Insider Trading in the Presence of Market Mispricing of Discretionary Accruals

by

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Abstract:

This paper investigates whether insiders exploit market mispricing of discretionary accruals by examining how insider activities and insider gains are related to discretionary accruals. The analysis suggests that insider selling activity and selling gains increase (and insider purchasing activity and purchasing gains decrease) in the presence of higher levels of discretionary accruals. In addition, the relation between insider selling activities and discretionary accruals is weaker towards the end of the fiscal year, implying that insiders avoid selling immediately before price declines in an attempt to deflect investor and regulator scrutiny.

1.   Introduction

Insiders, as defined by the American Securities and Exchange Act of 1934, refer to large stockholders who own indirectly or directly more than 10% of any class of stock traded on a national securities exchange, or directors or officers of the issuer of the stock. Insider trading based on the private knowledge of any material information is prohibited, and insiders are required by law to file with the American SEC information pertaining to all transactions in their firm's stocks. A considerable amount of research has been devoted to examining the consequences of insider trading and the effectiveness of insider trading regulation. It has been argued that insider trading: detracts from the public's perceived fairness of capital markets (Brudney, 1979), decreases firm value (Masson and Madhavan, 1991), leads to less efficient stock prices (Fishman and Hagerty, 1992), and causes managers to avoid commercially viable investments (Manove, 1989). Others contend that insider trading is part of management compensation (Carlton and Fischel, 1983) and facilitates information dissemination (Manne, 1966). Based on the second perspective, regulating insider trading could hamper information dissemination within financial markets. Hence, because of its public policy implications, the issue of insider trading commands continuing research attention.

Some of the earliest accounting researchers to investigate the relation between insider trading and accounting information were Penman (1982) and Elliott et al. (1984). The primary focus of these studies was on public announcements of notable information events (e.g., dividends, earnings, mergers, etc.). This paper takes a different approach by examining whether insider trading is related to more generic accounting information. Specifically, this study documents the relation between mispriced accounting information and insider trading.

Recent accounting research has documented that the market misprices certain accounting information and reverses its mispricing in future periods.[1] However, insiders have access to firm specific information and

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[1]   For example, Teoh et al. (1998a; 1998b) show that firms with abnormal income increasing accruals in the year of a public equity offering experience lower stock returns in the post-issue years. Dechow et al. (1996) and Beneish (1999) report that firms alleged to have violated GAAP suffer significant drops in stock price upon the announcement of the alleged violation. Sloan (1996) found that firms taking higher current accruals experience lower future abnormal returns and

are better able to decompose this garbled information signal. Therefore, if insiders anticipate the market's subsequent reversing of the mispricing and act on this accordingly, insiders' trades would exhibit an association with the mispriced accounting information. For example, insider selling may occur when a firm's accounting earnings are overvalued and insider purchasing may take place when the earnings are undervalued. In this regard, recent corporate scandals involving Enron revealed that the top executives sold their shares when Enron's earnings were overpriced by the market. It was only after the insider sales were executed and the accounting problems in Enron's financial reporting were exposed that the market revised down the value of Enron's stocks.

This paper addresses whether annual discretionary accruals affect insiders' trading behavior and therefore constitute a significant source of insider gains. Discretionary accruals are the focus of the study because management may use discretionary accruals to inflate profitability, and the market tends to misprice discretionary accruals measured on an annual basis (Xie, 2001). Thus, discretionary accruals can grant managers an informational advantage and a potential to realize insider gains. This paper hypothesizes that insider selling activities and selling gains increase as discretionary accruals increase and that insider purchasing activities and purchasing gains decrease as discretionary accruals increase.[2] The rationale for this hypothesis is that higher discretionary accruals signal weaker future performance whereas lower discretionary accruals signal stronger future performance of a firm. The paper also investigates whether insiders time their trades to avoid intensive scrutiny from regulators, investors, or the financial press around earnings release dates close to the end of the fiscal year. This has been achieved by testing whether the relationship between

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firms taking lower current accruals experience higher future abnormal returns. Xie (2001) extended Sloan's (1996) work by demonstrating that his findings were largely attributable to the discretionary component of current accruals. The evidence from these studies suggests that the market does not always see through the reported accounting information and therefore revises its initial expectations in the subsequent periods. See Healy and Wahlen (1999) for a further review on the literature.

[2]　By insider gains (or insider profits), this paper refers to the magnitude (or the absolute value) of the positive abnormal returns to insider purchases and the magnitude of the negative abnormal returns to insider sales.

discretionary accruals and insider trading is stronger at the midpoint of the year as opposed to the end of the year.

The major contribution of the study is that it examines insiders' behavior for a larger group of firms whose earnings manipulation is generally within the bounds of GAAP and, therefore, is less extreme. Previous research investigates insider trading in relation to more obvious information events (Dechow et al., 1996; Summers and Sweeney, 1998; Beneish, 1999; Ke et al., 2001; Beneish and Vargus, 2002).   For example, Dechow et al. (1996) and Beneish (1999) investigate insider behavior when extreme earnings inflation prompts SEC enforcement action, and Ke et al. (2001) test changes in insider trading patterns prior to a break in a string of consecutive rises in earnings. Thus, these studies confine their research samples to a group of firms whose earnings management have been charged by regulatory agencies, or to firms whose earnings patterns have undergone notable changes. In contrast, by focusing on the relationship between discretionary accruals and insider trading, this study examines the insider trading pattern when there are no unusual information events taking place. The current paper also complements recent research conducted by Beneish and Vargus (2002), who document that trading rules based on insider activity and accrual information earn significantly higher abnormal returns, by empirically addressing the question whether managers do in fact exploit their knowledge of accruals or discretionary accruals to obtain insider profits.

The major results are as follows. First, insider selling activities and insider profits from sale transactions increase (insider purchasing activities and insider profits from purchase transactions decrease) when discretionary accruals are higher.   Therefore, information about discretionary accruals seems to influence insiders' trading decisions. Second, the positive relationship between insider selling activities and discretionary accruals becomes weaker towards the end of the year. Thus, concerns for scrutiny from stockholders and regulatory authorities may have prevented insiders from trading on the information events immediately before the information release.   Third, the negative relationship between insider purchasing activities and discretionary accruals does not vary significantly between the beginning, middle, or the end of the year. This suggests that insiders are not concerned about stockholder and regulator scrutiny brought about by the timing of purchases. This result is consistent with more media attention and legal

processes being directed towards extensive insider sales associated with future price declines rather than towards insider purchases associated with future price increases.

The rest of the paper proceeds as follows. Section 2 reviews the literature and develops the testable hypotheses. Section 3 describes the measurements of major variables, and Section 4 presents descriptive statistics and the results of hypothesis testing. In order to validate the existence of market mispricing of discretionary accruals, this study replicates Xie's (2001) hedge portfolio tests and the results are presented before the hypothesis testing. Section 5 concludes the paper and offers suggestions for future research.

2.   Literature and Hypotheses

Accounting researchers have studied the relationship between insider trading activities and certain accounting information (Penman, 1982; Elliott et al., 1984; Penman, 1985) and, generally, the evidence supports the notion that managers possess and trade upon such information. For example, Dechow et al. (1996) investigated a sample of firms that had been subject to enforcement actions by the SEC. The authors found no evidence that the officers and directors of these firms sold a significantly greater proportion of their firms in comparison with the control firms. Beneish (1999) examines the same group of firms and utilizes a different measure of insider equity disposition, but unlike Dechow et al. (1996), he finds systematic evidence that managers are more likely to sell their holdings when earnings are overstated. More recently, Beneish and Vargus (2002) document evidence that income increasing accruals and discretionary accruals have lower persistence when managers have abnormally higher selling activity levels.

Within the environment of financial reporting, the source of informational advantage of insiders largely results from the problem of asymmetric information and market mispricing. Investors do not always see through the discretionary nature of financial reporting and, in some circumstances, fixate only on the reported accounting numbers. Sloan (1996), for example, finds that firms with earnings that have large accrual components tend to experience negative future returns, whereas firms with current earnings that have low accrual components tend to experience positive future returns. Further, Xie (2001) documents evidence that the market overprices abnormal accruals by

overestimating the persistence of abnormal accruals. Whilst the market reverses its initial reaction to firms' financial reporting by adjusting the subsequent stock returns, the above findings suggest that the market fails to initially fully process the accrual or discretionary accrual information when firms release their financial reports (Healy and Wahlen, 1999).

In the short run, the market's inability to fully take into account the possible implications of the problem of asymmetric information concerning firms' financial reporting provides an exploitable opportunity for managers to enhance their personal wealth via insider trading. For example, firms' use of positive discretionary accruals to manage up earnings causes temporary positive market reaction, but in the long run, the price reverts back to its fundamental level. As already noted, insiders possessing the information of positive discretionary accruals can act on their foreknowledge of a weaker future firm performance by selling shares when the current prices are higher, thus deriving trading gains that are positively related to the level of discretionary accruals. In the case of negative discretionary accruals, in anticipation of a stronger future firm performance, insiders may purchase shares when the current prices are lower and will be able to derive trading gains that are negatively related to the level of discretionary accruals. Thus, it is conjectured that there will be a positive relation between discretionary accruals and insider selling activities and selling gains, and a negative relationship between discretionary accruals and insider purchasing activities and purchasing gains. This leads to the following hypotheses:

H1: *Insider selling (purchasing) activities will increase (decrease) as discretionary accruals increase.*

H2: *Insider gains from sales (purchases) will increase (decrease) as discretionary accruals increase.*

Insiders may also carefully time their trades in order to take advantage of private information and, at the same time, to avoid the appearance of profiteering. For example, Ke et al. (2001) find that insiders increase stock sales about two years prior to a break of a string of consecutively increasing quarterly earnings, but detect no abnormal insider selling in the two quarters immediately before the break. Noe (1999) finds that insiders may wait until after voluntary information is disclosed to exploit their knowledge of firms' long-run performance in order to avoid "an appearance of impropriety" (Noe, 1999, p.325). In this study, it is

expected that discretionary accrual based trading activities and trading gains will decrease as the earnings release date approaches. In other words, the relationship between discretionary accruals and trading activities or trading gains will be weaker for the period immediately before earnings releases.

While insiders may refrain from extensive discretionary accrual based trading towards the *end* of the fiscal year, the discretionary accrual based trades may not be equally concentrated at the *beginning* of the year either. Instead, insiders may wait until the middle of the year to engage in more extensive discretionary accrual based trades. There are two reasons for this proposition. First, by the middle of the year insiders will have relatively more certain information on the level of discretionary accruals that is to be included in the forthcoming earnings. Second, compared with the transactions at the beginning of the year, transactions in the middle of the year are closer to potential market reversing, which occurs mostly in the subsequent year. Insiders intending to exploit their informational advantage may execute their transactions close to the anticipated reversing of the market (but not so close to the reversing in an effort to avoid potential scrutiny from regulators and investors) to ensure insider gains.

In summary, the above arguments suggest that the relation between insider activities and discretionary accruals and the relation between insider gains and discretionary accruals should be stronger for the middle of the year than either at the end or the beginning of the fiscal year. This leads to the third hypothesis:

H3:   The hypothesized relationships in H1 and H2 will be stronger around the midpoint of the fiscal year.

Consistent with Aboody and Lev (2000), the paper does not attempt to identify or isolate the effect of specific information events (e.g., dividend announcements, bankruptcy, or the approval of a patent) in the research design because there is evidence that insiders do not profit from the immediate information events. Instead, the profitability of insider trading is more likely to be related to generic factors (e.g., Sivakumar and Waymire, 1994; Noe, 1999). Thus, this study concentrates on whether discretionary accruals as a generic factor affect insider trading after controlling for the risk factors associated with firm size and book-to-market ratios.

3.   Variable Measurements

Accounting Accruals: Total, Nondiscretionary, and Discretionary

The estimation of total, nondiscretionary, and discretionary accruals follows Subramanyam (1996) and Xie (2001). First, total accruals are measured as follows:

$$TAC_{i,t} = \frac{IB_{i,t} - CFO_{i,t}}{AT_{i,t-1}} \tag{1}$$

where TAC is total accounting accruals. IB is the income before extraordinary items, and CFO is the net cash flow from operating activities, both scaled by lagged total assets AT_{t-1}.

Nondiscretionary (or expected) accruals (NDAC) are obtained by estimating equation (2) and then plugging the estimated coefficients in equation (3):

$$TAC_{i,t} = \alpha_1 \frac{1}{AT_{i,t-1}} + \alpha_2 \frac{\Delta REV_{i,t}}{AT_{i,t-1}} + \alpha_3 \frac{PPE_{i,t}}{AT_{i,t-1}} + \varepsilon_{i,t} \tag{2}$$

$$NDAC_{i,t} = \hat{\alpha}_1 \frac{1}{AT_{i,t-1}} + \hat{\alpha}_2 \frac{\Delta REV_{i,t}}{AT_{i,t-1}} + \hat{\alpha}_3 \frac{PPE_{i,t}}{AT_{i,t-1}} \tag{3}$$

where ∆REV is the change in revenues, PPE is the level of property, plant, and equipment.   Thus, equations (2) and (3) define nondiscretionary accounting accruals as a function of changes in a firm's revenues and long-term assets. Two-digit SIC codes are used to define an industry and equations (2) and (3) are estimated for each industry-fiscal year combination.   Combinations having fewer than six observations are dropped along with those firm-year observations with fiscal year changes.

Finally, discretionary accruals are the difference between total accruals and nondiscretionary accruals, that is, the residuals from estimating equation (2):

$$\begin{aligned} DAC_{i,t} &= TAC_{i,t} - NDAC_{i,t} \\ &= TAC_{i,t} - \hat{\alpha}_1 \frac{1}{AT_{i,t-1}} - \hat{\alpha}_2 \frac{\Delta REV_{i,t}}{AT_{i,t-1}} - \hat{\alpha}_3 \frac{PPE_{i,t}}{AT_{i,t-1}} \end{aligned} \tag{4}$$

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All variables are identified from COMPUSTAT as described by Xie (2001). If an insider transaction takes place within a twelve-month period ending three months after the closing of the fiscal year *t*, then that transaction is matched with the accrual data for year *t*. Observations with operating cash flows (scaled by lagged total assets), nondiscretionary accruals, and discretionary accruals falling outside three standard deviations from their respective means are also excluded.

Firm-Year Observations: Firm Returns, Insider Returns, and Trading Activities

Fama and French (1992) contend that not all of a stock's return can be explained by market betas (obtained by regressing a stock's return on the market return). Subsequent research by Fama and French (1993) further shows that size and book-to-market ratios capture common risk factors in stock returns. Therefore, in this study, excess returns (or abnormal returns) are defined as the raw returns less the reference portfolio returns formed on the basis of size and book-to-market equity. Following Lyon et al.'s (1999) procedure, seventy size and book-to-market control portfolios are formed, and the control portfolio returns are calculated in such a way as to eliminate new listing and rebalancing biases. The difference between the firm's annual returns (accumulated over a twelve-month period ending three months after the fiscal year end) and the control portfolio returns constitutes the abnormal buy-and-hold returns.

The accumulation of insider returns starts with the first month following the month in which the insider transaction occurs. The abnormal insider returns are weighted by the dollar amount of transactions in a firm-year, and are reported for purchase and sale transactions respectively.[3]

The trading activity measure for firm-year observations, YIND, follows John and Lang (1991) and Beneish (1999). It is defined as [(PV – SV) / (PV + SV)], where PV and SV are the dollar amounts of purchases and sales, respectively. Compared to the measure employed by Dechow et

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[3]   Empirical tests using equally weighted insider returns (i.e., the abnormal insider returns averaged across insider trades) yield similar results.

al. (1996), this measure increases the "likelihood of detecting an effect" of the variations in insiders' trading pattern (Beneish, 1999, p.427). [4, 5]

Firm-Month Observations: Timing and Trading Activities

The timing of transactions is the number of months to the month when annual earnings are released, which is assumed to be the third month after the end of the fiscal year. This paper categorically defines a period as being the end of the year when a transaction takes place 0, 1, 2, or 3 months to the end of the twelve-month period, and a period as the beginning of the year when a transaction takes place 9, 10, or 11 months to the end of the twelve-month period.

To capture the monthly variations of trading activities, three indices are constructed for purchase and sale transactions, respectively. MIND_SH_PUR gauges the fluctuation in the number of shares being purchased, calculated as the number of shares purchased in a month divided by the number of shares traded during the entire year. The second measure, MIND_VL_PUR, is the dollar value of purchases in a given month divided by the total dollar value of transactions in the entire year. The third measure, MIND_TR_PUR, concerns monthly variations in the number of purchase transactions made and is defined as the number of purchases divided by the total number of transactions during the entire year. The indices measuring monthly selling activities, MIND_SH_SEL, MIND_VL_SEL, and MIND_TR_SEL are defined and calculated in a similar manner as the monthly purchasing activity indices.

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[4]   However, this index does not account for the intensity of trading. To address this drawback, Beneish (1999) sets the index as zero if within the period of interest there are fewer than five insider transactions. In the current paper, this procedure significantly reduces the variances of the activity index because 36% of the firm-year observations have fewer than five insider transactions. Therefore, the current study includes the number of transactions in the regression model as a proxy for trading intensity rather than setting the index equal to zero.

[5]   YIND calculated using the number of shares traded provides similar empirical results.

4.   Empirical Results

Descriptive Statistics

Insider transaction data are taken from the First Call Insider Research Services Historical Files for the period from January 1988 to December 1999. The files cover transactions reported in Forms 3, 4, and 5 filed with the SEC by corporate insiders. A total of 881,971 open market transactions by directors and officers are identified. Table 1 Panel A reports the sample screening process. Duplicate transactions, or transactions for which there is insufficient information to identify the firm's size and book-to-market reference portfolios or to calculate the accrual data and two-year-ahead firm returns, are excluded. The final sample consists of 462,526 transaction records, including 140,027 purchases and 322,499 sales, covering 36,121 firm-years and 7,290 firms.

Table 1 Panel B reports the summary statistics for the identified sample. The average number of insider transactions per firm occurring during a year is 12.80 with a standard deviation of 19.16. In contrast, the median number of transactions is 7, indicating that for some firm-year observations the occurrences of insider transactions are extremely high, causing the data series to be skewed to the right. For example, the number of insider trades occurring at the 99th percentile is 89.

Typically, about 1.36% of the firms' outstanding shares and 1.74% of the firms' market value are traded by insiders during a year, with sale transactions accounting for the majority of the traded shares and dollar values. For example, the number of shares traded in purchase transactions is 0.38% of the total number of shares outstanding, while the shares traded in sale transactions account for 0.98% of the shares outstanding. Similar to the number of transactions measure, the two proportion measures are positively skewed.

Table 2 Panel A reports summary statistics for accounting accruals, operating cash flows, and earnings. The average of the discretionary accrual variable (DAC) is positive (0.0041) and stands in contrast

Table 2 cont.

9	−0.0366	−0.0193	0.0103	−0.0222	0.0004	−0.0181	0.0072	−0.0203	0.0176
	(−2.07)*	(−1.45)	(0.24)	(−0.90)	(0.02)	(−0.76)	(0.45)	(−2.26)***	(1.81)*
10	−0.0621	−0.0188	0.0132	−0.0586	−0.0073	0.0329	0.0324	0.0224	−0.0037
	(−3.12)***	(−0.67)	(0.55)	(−2.28)**	(−0.27)	(1.70)	(1.35)	(1.97)*	(−0.19)
Hedge Returns	0.1523	0.1178	0.0663	0.0870	0.0773	−0.0164	0.0196	0.0581	0.1454
	(2.34)**	(3.30)***	(1.07)	(2.33)**	(1.70)	(−0.58)	(0.17)	(0.60)	(1.43)

[a] The equation used in calculating total accounting accruals (TAC) is:

$$TAC_{i,t} = \frac{IB_{i,t} - CFO_{i,t}}{AT_{i,t-1}}$$

where *IB* is the income before extraordinary items, and *CFO* is the net cash flow from operating activities, both scaled by lagged total assets AT_{t-1}. Discretionary accruals (*DAC*) are the error terms (ε) obtained from estimating the following equation:

$$TAC_{i,t} = \alpha_1 \frac{1}{AT_{i,t-1}} + \alpha_2 \frac{\Delta REV_{i,t}}{AT_{i,t-1}} + \alpha_3 \frac{PPE_{i,t}}{AT_{i,t-1}} + \varepsilon_{i,t}$$

where ΔREV is the change in revenues, and *PPE* is the level of property, plant, and equipment. Nondiscretionary accruals (*NDAC*) are the expected value based on ΔREV and *PPE*. Two-digit SIC codes are used to define an industry, and discretionary accruals are estimated for each industry-fiscal year combination. Combinations having fewer than six observations are dropped along with those firm-year observations with fiscal year changes. Observations with operating cash flows (*CFO*, scaled by lagged total assets), nondiscretionary accruals, and discretionary accruals falling outside three standard deviations from their respective means are also excluded. Finally, an insider transaction occurring within a twelve-month period that ends three months after the closing of the fiscal year *t* is matched with the accrual data for year *t*.
[b] All correlation coefficients are different from zero with a significance level of less than 0.0001 (two-tailed).
[c] Portfolio returns are calculated as the time series means of equally weighted firm returns adjusted for size and book-to-market ratios for the period from 1988 to 1999. Hedge returns are obtained by buying the assets contained in the first portfolio and selling the assets contained in the tenth portfolio. Returns data are reported for observations with December fiscal year-ends only (n = 20,887). Non-December fiscal year-end observations show a similar pattern.

*: significance level <= 0.1 (two-tailed);
**: significance level <=0.05 (two-tailed);
***: significance level <= 0.01 (two-tailed).

with the negative mean (−0.0004) reported by Xie (2001, Table 1).[6] Statistics reported for other variables are mostly comparable to those

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6   Two factors may have caused the difference. First, a different sample covering the period of 1988 to 1999 is used in this paper. Second, the sample firms are

reported by Xie (2001) although variables in the current study tend to have higher standard deviations.

Table 2 Panel B contains the Pearson correlation matrix reported for the overall sample of 36,121 firm-year observations. Discretionary accruals are negatively related to nondiscretionary accruals (correlation = −0.2746) and positively correlated with total accruals (correlation = 0.8336). This is expected because, by definition, total accruals can be decomposed into discretionary and nondiscretionary accruals. If the nondiscretionary component is higher, given a fixed level of total accruals, the discretionary component will be lower. Further, as total accruals increase, discretionary accruals are also likely to increase as the discretionary accruals are one component of total accruals. Panel B further shows that total, discretionary, and nondiscretionary accruals are all negatively correlated with the operating cash flows (for total accruals, correlation = −0.2928; for nondiscretionary accruals, correlation = −0.0438; for discretionary accruals, correlation = −0.2700). This is expected because earnings are comprised of total accruals and cash flows. As cash flow amounts increase, the amounts of all types of accruals (including total, discretionary, and nondiscretionary) will decrease.

Table 2 Panel C reports portfolio returns, calculated as the time series means of equally weighted firm returns adjusted for size and book-to-market ratios for the period from 1988 to 1999.[7] The patterns of the portfolio returns in relation to discretionary accruals validate market mispricing of discretionary accruals for the current sample. The hedge portfolio returns, obtained by selling the assets with the highest discretionary accruals and buying the assets with the lowest discretionary accruals, are significant for year t + 1 (return = 0.1523; *t-stat* = 2.34) and year t + 2 (return = 0.1178; *t-stat* = 3.30), but not significant for year t + 3 (return = 0.0663; *t-stat* = 1.07). Additionally, untabulated statistics show that there exists an inverse relationship between the portfolio returns and the rank of discretionary accruals

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the trading firms. In order to facilitate insider transactions (most of which are sales), the trading firms may have self-selected to take on positive discretionary accruals.

[7]　Results in Table 2 Panel C are only for December fiscal year-end observations. Adjusted returns show a similar pattern for observations with non-December fiscal year ends.

(Pearson correlation = −0.92 for year t + 1, probability = 0.0002; Pearson correlation = −0.76 for year t + 2, probability = 0.01). That the market tends to reverse mispricing of discretionary accruals in future periods potentially provides an opportunity for insider gains, i.e., insiders may increase the buying activities in year *t* when discretionary accruals are lower and benefit from higher returns in the future periods. Alternatively, insiders may increase the selling activities in year *t* when discretionary accruals are higher and avoid lower returns in the future periods.

For nondiscretionary accruals, the hedge portfolio returns are only significant for year t + 1 (return = 0.0870; *t-stat* = 2.33), and are insignificant for operating cash flows for all years. The Pearson correlation between portfolio returns and the rank of nondiscretionary accruals (untabulated) is negative but insignificant for all years. The correlation between portfolio returns and the rank of operating cash flows (untabulated) is positive and insignificant for year t + 1, but is negative and significant for year t + 2 (Pearson correlation = −0.66, probability = 0.0391).[8]

Table 3 Panel A reports summary statistics for trading activities and insider returns calculated on the firm-year basis. As expected, the mean and median of the yearly trading activity index, YIND, are negative as the dollar value of sales is generally higher than that of purchases. Insider returns are accumulated over three intervals: t + 1 to t + 12, t + 1 to t + 18, t + 1 to t + 24 (with the event month represented as month t). Yearly insider returns are size and book-to-market ratio adjusted returns weighted by the value of trades, reported for purchase and sale transactions separately. Panel A shows that across the three intervals, insiders, *on average*, derive gains by earning positive returns from purchase transactions and by avoiding negative returns from sale transactions. For example, over the 12-month period, average insider returns are 4.3% for purchases and −5.4% for sales.

Table 3 Panel B contains statistics of activity indices and trading returns for firm-month observations. The monthly purchasing activity index, MIND_SH_PUR, shows that for an average firm-month, the number of

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8   This seems to suggest that the pricing of operating cash flows will be reversed in the future as well, although not in the immediate future as for discretionary accruals.

Table 3 Cont.

RET_12_SEL	=	Value-weighted firm size and book-to-market ratio adjusted returns from insider sales, calculated for firm-year observations. Returns start to accumulate from the first month after the month when the insider transaction occurs for the periods of 12, 18, and 24 months, respectively.
RET_18_SEL		
RET_24_SEL		

Definitions of variables for firm-month regressions:

MIND_SH_PUR	=	Monthly trading activity indices, calculated as the number of shares purchased in a month divided by the number of shares traded during the entire year;
MIND_VL_PUR	=	Monthly trading activity indices, calculated as the dollar value of purchases in a given month divided by the total dollar value of transactions in the entire year;
MIND_TR_PUR	=	Monthly trading activity indices, calculated as the number of purchase transactions divided by the total number of transactions during the entire year;
MIND_SH_SEL	=	Monthly trading activity indices, calculated as the number of shares sold in a month divided by the number of shares traded during the entire year;
MIND_VL_SEL	=	Monthly trading activity indices, calculated as the dollar value of sales in a given month divided by the total dollar value of transactions in the entire year;
MIND_TR_SEL	=	Monthly trading activity indices, calculated as the number of sale transactions divided by the total number of transactions during the entire year;
MRET_12_PUR	=	Firm size and book-to-market ratio adjusted returns from insider purchases, calculated for firm-month observations. Returns start to accumulate from the first month after the month when the insider transaction occurs for the periods of 12, 18, and 24 months, respectively;
MRET_18_PUR		
MRET_24_PUR		
MRET_12_SEL	=	Firm size and book-to-market ratio adjusted returns from insider sales, calculated for firm-month observations. Returns start to accumulate from the first month after the month when the insider transaction occurs for the periods of 12, 18, and 24 months, respectively.
MRET_18_SEL		
MRET_24_SEL		

shares purchased by insiders accounts for about 10.3% of the total number of shares traded by insiders over the firm-year (recall that MIND_SH_PUR is the number of shares purchased by insiders in one month divided by the total number of shares traded by insiders during the year). Also note that the medium of this purchase activity index is zero, implying that for over half of the trading months, there are no insider purchases. In contrast, the monthly selling activity index, MIND_SH_SEL, shows that the number of shares sold by insiders in one firm-month accounts for 16.5% of the total number of shares traded by

insiders in the firm-year, and the medium of MIND_SH_SEL is 4%. The indices calculated using dollar amounts and number of transactions provide similar interpretations. Panel B also shows that the means of value-weighted insider returns from purchase transactions remain positive, representing insider gains. However, the average insider returns from sale transactions are positive for the 12-month interval, representing insider losses from sales for firm-month observations. To reduce undue impacts of extreme values on data analyses, the variables used in all regressions are truncated at the 1st and 99th percentiles.

Tests of H1

The following regression is estimated for firm-year observations to test the positive relation between discretionary accruals and insider selling activities and the negative relation between discretionary accruals and insider purchasing activities (H1):

$$YIND_{i,t} = \beta_0 + \beta_1 DAC_{i,t} + \beta_2 NDAC_{i,t} + \beta_3 CFO_{i,t} + \beta_4 LSIZE_{i,t}$$
$$+ \beta_5 BMR_{i,t} + \beta_6 TRAN_{i,t} + \varepsilon_{i,t} \tag{5}$$

where all variables are as previously defined.[9] A lower negative value of trading indices implies more selling activities. Therefore, a negative coefficient on DAC would support the hypothesized positive (negative) relation between insider selling (purchasing) and discretionary accruals.

NDAC and CFO are included as independent variables to control for possible effects of nondiscretionary accruals and cash flows on insider trading activities. Since the pattern of the market reversing the pricing of NDAC and CFO is not obvious, this study does not make predictions for the directions of NDAC and CFO. As in Ke et al.'s (2001) study, the log of firm size (LSIZE) and book-to-market ratios (BMR) are also included, with the former expected to be negatively associated and the latter positively associated with the dependent variable. The variable TRAN, representing the number of transactions during one year, is included to control for the effect of trading intensity (see Footnote 4). It is predicted that TRAN is negatively associated with YIND. The condition for such a

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[9]   The variance inflation factor, or VIF (Bowerman et al., 1986), is calculated for each independent variable in equation (5) and for all the independent variables used in other regression models. No serious influence of multicollinearity on the coefficients is detected.

negative association is that as the number of transactions increases, the proportion of the value of sales increases at a faster rate. This condition appears to hold for the sample, given that the majority of the dollar value traded is from sale transactions.

The results are reported in Table 4 Panel A. The coefficient on DAC is negative and significant (coefficient = −0.6875, *t-stat* = −13.82), supporting the hypothesis that a higher level of discretionary accruals will induce more insider selling and a lower level of discretionary accruals will induce more insider purchasing. Also consistent with predictions, as the book-to-market ratio increases, insider purchases increase (coefficient = 0.2707, *t-stat* = 24.27), and as the number of transactions increases, the dollar value of sale transactions tends to increase (coefficient = −0.0122, *t-stat* = −33.84). The sign on the firm size variable is as predicted (coefficient = −0.1345, *t-stat* = −21.94), indicating that insiders sell more in larger firms.

It is noteworthy that, like discretionary accruals, the coefficients on NDAC and CFO are negative, indicating that a higher level of nondiscretionary accruals and operating cash flows will prompt insiders to sell more shares or buy fewer shares. This may be caused by insiders' perception that earnings generally are temporary, and that the market will reverse the pricing of these two components (nondiscretionary accruals and cash flows) of earnings.

Tests of H2

The second hypothesis concerns firm-year insider gains with relation to discretionary accruals. The following regression is for the abnormal insider purchase returns accumulated over the 12-month interval:

$$RET\_12\_PUR = \beta_0 + \beta_1 DAC_{i,t} + \beta_2 NDAC_{i,t} + \beta_3 CFO_{i,t} + \varepsilon_{i,t} \qquad (6)$$

where RET_12_PUR is the firm-year value-weighted abnormal returns to insider purchases accumulated over the 12-month interval, adjusted for size and book-to-market ratios. The above regression is also estimated for the abnormal insider purchase returns accumulated over the 18-month (RET_18_PUR) and 24-month (RET_24_PUR) intervals. For insider sales, the same regression is estimated, with the dependent variable as the abnormal returns to insider sales calculated over the 12-month (RET_12_SEL), 18-month (RET_18_SEL), and 24-month

(RET_24_SEL) periods. Unlike the regression for H1, firm size and book-to-market ratio variables are not included because the dependent variable has been adjusted by the returns of the reference portfolios which are constructed based on size and book-to-market ratios.

Note that this study does not equate insider gains with insider returns. For sale transactions, the more negative and lower values of insider returns indicate higher insider gains. Thus, the hypothesized positive relation between DAC and insider gains from sales is transformed to a negative relationship between DAC and insider returns from sales. On the other hand, for purchase transactions, the more positive and higher values of insider returns represent higher insider gains from purchases. Therefore, the hypothesized negative relation between DAC and insider *gains* from purchases implies a negative relationship between DAC and insider *returns* from purchases. Consequently, it is predicted that DAC will be negatively associated with both purchase and sale returns.

The first three columns in Table 4 Panel B report results for insider purchase returns. Discretionary accruals are negatively related to insider returns for the 18- and 24- month intervals, with the coefficients on DAC −0.1342 (*t-stat* = −2.30) and −0.2599 (*t-stat* = −3.53) respectively. This evidence supports the hypothesis that the higher the discretionary accrual, the less is the insider gain from purchase. The coefficient of DAC for the 12-month interval is negative but insignificant.

Across the three intervals, the coefficients on operating cash flows have a positive sign. This indicates that, contrary to the relation between discretionary accruals and insider gains, insiders obtain higher gains from purchases when operating cash flows are higher. Further, with positive coefficients for the 12- and 18-month intervals, nondiscretionary accruals seem to have the same positive impact on insider purchasing gains as operating cash flows do (although smaller in magnitude). Thus, while the results from H1 tests suggest that insiders themselves may perceive (or expect the market to perceive) nondiscretionary accruals and operating cash flows as temporary, results from H2 suggest that the market takes nondiscretionary and operating cash flows as more permanent. As a result, returns to insider purchases are positively associated with nondiscretionary accruals and operating cash flows.

The last three columns of Table 4 Panel B present empirical results for insider sale returns. The findings are similar to those for purchase

returns. For the 18- and 24-month periods, discretionary accruals are negatively related to sale returns (coefficient = −0.0799, *t-stat* = −1.75 for the former; coefficient = −0.1859, *t-stat* = −3.18 for the latter), supporting the hypothesis that discretionary accruals are positively associated with insider gains derived from sale transactions. Concerning nondiscretionary accruals and operating cash flows, findings for sale returns generally remain the same as those for purchase returns.

Tests of H3

The following firm-month regression tests whether the relationship between discretionary accruals and insider purchasing activities varies for the trades taking place at the beginning, middle, or end of the twelve-month period:

$$MIND\_SH\_PUR = \beta_0 + \beta_1 DAC_{i,t} + \beta_2 BEG_{i,t} * DAC_{i,t} + \beta_3 END_{i,t} * DAC_{i,t} + \varepsilon_{i,t} \quad (7)$$

where MIND_SH_PUR is the number of shares purchased by insiders in one month divided by the total number of shares traded by insiders during the entire year. In addition, results for the monthly purchasing activity indices computed using the dollar value of trades (MIND_VL_PUR) and the number of transactions (MIND_TR_PUR) are presented. Equation (7) is also used to test for the variations in monthly selling activities, with the dependent variable as MIND_SH_SEL, MIND_VL_SEL, and MIND_TR_SEL.

Since the current part of analysis focuses on discretionary accruals, nondiscretionary variable (NDAC) and operating cash flows (CFO) are excluded from the regressions. The dummy variable, BEG, is equal to 1 if the number of months to the month in which earnings information is released (the third month after the end of the fiscal year) is 9, 10, or 11, and zero otherwise. The dummy variable, END, is equal to 1 if the number of months to the earnings release month is 0, 1, 2, or 3, and zero otherwise. The interaction terms of the period dummies and discretionary accruals capture the variations in the relation between discretionary accruals and trading activities for the beginning or end of the twelve-month period. The predictions are that $\beta_1 < 0$, $\beta_2 > 0$, and $\beta_3 > 0$ for purchase activities. Specifically, for purchases, $\beta_1 < 0$ implies that, as the discretionary accrual level gets higher, the monthly purchase

activities relative to insiders' entire-year trading activities decrease. $\beta_2 > 0$ and $\beta_3 > 0$ represent that the negative relationship between the purchase activity and discretionary accruals is mitigated for the beginning and end of the fiscal year. Similar interpretations, although in opposite directions, apply to sales. Thus, for sale activities, $\beta_1 > 0$, $\beta_2 < 0$, and $\beta_3 < 0$ are predicted.

Table 5 Panel A presents results for monthly purchasing activities in the first three columns. H3 is not supported for purchase transactions. The interaction terms are all insignificant, indicating that insiders do not significantly alter their purchase activities over the twelve-month period. There is also no evidence that insiders decrease their purchasing activities on a monthly basis when discretionary accruals are higher, as implied by the insignificant negative coefficients of DAC.

The last three columns of Table 5 Panel A contain the findings for insider selling. The predicted variation in trading patterns is partially supported for sale transactions. Insider selling is positively related to discretionary accruals, with coefficients 0.0354 (*t-stat* = 4.46), 0.0366 (*t-stat* = 4.55), and 0.0339 (*t-stat* = 5.11) for the monthly selling indices calculated using shares, dollar amounts, and number of transactions, respectively. Towards the end of the year, the positive relationship is mitigated, evidenced by the significantly negative coefficient of END*DAC, which is −0.0261 (*t-stat* = −2.05), −0.0250 (*t-stat* = −1.95), and −0.0259 (*t-stat* = −2.44) for the monthly selling activity indices calculated using shares, dollar amounts, and number of transactions, respectively. The findings suggest that a higher level of discretionary accruals causes insiders to increase their monthly selling activities, but as the earnings announcement date approaches, discretionary accrual based selling activities subside. For the beginning of the year, no significant reduction in discretionary accrual based selling is detected.

To test whether the relation between profitability of insider trades and discretionary accruals varies between the beginning, middle, or the end of the year, the following firm-month regression is estimated:

$$MRET\_12\_PUR = \beta_0 + \beta_1 DAC_{i,t} + \beta_2 BEG * DAC_{i,t} + \beta_3 END * DAC_{i,t} + \varepsilon_{i,t} \quad (8)$$

where the dependent variable, MRET_12_PUR, is the firm-month abnormal returns to insider purchases calculated over the 12-month

period, adjusted for firm size and book-to-market ratios.   Abnormal returns to insider purchases calculated over the 18- (MRET_18_PUR) and 24-month (MRET_24_PUR) periods are also used as the dependent variable.   For insider sales, the dependent variable is the firm-month abnormal returns to insider sales calculated over the 12-month (MRET_12_SEL),   18-month   (MRET_18_SEL),   and   24-month (MRET_24_SEL) periods in the above regression.   BEG and END variables are as defined previously. For both purchases and sales, the findings of $\beta_1 < 0$, $\beta_2 > 0$, and $\beta_3 > 0$ will support the prediction that insider gains are more related to discretionary accruals around the midpoint of the year.

The results presented in Table 5 Panel B show that for both purchases (the first three columns) and sales (the next three columns), the coefficients of discretionary accruals are consistently negative, as predicted. The interpretation is that insider gains from sales calculated on a monthly basis are positively related to discretionary accruals, and insider gains from purchases calculated on a monthly basis are negatively related to discretionary accruals. Except for MRET_12_SEL, the coefficients of BEG*DAC are significantly positive, as predicted. However,   for   END*DAC,   none   of   the   coefficients   reaches   the significance level. The finding implies that discretionary accrual related insider profits are significantly higher for the middle and the end of the year than those for the beginning of the year, and that they do not decrease significantly as the year progresses from the middle towards the end.

Since the evidence from equation (7) suggests that insiders do engage in the same level of discretionary accrual based trading at the beginning as in the middle of the year, the two arguments for a weaker relation between insider activities and discretionary accruals and a weaker relation between insider gains and discretionary accruals at the beginning of the year should be ruled out.[10] An alternative explanation for the results from equation (8) may lie with the time horizon over which the insider returns are accumulated.   Specifically, compared with the trades made in the middle or at the end of the year, trades made at the

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[10]   The arguments are that there may not be adequate information for insiders to foresee the level of discretionary accruals at the beginning of the fiscal year, and that to ensure insider gains, insiders may postpone the transactions in order to get reasonably close to the market reversing (see Section 2).

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beginning are further from the expected reversing of market mispricing, which mostly occurs in the subsequent year.

5.   Conclusion

In examining discretionary accrual related trading activities and trading profits, this study extends previous research on the linkage between insider trading and accounting information by using a more comprehensive sample and by obtaining different perspectives from both activity tests and profitability tests. Since insiders are contrarian traders (Lakonishok and Lee, 2001), investigating trading activities alone cannot identify whether certain information is a source of insider gains. For example, the tests for the first hypothesis show that in the presence of higher cash flows, insiders tend to sell; yet the evidence from the second hypothesis indicates that with higher operating cash flows, insider gains from sales decrease.

Analysis of aggregate insider trading conducted by this study suggests that insiders trade on market mispricing caused by discretionary accruals. Specifically, insider selling activities and selling gains increase and insider purchasing activities and purchasing gains decrease in the presence of higher discretionary accruals. While the relation between selling activities and discretionary accruals weakens towards the end of the year, the relation between purchasing activities and discretionary accruals does not show such a pattern. The different findings for sales and purchases may be due to investor and the regulator's stronger reaction to price declines and the harsher scrutiny of management trading in times of worsening firm performance. Profitability of insider purchases and sales are less related to discretionary accruals at the beginning of the year but not at the end of the year, suggesting that although insiders may decrease discretionary accrual related trading activities towards the year end, discretionary accrual related gains do not decrease significantly.   A potential explanation for the weaker relationship between trading profitability and discretionary accruals at the year beginning is that, for trades made at the beginning of the year, the period over which the returns are accumulated overlaps to a lesser extent with the period when the market reverses its mispricing of discretionary accruals.

It is possible that insiders treat earnings overall as temporary and anticipate the reversing of the pricing for all earnings components,

although this may not be an optimal strategy for insiders to implement. If this is the case, then insiders may not have exploited the mispricing of discretionary accruals purposely. Future research could further clarify this issue. This will advance our understanding of the connection between insider trading and earnings management, and will help evaluate the fairness of insider trading in relation to accounting information. Additionally, the study can be extended to quarterly earnings as Collins and Hribar (2000) document that the accrual (not the discretionary accrual) component of quarterly earnings is also subject to market mispricing.

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