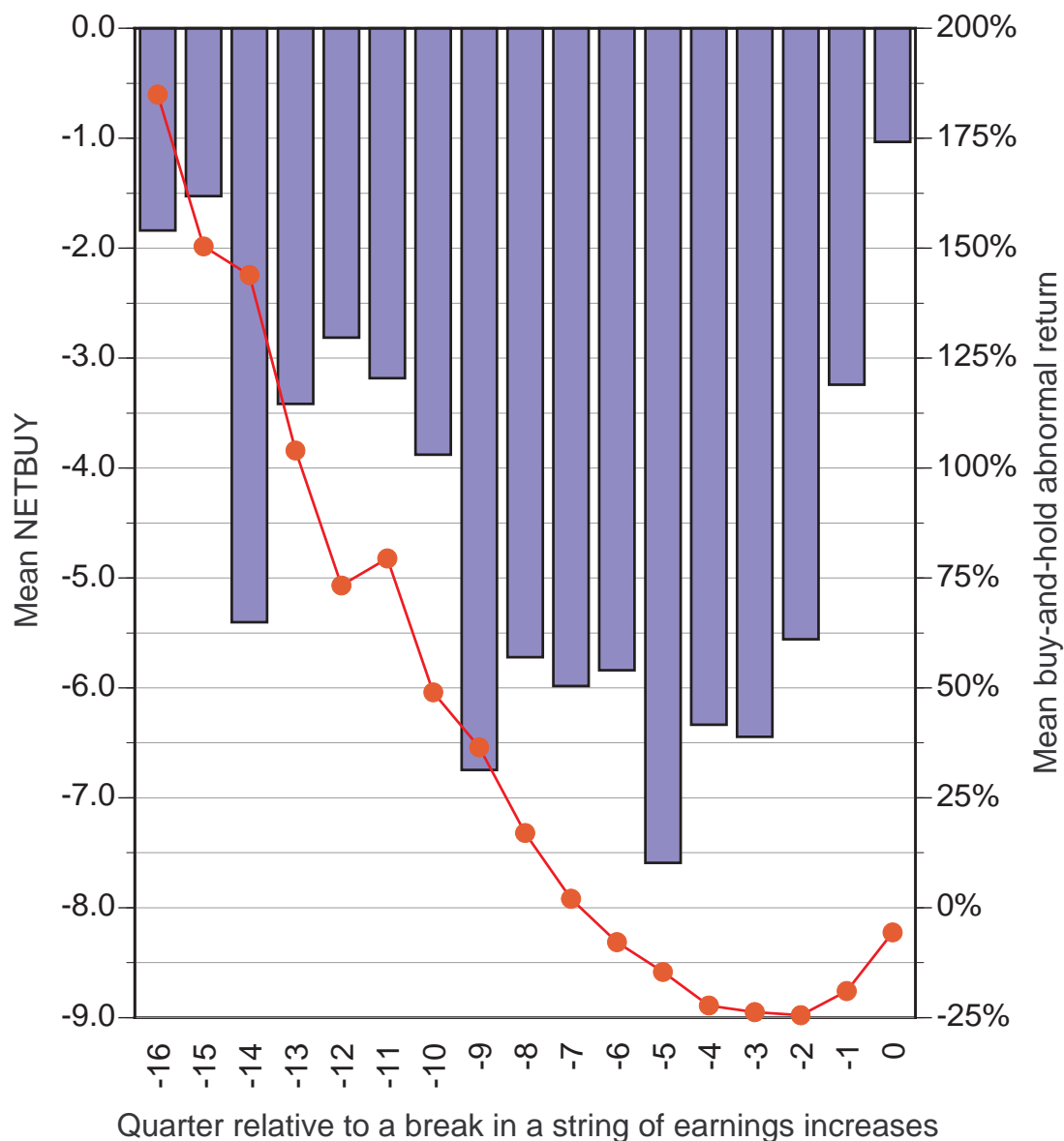
Observations are drawn only from strings where (i) the median book-to-market ratio over the string is less than the median for all strings (i.e., growth firms), (ii) three or more consecutive quarterly earnings decreases follow the string (i.e., long breaks) and (iii) the earnings decline at the break is larger than the median decline at the break (i.e., large declines). In quarter $-q$ relative to the break quarter, the mean of NETBUY and buy-and-hold abnormal returns are calculated using observations for the quarter that are part of strings of length q or more. Because short strings are more common than long strings, means of NETBUY and returns are computed over more observations for quarters closer to the break. For quarter -16, there are 32 observations, while for quarter -1 there are 1,240 observations; there are at least 100 observations for quarters -11 through 0. Bars plot the mean value of NETBUY, which is defined in table 1. Circles plot the buy-and-hold abnormal returns, which is computed by subtracting the buy-and-hold equally-weighted market index return from the raw buy-and-hold return. Because the earnings strings vary in length, the abnormal return is calculated over the period from the beginning of the observation quarter to the end of the month in which the break is announced.

Figure 2
Median abnormal returns from the observation quarter to the break, by direction of insider of trade
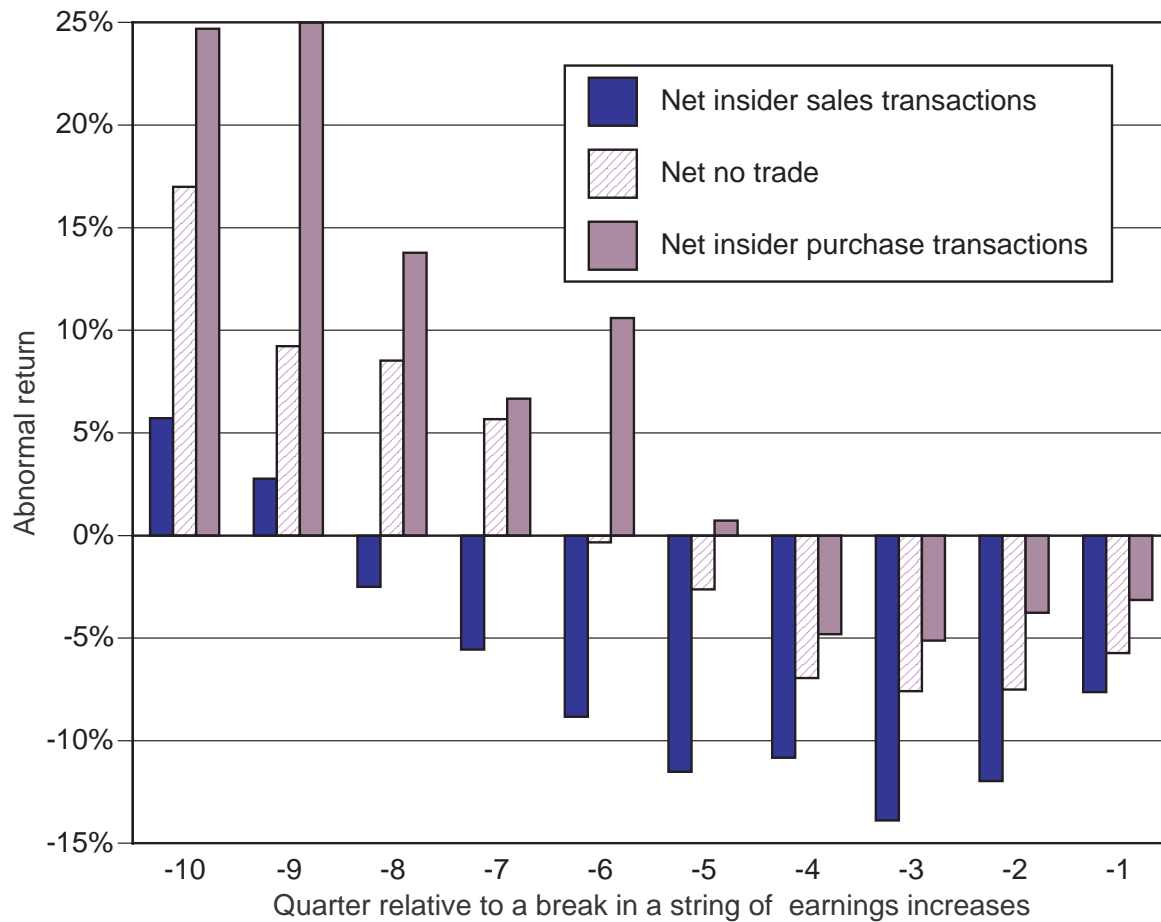
Firm-quarter observations are grouped according to the number of quarters until the break. The observations are further subdivided according to whether the value of NETBUY for the firm-quarter is positive (net insider purchase transactions), zero (net no trade), or negative (net insider sales transactions). For insider trade measured q quarters prior to the break, abnormal returns are computed over the $3 \times q$ calendar months that follow the earnings announcement in quarter $-q$. Table 6 presents the data underlying this figure.