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Insider Trading, Discretionary Accruals and Information Asymmetry

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ABSTRACT

Using US data for the period from 2004 to 2012 and alternative discretionary accruals measures, we examine whether insiders manipulate earnings in an asymmetric information environment to profit from their informed trades, and whether the intervening information environment influences the relationship between earnings management and insider trading. We show that insider trading dominated by sell trades has a positive association with discretionary accruals. The incremental effect of information asymmetry as well as the interaction with insider trading is also prevalent in this relation, confirming the moderating effect of asymmetric information. Further, we show that the active involvement of some key insiders in high discretionary accruals is for personal benefit more in growth firms than in value firms. Our results also suggest that earnings management allows for insiders' opportunistic, rather than routine, buy and sell trades. Our findings highlight that regulators should oversee and scrutinise both insider trading and earnings management to mitigate the risk of the opportunistic behaviour of insiders to avoid future corporate scandals.

Keywords: insider trading, discretionary accruals, information asymmetry, major insiders, opportunistic and routine trading

1. Introduction

In this paper, we look into earnings quality by exploring the relation between insider trading and accrual-based earnings management (i.e. discretionary accruals, which has been viewed as a form of agency cost). We posit that insider trading and earnings management have a positive relation in which lower earnings quality maps to an increased level of insider trading. We emphasise that the influence of this positive relation is subject to the firms' quality of accounting information and their financial reporting environment. For firms with high information asymmetry, the relation becomes stronger, while it is weaker for firms with low information asymmetry. The empirical evidence suggests that lower earnings quality implies a greater information asymmetry between investors (outsiders) and management (insiders).

Richardson (2000) suggests a systematic relationship between the magnitude of information asymmetry and the level of earnings management, referring to the fact that when information asymmetry is high, stakeholders do not have sufficient resources or incentives or access to relevant information to monitor managers' actions, which gives rise to the practice of earnings management (Schipper, 1989; Warfield, Wild, & Wild, 1995). Moreover, Cohen, Dey and Lys (2008) provide evidence that the increases in accrual-based earnings management are concurrent with increases in equity-based compensation (stock-option) intended for insider trading. Managers have a tendency to engage in earnings management where shareholders are poorly informed and have limited access to company information (Davidson, Jiraporn, Kim, & Nemec, 2004; Jiraporn, Miller, Yoon, & Kim, 2008). As such, information asymmetry has an incremental chain effect on insider trading and earnings management relations whereby firms with high discretionary accruals tend to have higher information asymmetry, which eventually leads to greater engagement in insider trading. Corporate governance and financial reporting standards deal with such manipulation and self-dealing issues in the context of an asymmetric information environment, given that the decrease in information asymmetry causes to decrease

in earnings management (Kanagaretnam, Lobo, & Whalen, 2007). The corporate governance and earnings management literature provides evidence of reducing information asymmetry and earnings management through governance mechanisms (Xie, Davidson, & DaDalt, 2003; Cornett, Marcus, & Tehranian, 2008; Chang & Sun 2009; Kent, Routledge, & Stewart, 2010). However, the worldwide high-profile corporate collapse involving earning manipulations during the pre/post global financial crisis (GFC) periods raises concerns attributed to earnings management.

Earnings management¹ through the manipulation of firms' accounting accruals has been extensively investigated by researchers. The results show that managerial incentives drive widespread earnings management (Bartov & Mohanram, 2004; Cheng & Warfield, 2005; Bergstresser & Philippon, 2006). Loomis (1999) demonstrates that earnings management covers accurate financial results and obscures facts that stakeholders ought to know. On the one hand, the use of financial information in many managerial contracts may provide incentives for earnings management, which results in lower earnings quality. On the other hand, deliberate earnings manipulation by managers diminishes financial reporting quality and is more reflective of the discretion of management (Levitt, 1998).

Earnings quality becomes doubtful when managers have an incentive to opportunistically manage reported earnings (Healy & Wahlen, 1999; Dechow & Skinner, 2000; Rosenfield, 2000). The opportunistic behaviour of managers changes the shareholders' perception of the reported earnings quality and the degree of the asymmetric information between shareholders and managers. In this context, Levitt (1998) compares the rise in earnings management with the

¹ Earnings management is a deliberate action, and it includes any sort of manipulation that can affect financial reporting either through earnings numbers or any other accounting items, and can be either legitimate (within the Generally Accepted Accounting Principles (GAAP)) or illegitimate (accounting frauds) (Schipper, 1989). Schipper (1989, p.92) also contends that "By 'earnings management' I really mean 'disclosure management' in the sense of a purposeful intervention in the external financial reporting process, with the intent of obtaining some private gain".

decline in financial reporting quality. This contention implies that the ‘absence of earnings management’ is an indicator of earnings quality, and an accrual anomaly might be attributable to opportunistic earnings management and deteriorating earnings quality.

Insider trading takes place when an insider uses relevant information regarding a firm to trade in its listed securities (Seyhun, 1998). Empirical studies find that private information access by insiders allows them to outperform the market, thereby enabling them to obtain abnormal returns by trading the shares of their own firms (Rozeff & Zaman, 1988; Jeng, Metrick, & Zeckhauser, 2003; Fidrmuc, Goergen, & Renneboog, 2006; Cheuk, Fan, & So, 2006; Betzer & Theissen, 2008). These studies show that insider trading volume is positively linked to the value of the inside information. Asymmetric information, expressed as the information difference between that of the insiders and the market, is therefore seen as the most essential factor behind the insiders’ abnormal returns. Again, consistent with the information signalling hypothesis, insiders might buy (sell) securities when they are aware of some good (bad) news (Louis, Sun, & White, 2010), so insider purchases (sales) should be related to positive (negative) abnormal returns.

Information asymmetry refers to the information gap between informed or more informed and uninformed or less informed traders, whereby informed or more informed traders retain private information, in addition to public information, which has not yet been incorporated into stock prices. Despite having access to public information, uninformed or less informed traders, who trade purely for liquidity reasons, are at a significant information disadvantage when trading with informed or more informed traders. As such, information asymmetry results in conflicts of interest between corporate insiders (i.e. more informed parties) and outsiders (i.e. less informed parties), because managers might not have the incentive to provide precise and informative public disclosures, which underpins information-based trades in their favour. In fact, a high level of information asymmetry between investors can lead to increases in

transaction costs and market illiquidity. Amihud and Mendelson (1988) contend that private information-based insider trading leads to a widening of the bid-ask spread (i.e. information asymmetry).

From the agency context, both earnings management and insider trading are closely associated with information asymmetry when informed parties' interests are not aligned to uninformed parties' interests. Lee and Masulis (2009) argue that information asymmetry is associated with the quality of accounting information because the financial statements are the central information source for external investors regarding the performance of the firm. Insider trading can be facilitated by market inefficiency and dis-integrity but is complemented or worsened by several forms of manipulations in the financial reporting system. Thus, the scope of accounting manipulation might motivate insider trading. We argue that there is a relationship between insider trading and accrual-based earnings management (i.e. discretionary accruals). Because these affect the information carried by reported earnings (Sawicki & Shrestha, 2008), information asymmetry plays a vital role in both. In the asymmetric information scenario, managers play a direct role through various mechanisms of manipulation, such as reporting inflated earnings and delaying the release of bad news, and undertake distorted paths to validate overvalued equity, growth expectations and reputation (see Jensen, 2005; Kothari, Loutskina, & Nikolaev, 2006). Teoh, Welch, and Wong (1998) suggest that firms overstating net income prior to equity issuance are more likely to be involved in discretionary accruals. Aboody, Hughes, and Liu (2005) argue that insider trading is more profitable in firms with higher earnings management (or lower earnings quality), indicating a positive link between them. Under the agency context, when managers anticipate a correction in the stock price, they use accruals to temporarily maintain overvaluation in order to sell their shares (Sawicki & Shrestha, 2012). Accruals are also used by managers during seasoned offerings of IPOs to inflate the share price in order to benefit from overvaluation. As such, upward earnings management is

positively linked to the sale transactions of the insiders. However, downward earnings management is positively linked to the purchase transactions of the insiders.

A growing body of literature examines the relation between insider trading and earnings management (Udpa, 1996; Cheng et al., 2005; Core, Guay, Richardsons & Verdi, 2006; Sawicki & Shrestha, 2008 & 2012). Our study complements and extends this literature further as well as provides some new insights into the insider trading and earnings management relationship from different aspects. Such complementing of prior studies is not uncommon in the existing literature in accounting and finance for the further contribution of knowledge (e.g. Sawicki & Shrestha, 2012). Applying Generalised Method of Moments (GMM), our paper is clearly distinguished from prior studies, including Sawicki and Shrestha (2008) and Core et al. (2006), through the introduction of the cumulative abnormal returns (CAR) insiders earn from managing earnings, alternative models of absolute value of discretionary accruals and the moderating effect of information asymmetry on the relationship between insider trading and discretionary accruals. It also provides insights into the routine and opportunistic trading behaviour of insiders, insider trading in growth and value firms, trading behaviour of each major corporate insiders, and the impact of corporate governance variables, among others.

Using a comprehensive sample of buy and sell trades of major insiders in US listed firms, we investigate the effect of sell-dominated insider trading² on the absolute value of the discretionary accruals while controlling for the effect of information asymmetry. We then test the extent of the relationship through interaction terms between the information asymmetry and insider trading proxies. In addition, these relations are also checked against each of the key insiders in growth and value firms in terms of their book-to-market value, for routine and opportunistic buy and sell behaviour, and for CEO change and insider tenure.

² Our sample consists of approximately 90% sale transactions and 10% purchase transactions, hence we refer to our sample as sell-dominated insider trading.

Our major finding is a significantly positive relationship between accrual-based earnings management (i.e. discretionary accruals) and sell-dominated insider trading given the existence of asymmetric information. We find a leading role for information asymmetry and its interaction effect on the relationship between insider trading and discretionary accrual proxies. Additionally, we also provide evidence of the difference between growth (low book-to-market value) and value (high book-to-market value) firms in their relation with discretionary accruals, which indicates that insiders in growth firms are more associated with increased discretionary accruals and trading than value firms. We also examine each of the major insiders' trading behaviour relating to the manipulation of earnings and find more active involvement by some major insiders as opposed to others. We further report differences between routine and opportunistic buy and sale trades in the sense that opportunistic trades are more aligned to earnings management than routine trades in an information asymmetric environment, suggesting that insiders take advantage of their superior knowledge and pricing errors/mispricing made by outsiders and accordingly trade against current investor sentiment/contrarian beliefs.

Our paper contributes to literature in several ways. Our first and primary contribution in the paper is to show a relationship between outcome of insider trading and discretionary accruals. Since CAR reflects the trading performance of stocks of the insiders, we use CAR as the 'outcome' of insider trading activities capturing the volumes of both buy and sale transactions of the insiders at the specified prices of transaction dates. While we complement the literature by using existing insider trading proxies (e.g. NPR and IPR), we particularly focus on CAR to show the performance of insiders when managing the earnings of the firms. To our knowledge, no prior research has examined the relationship between the abnormal returns from insider trading (CAR) and discretionary accruals. We posit that insiders manipulate earnings to profit from their trades, suggesting insider trading pre-empts discretionary accruals. Insiders manage

earnings to influence the perceptions of investors regarding firm value so that they can benefit from the favourable effect and can hence earn abnormal returns.

Second, the literature considers information asymmetry theoretically but does not control for it in the empirical literature. We argue that without controlling for information asymmetry, the evidence of the relationship might not be plausible on the basis of confounding effects. So, unlike the literature, we measure asymmetric information by the bid-ask spread as an intervening control in our study. We contend that information asymmetry leads to greater discretionary accruals as well as more insider trading, therefore can mediate and influence their relationship. So, we explicitly test its effects as well as its interactions with insider trading and earnings management relationship, i.e. the moderating effect of information asymmetry. We contribute to the body of knowledge by providing evidence that reinforces the relationship between insider trading and earnings management (i.e. discretionary accruals) in the presence of information asymmetry.

Third, we also examine the trading behaviour of each of the major corporate insiders in relation to the manipulation of earnings in addition to all insiders as a group. We focus on eight major insiders separately, while the existing literature focuses on only the CEO and CFO (Jiang, Petroni, & Wang 2010; Shin & Wang, 2011; Wang et al., 2012). Our evidence supports the fact that each insider behaves differently and some insiders are more actively involved in earnings management for their own profit than others.

Fourth, following Cohen, Malloy, and Pomorski (2012), our research disentangles how opportunistic and routine trading behaviour of insiders' influence earnings management differently. To our knowledge, this is the first study uncovers this relationship. Since the motives and patterns of opportunistic and routine trading are different, it is important to understand which trade type contributes to earnings management. We contend that opportunistic trade (buy or sell), rather than routine trade, is driven by speculation for making personal gain

through managing earnings and using private information. We show that the manipulation of earnings is more aligned to insiders' opportunistic trading (both buy and sell) than routine trading. Our evidence suggests a significant difference between opportunistic and routine trader behaviour and that the former has a motivation to become involved in discretionary accruals.

The remainder of our paper is organised as follows: Section 2 provides a literature review and hypotheses. Section 3 describes research design, insider transactions data, summary statistics of the insider transactions, discretionary accruals, and the other data we use in the paper. Section 4 presents and discusses the empirical results and robustness tests. Section 5 summarises and concludes the paper.

2. Literature and Hypotheses Development

Insider trading has been attributed to temporary mispricing (Rozeff & Zaman, 1998) and superior knowledge/information of future performance (Piotroski & Roulstone, 2005). Managers, boards of directors and other executives are a unique class of insider traders who have easy access to sensitive information in comparison to outsiders. Although they communicate this private information to outsiders, through which stock prices capture more information (Leland, 1992), insiders mainly use their superior information to trade for earning abnormal profits and/or to rebalance their portfolios or for liquidity. Prior research examines whether insider trading is based on the private information of earnings (Elliott, Morse, & Richardson, 1984) or cash flows from operation (Ke, Huddart, & Petroni, 2003). Seyhun (1992) and Rozeff and Zaman (1998) suggest that insiders trade based on contrarian beliefs (i.e. trading against investors' current sentiment). Since changes in the unexpected earnings performance of firms has an impact on share prices (Ball & Brown, 1968), Piotroski et al. (2005) find that insiders have a tendency to be involved in trades based on reliable information about the future earnings of firms. They use next year's annual earnings innovation (which is year $t+1$'s change

in the return-on-assets) as one of the proxies for superior information. They add that insiders also trade based on contrarian beliefs.

2.1. Insider Trading and Earnings Management

The existing literature emphasises that insider trade based on superior information and their cash flow needs. Elliott et al. (1984) analyse trading behaviour and find that insiders sell less before news (either good or bad). On the other hand, Ke et al. (2003) conclude that insiders do not trade immediately before the break to avoid this form of exploiting inside information, which can consequently lead to a court hearing or adverse media coverage. However, Udpa (1996) finds that insider trading results in a greater amount of pre-disclosure information prior to an earnings announcement to generate inferences about forthcoming earnings.³

Further, prior research has also examined whether insiders earn abnormal returns (Rozeff and Zaman, 1988). Seyhun (1986), Lin and Howe (1990), Gregory, Matatko, and Tonks (1997) and Chang and Suk (1998) find that insider purchases are positively associated with abnormal returns. By separating insider trades into ‘routine’ and ‘opportunistic’, Cohen et al. (2012) find that opportunistic trades yield abnormal returns while routine trades do not. Wang et al. (2012) examine the trading behaviour of CEOs and CFOs and find that CFOs earn more abnormal returns. In addition, previous research finds that insiders usually trade on the basis of contrarian beliefs (Seyhun, 1992; and Rozeff and Zaman, 1998), but Piotroski et al. (2005) suggest that insiders trade on the basis of both superior information and contrarian beliefs of future earnings of a firm.

A large quantity of academic research examines the earnings management of firms. The empirical studies emphasise that managers have strong incentives and motivation to manipulate or influence earnings for a number of reasons, such as hyping the stock price prior to initial

³ In the United States, insiders are not allowed to trade on undisclosed information. Before they trade, they must release this information to the public (Hu & Noe, 1997). If insiders trade in a given month, they must report their holdings within the first 10 days of the next month (Pearsons, 1997).

public offerings (Friedlan, 1994) and before seasoned equity offerings (DuCharme, Malatesta, & Sefcik, 2004; Jo & Kim, 2007). Charoenwong and Jiraporn (2009) argue that managers do so to avoid reported losses and the violation of debt covenants. Jaggi and Lee (2002) find that they do so to decrease the cost of debt, while Cormier, Magnan and Morard (2000) find that it is to smooth earnings volatility. Iatridis and Kadorinis (2009) argue that it is to meet the earnings forecasts of financial analysts.

Insiders manage earnings in either direction to make an impact on the perceptions of investors about the firm value to get a favourable effect for their trades. Geiger and North (2006) and Jiang et al. (2010) find that CFOs have a superior power regarding reported financial information as well as an influential role in a firm's earnings management matching their equity incentives. However, Beneish (1999) investigates the incentives and penalties of managers for earnings overstatement. They reveal that the lagged persistence of income-increasing accruals is considerably greater when it goes along with abnormal insider buying and lower when it goes along with abnormal insider selling, whereby the latter is partially associated with opportunistic earnings management. In this regard, Aboody et al. (2005) argue that the systematic part of earnings quality is priced, and informed insiders earn larger profits when trading shares with greater exposure to a risk aspect regarding the earnings quality. Core et al. (2006) find evidence that managers purchase more (fewer) shares of the firms with low (high) accruals. Cheng et al. (2005) suggest that managers are motivated to become involved in earnings management when they have high equity incentives to increase the value of the shares and sell more shares. In addition, Sawicki & Shrestha (2008) reveal that insiders manage earnings downward when they buy stocks of own firms and manage earnings upward when they sell shares. From this literature, we expect that insider trades are linked to earnings management. We also expect that insiders gain abnormal returns from managing the earnings.

We complement the existing literature to extend our knowledge further (e.g. Sawicki & Shreshta, 2008; Core, Guay, Richardson, & Verdi., 2006) with the use of absolute value of discretionary accruals models and CAR, along with different data periods, sell-dominated sample firms, and advanced regression/econometric approaches. The main reason of using absolute value of discretionary accruals is that the absolute accrual measure is likely to be better than the signed accrual measure when researchers are interested in how corporate insiders affect accruals for their personal benefit through insider trading. Becker, DeFond, Jiambalvo, and Subramanyam (1998) argue that the use of the absolute value of discretionary accruals is effective in capturing both income-increasing and income-decreasing effects of earnings management. We generally expect a positive effect of insider trading (CAR) on absolute value of discretionary accruals. Thus, our first hypothesis is:

H₁: Insider trading has a positive effect on the absolute value of the discretionary accruals.

2.2. Insider Trading and Asymmetric Information

Both the agency and signalling theories emphasize the role of asymmetric information in the problem of adverse selection. If managers' incentives are aligned to the market value of firms, they might be motivated to signal that information. For example, asymmetric information between existing and potential IPO investors can help managers to signal some information to potential investors with the view of increasing the firm's value (Cohen & Dean, 2005). In this regard, Armstrong et al. (2011) suggest that in an imperfect market condition, asymmetric information is positively associated with the cost of capital, and in a perfectly competitive market environment there is no association between information asymmetry and the cost of capital. However, higher information asymmetry leads to lower earnings quality, which indicates a positive relationship between earnings management and asymmetric information. Previous research suggests that when the unexplained variance in the accrual quality is higher, information asymmetry is higher (Aboody et al., 2005; Francis, LaFond, Olsson, & Schipper,

2005). However, superior analyst coverage enhances information synchronisation and is correlated with lesser asymmetric information (Brennan & Subrahmanyam, 1995).

Following hypothesis 1 above, we contend that there is a relationship between insider trading and accrual-based earnings management and asymmetric information accelerates such a relationship. Thus, we argue that both insider trading and earnings management are an outcome of asymmetric information when markets are not perfectly competitive. Accordingly, the second hypothesis is:

H₂: Asymmetric information and its interactions with insider trading proxies have a positive effect on the absolute value of the discretionary accruals.

3. Data and Method

3.1. Data

Our data on US firms cover insider trades for the period from 2004 to 2012. We obtain the data from 2iQ Research. This databank comprises open market buys and sales of all insiders. It also contains information on company names, insiders' names, transaction date, filing date, transaction price, size of the transaction, type of the transaction, and insiders' positions. We choose CEO, CFO, COO, president, vice president, chairman of the board, director, and officers as insiders in this study. Following similar studies, we only take nonfinancial firms that have at least four years of insider transactions. We also consider multiple trades on the same day by the same insider as one transaction due to the fact that these same-day trades use the same information, and therefore we combine them into a single data point. We also remove the trade dates around ± 1 day of earnings announcement date for each firm to exclude the effect of earnings announcement on those trades. In addition, a corporate lockout period is imposed on the trade data, i.e. trade dates outside the lockout period are considered. The final sample consists of 300,204 purchase and sale transactions of the insiders from 2,269 US firms. We collect company-specific variables from Worldscope and Burea Van Dijk Orbis.

3.2. Research Design

We use alternative proxies for insider trading and earnings management in the regression as described in Equation 1. We also consider proxies for information asymmetry and growth aspects as explanatory variables in addition to a number of control variables. We develop our baseline regression model, as shown below in Equation 1, to test the association between insider trading and earnings management by using the OLS approach at first and then the GMM approach to overcome and control the endogeneity problem.

$$DA_{it} = \beta_0 + \beta_1 CAR_{it \text{ or } NPR_{it}} + \beta_2 Bid \ Ask \ Spread_{it} + \beta_3 PE_{it} + \beta_4 CFOA_{it} + \beta_5 Leverage_{it} + \beta_6 Size_{it} + \beta_7 BM_{it} + \varepsilon_i \quad (1)$$

where DA is the absolute value of the discretionary accruals, CAR⁴ is the cumulative abnormal return from insider trading, NPR is the net purchase ratio, Bid-Ask Spread is the proxy for asymmetric information, PE is the price-earnings ratio, CFOA is the log of cash flow from operating activities, Leverage is the debt-to-asset ratio, Size is the log of the market value of equity, and BM is the book-to-market ratio. We conduct additional tests by including other control variables (investment opportunity, dividends, earnings per share, loss of earnings) in the baseline regression model. Given that we focus on the legitimate trading that insiders are entitled to as well as discretionary accruals insiders can apply within the scope of the accounting standard (i.e. US GAAP) rather than accounting fraud, we also control for corporate governance/ownership variables (e.g. institutional shareholdings, ownership concentration, CEO changes, tenure of insiders). Numerous studies provide evidence that corporate governance mechanisms can mitigate both discretionary accruals and insider trading.

⁴ CAR is a proxy for insider trading that influences discretionary accruals. Following Wang, Shin, and Francis (2012), we measure CAR by taking the daily return of a share, deducting the corresponding market portfolio return and adding these daily excess returns after an insider trade occurs. We then remove the CARs for the trade dates around ± 1 day of the earnings announcement date and corporate lockout period for insiders, so that it is not influenced by any confounding events.

Following the earnings management literature (Cohen et al., 2008; Francis et al., 2008; Yu, 2008; Mouselli et al., 2012; Katmon & Farooque, 2015), we estimate the absolute value of the discretionary accruals based on the modified Jones model (1995) and the performance-matched discretionary accruals model of Kothari, Leone, and Wasley (2005).⁵ Cohen et al. (2008) argue that the more meaningful measure of earnings management is the absolute level of discretionary accrual. Regardless of income-increasing or decreasing incentives or motivations, we employ the discretionary accruals in the ‘absolute value’ as a proxy for the overall earnings management rather than the ‘signed value’ (+/- tive) used in most studies as a proxy for accounting conservatism.

We measure insider trading behaviour using the insiders’ net trading ratio denoted as net purchase ratio (NPR), insider purchase ratio (IPR), and the cumulative abnormal return of trading (CAR). NPR is defined as follows:

$$NPR_{it} = (Buy_{it} - Sell_{it}) / (Buy_{it} + Sell_{it}) \quad (2)$$

where Buy_{it} ($Sell_{it}$) equals the number of shares bought (sold) by the registered insiders of firm i during year t . The IPR is defined as:

$$IPR_{it} = Buy_{it} / (Buy_{it} + Sell_{it}) \quad (3)$$

We estimate trading performance of the insiders by calculating the CARs of a stock during the three-month period after an insider trade takes place excluding the trade dates around ± 1 day of each earnings announcement date and corporate lockout period for insiders. While Wang et al. (2012) use three, six, nine and twelve-month CARs and Piotroski and Roulstone (2005) use twelve month buy and hold market adjusted return, we choose three-month CARs to avoid the quarterly earnings announcement dates of the firm, and hence we predict that insiders manage earnings within this period, i.e. before and after the release of earnings outside the corporate lockout period for insider trading. It is worth noting that following the above

⁵ For brevity, a detailed description of the discretionary accrual models is not shown here.

procedures, the three-month CARs do not overlap with the next quarterly earnings announcements and are free from the lockout period by default in the US context since insiders cannot trade during the lockout period imposed by the corporations. Shin and Wang (2011) find that managers take advantage of their superior knowledge of future earnings prospects and opportunistically time their trades to exploit information in both current earnings reports and future earnings. When an earnings report in a current quarter contradicts future earnings prospects, CFOs buy (sell) more shares after a bad (good) earnings report in anticipation of good (bad) future earnings. When the current earnings report is consistent with future earnings prospects, all managers buy more shares before good earnings news.

Consistent with Wang et al. (2012), the CARs are measured by taking the daily return of a share, deducting the corresponding market portfolio return, and adding these daily excess returns after an insider trade occurs.⁶ Excess or abnormal return on day t is:

$$A_{jt} = R_{jt} - R_{mt} \quad (4)$$

where R_{jt} is return of the j th stock on day t and R_{mt} is the contemporaneous market (benchmark) return on day t . The cumulative excess or abnormal return from event date a to event date b is the summation of the excess or abnormal returns:

$$CAR_{a,b} = \sum_{t=a}^b A_{jt} \quad (5)$$

Hence, our CAR may be called cumulative excess return or cumulative abnormal return.

The benchmark portfolios are designed on the basis of Fama et al.'s (1992) 10 × 10 size and book-to-market ratio decile in controlling for risks. We apply NYSE and NASDAQ size and book-to-market decile breakpoints to categorise stocks. The NYSE-listed firms are relatively large firms. Because our sample has both big and small firms, we include the NYSE

⁶ This approach does not need a separate estimation period (a number of days before the event), as the Market model does.

and NASDAQ deciles as our benchmarks to get more firms in a pooled benchmark that describes our sample well.

To estimate the portfolio returns and individual stock returns, we align with Asparouhova, Bessembinder, and Kalcheva (2010a), who pioneer the return-weighted portfolio returns. Despite equal-weighted and value-weighted benchmark portfolios used in the literature, we do not employ these measures for the reasons below. Blume and Stambaugh (1983) note that market structure noises in stock prices cause bias in the estimated security returns. Asparouhova et al. (2010a) also reveal that the return for an equal-weighted portfolio is biased through the ordinary bias in the individual stock returns. Nevertheless, although value-weighted portfolio returns are not conditional to the noise-driven bias (Asparouhova, Bessembinder, & Kalcheva, 2010b), these are controlled by a few big stocks. As our sample consists of many small firms, the value-weighted portfolio mean return is inappropriate for our research. We rather use the equal-weighted portfolio because we calculate the insider traders' average information. Nonetheless, the return-weighted portfolio removes the bias in the equal-weighted portfolio return. So, we apply this portfolio return, whereby each observed return in a portfolio is weighted by the gross (1+) return of the same stock in the previous trading day. In particular, we multiply the stock return by its previous day's gross return and divide it by the average previous day's gross return of the shares in the same size and book-to-market portfolio. We apply the same process to remove the bias in the individual share return of the sample. Then the abnormal return is estimated as the difference between the daily share return and the benchmark portfolio return.

As for the other variable of interest, following Richardson (2000), we use the Bid-Ask spread as the proxy for asymmetric information, which is widely used in the literature. For controls, we use the following variables: PE ratio, CFOA, Leverage, Size and BM in the baseline regression model (Eq. 1), and IO, DY, EPS, Loss, CEO change and tenure and

institutional ownership variables in additional models. Most of them are considered following the relevant literature on insider trading and earnings management discussed earlier (Rozeff & Zaman, 1988; Sawicki et al. 2008; Geiger et al., 2006; Cohen et al., 2012). These variables have either a positive or negative relationship with accruals, thus without controlling them the relationship between insider trading and accruals may be misleading.

3.3. Summary Statistics

Table 1 (in Panel A) presents the summary statistics of the insider trades. Not surprisingly, sale transactions are substantially higher than buy transactions of the insider trades. Sales also dominate the buy transactions in dollar value and as a percentage of market capitalisation of the firms. Because insiders are offered restricted stock and stock-options as executive compensation, they have to be net sellers for reasons of rebalancing, diversification, or liquidity. As such, a stock-option component provides them with more incentive to sell than purchase.

Panel B of Table 1 provides the summary statistics for the discretionary accrual measures for four different models, whereby the first two accrual models are used for baseline regression and the other two are for robustness. The closeness of the mean or median values of these accrual models implies that they are not significantly different from each other. Panel C provides the summary statistics for the insider trading activity and the discretionary accruals according to book-to-market value (BM) and size (MV) quartiles, that is, growth versus value firms and small versus big firms, respectively. In all four discretionary accrual models, we see that the discretionary accruals for the lowest BM quartile (BM1: growth firms) are the highest compared to those of other BM quartiles. In terms of the size quartiles, smaller firms (MV1) are more engaged in earnings management than larger firms (MV4). These findings suggest a significant difference between discretionary accrual levels in terms of firms' growth prospects and size. Again, considering the trading activity of insiders, we find that NPR and IPR are higher in value firms (BM4) than in growth firms (BM1). In terms of size quartiles, NPR and

IPR are higher in small firms (MV1) than in large firms (MV4). However, the CAR is higher in growth (BM1) and large (MV4) firms than in value (BM4) and small (MV1) firms.

Panel D of Table 1 presents the descriptive statistics for all of the variables. Focusing on NPR, our sample illustrates that the vast majority of insider transactions represent sells, which suggests that there is enough disparity in the trading behaviour in our sample. Since buy transactions are more informed and trading and sell transactions are mainly for portfolio rebalancing/diversification and for liquidity needs, we expect that buy (sell) transactions will reflect positive (negative) CARs. A positive CAR indicates abnormal returns in buy transactions, while a negative CAR indicates abnormal returns in sell transactions. The average CAR from insider transactions is negative (-3.9%) in our sample because sell transactions dominate the purchase transactions, indicating that insiders manage earnings in order to avoid loss on sell transactions and earn superior return on buy transactions. The median market value of the firm is \$863 million. Thus, we have mostly equal number of small and large firms in our sample. Additionally, the median BM is 0.437, suggesting that we have mostly equal number of value and growth stocks in our dataset.

Panel E of Table 1 reports the summary statistics for our categories of insider traders and insider trades as opportunistic and routine. For each insider, we analyse their trading history and determine similarity in their trading behaviour. If a trader trades in the same calendar month for at least three consecutive years, he or she would be defined as a routine trader. Others are defined as opportunistic traders. We also observe their trading patterns.. As Panel E of Table 1 demonstrates, we categorize 12.3% of insider buys and 27.59% insider sales as routine trades in our sample, and 87.7% of insider buys and 72.41% of insider sales as opportunistic trades. On the whole, trades made by opportunistic traders comprise 74.03% of the total sample, which indicates that opportunistic trades dominate our sample.

Panel F of Table 1 provides discretionary accruals analysed by levels of insider trading (i.e. buy and sell transactions) and levels of information asymmetry (i.e. low and high Bid-Ask spread, based on median value). In both modified Jones (1995) and performance-matched (Kothari et al., 2005) discretionary accrual models, the general trend is high discretionary accruals for both buy and sell transactions in high information asymmetry compared to in low information asymmetry. This supports the view that information asymmetry leads to high discretionary accruals.

Similarly, insiders manipulate earnings to earn abnormal returns from their trades. Since we use both insider trading and information asymmetry proxies (CAR, NPR and Bid-Ask spread) as the determining factors of discretionary accruals, in Panel G of Table 1 we check for multicollinearity among those proxies in a correlation matrix along with other variables of interest. We report no multicollinearity problem between CAR and Bid-Ask spread, between NPR and Bid-Ask spread, and between Bid-Ask spread and any other variables of interest. Our VIF test (untabulated) also confirms no such issue.

[Table 1 about here]

4. Empirical Results

This section presents the empirical results from the multivariate analysis. We offer our baseline regression results, additional results, and the results for opportunistic and routine trades.

4.1. Baseline Regression Results

Our baseline regression results are presented in Tables 2 to 5, showing both the OLS and GMM findings together for the main variables of interest, i.e. two proxies of discretionary accruals (e.g. modified Jones and performance-matched discretionary accruals models) and insider trading (e.g. CAR and NPR) along with the moderating proxy for information

asymmetry (e.g. Bid-Ask spread). Since OLS cannot overcome the endogeneity problem, we run an endogeneity test for both proxies of discretionary accruals and insider trading and find that CAR and NPR are endogenous to the modified Jones and performance-matched discretionary accruals model.⁷ To address the endogeneity issue, we prefer to use System GMM over the instrumental variable approach, because of the difficulty in finding suitable instruments. While the regression results are mostly consistent between OLS and GMM, we rely more on GMM findings, although both are mentioned in the paragraphs below.

4.1.1 CAR and Modified Jones Discretionary Accruals Relationship:

Table 2 reports the results based on OLS and GMM tests that use the modified Jones discretionary accruals model (Dechow et al., 1995) as the proxy for earnings management and CAR as the proxy for insider trading. We document evidence that insider trading is a strong predictor of earnings management in an asymmetric information environment across the columns 1 to 8 in OLS and GMM. The coefficients of the CAR dominated by sales show positive and significant relations with discretionary accruals. Thus, our results support **H₁** that as the proportion of the CAR increases, discretionary accruals also increase and earnings quality declines. These results are consistent with Aboody et al. (2005) and Sawicki et al. (2012) and confirm that the relationship between insider trades and discretionary accruals is concentrated on the selling side. Although we emphasise sell trading, our findings are qualitatively consistent with both Core et al. (2006) and Sawicki et al. (2008) because we find that insiders manage earnings upward when they sell shares, and managers sell more shares of the firms with high accruals. Our evidence also implies that insiders are actively engaged in earnings management to benefit their trading, especially by selling their own firms' shares.

We use Bid-Ask spread as the measure of asymmetric information to examine its role in the earnings management and insider trading relationship. Unlike OLS, the GMM regression results

⁷ For brevity, the endogeneity test results are not shown here, but are available upon request.

show a positive and significant effect of information asymmetry on discretionary accruals across columns 5 to 8. We then explore the interaction effect between CAR and earnings management by adding an interaction term (CAR*Bid-Ask spread) to the regression model. The GMM results in columns 7 and 8 indicate positive and significant relations with the accrual model. These results provide evidence of an incremental joint effect of information asymmetry on the insider trading and earnings management relationship. Therefore, they support **H₂**⁸.

We then test the association between insider trading and earnings management for value and growth stocks because Rozeff et al. (1998) found that insider trades are not random across value and growth stocks. Thus, following Piotroski et al. (2005) and Sawicki et al. (2008), in each year, we rank firms on the basis of BM quartiles, which are used as proxies for growth. We use equation 1 by adding BM indicator variables instead of BM_{it} . The indicator variables BM2, BM3, and BM4 are equal to one if the firm's BM ratio ranks, respectively, in the second, third, and fourth quartiles of the annual BM ratios and zero otherwise. The BM4 group is the value firms. In this method, the intercept reflects the discretionary accruals for growth firms (i.e. BM1) and the significant coefficient for the intercept implies that the discretionary accruals for growth firms are different from those for value firms. A number of corporate governance/ownership and additional control variables, such as institutional shareholdings (Inst. Share), ownership concentration (Herfindahl Index), CEO changes, tenure of insiders (Tenure), investment opportunity (IO), dividends (DY), earnings per share (EPS) and loss of earnings (Loss) are included in this specification. The results in OLS and GMM (Table 2) are consistent with Sawicki & Shrestha (2008), and the coefficient estimates for all BM quartiles are negative and significant, which indicates that the average discretionary accruals of these groups are lower than that of growth firms, which adds to the evidence of increasing earnings

⁸ Our results show statistically significant effect of information asymmetry on discretionary accruals; however its economic significance is negligible due to an extraordinary asymmetric market condition. We reveal that the distribution of bid-ask spread (see Table 1, Panel D) is abnormal. Thus, we support **H₂** statistically, but not economically. A similar interpretation is applicable for the rest of empirical results.

management by growth firms. Moreover, after controlling for the CAR*Bid-Ask spread, PE, CFOA, leverage, size, IO, DY, EPS, loss of earnings, Inst. Share, Herfindahl Index, CEO changes, and the tenure of insiders, the accrual of the BM4 is lower than those of the other quartiles.

Regarding the relationship between the governance/ownership variables and the discretionary accruals, we find no significant effect of institutional ownership, Herfindahl Index, and a change in CEO on the insider trading and earnings management (modified Jones discretionary accruals) relationship, although there is a significant negative effect of the insiders' tenure on that relationship, which suggests that short-tenured insiders are more prone to insider trading and earnings management than long-tenured (at least five years). From monitoring perspectives, the findings on ownership variables are beyond expectation. It may be the case that institutional and concentrated owners are either not in a position to restrain discretionary accruals or are in a strategic alliance with top executives for mutual benefits. Similarly, CEO change also remains ineffective in mitigating discretionary accruals. Overall, the governance/ownership variables play no role in the relationship between insider trading and earnings management.

Again, the relations between other control variables and earnings management are significant for most cases, both in OLS and GMM, in Table 2. Both the PE ratio and CFOA show the expected significant and positive relation with the discretionary accruals. This finding indicates that the firms' high cost of capital and free cash flow can explain the earnings management behaviour. Leverage shows a significant constraining effect on the discretionary accruals, which is consistent with the literature in the sense that creditors closely monitor managerial behaviour that helps to reduce agency cost and earnings management. Again, size has a negative relationship, which signifies that large firms can mitigate earnings management. Similarly, DY shows the expected significantly negative sign, which indicates that dividend

signals lower earnings management. A similar interpretation can be done for the EPS, which provides a signal for less earnings management. However, the negative earnings of the firms (i.e. losses) show strong evidence of high earnings management providing incentives to the managers not to disclose negative earnings or losses of the firm. Similarly, contrary to expectation, IO demonstrates a positive effect on modified Jones discretionary accruals.

[Table 2 about here]

4.1.2 CAR and Performance-matched Discretionary Accruals Relationship:

Table 3 extends the OLS and GMM tests using the CAR as the proxy for insider trading and the performance-matched discretionary accruals model (Kothari et al., 2005) as the proxy for earnings management. As expected, we find evidence of a positive and significant relation between the discretionary accruals and the CAR in both OLS and GMM across columns 1 to 8. These results are highly consistent with the results in Table 2, thus reconfirming **H₁**. These results indicate that if insiders forecast the earning of abnormal returns from selling shares of their own firms, they manage earnings upward. Regarding the effect of information asymmetry (Bid-Ask spread) on the relationship between earnings management and insider trading, the GMM results offer mixed evidence with significant but different signs. The interaction effect between CAR and earnings management indicates variations from the Table 2 results, therefore, we cannot confirm **H₂**.

Again, as in Table 2, we find similar results for both OLS and GMM in Table 3 when we control for the growth and value stocks. This provides evidence that insiders manage earnings upward when they forecast abnormal returns for growth firms. The relations between the discretionary accruals and the governance/ownership and other control variables are similar to those in Table 2 in most cases, with the exception of IO showing the opposite sign, i.e. a negative significant effect of IO on earnings management, consistent with expectations. Similarly, CEO change also demonstrates a different finding to that reported in Table 2. The

finding here shows that changes in CEOs have significant negative effect on earnings management, i.e. in firms where CEOs are short-lived or repeatedly changed, they have more incentive to be involved in managing earnings and vice versa. Also in the OLS, institutional ownership reveals a significant positive effect on earnings management, implying strategic alliances with top executives. These variations in the Table 3 findings with performance-matched discretionary accruals indicate that their effects largely depend on discretionary accrual models.

[Table 3 about here]

4.1.3 NPR and Modified Jones Discretionary Accruals Relationship:

Table 4 presents the results from both the OLS and GMM approaches using the NPR as the proxy for insider trading, instead of the CAR, and modified Jones discretionary accruals model (Dechow et al., 1995) as proxy for earnings management. Consistent with the prior studies mentioned earlier, NPR dominated by sales shows positive and significant relations with discretionary accruals in all columns 1 to 8, thus supporting **H₁**. Again, the Bid-Ask spread and interaction variable (NPR*Bid-Ask spread) also demonstrate a positive effect on discretionary accruals in GMM, which leads to supporting **H₂**, consistent with Table 2, signifying incremental joint effects from information asymmetry on the insider trading and earnings management relationship. Again, the relations between all governance/ownership and other control variables including the growth and value stocks and the discretionary accruals are identical to what we report in Table 2.

[Table 4 about here]

4.1.2 NPR and Performance-matched Discretionary Accruals Relationship:

Table 5 extends the OLS and GMM tests using the NPR as the proxy for insider trading and the performance-matched discretionary accruals model (Kothari et al., 2005) as the proxy for earnings management. As expected, the results indicate a positive significant effect of NPR,

Bid-Ask spread and interaction variable (NPR*Bid-Ask spread) on discretionary accruals across the columns, which is highly consistent with the results in Table 2. Therefore, we reconfirm **H₁** and **H₂**. Again, the relations between the governance/ownership and other control variables and the discretionary accruals are identical to those in Table 3 while similar to those in Table 2 in most cases except for CEO change, which shows a negative significant effect in GMM, for institutional ownership, which shows a positive significant effect in OLS, and for IO, which shows a negative significant effect, indicating a variation in their effects depending on discretionary accrual models.

[Table 5 about here]

In summary, following the GMM regression results, our findings support both **H₁** and **H₂**. That is, in an asymmetric information environment, insider trading has strong positive explanatory power on earnings management. Further, an incremental joint effect of information asymmetry on the insider trading and earnings management relationship is evident. However, governance and ownership variables remain ineffective in influencing earnings management in either direction and between the insider trading and earnings management relationship. The reason could be that managers can still apply discretion within the US-GAAP and the trades are legal, leading to managerial self-dealing and manipulations. Similarly, in regards to the use of lagged dependent variable (i.e. lag discretionary accrual), while there is no evidence of the lack of validity of the lagged model, the effect of the lagged variable varies depending on the discretionary accrual model used but disregarding the proxies used for insider trading. More specifically, in the case of using modified Jones discretionary accruals, we observe a positive effect, while in performance-matched discretionary accruals, a negative effect is found.

4.2. Trading of Individual Insiders

To explore the relationship between CAR or NPR and the accrual models, in Tables 6 and 7 we split the sample into the eight major insiders: CEO, CFO, COO, president, vice president,

chairman of the board, directors, and officers. We use our base Equation 1 and report the results in two columns for each insider. In column 1 we use the following control variables: Bid-Ask spread, PE, CFOA, leverage, size, and BM. In column 2 we add the indicator variables of BM, IO, DY, EPS, loss of earnings, institutional ownership, Herfindahl Index, CEO changes and the tenure of insiders.

Panel A of Table 6 contains the modified Jones (Dechow et al., 1995) discretionary accrual model. The findings illustrate that only the CARs of the vice president and director are positively and significantly related to the discretionary accruals. Similarly, the Bid-Ask spread shows positive and significant relations for the CFO, vice president, director and the chairman of the board. Again, in Panel B when NPR is used instead of the CAR, the NPR shows positive and significant relations only for the CEO, vice president and officer, while the Bid-Ask spread is positive and significant for the CFO, vice president, director and the chairman of the board.

Panel A of Table 7 has the performance-matched (Kothari et al., 2005) discretionary accrual model, in which we find a significant relation between the CAR and the discretionary accruals for the director only, while the Bid-Ask spread is significantly positive for the CFO, COO, vice president and director. Further, in Panel B when the NPR is used instead of the CAR, the NPR is significant for the CEO only. On the other hand, the Bid-Ask spread shows positive and significant relations for the CFO, COO, vice president and director only. These findings suggest a pattern of the use of information asymmetry by a few high-level insiders, such as the CEO, the CFO, the COO, the vice president, the chairman of the board and director, but no such similarity is found for either the CAR or the NPR. For the CFO, the results can be linked to Jiang et al. (2010), who find that the magnitude of discretionary accruals is more sensitive to the CFO's equity incentives than to those of the CEO. For the CEO, both Bergstresser et al. (2006) and Cheng et al. (2005) report that the CEO's equity incentive is associated with accrual

management. Nevertheless, these results indicate that some insiders are more actively involved in activities related to earnings management than others.

[Table 6 and Table 7 about here]

4.3. Routine vs. Opportunistic Trading

Some studies find that while possessing private information, insiders trade for many reasons. For example, some buy or sell trades might have a more systematic pattern of trading that is driven by liquidity reasons or for the diversification or rebalancing of portfolios following stock-option compensation, while other trades might have no pattern and are driven for reasons of speculation or profit. The former are routine trades that signal no information about the firm and the latter are opportunistic trades which signal the use of private information. We argue that opportunistic trades (buy or sell) are more aligned to earnings management than routine trades when information asymmetry exists. Following Cohen et al. (2012), we separate the insider trades into routine and opportunistic. We run OLS tests by using our base Equation 1 and add new variables of interest as routine and opportunistic buy and sell dummies.

Table 8 presents the regression results using both the absolute value and signed value of the discretionary accruals in Panel A and Panel B, respectively. In Panel A with the modified Jones (Dechow et al., 1995) discretionary accrual model (column 1), the opportunistic buys are significantly and positively related to the absolute value of the discretionary accruals as expected, while routine buys do not indicate any such significant relation. In column 2, our results show that opportunistic sells, but not routine sells, are negatively and significantly correlated to the absolute value of the discretionary accruals as predicted. Again, in the performance-matched (Kothari et al., 2005) discretionary accrual model (column 3 and column 4) we find similar findings, however opportunistic buys remain insignificant. These findings are consistent with the Panel B results (column 1 to column 4) for opportunistic buys and opportunistic sells, when signed values of the discretionary accruals are used, indicating

opposite sign of coefficients in both discretionary accrual models to Panel A coefficients of the same models (column 1 to column 4), as expected in the literature. In particular, in Panel B, the performance-matched (Kothari et al., 2005) discretionary accrual model (column 3 and column 4) demonstrates a significantly negative effect of opportunistic buys, not routine buys, on discretionary accruals, while opportunistic sells, not routine sells, reveal a significantly positive effect on discretionary accruals. These findings suggest that insiders are motivated to manipulate earnings downward for opportunistic buys and upward for opportunistic sells, as the literature suggests, to earn abnormal returns out of such trading. However, this is not the case for routine insider buys or routine insider sells.

We suggest that insiders take advantage of their superior knowledge and opportunistically exploit information and manipulate earnings to earn abnormal returns on opportunistic trades only, rather than routine trades, and that these trades are manifested in both superior information and contrarian beliefs (Ke et al., 2003; Jiang & Zaman, 2010; Piotroski and Roulstone, 2005; Seyhun 1992; Rozeff & Zaman, 1998). That is, in a condition of information asymmetry, insiders manage discretionary accruals downward (upward) to opportunistically engage in buy trades (sell trades) to earn abnormal return. With superior knowledge of the firm, insiders recognize pricing errors/mispricing made by outsiders and accordingly trade opportunistically against current investor sentiment/contrarian beliefs. Thus, we provide evidence that discretionary accrual manipulation influences the market in different directions at the convenience of opportunistic buy and sell activities of insiders. Consistent with Cohen et al. (2012), these results demonstrate that our opportunistic versus routine identification of informed insider trading is, in fact, robust to reasonable changes in the classification procedure.

Again, from both Panel A and Panel B of Table 8 we also find that the absolute value of the discretionary accruals is significantly related to CFOA and PE ratio. The other control variables show qualitatively similar findings, as previously reported. In fact, for control variables, in the

Kothari et al. (2005) model (column 3 and column 4), we find exactly similar findings as reported in Dechow et al. (1995) model (column 1 and column 2) with the exception of IO showing a significant negative effect and institutional ownership showing a significant positive effect on earnings management in Panel A.

[Table 8 about here]

4.4. Robustness

Since insider sales dominate insider buys in our sample, to validate our baseline findings in Tables 2 to 5 we split the insider trades into insider buys and insider sells to examine the relationship between the signed discretionary accruals and CAR for buy and sell samples separately. The untabulated results indicate that CAR is inversely related to the discretionary accruals for the buy sample (i.e. insiders manage discretionary accruals downwards for buy trades, as expected) and positively related for the sell sample (i.e. insiders manage discretionary accruals upwards for sale trades, as expected), which is consistent with our baseline results in Tables 2 to 5. Since NPR includes both buy and sell trades, it cannot be used in the regressions of separate samples.

The GMM (Tables 2 to 5) and OLS (Tables 2 to 8) results are checked in two other discretionary accrual models commonly used in the literature and by using another insider trading proxy. Firstly, we re-estimate these tables by using the Kasznik (1999) and Larcker et al. (2004) discretionary accrual models with CAR (Tables 2 and 3), NPR (Tables 4 and 5), major insiders (Tables 6 and 7), and routine and opportunistic trades (Table 8). The untabulated GMM results from the Kasznik (1999) and Larcker et al. (2004) discretionary accrual models provide consistent findings as reported in our baseline results in sub-section 4.1, for insider trading proxies CAR and NPR (i.e. Tables 2 to 5).⁹ This reconfirms the validity of our **H₁** and **H₂**. However, the findings are more solid and resilient for CAR than for NPR. Again, the

⁹ For brevity, the results are not shown here but are available upon request. A similar comment is applicable for rest of untabulated results in the section.

untabulated OLS results for major insiders and routine versus opportunistic trades using the Kasznik (1999) and Larcker et al. (2004) discretionary accrual models are qualitatively similar to our main findings, as reported in sub-sections 4.2 and 4.3 (i.e. Tables 6 to 8). Secondly, we achieve consistent results by using IPR as the insider trading proxy for the Dechow et al. (1995), Kothari et al. (2005), Kasznik (1999) and Larcker et al. (2004) discretionary accrual models for all tables. The results of these further tests are qualitatively similar to our main findings, which suggest that our main hypotheses and other key findings are valid.

We also check the results reported in Tables 2 to 5 with additional corporate governance variables (i.e. board size and board independence) in a substantially reduced sample, since these data are not available for all the sample firms in our data set. The untabulated results do not qualitatively change our baseline findings on the relations between insider trading and discretionary accruals and on the general ineffectiveness of governance and ownership variables in deterring earnings management.

5. Conclusion

Insider trading remains a key concern for regulators despite decades of enforcement and innovation to prevent it. In this paper, we investigate whether insiders, in an asymmetric information environment, manipulate the earnings of a firm to influence the perceptions of investors on firm value to benefit their trades. Using US data for the period from 2004 to 2012, we investigate the link between the absolute value of the discretionary accruals and the insider trading dominated by sell trades for all major insiders as a group and separately. We extend this investigation and check the possible link between routine and opportunistic buy and sell trades with the absolute value of discretionary accruals. These are also examined after controlling for value and growth stocks and other control variables.

We provide evidence of a positive and significant relationship between discretionary accruals and insider trading. This association indicates that earnings management is directly

linked to insider trading. Our information asymmetry proxy (Bid-Ask spread) and its interaction term with insider trading proxies also show significant and positive relations with discretionary accruals, which indicates an incremental effect of asymmetric information on the insider trading and earnings management relationship. Therefore, unlike prior insider trading literature, we contribute by showing a three-way interaction between insider trading, discretionary accruals and information asymmetry, i.e. greater information asymmetry leads to greater insider trading, which results in higher discretionary accruals. Again, at the individual level, we find that the CEO, CFO, vice president and director are more active in insider trading. We also provide evidence of a difference between high and low-growth firms in their relation with discretionary accruals, which shows that growth firms (low book-to-market value) are more aligned to increased discretionary accruals than value firms (high book-to-market value). Further evidence also suggests the managing and manipulation of earnings for insiders' opportunistic trading over routine trading.

Our findings show that the relationship between discretionary accruals and insider trading has a greater emphasis for sell trades in the context of information asymmetry. In particular, we measure the performance of insiders by the abnormal returns they earn from their trades when managing or manipulating the earnings of the firms. We also measure the active involvement of some major insiders in earnings management for their personal benefits. Our research disentangles which trades of the insiders (routine and opportunistic) are particularly related to earnings management. Thus, we contribute to the literature with the use of CAR as a proxy for insider trading, controlling for information asymmetry in the relationship between discretionary accruals and insider trading, breaking down the analysis into examining the impact of each major corporate insider, investigating whether opportunistic or routine trades are more aligned to discretionary accruals, applying alternate models of discretionary accruals in the earnings management literature, and finally using a more meaningful measure of the absolute value of

discretionary accruals. These findings are of interest to regulators to mitigate both earnings management and insider trading problems simultaneously. They also highlight the associated information asymmetry conditions from the viewpoint of agency and signalling to help protect the interests of investors and the firm's value. An appropriate internal control system, governance mechanisms, stringent disclosure environment, and enforcement of regulatory and market scrutiny might be useful to minimise the risk of opportunistic behaviour by insiders as well as future corporate scandals.

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Table 1
Summary Statistics and Correlation Matrix

This table reports the summary statistics. Panel A reports the descriptive statistics for insider trades. Panel B reports the descriptive statistics for the discretionary accruals from various models. Panel C presents the summary statistics for the insider trading activity and discretionary accruals for value and growth stocks (book-to-market quartile) and small and large firms (size quartiles as indicated by market value quartiles). Panel D reports the descriptive statistics for the key variables used in this study. Panel E presents insider-level characteristics. If a trader trades in the same calendar month for at least three consecutive years, his or her trades are defined as routine trades. Other trades are defined as opportunistic trades. Panel F provides discretionary accruals analyzed by levels of insider trading (i.e. buy and sell transactions) and levels of information asymmetry (i.e. low and high Bid-Ask spread, based on medium value). Panel G presents the correlation matrix among the insider trading and information asymmetry proxies (CAR, NPR and Bid-Ask spread) along with other variables of interest.

Panel A: Insider Trades

	N	Mean	SD	25%	Median	75%
Insider purchase (shares)	31,695	27,549	543,188	695	2,000	7,500
Insider purchase amount	31,695	289,260	5,285,535	7,120	23,500	77,161
Insider purchase amount scaled by market capitalisation	31,505	0.00050	0.00617	0.00001	0.00004	0.00016
CAR from insider purchases (%)	30,803	0.938	27.374	-12.394	-0.518	11.877
Insider sales (shares)	268,509	30,815	451,959	985	3,480	10,726
Insider sales amount	268,509	847,840	11,354,070	21,791	88,741	333,640
Insider sales amount scaled by market capitalisation	267,519	0.00067	0.08206	0.00001	0.00005	0.00020
CAR from insider sales (%)	266,276	-3.431	19.061	-13.156	-2.826	6.701

Panel B: Discretionary Accruals

Models	N	Mean	SD	25%	Median	75%
Modified Jones (1995)	16,322	0.084	0.085	0.026	0.058	0.111
Kothari et al. (2005)	16,373	0.089	0.088	0.029	0.063	0.118
Larcker et al. (2004)	16,370	0.090	0.086	0.030	0.065	0.120
Kaszniak (1999)	16,297	0.083	0.084	0.026	0.058	0.110

Panel C: Summary Statistics for NPR, CAR, IPR and Discretionary Accruals for BM and Size Groups

	NPR		CAR		IPR	
	Mean	SD	Mean	SD	Mean	SD
BM Quartile						
BM1	-0.680	0.648	-0.015	0.178	0.159	0.324
BM2	-0.763	0.557	-0.028	0.142	0.118	0.279
BM3	-0.683	0.632	-0.044	0.140	0.158	0.316
BM4	-0.522	0.735	-0.067	0.178	0.239	0.368
Size (MV) Quartile						
MV1	-0.298	0.850	-0.060	0.241	0.351	0.425
MV2	-0.610	0.688	-0.061	0.170	0.195	0.344
MV3	-0.792	0.501	-0.039	0.124	0.104	0.251
MV4	-0.880	0.365	0.000	0.085	0.060	0.183

	Modified Jones (1995)		Kothari et al. (2005)		Larcker et al. (2004)		Kaszniak (1999)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
BM Quartile								
BM1	0.110	0.095	0.115	0.102	0.103	0.095	0.101	0.095
BM2	0.080	0.082	0.089	0.088	0.085	0.080	0.080	0.082
BM3	0.076	0.078	0.078	0.077	0.084	0.082	0.076	0.078
BM4	0.079	0.081	0.079	0.080	0.089	0.086	0.079	0.081
Size (MV) Quartile								
MV1	0.110	0.103	0.110	0.104	0.113	0.103	0.110	0.103
MV2	0.090	0.088	0.095	0.090	0.097	0.089	0.090	0.088
MV3	0.079	0.077	0.086	0.083	0.085	0.079	0.078	0.077
MV4	0.067	0.071	0.077	0.079	0.072	0.072	0.067	0.070

Panel D: Firm-Year Descriptive Statistics

	N	Mean	SD	25%	Median	75%
NPR	18,341	-0.663	0.651	-1.000	-1.000	-0.783
CAR	18,107	-0.039	0.161	-0.113	-0.034	0.036
IPR	18,341	0.168	0.326	0.000	0.000	0.109
Bid-Ask Spread	15,164	3.660	372.575	0.017	0.029	0.052
PE	14,531	0.372	1.177	0.140	0.195	0.300
CFOA	19,517	509	2,028	15.9	77.3	291
Leverage	19,411	0.237	0.283	0.022	0.195	0.358
Size	20,421	4,915	17,627	269	863	2,915
BM	19,640	0.550	2.067	0.237	0.437	0.727

Panel E: Insider-Level Characteristics

Average number of buys per insider	3.10
% all buys that are routine	12.30%
% all buys that are opportunistic	87.70%
Average number of sells per insider	9.09
% all sells that are routine	27.59%
% all sells that are opportunistic	72.41%
Average number of trades per insider	9.07
% all trades that are routine	25.97%
% all trades that are opportunistic	74.03%
% of traders that are routine traders	19.98%
% of traders that are opportunistic traders	80.02%

Panel F: Discretionary Accruals by Levels of Insider Trading and Bid Ask Spread

	Absolute Discretionary Accruals			
	Modified Jones (Dechow et al., 1995)		Performance-Matched (Kothari et al., 2005)	
	Low Bid Ask Spread	High Bid Ask Spread	Low Bid Ask Spread	High Bid Ask Spread
Buy Transactions	0.089	0.100	0.095	0.100
Sell Transactions	0.086	0.086	0.092	0.099

Panel G: Correlation Matrix

	DA_mjabs	DA_paabs	CAR	NPR	Bid Ask	PE	CFOA	Leverage	Size
DA_paabs	0.65516*** (0.0000)								
CAR	0.01246 (0.2283)	0.01576 (0.1276)							
NPR	0.04093*** (0.0001)	0.01321 (0.2013)	0.07072*** (0.0000)						
Bid Ask Spread	0.01529 (0.1393)	-0.00124 (0.9047)	-0.00028 (0.9783)	-0.00115 (0.9111)					
PE	0.04030*** (0.0001)	0.02932*** (0.0046)	0.01280 (0.2159)	-0.00706 (0.4946)	-0.00124 (0.9042)				
CFOA	-0.05445*** (0.0000)	-0.02045** (0.0479)	0.16160*** (0.0000)	-0.17745*** (0.0000)	-0.01425 (0.1681)	-0.05279*** (0.0000)			
Leverage	-0.04074*** (0.0001)	-0.07457*** (0.0000)	0.01645 (0.1117)	0.10997*** (0.0000)	-0.00561 (0.5873)	0.00695 (0.5015)	0.20887*** (0.0000)		
Size	-0.10507*** (0.0000)	-0.05994*** (0.0000)	0.20317*** (0.0000)	-0.24702*** (0.0000)	-0.00890 (0.3895)	-0.00228 (0.8256)	0.89634*** (0.0000)	0.10520*** (0.0000)	
BM	-0.05277*** (0.0000)	-0.09579*** (0.0000)	-0.12628*** (0.0000)	0.16945*** (0.0000)	-0.00497 (0.6306)	-0.04391*** (0.0000)	-0.05059*** (0.0000)	-0.08912*** (0.0000)	-0.25510*** (0.0000)

Table 2

Discretionary Accrual and Performance from Insider Trading

This table reports OLS and GMM estimations for the discretionary accruals on insider trading performance over the 2004 to 2012 sample period. The dependent variable is the absolute values of the discretionary accruals from the Modified Jones (Dechow et al., 1995) model. CAR, the cumulative abnormal returns, is the main variable of interest. The CARs are calculated by taking the daily return of a stock, subtracting the corresponding benchmark portfolio return, and adding these daily excess returns over 90 days after an insider trade takes place. The description of the control variables is as follows: the Bid Ask Spread is the proxy for information asymmetry, CAR*Bid-Ask-Spread is the interactive variable between the CAR and the average bid-ask-spread. PE is the price-earnings ratio, CFOA is the cash flow from operations activity, leverage is the debt-to-asset ratio, size is the log of market value of equity, BM is the book-to-market, IO is the investment opportunity, DY is the dividend yield, and EPS is the earnings per share. BM2, BM3, and BM4 are book-to-market quartile dummies: BM2 equals 1 if the firm is in the second book-to-market quartile and zero otherwise, BM3 equals 1 if the firm is in the third book-to-market quartile and zero otherwise, and BM4 equals 1 if the firm is in the fourth book-to-market quartile and zero otherwise. In this methodology, the intercept is the discretionary accruals of the firms in the first book-to-market quartile (growth firms). Loss is a dummy variable equal to 1 if the firm has negative net income before extraordinary and discontinued items and zero otherwise. CEO Change is a dummy variable equal to 1 if there is a change in the CEO in a firm for a year and zero otherwise. Tenure is a dummy variable equal to 1 if an insider trades for at least five years and zero otherwise. Inst. Share is the percentage of shares owned by the institutional investors. Herfindahl is the Herfindahl-Hirschman index for institutional ownership. The *t*-statistics are shown below the estimates in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% respectively.

	OLS regression				GMM regression			
	Modified Jones (Dechow et al., 1995)				Modified Jones (Dechow et al., 1995)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CAR	0.019*** (2.96)	0.020*** (3.28)	0.019*** (2.99)	0.020*** (3.30)	0.0254*** (5.174)	0.0259*** (7.053)	0.0243*** (5.235)	0.0252*** (7.165)
Bid Ask Spread	2.4E-6 (1.47)	2.4E-6 (1.50)	-6.1E-7 (-0.28)	-2.5E-7 (-0.12)	4.09e-05*** (52.00)	3.46e-05*** (33.36)	0.000808*** (4.775)	0.000658*** (5.136)
CAR*BidAskSpread			-1.4E-4** (-2.09)	-1.2E-4* (-1.87)			0.00274*** (4.541)	0.00223*** (4.876)
PE	0.003*** (5.10)	0.001 (1.64)	0.003*** (5.10)	0.001* (1.65)	0.00225*** (5.242)	0.000403* (1.715)	0.00230*** (5.484)	0.000378 (1.626)
CFOA	0.019*** (16.28)	0.020*** (17.43)	0.019*** (16.25)	0.020*** (17.40)	0.0198*** (16.49)	0.0217*** (23.44)	0.0201*** (17.67)	0.0216*** (24.81)
Leverage	-0.029*** (-8.03)	-0.031*** (-8.13)	-0.029*** (-8.06)	-0.031*** (-8.11)	-0.0258*** (-9.272)	-0.0322*** (-11.70)	-0.0261*** (-9.594)	-0.0318*** (-11.74)
Size	-0.025*** (-19.91)	-0.025*** (-19.52)	-0.025*** (-19.87)	-0.025*** (-19.49)	-0.0248*** (-18.87)	-0.0256*** (-26.21)	-0.0251*** (-20.22)	-0.0255*** (-27.76)
BM	-0.027*** (-14.83)		-0.027*** (-14.84)		-0.0232*** (-13.44)		-0.0233*** (-14.28)	
BM2		-0.024*** (-10.30)		-0.024*** (-10.30)		-0.0224*** (-16.35)		-0.0221*** (-16.54)
BM3		-0.034*** (-14.26)		-0.034*** (-14.25)		-0.0330*** (-29.13)		-0.0328*** (-29.67)
BM4		-0.052*** (-19.53)		-0.052*** (-19.52)		-0.0466*** (-29.75)		-0.0465*** (-30.26)
IO		0.010*** (2.92)		0.010*** (2.92)		0.0115*** (5.550)		0.0114*** (5.641)
DY		-0.003*** (-6.90)		-0.003*** (-7.01)		-0.00234*** (-8.628)		-0.00236*** (-8.862)
EPS		-0.002*** (-6.54)		-0.002*** (-6.56)		-0.00235*** (-12.45)		-0.00235*** (-14.40)
Loss		0.062*** (16.83)		0.062*** (16.74)		0.0576*** (20.77)		0.0579*** (21.18)
CEO Change		-0.001 (-0.44)		-0.001 (-0.44)		-0.00199 (-1.300)		-0.00207 (-1.389)
Tenure		-0.009*** (-3.71)		-0.009*** (-3.71)		-0.00437*** (-2.898)		-0.00386*** (-2.613)
Inst. Share		0.001 (0.21)		0.001 (0.18)		0.00122 (0.456)		0.00104 (0.401)
Herfindahl Index		-0.005 (-0.32)		-0.006 (-0.39)		-0.00612 (-0.622)		-0.00745 (-0.812)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lag Disc Accrual					0.0615***	0.0485***	0.063***	0.047***
Intercept	0.234***	0.233***	0.234***	0.233***	0.037***	0.091***	0.189***	0.122***
Observations	9,438	9,426	9,438	9,426	8,991	8,983	8,991	8,983
Adj R-sq	0.0483	0.1097	0.0487	0.1099				
AR(1)-p-value					0.000	0.000	0.000	0.000
AR(2)-p-value					0.615	0.464	0.664	0.464
Hansen-J- P-value					0.791	0.812	0.705	0.931

Table 3

Discretionary Accrual and Performance from Insider Trading

This table reports OLS and GMM estimations for the discretionary accruals on insider trading performance over the 2004 to 2012 sample period. The dependent variable is the absolute values of the discretionary accruals from the performance-matched (Kothari et al., 2005) accrual model. CAR, the cumulative abnormal returns, is the main variable of interest. The CARs are calculated by taking the daily stock return of a share, deducting the corresponding market portfolio return, and adding these daily excess returns over 90 days after an insider trade takes place. The description of the control variables is as follows: the Bid Ask Spread is the proxy for information asymmetry, CAR*Bid-Ask-Spread is the interactive variable between CAR and the average bid-ask-spread, PE is the price-earnings ratio, CFOA is the cash flow from operations activity, leverage is the debt-to-asset ratio, size is the log of market value of equity, BM is the book-to-market, IO is the investment opportunity, DY is the dividend yield, and EPS is the earnings per share. BM2, BM3, and BM4 are book-to-market quartile dummies: BM2 equals 1 if the firm is in the second book-to-market quartile and zero otherwise, BM3 equals 1 if the firm is in the third book-to-market quartile and zero otherwise, and BM4 equals 1 if the firm is in the fourth book-to-market quartile and zero otherwise. In this methodology, the intercept is the discretionary accruals of the firms in the first book-to-market quartile (growth firms). Loss is a dummy variable equal to 1 if the firm has negative net income before extraordinary and discontinued items and zero otherwise. CEO Change is a dummy variable equal to 1 if there is a change in the CEO in a firm for a year and zero otherwise. Tenure is a dummy variable equal to 1 if an insider trades for at least five years and zero otherwise. Inst. Share is the percentage of shares owned by the institutional investors. Herfindahl is the Herfindahl-Hirschman index for institutional ownership. The *t*-statistics are shown below the estimates in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% respectively.

	OLS regression				GMM regression			
	Performance-matched (Kothari et al., 2005)				Performance-matched (Kothari et al., 2005)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CAR	0.016** (2.35)	0.017*** (2.60)	0.016** (2.39)	0.017*** (2.64)	0.0179*** (3.816)	0.0207*** (5.773)	0.0169*** (3.727)	0.0219*** (6.230)
Bid Ask Spread	-2.2E-7 (-0.13)	-2.4E-7 (-0.14)	-4.1E-6* (-1.76)	-3.9E-6* (-1.75)	1.19e-07** (2.275)	2.26e-07*** (4.590)	-3.68e-06*** (-43.66)	-3.20e-06*** (-31.18)
CAR*BidAskSpread			-1.8E-4** (-2.52)	-1.7E-4** (-2.49)			-0.000173*** (-57.63)	-0.000157*** (-37.65)
PE	0.003*** (4.05)	4.9E-4 (0.72)	0.003*** (4.05)	4.9E-4 (0.73)	0.00263*** (6.888)	0.000477** (1.966)	0.00269*** (7.141)	0.000408* (1.720)
CFOA	0.021*** (16.78)	0.024*** (20.03)	0.021*** (16.74)	0.024*** (20.00)	0.0249*** (22.43)	0.0278*** (29.76)	0.0240*** (21.38)	0.0275*** (32.51)
Leverage	-0.051*** (-12.96)	-0.048*** (-11.69)	-0.051*** (-13.00)	-0.048*** (-11.67)	-0.0497*** (-14.05)	-0.0572*** (-16.05)	-0.0510*** (-14.59)	-0.0580*** (-16.24)
Size	-0.025*** (-18.66)	-0.027*** (-20.26)	-0.025*** (-18.61)	-0.027*** (-20.22)	-0.0294*** (-23.18)	-0.0302*** (-29.69)	-0.0284*** (-22.30)	-0.0301*** (-31.67)
BM	-0.035*** (-18.16)		-0.035*** (-18.17)		-0.0334*** (-17.54)		-0.0342*** (-18.60)	
BM2		-0.031*** (-12.95)		-0.031*** (-12.95)		-0.0310*** (-21.95)		-0.0306*** (-22.41)
BM3		-0.050*** (-20.04)		-0.050*** (-20.02)		-0.0471*** (-41.87)		-0.0471*** (-42.42)
BM4		-0.069*** (-24.75)		-0.069*** (-24.74)		-0.0637*** (-39.68)		-0.0627*** (-38.95)
IO		-0.008** (-2.23)		-0.008** (-2.23)		-0.00993*** (-3.955)		-0.0102*** (-4.192)
DY		-0.003*** (-7.43)		-0.003*** (-7.58)		-0.00294*** (-11.37)		-0.00260*** (-8.422)
EPS		-0.003*** (-6.82)		-0.003*** (-6.84)		-0.00282*** (-14.99)		-0.00270*** (-15.65)
Loss		0.062*** (15.88)		0.062*** (15.76)		0.0638*** (24.82)		0.0620*** (22.88)
CEO Change		-0.005 (-1.59)		-0.005 (-1.58)		-0.00365** (-2.230)		-0.00339** (-2.124)
Tenure		-0.009*** (-3.67)		-0.009*** (-3.67)		-0.00424*** (-2.627)		-0.00365** (-2.306)
Inst. Share		0.009** (2.07)		0.008** (2.03)		-0.00158 (-0.529)		-0.00104 (-0.351)
Herfindahl Index		0.002 (0.15)		0.001 (0.05)		-0.0114 (-1.246)		-0.00182 (-0.192)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lag Disc Accrual					-0.0426***	-0.0468***	-0.0372***	-0.0478***
Intercept	0.230***	0.241***	0.229***	0.241***	0.136	1.072	0.117	0.0747
Observations	9,509	9,496	9,509	9,496	9,142	9,134	9,142	9,134
Adj R-sq	0.0522	0.1316	0.0527	0.1321				
AR(1)-p-value					0.000	0.000	0.000	0.000
AR(2)-p-value					0.221	0.175	0.137	0.211
Hansen-J- P-value					0.878	0.964	0.875	0.718

Table 4

Discretionary Accrual and Insider Trading

This table reports the OLS and GMM estimations for the discretionary accruals on insider trading activity over the 2004 to 2012 sample period. The dependent variable is the absolute values of the discretionary accruals from the Modified Jones (Dechow et al., 1995) model. NPR, the net purchase ratio, is the main variable of interest. The description of the control variables is as follows: the Bid Ask Spread is the proxy for information asymmetry, NPR*Bid-Ask-Spread is the interactive variable between NPR and the average bid-ask-spread, PE is the price-earnings ratio, CFOA is the cash flow from operations activity, leverage is the debt-to-asset ratio, size is the log of market value of equity, BM is the book-to-market, IO is the investment opportunity, DY is the dividend yield, and EPS is the earnings per share. BM2, BM3, and BM4 are book-to-market quartile dummies: BM2 equals 1 if the firm is in the second book-to-market quartile and zero otherwise, BM3 equals 1 if the firm is in the third book-to-market quartile and zero otherwise, and BM4 equals 1 if the firm is in the fourth book-to-market quartile and zero otherwise. In this methodology, the intercept is the discretionary accruals of the firms in the first book-to-market quartile (growth firms). Loss is a dummy variable equal to 1 if the firm has negative net income before extraordinary and discontinued items and zero otherwise. CEO Change is a dummy variable equal to 1 if there is a change in the CEO in a firm for a year and zero otherwise. Tenure is a dummy variable equal to 1 if an insider trades for at least five years and zero otherwise. Inst. Share is the percentage of shares owned by the institutional investors. Herfindahl is the Herfindahl-Hirschman index for institutional ownership. The *t*-statistics are shown below the estimates in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% respectively.

	OLS regression				GMM regression			
	Modified Jones (Dechow et al., 1995)				Modified Jones (Dechow et al., 1995)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NPR	0.005*** (3.33)	0.004** (2.48)	0.005*** (3.27)	0.004** (2.45)	0.00307** (2.423)	0.00141 (1.519)	0.00334*** (2.850)	0.00114 (1.318)
Bid Ask Spread	2.4E-6 (1.48)	2.4E-6 (1.51)	1.9E-5** (2.22)	1.7E-5** (2.06)	3.85e-05*** (48.00)	3.32e-05*** (31.76)	1.29e-04** (1.97)	3.34e-05*** (32.77)
NPR*BidAskSpread			1.7E-5** (1.97)	1.5E-5* (1.81)			3.81e-05*** (50.63)	2.09e-05* (1.82)
PE	0.003*** (5.19)	0.001* (1.75)	0.003*** (5.19)	0.001* (1.76)	0.00229*** (5.422)	0.000463** (2.046)	0.00234*** (5.653)	0.000529** (2.354)
CFOA	0.019*** (16.12)	0.020*** (17.24)	0.019*** (16.09)	0.020*** (17.22)	0.0193*** (16.14)	0.0214*** (23.56)	0.0195*** (16.88)	0.0201*** (22.80)
Leverage	-0.029*** (-8.04)	-0.029*** (-7.77)	-0.029*** (-8.06)	-0.029*** (-7.75)	-0.0265*** (-9.431)	-0.0323*** (-11.91)	-0.0264*** (-9.706)	-0.0301*** (-11.21)
Size	-0.025*** (-19.24)	-0.024*** (-18.90)	-0.025*** (-19.20)	-0.024*** (-18.88)	-0.0238*** (-18.24)	-0.0247*** (-25.81)	-0.0240*** (-19.11)	-0.0234*** (-24.89)
BM	-0.028*** (-15.33)		-0.028*** (-15.33)		-0.0251*** (-14.43)		-0.0255*** (-15.28)	
BM2		-0.023*** (-10.21)		-0.023*** (-10.20)		-0.0227*** (-16.73)		-0.0187*** (-11.28)
BM3		-0.034*** (-14.27)		-0.034*** (-14.25)		-0.0332*** (-28.66)		-0.0278*** (-15.87)
BM4		-0.052*** (-19.70)		-0.052*** (-19.68)		-0.0473*** (-30.31)		-0.0432*** (-22.79)
IO		0.009*** (2.76)		0.009*** (2.77)		0.0117*** (5.686)		0.0113*** (5.521)
DY		-0.003*** (-7.33)		-0.003*** (-7.44)		-0.00255*** (-9.518)		-0.00245*** (-9.247)
EPS		-0.002*** (-6.42)		-0.002*** (-6.44)		-0.00236*** (-12.88)		-0.00214*** (-12.81)
Loss		0.061*** (16.58)		0.061*** (16.48)		0.0578*** (21.03)		0.0569*** (21.05)
CEO Change		-0.001 (-0.50)		-0.001 (-0.49)		-0.00214 (-1.382)		-0.00207 (-1.380)
Tenure		-0.008*** (-3.48)		-0.008*** (-3.48)		-0.00331** (-2.162)		-0.00393*** (-2.617)
Inst. Share		0.001 (0.25)		0.001 (0.22)		-0.000135 (-0.0510)		0.00222 (0.835)
Herfindahl Index		-0.003 (-0.20)		-0.004 (-0.27)		-0.00224 (-0.223)		0.00250 (0.258)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lag Disc Accrual					0.0629***	0.0495***	0.0588***	0.0532***
Intercept	0.228***	0.227***	0.228***	0.227***	0.063***	0.0345***	0.181***	0.197***
Observations	9,462	9,450	9,462	9,450	8,991	8,983	8,991	8,983
Adj R-sq	0.0482	0.1083	0.0485	0.1085				
AR(1)-p-value					0.000	0.000	0.000	0.000
AR(2)-p-value					0.551	0.417	0.641	0.382
Hansen-J- P-value					0.901	0.956	0.786	0.832

Table 5

Discretionary Accrual and Insider Trading

This table reports the OLS and GMM estimations for the discretionary accruals on insider trading activity over the 2004 to 2012 sample period. The dependent variable is the absolute values of the discretionary accruals from the performance-matched (Kothari et al., 2005) accrual model. NPR, the net purchase ratio, is the main variable of interest. The description of the control variables is as follows: the Bid Ask Spread is the proxy for information asymmetry, NPR*Bid-Ask-Spread is the interactive variable between NPR and the average bid-ask-spread, PE is the price-earnings ratio, CFOA is the cash flow from operations activity, leverage is the debt-to-asset ratio, size is the log of market value of equity, BM is the book-to-market, IO is the investment opportunity, DY is the dividend yield, and EPS is the earnings per share. BM2, BM3, and BM4 are book-to-market quartile dummies: BM2 equals 1 if the firm is in the second book-to-market quartile and zero otherwise, BM3 equals 1 if the firm is in the third book-to-market quartile and zero otherwise, and BM4 equals 1 if the firm is in the fourth book-to-market quartile and zero otherwise. In this methodology, the intercept is the discretionary accruals of the firms in the first book-to-market quartile (growth firms). Loss is a dummy variable equal to 1 if the firm has negative net income before extraordinary and discontinued items and zero otherwise. CEO Change is a dummy variable equal to 1 if there is a change in the CEO in a year and zero otherwise. Tenure is a dummy variable equal to 1 if an insider trades for at least five years and zero otherwise. Inst. Share is the percentage of shares owned by the institutional investors. Herfindahl is the Herfindahl-Hirschman index for institutional ownership. The *t*-statistics are shown below the estimates in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% respectively.

	OLS regression				GMM regression			
	Performance-matched (Kothari et al., 2005)				Performance-matched (Kothari et al., 2005)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
NPR	0.004** (2.15)	0.003** (1.96)	0.003** (2.08)	0.003* (1.92)	0.00355*** (3.698)	0.00142* (1.705)	0.00137 (1.068)	0.00197** (2.100)
Bid Ask Spread	-2.2E-7 (-0.12)	-2.2E-7 (-0.13)	2.2E-5** (2.40)	2.1E-5** (2.40)	1.07e-07** (2.023)	2.29e-07*** (4.615)	2.19e-05*** (54.98)	2.01e-05*** (37.91)
NPR*BidAskSpread			2.2E-5** (2.47)	2.2E-5** (2.47)			2.23e-05*** (54.70)	2.02e-05*** (37.53)
PE	0.003*** (4.13)	0.001 (0.81)	0.003*** (4.13)	0.001 (0.82)	0.00284*** (7.475)	0.000559** (2.186)	0.00287*** (7.625)	0.000493* (1.953)
CFOA	0.021*** (16.68)	0.024*** (19.97)	0.021*** (16.64)	0.024*** (19.94)	0.0247*** (21.08)	0.0281*** (29.66)	0.0238*** (20.72)	0.0277*** (30.73)
Leverage	-0.051*** (-13.18)	-0.047*** (-11.78)	-0.051*** (-13.21)	-0.047*** (-11.76)	-0.0536*** (-15.21)	-0.0590*** (-16.86)	-0.0529*** (-15.41)	-0.0583*** (-16.91)
Size	-0.025*** (-18.20)	-0.026*** (-19.83)	-0.025*** (-18.15)	-0.026*** (-19.79)	-0.0285*** (-21.36)	-0.0298*** (-28.83)	-0.0278*** (-21.46)	-0.0296*** (-29.92)
BM	-0.036*** (-18.49)		-0.036*** (-18.50)		-0.0348*** (-17.80)		-0.0354*** (-18.37)	
BM2		-0.031*** (-12.97)		-0.031*** (-12.97)		-0.0313*** (-22.00)		-0.0306*** (-21.86)
BM3		-0.051*** (-20.16)		-0.051*** (-20.14)		-0.0477*** (-41.88)		-0.0477*** (-42.52)
BM4		-0.070*** (-24.99)		-0.070*** (-24.97)		-0.0654*** (-40.06)		-0.0648*** (-40.22)
IO		-0.008** (-2.37)		-0.008** (-2.37)		-0.00977*** (-3.887)		-0.00968*** (-3.914)
DY		-0.004*** (-7.80)		-0.004*** (-7.95)		-0.00294*** (-10.53)		-0.00277*** (-9.153)
EPS		-0.003*** (-6.72)		-0.003*** (-6.74)		-0.00284*** (-14.81)		-0.00266*** (-14.97)
Loss		0.061*** (15.72)		0.061*** (15.60)		0.0635*** (24.35)		0.0624*** (23.16)
CEO Change		-0.004 (-1.44)		-0.004 (-1.43)		-0.00352** (-2.151)		-0.00341** (-2.141)
Tenure		-0.008*** (-3.42)		-0.008*** (-3.42)		-0.00351** (-2.189)		-0.00317** (-1.998)
Inst. Share		0.008* (1.95)		0.008* (1.91)		-0.00155 (-0.520)		-0.000895 (-0.300)
Herfindahl Index		0.005 (0.32)		0.004 (0.23)		-0.00453 (-0.483)		0.00381 (0.419)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lag Disc Accrual					-0.0465***	-0.0480***	-0.0444***	-0.0492***
Intercept	0.226***	0.236***	0.225***	0.236***	0.226	0.144***	0.099	-0.812
Observations	9,533	9,520	9,533	9,520	9,142	9,134	9,142	9,134
Adj R-sq	0.0521	0.1312	0.0526	0.1317				
AR(1)-p-value					0.000	0.000	0.000	0.000
AR(2)-p-value					0.331	0.291	0.210	0.314
Hansen-J- P-value					0.872	0.916	0.762	0.817

Table 6
Modified Jones Discretionary Accrual (Dechow et al., 1995) and Insider Trading by

This table reports OLS estimations of the discretionary accruals on insider trading activity by insider category over the 2004 to 2012 sample period. Panel A reports the discretionary accruals from Modified Jones (Dechow et al., 1995) model. In Panel A, CAR, the cumulative abnormal return, is used to measure insider trading activity. In Panel B, NPR, the net purchase ratio, is used as a measure of insider trading activity. Other control variables are as in Table 2. The *t*-statistics are in parentheses. ** and * indicate significance at 1%, 5% and 10% respectively.

Panel A: CAR as a measure of insider trading performance

	CEO		CFO		COO		President		Vice President		Chairman of the Board	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Intercept	0.252*** (24.02)	0.242*** (19.26)	0.232*** (22.87)	0.219*** (18.15)	0.256*** (12.62)	0.246*** (10.10)	0.188*** (8.43)	0.158*** (5.69)	0.233*** (19.59)	0.211*** (14.22)	0.160*** (7.23)	0.153*** (5.5)
CAR	0.008 (1.20)	0.011 (1.63)	4.3E-5 (0.01)	0.003 (0.48)	0.001 (0.10)	0.012 (0.95)	0.003 (0.16)	0.007 (0.49)	0.014* (1.86)	0.014* (1.84)	0.005 (0.38)	0.005 (1.0)
Bid Ask Spread	2.2E-6 (1.31)	2.3E-6 (1.45)	3.9E-5** (2.30)	3.5E-5** (2.11)	0.037 (1.10)	-0.008 (-0.22)	0.001 (0.07)	0.021 (1.00)	3.7E-5** (2.13)	3.4E-5** (1.96)	0.002 (0.14)	0.04 (2.1)
Controls in Main Specifications	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,886	5,875	6,440	6,433	1,594	1,593	1,165	1,163	5,182	5,174	1,854	1,854
Adj R-sq	0.0592	0.1191	0.0501	0.1085	0.0784	0.1026	0.0230	0.0974	0.0451	0.1033	0.0116	0.06

Panel B: NPR as a measure of insider trading

	CEO		CFO		COO		President		Vice President		Chairman of the Board	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Intercept	0.249*** (23.88)	0.238*** (19.10)	0.230*** (23.00)	0.218*** (18.23)	0.258*** (12.75)	0.244*** (9.97)	0.186*** (8.46)	0.154*** (5.58)	0.233*** (19.82)	0.209*** (14.22)	0.158*** (7.21)	0.149*** (5.4)
NPR	0.003* (1.95)	0.002 (1.23)	-0.002 (-0.80)	-0.002 (-1.10)	-0.002 (-0.44)	-0.002 (-0.58)	-0.001 (-0.21)	-0.005 (-0.90)	0.005** (1.98)	0.004 (1.47)	0.002 (0.59)	-4.1E-5 (-0.0)
Bid Ask Spread	2.1E-6 (1.29)	2.3E-6 (1.42)	4.0E-5** (2.33)	3.5E-5** (2.13)	0.040 (1.20)	-0.010 (-0.26)	0.002 (0.09)	0.018 (0.86)	3.6E-5** (2.02)	3.3E-5* (1.90)	0.003 (0.17)	0.04 (2.0)
Controls in Main Specifications	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,916	5,905	6,463	6,456	1,601	1,600	1,168	1,166	5,194	5,186	1,857	1,857
Adj R-sq	0.0575	0.1153	0.0486	0.1075	0.0788	0.1039	0.0220	0.0934	0.0455	0.1033	0.0115	0.06

Table 7
Performance-matched Discretionary Accrual (Kothari et al., 2005) and Insider Trading

This table reports OLS estimations of the discretionary accruals on insider trading activity by insider category over the 2004 to 2012 sample period of the discretionary accruals from the performance-matched (Kothari et al., 2005) accrual model. In Panel A, CAR, the cumulative abnormal return, is used as a measure of insider trading activity. In Panel B, NPR, the net purchase ratio, is used as a measure of insider trading activity. The other control variables are as in Table 1 in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% respectively.

Panel A: CAR as a measure of insider trading performance

	CEO		CFO		COO		President		Vice President		Chairman Board
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Intercept	0.250*** (23.72)	0.246*** (19.78)	0.229*** (21.23)	0.222*** (17.44)	0.224*** (10.04)	0.238*** (9.00)	0.182*** (7.58)	0.194*** (6.49)	0.217*** (17.11)	0.210*** (13.40)	0.195*** (7.97)
CAR	0.005 (0.74)	0.008 (1.21)	0.003 (0.49)	0.006 (0.88)	-0.002 (-0.18)	0.006 (0.48)	0.024 (1.44)	0.024 (1.48)	0.006 (0.80)	0.004 (0.56)	-0.016 (-1.10)
Bid Ask Spread	-5.3E-7 (-0.32)	-3.8E-7 (-0.24)	4.7E-5*** (2.61)	4.5E-5** (2.57)	0.101*** (2.72)	0.042 (1.05)	-0.001 (-0.07)	0.020 (0.89)	4.7E-5** (2.52)	4.8E-5*** (2.65)	-0.011 (-0.59)
Controls in Main Specifications	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,926	5,914	6,497	6,489	1,604	1,603	1,175	1,172	5,260	5,251	1,902
Adj R-sq	0.0662	0.1484	0.0585	0.1318	0.0693	0.1200	0.0289	0.1078	0.0470	0.1224	0.0474

Panel B: NPR as a measure of insider trading

	CEO		CFO		COO		President		Vice President		Chairman Board
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Intercept	0.248*** (23.68)	0.244*** (19.74)	0.227*** (21.31)	0.222*** (17.56)	0.226*** (10.16)	0.239*** (9.04)	0.176*** (7.43)	0.186*** (6.30)	0.219*** (17.50)	0.211*** (13.58)	0.196*** (8.10)
NPR	0.004** (2.21)	0.003 (1.64)	-0.003 (-1.39)	-0.003 (-1.30)	-0.002 (-0.40)	-4.4E-4 (-0.10)	0.003 (0.53)	-0.001 (-0.15)	0.005 (1.56)	0.004 (1.37)	0.001 (0.20)
Bid Ask Spread	-5.6E-7 (-0.34)	-4.1E-7 (-0.26)	4.8E-5*** (2.66)	4.5E-5*** (2.59)	0.101*** (2.72)	0.037 (0.94)	-0.001 (-0.07)	0.018 (0.79)	4.6E-5** (2.42)	4.7E-5** (2.58)	-0.011 (-0.57)
Controls in Main Specifications	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,956	5,944	6,520	6,512	1,611	1,610	1,178	1,175	5,272	5,263	1,905
Adj R-sq	0.0650	0.1452	0.0573	0.1305	0.0683	0.1198	0.0267	0.1042	0.0477	0.1228	0.0463

Table 8
Discretionary Accrual and Routine vs. Opportunistic Trades

This table presents the OLS estimations for the discretionary accruals on the routine and opportunistic classification of insider trading over the 2004 to 2012 sample period. The dependent variable in Panel A is the the absolute values of the discretionary accruals from the Modified Jones (Dechow et al., 1995) model and the performance-matched (Kothari et al., 2005) accrual model whereas the dependent variable in Panel B is the signed discretionary accruals from those two discretionary accrual models. We classify the insider traders as routine trader and opportunistic trader. We analyse trading history for each trader by looking at consistency in trading pattern for each trader.. We define a trader as a routine trader if he or she trades in the same calendar month for at least three consecutive years. Other traders are defined as opportunistic traders Opportunistic Buy is a categorical variable equal to 1 if there were any opportunistic buys of an insider on a given firm and zero otherwise. Routine Buy is a categorical variable equal to 1 if there were any routine buys of an insider on a given firm and zero otherwise. Opportunistic Sell and Routine Sell are defined analogously for insider sales. The other control variables are as in Table 2. The *t*-statistics are shown below the estimates in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% respectively.

Panel A: Using the absolute value of discretionary accruals

	Modified Jones (Dechow et al., 1995)		Performance-matched (Kothari et al., 2005)	
	(1)	(2)	(3)	(4)
Intercept	0.223*** (21.94)	0.231*** (22.8)	0.233*** (21.80)	0.239*** (22.48)
Opportunistic Buys	0.007** (1.97)		0.005 (1.51)	
Routine Buys	0.011 (0.91)		0.010 (0.80)	
Opportunistic Sells		-0.007** (-2.21)		-0.006* (-1.68)
Routine Sells		-0.006 (-1.53)		-0.006 (-1.34)
Bid Ask Spread	2.4E-6 (1.51)	2.4E-6 (1.51)	-2.2E-7 (-0.13)	-2.2E-7 (-0.13)
PE	0.001* (1.76)	0.001* (1.76)	0.001 (0.81)	0.001 (0.81)
CFOA	0.020*** (17.26)	0.020*** (17.21)	0.024*** (19.99)	0.024*** (19.95)
Leverage	-0.029*** (-7.74)	-0.029*** (-7.74)	-0.047*** (-11.75)	-0.047*** (-11.76)
Size	-0.024*** (-18.96)	-0.024*** (-18.96)	-0.026*** (-19.88)	-0.026*** (-19.88)
BM	-0.023*** (-10.21)	-0.023*** (-10.20)	-0.031*** (-12.97)	-0.031*** (-12.96)
IO	0.009*** (2.77)	0.009*** (2.77)	-0.008** (-2.35)	-0.008** (-2.36)
DY	-0.003*** (-7.34)	-0.003*** (-7.34)	-0.004*** (-7.81)	-0.004*** (-7.80)
EPS	-0.002*** (-6.43)	-0.002*** (-6.41)	-0.003*** (-6.72)	-0.003*** (-6.71)
Loss	0.061*** (16.58)	0.061*** (16.58)	0.061*** (15.72)	0.061*** (15.73)
CEO Change	-0.001 (-0.51)	-0.001 (-0.51)	-0.004 (-1.46)	-0.004 (-1.47)
Tenure	-0.008*** (-3.53)	-0.008*** (-3.51)	-0.009*** (-3.46)	-0.009*** (-3.40)
Inst. Share	0.001 (0.25)	0.001 (0.23)	0.008* (1.96)	0.008* (1.95)
Herfindahl Index	-0.004 (-0.23)	-0.003 (-0.21)	0.005 (0.30)	0.005 (0.31)
Observations	9,448	9,448	9,518	9,518
Adj R-sq	0.1082	0.1082	0.1311	0.1311

Panel B: Using the signed value of discretionary accruals

	Modified Jones (Dechow et al., 1995)		Performance-matched (Kothari et al., 2005)	
	(1)	(2)	(3)	(4)
Intercept	-0.112*** (-9.12)	-0.119*** (-9.71)	-0.136*** (-10.93)	-0.143*** (-11.54)
Opportunistic Buys	-0.006 (-1.53)		-0.009** (-2.04)	
Routine Buys	0.022 (1.56)		0.000 (0.03)	
Opportunistic Sells		0.006 (1.48)		0.007* (1.75)
Routine Sells		-0.003 (-0.64)		0.010* (1.93)
Bid Ask Spread	0.000 (1.58)	0.000 (1.59)	0.000 (0.68)	0.000 (0.68)
PE	-0.003*** (-4.24)	-0.003*** (-4.23)	-0.003*** (-3.18)	-0.003*** (-3.19)
CFOA	-0.050*** (-34.67)	-0.049*** (-34.46)	-0.042*** (-28.67)	-0.042*** (-28.65)
Leverage	0.043*** (9.26)	0.043*** (9.26)	0.055*** (11.48)	0.055*** (11.47)
Size	0.045*** (28.64)	0.045*** (28.63)	0.038*** (23.79)	0.038*** (23.80)
BM	0.031*** (14.01)	0.031*** (14.01)	0.041*** (17.94)	0.041*** (17.92)
IO	0.008** (2.10)	0.008** (1.97)	0.024*** (5.79)	0.024*** (5.80)
DY	0.003*** (5.56)	0.003*** (5.80)	0.003*** (5.95)	0.003*** (5.94)
EPS	0.006*** (13.17)	0.006*** (13.12)	0.005*** (10.93)	0.005*** (10.95)
Loss	-0.081*** (-17.49)	-0.080*** (-17.42)	-0.067*** (-14.31)	-0.067*** (-14.31)
CEO Change	0.003 (0.74)	0.002 (0.63)	-0.001 (-0.17)	-0.001 (-0.17)
Tenure	-0.000 (-0.04)	0.001 (0.47)	-0.006* (-1.92)	-0.006* (-1.96)
Inst. Share	-0.021*** (-4.29)	-0.021*** (-4.26)	-0.025*** (-5.01)	-0.025*** (-5.05)
Herfindahl Index	0.003 (0.16)	0.004 (0.22)	-0.017 (-0.86)	-0.017 (-0.84)
Observations	9.448	9.448	9.518	9.518
Adj R-Sq	0.1726	0.1728	0.1315	0.1315