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Insider trading : the interrelation between accounting information, stock prices, and reported insider trades

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4 Decomposing Executive Stock Option Exercises: Relative Information and Incentives to Manage Earnings²⁰

4.1 INTRODUCTION

This chapter provides an empirical evaluation of the information reflected in executive stock option exercises. Specifically, it analyses the extent to which managers' exercise decisions provide signals for earnings forecasting and the quality of current earnings. The research is motivated by an increased interest by academics, practitioners and the wider business community in the role that stock options play in executive compensation. Executive stock options became the largest component of compensation in U.S. corporations during the 1990s fuelled by calls to link compensation with performance (Murphy 1998; Hall and Liebman 1998; Hall and Murphy 2002; Hall and Murphy 2003). Concurrently, major financial reporting scandals such as Enron have been blamed on the excessive use of stock options in executive compensation packages. For example, Kranhold (2003) argues that stock options "...motivat[e] employees to place too much emphasis on increasing the stock price at the expense of other performance measures".

An employee stock option provides a manager the right to purchase firm stock at a pre-determined exercise price within a pre-determined time frame. These options are generally awarded with an exercise price equal to the market price at the grant date ("at-the-money"). Theoretically, equity-based compensation makes managerial wealth a positive function of firm value and aligns the interests of managers and shareholders (Jensen and Meckling 1976). However, at the same time, tying wealth to firm performance may have the effect that risk-averse and under-diversified managers will pass up risk-increasing positive NPV projects (Smith and Stulz 1985). Options, which have a convex relation with stock price, may reduce such risk-related agency problems. Because option value increases with stock price volatility, option awards induce risk-averse managers to pursue risky but value enhancing projects (Guay 1999; Bryan et al. 2000; Rajgopal and Shevlin 2002; Ittner et al. 2003; Williams and Rao 2006). However, while reducing risk-related agency problems by incentivising more risk-

²⁰ This chapter is based on a joint research project with Allan Hodgson, Bart van Praag, and Wei Zhang.

taking, option awards also induce managers to take more risks in terms of aggressive financial reporting, as the cost of detection is limited (Burns and Kedia 2006). Options shield managers from the downside risk that is imposed by stock (Feltham and Wu 2001).

This chapter extends the literature on corporate insider trading and the incentives induced by stock option compensation. Using a broad sample of executive option exercises in U.S. firms during the period 1996-2006, the first purpose is to provide evidence on the information content of option exercises versus share trades. Information content is measured by the extent to which “abnormal” (unexpectedly high) trading activity is associated with changes in future annual earnings performance. Consistent with Aboody et al. (2008), option exercises are decomposed based on whether or not the insiders sell shares acquired upon exercise. Exercise-and-hold transactions are defined as “conversions” and exercise-and-sell transactions are defined as “liquidations”. In addition, liquidation-related sales are separated from sales of previously held shares. This creates the opportunity to make a comparison between regular equity purchases and sales and purchases and sales of shares through the exercise of options.

This chapter predicts that managers are more inclined to trade ahead of disappointing future earnings news when the wealth loss avoided from anticipated price changes is greater. Based on total equity holdings data for a subset of our sample firms, the descriptive analysis in section 3.6 suggested that CEO wealth is most sensitive to price fluctuations as a result of option holdings, and even more so for deeper in-the-money options. Accordingly, the first hypothesis predicts that managers’ decisions to liquidate options are more informative with respect to future firm performance than regular sales of shares. In addition, earnings management incentives are greater in the presence of option compensation due to the convexity that options introduce into managerial wealth (Burns and Kedia 2006). Since the reversing nature of earnings management induces endogeneity in the relation between insider trades and future earnings (Sawicki and Shrestha 2008), the information content of insider sales is likely concentrated in exercise-related sales. Consistent with these predictions, the empirical evidence suggests that liquidation exercises are significantly more informative than regular sales of previously held shares. Furthermore, the information content of liquidation exercises is most pronounced when the wealth loss avoided by managers is greatest, i.e. when options are deep in-the-money.

Next, the chapter predicts that managers’ conversion exercises more likely reflect non-information incentives compared to regular equity purchases due to ex-post timing (backdating), dividend payments, and option expiration. While prior research has shown that

abnormal returns after conversion exercises are mechanical and can be explained by exercise-date backdating (Cicero 2009), this chapter documents additional predictable differences in the distribution of conversion versus liquidation exercises around ex-dividend dates and expiration dates. The empirical analyses confirm that abnormal insider share purchase – but not option conversion – activity is associated with significantly positive changes in future earnings performance, suggesting that only purchases are useful signals for forecasting and valuation.

The second purpose of this chapter is to analyse whether option liquidations and regular share sales provide different signals about the quality of reported earnings. Because of increased risk-taking incentives and the amplified profit potential from stock options, it is predicted that option liquidation exercises are more likely associated with income-increasing earnings management than non-exercise related regular share sales. Inconsistent with this prediction, the null hypothesis that both types of disposition trades have similar information content cannot be rejected. Both abnormal liquidation activity and abnormal selling activity are positively associated with income-increasing discretionary accruals. However, further tests suggest that abnormal liquidation of deep in-the-money options has a significantly stronger association with discretionary accruals than abnormal sales of previously held shares. This finding is consistent with the conjecture that managers' decisions to unload their positions through option exercises are more informative about the quality of earnings than their sales of previous share holdings. Finally, consistent with non-information incentives driving conversion exercises, no association between abnormal conversion and discretionary accruals is found.

Additional tests suggest that the earnings management results are robust to an analysis of discretionary *working capital* accruals instead of discretionary *total* accruals. Unrelated to the hypotheses, additional evidence is presented in support of the finding by Sawicki and Shrestha (2008) of a relation between downwards earnings management and insider buying, as years of abnormal buying are associated with significantly more negative income-decreasing abnormal accruals. Also, using F-scores based on Dechow et al. (2009) which capture the likelihood of material earnings misstatements, results are consistent with deep in-the-money liquidation exercises being more informative about the quality of reported earnings.

This chapter contributes to the literature in several ways. First, it adds to the literature on the information content of executive stock option exercises. While prior research presents mixed evidence while assuming that all exercises are liquidations (Carpenter and Remmers

2001; Huddart and Lang 2003), this chapter complements and extends Aboody et al. (2008) by showing that many exercises are in fact conversion exercises and that conversion and liquidation exercises provide differential signals about future earnings performance and current earnings quality. The evidence presented is consistent with managers converting their options into shares (and holding the shares) because of non-private information events such as option expiration and ex-dividend dates.

Second, this chapter adds to the literature on corporate insider trading in general, which has shown that managers are able to profit from trading their own firms' shares (Jaffe 1974; Finnerty 1976; Seyhun 1986; Seyhun 1998; Lakonishok and Lee 2001). Previous studies either pool all option liquidation-sales with regular sales of shares (e.g., Beneish and Vargus 2002; Piotroski and Roulstone 2005; Sawicki and Shrestha 2008), or explicitly exclude sales from option exercises (Fidrmuc et al. 2006; Jin and Kothari 2008).²¹ To my best knowledge, this is the first study that separates liquidation-related sales from pooled equity sales.²² This distinction is important given that stock options provide managers with different incentives than shares. Likewise, prior research has not considered the parallel between managers' regular equity purchases and purchases through option conversions. Consistent with the predictions, the empirical evidence suggests that insider purchases are significantly more informative for earnings forecasting purposes than conversion exercises, and that option liquidations are more negatively associated with future annual earnings changes than sales of previously held shares.

Lastly, the chapter contributes to the literature that links managerial equity incentives to opportunistic financial reporting. Prior research focuses primarily on the *potential* gains for managers through earnings management by analysing the relation between discretionary accounting choices and levels of option holdings (Cheng and Warfield 2005; Burns and Kedia 2006; Cohen et al. 2008). In contrast, I investigate managers' *actual* gains by looking at flows

²¹ In their data description, Fidrmuc et al. (2006, p. 2942) argue that: "...as sales after the exercise of options are likely to be related to the directors' remuneration packages and whether the options are in the money, we expect their information content to be low. Hence, we exclude these sales." Jin and Kothari (2008, p. 25) similarly suggest: "We make a distinction between option exercise and sale of equity, and do not expect a perfect correspondence between the reasons for CEO's option exercises and sales of equity." They go on to state (p. 27): "A portion of the selling [...] might be attributed to selling in response to option exercises [...] Although such selling still reduces a CEO's incentive, the market might not perceive it as "information revealing" and a CEO consequently feels less constrained to sell".

²² Corporate insiders are required to report changes in their beneficial holdings to the SEC on Forms 4 and 5. While these forms are structured in a way that share (Table I) and option (Table II) trades are reported separately, all sales transactions, be it from option liquidations or previously held shares, are reported in Table I. Given that a separation of liquidation-sales from sales of previously held shares requires a detailed and intensive analysis of share sales around option exercises, previous research has not considered separating these types of transactions.

of option holdings through exercise decisions. The timing of insider trades provides an information signal about anticipated changes in firm performance which result in changes in the value of executive compensation holdings. Consistent with critical claims made in the business press regarding the increased opportunistic incentives induced by stock options (Cassidy 2002; Kranhold 2003; Michaels 2003), results suggest that liquidation exercises of deeply in-the-money options are signals of managerial opportunism.

4.2 BACKGROUND LITERATURE

4.2.1 Prior Research

Allowing insiders, i.e. corporate officers and directors, to trade their firms' equity for personal benefits can be seen as a form of compensation for value-increasing efforts. For example, Manne (1966a) suggests that insider trading is an efficient way of compensating managers for producing information which is of value to the firm and incentivizes them to develop additional valuable innovations. Roulstone (2003) predicts and finds that insiders demand and receive additional compensation when companies impose restrictions on insider trading, consistent with insider trades being a mechanism to reward and motivate managers. Zhang et al. (2005) also find support that insider trading profits are an alternative form of managerial compensation by documenting an inverse relation between pay-performance sensitivities and unexpected insider trades.

In order for insider trading to be an effective reward mechanism, insiders should be able to profit from their trading. The empirical literature largely supports this condition, providing evidence that insiders are able to outperform the market by purchasing before good news and selling before bad news (Jaffe 1974; Finnerty 1976; Seyhun 1986; Seyhun 1998; Pope et al. 1990; Hillier and Marshall 2002a). Evidence in recent research suggests that superior information in insider trades is mostly concentrated in share purchases, while share sales are more likely driven by non-information factors, that is, liquidity and diversification needs (Lakonishok and Lee 2001; Jeng et al. 2003; Fidrmuc et al. 2006). Also, insiders' successful timing ability stems from their ability to detect market mispricing and trade as contrarians (Rozeff and Zaman 1998), as well as their ability to predict future cash flow and earnings realisations (Piotroski and Roulstone 2005).

Early studies on managers' ability to profit from their stock option exercises present mixed results. Carpenter and Remmers (2001) analyse the information content of executive option exercises and find limited evidence that exercises reflect managers' information advantage. In contrast, Huddart and Lang (2003) who examine a proprietary sample of exercises of over 50,000 employees at seven different firms, provide evidence that average option exercises are associated with significantly lower future stock returns.

Motivated by the mixed findings in prior research, Bartov and Mohanram (2004) analyse abnormally large option exercises. They argue that the inclusion of small exercises, which are more likely driven by liquidity and diversification needs, result in low power research designs. Consistent with their prediction, the authors provide evidence that abnormally large exercises precede significantly lower stock returns. In addition, these returns are associated with negative changes in future earnings, which are further explained by reversals in inflated accruals. These findings suggest that managers engage in earnings management to increase the value of their compensation. In a similar vein, Bergstresser and Philippon (2006) show that exercise activity is higher in periods of large accruals.

Previous studies assume that executive stock option exercises are associated with immediate dispositions of shares (i.e., liquidations) and, hence, information-based exercise is predicted to be associated with negative future firm performance.²³ However, Aboody et al. (2008) show that many exercises are *not* followed by share sales.²⁴ After separating liquidation exercises from conversion exercises, they find that conversions are associated with positive future abnormal returns, suggesting ex-ante managerial timing on positive information. On the other hand, they find only weak evidence of a relation between sell-all exercises and negative abnormal returns, which they argue mirrors the results of insider share trades in prior studies due to diversification or liquidity needs (Lakonishok and Lee 2001; Jeng et al. 2003). The authors, however, do not empirically compare option exercises with

²³ This assumption has evolved from Ofek and Yermack (2000) who examine the impact of equity compensation on the level of managerial ownership. They show that compensation generally does not increase holding levels since managers diversify away the increased exposure to idiosyncratic risk by selling previously held shares. In addition, option exercises do not increase managers' shareholdings, suggesting that on average all shares acquired through exercise are sold during a firm-year. Similarly, Bartov and Mohanram (2004, p. 898) argued "...stock sales are much higher in years of high exercise than in other years, providing *prima facie* evidence that executives sell shares acquired through option exercise rather than retain them." Bergstresser and Philippon (2006, p. 520) further state: "Our maintained assumption is that executives sell the shares arising from option exercises. Ofek and Yermack (2000), looking at U.S. executives, document that nearly all executive stock option exercises are followed by share sales."

²⁴ In a discussion of Huddart and Lang (2003), Kasznik (2003, 37) suggests that "...the conjectured association between option exercise by insiders and subsequent stock returns is similar to that conjectured for ordinary sales. Yet, there are a number of scenarios under which option exercises more likely reflect a "purchase" type exercise, leading to the exact opposite prediction for the association with post-exercise stock performance."

regular share trades and do not consider any incentive differences reflected in option exercises versus share trades.

4.2.2 Earnings Management and Equity Incentives

The rash of corporate scandals at the end of the 1990s and the early 2000s has led to an increased interest by academics into the role of *levels* of equity incentives in earnings management and material accounting misstatements. Early evidence by Healy (1985) suggests that managers shift accruals over time to maximise their earnings-linked bonus payouts. Recent research by Cheng and Warfield (2005) suggests a higher degree of earnings management to meet or beat the analyst forecast benchmark in firms with greater executive equity incentives. Similarly, Cohen et al. (2008) find that increases in accrual-based earnings management in the period leading up to the Sarbanes-Oxley Act are associated with increases in equity-based compensation. Further, the authors find a differential set of incentives with regard to the exercise price of options. That is, new option grants are negatively associated with income-increasing earnings management, while unexercisable options are positively related to income-increasing earnings management (see also Gao and Shrieves 2002; Kadan and Yang 2005).²⁵

In the business press, stock options are particularly scrutinised for creating perverse incentives for managers to inflate or maintain artificially high market prices. The 1990s saw an enormous increase in stock option grants to employees in U.S. corporations (Hall and Liebman 1998; Hall and Murphy 2002), a phenomenon which is partly driven by lenient tax and accounting rules (Lipman 2002; Guay et al. 2003; Hall and Murphy 2003). Theoretically, the criticism towards option compensation may be explained by the asymmetric payoff structure of options which rewards managers in times of good performance but does not punish as much in times of bad performance (Feltham and Wu 2001; Burns and Kedia 2006). While the convexity of options' payoffs make them a powerful tool to induce risk-averse managers to pursue valuable risk-increasing projects (Smith and Stulz 1985; Guay 1999), options also induce managers to take more risks in terms of financial reporting and increase the value of options through earnings management or, worse, fraudulent reporting. Consistent with this conjecture, Burns and Kedia (2006) show that CEO stock option holdings – but not

²⁵ In contrast to the results for earnings management, Erickson et al. (2006) find no consistent evidence of a link between equity incentives and accounting *fraud*.

share holdings or restricted stock – are positively related to the likelihood that a firm will subsequently restate its reported earnings. Efendi et al. (2007) find that the probability of a restatement is positively related to the size of in-the-money CEO option holdings and incentives to misreport are largely driven by needs to support overvalued equity (Jensen 2005). Additionally, Cornett et al. (2008) find that the previously documented positive impact of stock option compensation on operating performance is mainly an artefact of opportunistic earnings management. Kuang (2008) documents that managers' propensity of managing earnings is positively associated with the proportion of their compensation in performance-vested stock options.

Previous studies have also considered the link between *flows* in managerial equity incentives and earnings management. For example, Beneish and Vargus (2002) show that abnormal selling by corporate executives is associated with a lower persistence of income-increasing accruals, and that this lower persistence is at least partly explained by opportunistic earnings management. Sawicki and Shrestha (2008) provide supporting evidence consistent with managers using income-increasing earnings management while selling, and income-decreasing earnings management while purchasing shares in the company. These studies, however, focus on pooled equity sales, i.e. the aggregate of sales from previously held shares and exercise-related sales, and do not consider the differential incentives induced by stock options versus shares.

4.3 HYPOTHESIS DEVELOPMENT

4.3.1 Liquidation Exercises versus Regular Share Sales

In addition to lenient tax and accounting rules, the popularity of stock option compensation in the 1990s can be explained by the amplified profit potential in rapidly rising markets (Knowledge at Wharton 2003). For example, consider two managers of the same firm that are awarded \$100,000 in equity-based compensation. Manager A receives stock options, while manager B receives restricted stock. The options have an exercise price equal to the market price of \$20.00, and a Black-Scholes value of \$8.00.²⁶ Accordingly, manager A receives 12,500 options worth \$100,000, while manager B receives 5,000 shares worth \$100,000.

²⁶ The Black-Scholes option values used in this example are rounded figures for an option on a non-dividend paying stock with an expected lifetime of 7 years, risk-free rate of 5%, and volatility of 25%.

Suppose that after three years, when both the options and restricted stock fully vest, the stock price equals \$40.00, and the Black-Scholes value of the options equals \$24.00. Now, the value of manager A's compensation has risen to \$300,000 (+200%), while the value of manager B's compensation has risen to \$200,000 (+100%). If the stock price had increased to \$50.00, option value would be \$34.00 and manager A's compensation would have increased to \$425,000 (+325%) relative to \$250,000 for manager B (+150%).

The takeaway from this stylised example is that options make managers' wealth more sensitive to price changes than shares. Next, suppose that both managers receive the same private information about disappointing operating performance in year $t+1$. After trading-off the costs and benefits of trading on this information, we expect that manager A is more likely to act on his information advantage since the expected loss from a relative price decline is larger than for manager B. Further, this incentive difference becomes greater once the options become more and more in-the-money. Section 3.6 showed that this example is descriptive for CEOs of S&P 1500 companies during the period 1996-2006. The average values of CEO stock and option holdings are almost equal at \$6,381,581 and \$6,578,686, respectively. However, the average number of options held is more than double the number of shares held. As a result, the total value of option holdings is substantially more sensitive to share price changes than the value of stock holdings. For every one percent change in share price, the value of stock and option holdings changes by \$63,816 and \$104,717, respectively. Hence, option holdings give greater incentives than stock holdings to trade on price-sensitive information as the wealth loss avoided is substantially larger. Further, a breakdown of option holdings into new grants, unexercisable options, and exercisable options following Core and Guay (2002), suggests that exercisable options have the largest price-to-strike ratio and the greatest sensitivity to price changes.

Besides greater incentives with stock options to trade on privately held information, options induce greater earnings management incentives than shares. Due to the asymmetric payoff structure, Burns and Kedia (2006) argue that stock options are more likely to induce aggressive accounting compared to holdings of shares, because "...[m]anagement is rewarded in good times, but not penalised as much in bad times" (p. 36). Their empirical results support this prediction and suggest a greater propensity to misreport (proxied by subsequent restatements) when the sensitivity of CEO compensation to stock price arising from option holdings is greater. Sawicki and Shrestha (2008) further show that managers sell in times of

income-increasing earnings management, which suggests that the reversing nature of inflated accruals will have a negative effect on future earnings performance.²⁷

Based on the discussion above, I anticipate that managers' decisions to unload their positions provide signals about future firm performance and current earnings quality. I predict that these signals are stronger for sales from option liquidations than for regular sales of previously held shares. In addition, incentives to trade on forthcoming bad news are greater when options are more deeply in-the-money. Accordingly, the first set of hypotheses is stated as follows (in alternative form):

H1a: Liquidation exercises are more strongly associated with lower future earnings performance than sales of previously held shares.

H1b: The negative relation between liquidation exercises and future earnings performance is strongest for exercises of deep in-the-money options.

H1c: Liquidation exercises are more strongly associated with contemporaneous upwards earnings management than sales of previously held shares.

4.3.2 Conversion Exercises versus Regular Share Purchases

Aboddy et al. (2008, p.569) argue that the motivation for managers to not immediately sell shares after exercise "is unclear" and they postulate upcoming dividends as an economic explanation, given that option contracts are generally not corrected for paid-out dividends. However, while dividend yields are greater in their conversion sample of firms, they find no difference in post-exercise stock price performance in high versus low dividend firms. Another potential motivation is that exercising options and holding the shares in anticipation of a rising stock price is profitable from a tax perspective.²⁸ Carpenter and Remmers (2001)

²⁷ Two important assumptions should hold for the above discussion on option incentives and earnings management: (1) earnings news impacts stock prices, and (2) investors are unable to fully see through opportunistic financial reporting choices (see Bartov and Mohanram 2004; Cheng and Warfield 2005). Both assumptions are broadly supported in the accounting literature (e.g., Ball and Brown 1968; Sloan 1996).

²⁸ In U.S. tax regulation, all executive stock options are nonqualified (NQSO) unless they meet the criteria for incentive stock options (ISO). Upon exercise of an NQSO, the difference between the market price and exercise price is taxed as ordinary income. In the case that shares acquired through exercise are retained for a period of at least one year, subsequent appreciation of the stock is taxed at capital gains rates. Due to the substantially lower capital gains taxes than ordinary income rates, a strategy to exercise-and-hold may be optimal when the manager expects the stock price to rise. For an ISO, no income taxes are realised at exercise and all subsequent stock appreciation is taxed at the capital gains rate when the shares are sold at least two years after the grant and one

and McDonald (2003), on the other hand, analytically show that this strategy is less optimal than a strategy of holding options and acquiring additional shares.

Cicero (2009) confirms that many option exercises are conversion exercises, but introduces backdating of exercise dates as an alternative explanation.²⁹ Before the more stringent disclosure requirement after the Sarbanes Oxley Act (August 29th 2002), corporate insiders were allowed to report their transactions to the SEC as late as the tenth day of the following month. While an open market share sale pinpoints the date at which a spread between the market price and exercise price is realised, this is not the case when shares are held. As the reporting delay could be as long as 40 days, Cicero (2009) shows that – with the benefit of hindsight – some managers falsify exercise dates in order to lock in a tax gain.³⁰ As a result, conversion exercises are, on average, followed by a “mechanical” abnormal return of about 3% in the subsequent 20 days (Cicero 2009, Table III).

For a tax-planning exercise-and-hold strategy to be profitable, a manager should be reasonably certain that stock price will increase in the future. This argument is consistent with Aboody et al.’s (2008) result of managers’ *ex-ante* timing of their exercises on good news. However, Cicero’s (2009) evidence on backdating suggests that *ex-ante* timing may not be the only factor contributing to the positive post-exercise returns if a tax gain is realised through *ex-post* timing.³¹ Hence, it is unclear to what extent conversion exercises reflect executives’ private information on *actual* future firm performance.

Compared to regular share purchases, backdating makes conversions relatively less informative. In addition, there are at least three alternative explanations for why conversion exercises may be less informative. First, signalling theory predicts that an information signal is more credible when it is more costly. By purchasing shares, managers communicate a positive signal about the future value of the firm (Fidrmuc et al. 2006). This signal is costly because *i*) the manager’s wealth is put at stake, *ii*) the manager bears the cost of holding an

year after the exercise. ISOs may cover only a maximum aggregate value of \$100,000 per employee per year. See Lipman (2002) and Scholes et al. (2004) for further information.

²⁹ Backdating of option *exercise* dates is a different phenomenon than the backdating of option *grant* dates (see section 3.5.3). For more evidence on the backdating of *exercise* dates see also Dhaliwal et al. (2009).

³⁰ For nonqualified stock options (NQSOS), the difference between the “real” market price and the “backdated” price is deferred from ordinary income tax rates to capital gains tax rates. Manipulating the option exercise date is not relevant for incentive stock options (ISO), because there is no taxable event when the options are exercised. However, in many cases ISOs are treated as nonqualified because the executive owes money under the alternative minimum tax (AMT) rule (Lipman 2002). Hence, even when the exercised options are ISOs, backdating may be profitable (see also Cicero 2009; Dhaliwal et al. 2009).

³¹ In fact, Aboody et al.’s (2008, Table 3, Panel A) result of positive abnormal returns after conversion exercises is strongest in the month of the exercise. Significant abnormal returns of 3.4% are realised in the exercise month, which is comparable to Cicero’s finding of 2.78% over 20 days (Cicero 2009, Table III). In the subsequent twelve months, the maximum observed monthly abnormal return is 0.6%, substantially smaller.

under-diversified investment portfolio, and *iii*) Section 16(b) of the Securities and Exchange Act of 1934 requires the manager to hold on to the shares for at least six months. On the other hand, purchases through option conversion exercises are less costly, because *i*) an option holding is a virtual (non-transferable) long position in the firm's equity and conversion does not significantly shift the idiosyncratic risk borne by the manager, and *ii*) the six month holding rule does not apply for option exercises occurring more than six months after the grant date (Carpenter and Remmers 2001).

Second, an option is worthless when it expires out-of-the-money. In contrast, if the option is in-the-money at expiration, it is always optimal to exercise. In this regard, option expiration is a non-information event that triggers option conversion. Given that the executive did not previously have incentives to exercise-and-sell, and because an options-shares swap does not significantly impact his investment portfolio (options behave similar to shares once substantially in-the-money), I anticipate that exercises triggered by expiration are less likely to be followed by share liquidations.

Lastly, executive stock options are generally not protected against dividends. While a dollar of dividends reduces the market price of a share by the same dollar amount, the exercise price of the option is not updated. Therefore, a declared dividend, which is publicly known, may trigger a manager to convert options into shares prior to the day the stock goes ex-dividend. Based on the above arguments, the second hypothesis (stated in alternative form) is as follows:

H2: Insider purchases are more strongly associated with higher future earnings performance than conversion exercises.

4.4 RESEARCH DESIGN

4.4.1 Data

Transactions by corporate insiders are collected from the Thomson Reuters insider filings database. The initial sample consists of all transactions between 1996 and 2006 filed on SEC Forms 4 and 5, which contain a "Table I" and a "Table II". The Table-I file covers all transactions in non-derivative instruments from which I obtain open market share purchases

(transaction code *P*) and open market share sales (*S*). The Table-II file covers all transactions in derivatives from which I collect option exercises pursuant to Rule 16(b)-3 (*M*). Consistent with prior research (e.g., Beneish and Vargus 2002), the analyses are restricted to the transactions made by the top five executives, i.e. Chief Executive Officer (role code *CEO*), Chief Financial Officer (*CFO*), Chief Operating Officer (*COO*), Chairman of the Board (*CB*), and President (*P*).

Panel A of Table 4.1 presents the sample selection for insider trades. Initially, 725,768 records are identified for the top five executives. All observations without a CUSIP identifier, with missing data items such as transaction price, firms that could not be matched with either CRSP or Compustat, transactions in non-common shares (Frankel and Li 2004), and lastly observations that did not have corresponding price data in CRSP are dropped.³² The requirement of corresponding price data in CRSP is necessary in order to calculate the price-to-strike ratio (“moneyness”) of the exercised stock options. This sampling procedure results in a final sample of 678,192 records comprised of 84,274 share purchases, 472,860 share sales, and 121,058 stock option exercises.

To determine which option exercises are associated with subsequent share sales, exercises in Table-II are matched with share sales in Table-I. For every exercise event, the share sales by the same insider are tracked during the 30 day window starting on the transaction date. Consistent with Aboody et al. (2008), “conversions” are defined as exercises which are not followed by share sales in the 30 day window, “liquidations” are defined as exercises for which all shares are sold within 30 days, and the remaining observations are classified as partial liquidations. At the same time, I determine whether share sales are regular sales or relate to option exercises.

Panel A of Table 4.1 shows that 44% of total share sales are exercise related, while 56% are regular sales. Further, 30% of exercises are identified as conversions, 59% are liquidations, and 11% are partial liquidations. A general motivation for an insider to sell only a part of the acquired shares is the need to cover payment of the strike price or pay taxes which are triggered upon exercise. Following Aboody et al. (2008), partial liquidation exercises are dropped. Finally, liquidations are split based on moneyness of the options exercised, with a cut-off point of 4.

³² Transactions from the Thomson filings databases are matched with the CRSP daily stock file based on eight-digit CUSIP. We use CRSP’s historical CUSIP identifier (*NCUSIP*) to match firms for which CUSIP has changed over time and match the remainder of firms based on CRSP header CUSIP. Next, transactions are matched to the Compustat database using the GVKEY-PERMNO link provided in the CRSP/Compustat

Panel B of Table 4.1 presents some descriptive statistics on the sample of insider transactions. At the transaction level, share purchases occur at relatively low prices and sales occur at relatively high prices. Further, the average strike price of options exercised equals \$9.35, which is slightly higher (lower) for conversions: \$9.93 (liquidations: \$9.10). Consistent with lower incentives to sell shares acquired upon exercise, the average moneyness for conversion exercises is substantially lower compared to liquidation exercises (2.38 versus 3.38). By definition, the average moneyness of deep in-the-money liquidations is greatest: 7.30.

Because sales transactions occurring at different market prices – but related to the same liquidation exercise – are reported to the SEC as separate transactions, the number of exercise-related sales transactions appears to substantially outnumber liquidation exercises. Therefore, transactions are next aggregated by insider and trading day. Doing so, the number of sales transactions and option exercises converge. Further, the average number of shares purchased (2,000) on an insider purchase day is substantially lower than the number of shares sold (10,000) on an insider selling day. Interestingly, the most intensive trading is found for conversion exercises with an average of 14,537 shares trades, which equals 0.0499% of shares outstanding. This finding highlights the importance of examining managers' post-exercise selling behaviour rather than assuming that all exercises are liquidations.

Panel A of Table 4.2 presents the data collection for the firm-year sample. Consistent with the procedure for transactions, firms should be covered by both Compustat and CRSP. Consistent with related literature, financial firms (SIC industry codes 6000-6999) and regulated industries (SIC industry codes 4400-4999) are dropped as such firms have different accruals, monitoring, and incentives to manage earnings. Next, all observations without sufficient data for the main tests are deleted, leaving a comprehensive sample of 33,865 firm-years over the period 1996-2006 reflecting 5,969 different firms.

Consistent with prior research (Beneish and Vargus 2002; Piotroski and Roulstone 2005; Sawicki and Shrestha 2008), insider transactions are aggregated over firm-years. In panel B of Table 4.2, the intersection of the insider transaction sample and the full sample of firm-years is presented, where years are partitioned into deciles based on firm size. The statistics suggest that regular share sales occur most frequently (24.7%), followed by purchases (22.4%). Interestingly, the distribution across firm size shows that purchases occur more frequently in small firms and sales occur more frequently in large firms. With regard to option exercises, the figures show that conversion activity is more pronounced in smaller firms relative to

liquidations. Only in the four largest deciles is conversion activity greater than liquidation activity, again supporting the importance of a post-exercise selling investigation.

Table 4.1
Sample Selection and Descriptive Statistics for Insider Trades

Panel A: Insider trading sample selection				
	Total	Purchases	Sales	Exercises
Share purchases (<i>P</i>), sales (<i>S</i>) and stock option exercises (<i>M</i>) of top five executives between 1996 and 2006	725,768	147,416	563,831	161,937
Eliminate:				
No CUSIP	-13,654	-2,884	-7,771	-2,999
Missing data items	-16,835	-1,163	-1,029	-14,643
No match with CRSP	-106,709	-42,957	-49,905	-13,847
No match with Compustat	-12,689	-3,096	-7,071	-2,522
CRSP share class code other than 10 or 11 (non-common shares)	-44,528	-12,794	-25,012	-6,722
No price data	-577	-248	-183	-146
Transactions remaining	678,192	84,274	472,860	121,058
Sales exercise-related (44%)			206,169	
Sales previously held shares (56%)			266,691	
Conversions (30%)				35,980
Partial (11%)				13,627
Liquidations (59%)				71,451
Liquidations near-the-money (58%)				41,535
Liquidations deep in-the-money (42%)				29,916

Panel B: Transaction descriptives (medians)						
	Transaction level			Insider-date level		
	n	Transaction price	Price/strike ratio	n	Number of shares	Fraction of outst. shares
Purchases	84,274	8.13	-	56,129	2,000	0.0163%
Sales	472,860	32.28	-	135,012	10,000	0.0285%
Sales no exercise	266,691	30.00	-	77,229	8,000	0.0303%
Exercises	107,431	9.35	-	67,599	12,000	0.0313%
Conversions	35,980	9.93	2.38	21,606	14,537	0.0499%
Liquidations	71,451	9.10	3.38	45,995	11,000	0.0265%
Liquidations near-the-money	41,535	14.00	2.26	26,720	10,182	0.0260%
Liquidation in-the-money	29,916	4.00	7.30	20,998	10,504	0.0254%

Panel A presents the sample selection procedure for insider transactions. Only transactions by top executives (CEO, CFO, Chief Operating Officer, President, and Chairman of the Board) are considered. Contemporaneous market prices are obtained from CRSP. An exercise is defined as conversion when the exercise is not accompanied by share sales within 30 days. An exercise is defined as liquidation when all shares are sold within 30 days. All other exercises are defined as partial exercise-and-sell transactions. A share sale is exercise-related when it matched with option liquidation. Options are deep in-the-money when moneyness >4. Panel B presents descriptive statistics for transactions (partial exercises are dropped). At the transaction level, average (median) transaction price and price-to-strike ration are shown; at the insider-date level, average (median) aggregate number of shares traded and fraction of total outstanding shares are shown.

Table 4.2
Firm-Year Sample Selection and Merge with Insider Trades

Panel A: Firm-year sample selection							
	Firm-years				Firms		
		%					%
NYSE, AMEX, NASDAQ firm-years on Compustat/CRSP 1996-2006	65,017	100.0%	11,111	100.0%			
Eliminate:							
Financial firms (SIC 6000-6999)	-14,257	-21.9%	-2,311	-20.8%			
Regulated firms (SIC 4400-4999)	-4,339	-6.7%	-713	-6.4%			
Firm-years with insufficient data to compute changes in return on assets	-11,582	-17.8%	-1,999	-18.0%			
Firm-years with insufficient data to compute abnormal accruals	-974	-1.5%	-119	-1.1%			
Final sample of firm-years	33,865	52.1%	5,969	53.7%			

Panel B: Firm-years matched with insider trades							
Deciles	Purchases	Sales no exercise	Conversions	Liquidations	Liquidations near-the- money	Liquidations deep in-the- money	
Small	24.6%	9.4%	5.7%	2.5%	1.9%	1.1%	
2	25.2%	12.1%	9.4%	3.8%	2.8%	1.3%	
3	25.3%	16.6%	10.7%	6.0%	4.2%	2.9%	
4	24.5%	20.3%	12.2%	8.7%	6.9%	3.7%	
5	24.5%	25.0%	15.9%	13.5%	10.1%	6.5%	
6	24.7%	28.4%	19.1%	17.7%	13.1%	9.4%	
7	20.3%	32.7%	22.1%	23.4%	17.7%	12.1%	
8	21.2%	33.7%	22.5%	24.5%	17.9%	13.0%	
9	19.2%	33.1%	26.1%	32.3%	26.0%	15.4%	
Large	14.4%	35.1%	33.8%	38.5%	28.9%	18.9%	
Total	22.4%	24.7%	17.7%	17.1%	12.9%	8.4%	

Panel A presents the sample selection for U.S. firms listed on NYSE, AMEX, or NASDAQ with available data (current, lagged, and future) for the period 1996-2006. Financial statement data are from Compustat, exchange listing and industry information are from CRSP. Panel B presents the distribution of matched insider trades during the firm-years across firm size deciles for the full sample of 33,865 firm-years. Size deciles are constructed annually based on market capitalisations at the beginning of the fiscal year. See Table 4.1 for details on the sample selection procedure for insider trades.

4.4.2 Test Variables

Following Beneish and Vargus (2002), this study focuses on “abnormal” insider trading activity in order to separate information based trading from noise trading which occurs for reasons such as diversification and liquidity needs. Bartov and Mohanram (2004) also show that normal levels of option exercise activity are not informative. Because of the cross-sectional variation in trading activity across firm size (see Table 4.2, panel B), the average trading in similar sized firms is used as a benchmark to determine whether a firm-year can be

characterised as having abnormal trading activity. For example, firm-year t is defined as abnormal buying (*BUY*) when the total number of shares purchased (as a percentage of shares outstanding) by all managers in the firm is greater than the median figure for similar sized firms with purchase activity. In a similar way, I define abnormal selling (*SELL*), abnormal non-exercise related selling (*SELLNOX*), abnormal exercise (*EX*), abnormal conversion (*CONV*), abnormal liquidation (*LIQ*), abnormal liquidation of near-the-money options (*LIQNTM*), and abnormal liquidation of deep in-the-money options (*LIQITM*).

4.4.3 Dependent Variables

The research design is focused on long-run (one-year ahead) future performance. This choice is motivated by Ke et al. (2003), who show that managers trade in anticipation of future earnings news at least one year prior to realization. Also, managers abstain from trading on short-run information events due to litigation risks and because most firms have individual trading restrictions prior to price-relevant information events such as earnings announcements (Bettis et al. 2000).

As the construct for future firm performance, this paper focuses on firms' changes in annual earnings performance (ΔROA), similar to Piotroski and Roulstone (2005).³³ The annual change in earnings performance is defined as:

$$\Delta ROA_t = ROA_t - ROA_{t-1} \quad (4.1)$$

where ROA is net income before extraordinary items (Compustat data item IBC) scaled by lagged total assets (AT).³⁴ Next, to measure earnings management, abnormal accruals are estimated using the cross-sectional modified Jones (1991) model (DeFond and Jiambalvo

³³ The design choice to focus on earnings performance, rather than stock price performance, is motivated as follows. First, stock returns are a noisy measure of the information set that insiders condition trade trading decisions on. Piotroski and Roulstone (2005, p.60) argue that "...[n]either insiders ex ante nor researchers ex post can perfectly predict or explain how market expectations and therefore future returns will evolve". Second, insiders base their information-based trading on market valuation errors as well as superior knowledge of future firm performance. While tests using stock prices and returns capture both these aspects of insider trades, an examination of changes in future earnings performance allows us to more directly test managers' private information and, hence, test for the usefulness of reported insider trading information for forecasting and valuation purposes.

³⁴ All continuous variables are winsorized at the 1st and 99th percentiles of their distributions.

1994; Bartov et al. 2000). For each three-digit SIC industry in a given year, the following model is estimated using OLS:^{35,36}

$$ACC_t = a_0 + a_1(1/ASSETS_{t-1}) + a_2(\Delta REV_t - \Delta REC_t) + a_3PPE_t + e_t \quad (4.2)$$

where *ACC* equals total accruals, computed as the difference between net income before extraordinary items (IBC) and operating cash flows (OANCF) taken from the statement of cash flows (Hribar and Collins 2002). ΔREV denotes change in revenue (SALE), ΔREV equals the change in receivables (RECT), and *PPE* is gross property, plant and equipment (PPEGT). All variables are deflated by lagged total assets. The residual term e_t is used as the measure of abnormal accruals (AAC).

To control for spurious correlation between estimates of abnormal accruals and firm performance (Dechow et al. 1995; Kothari et al. 2005), abnormal accruals are performance-adjusted (*AACADJ*) as in Francis et al. (2005) and Cahan and Zhang (2006). Each industry-year group is partitioned into deciles based on lagged ROA and performance-adjusted abnormal accruals are computed by subtracting from firm-year *i*'s abnormal accruals the median abnormal accruals of its matched industry-year-performance group (excluding firm-year *i*). In additional tests, we also examine abnormal working capital accruals. The calculation of this measure follows that for abnormal total accruals, with the difference that working capital accruals are adjusted for depreciation (IBC - OANCF + DPC) and *PPE_t* is excluded from equation (4.2).

4.4.4 Control Variables

The research design controls for several factors which are potentially related to both the dependent and test variables. All variables presented in this section are defined more precisely in Appendix 4.1.

For the earnings forecasting tests, variables for firm size and growth are included to control for differences in trading activity and profitability across firm size and growth expectations. Rozeff and Zaman (1998) show that managers trade in response to market

³⁵ The inclusion of an intercept term is consistent with Kothari et al. (2005, p.173), who argue that it *i*) additionally controls for heteroskedasticity which is not mitigated by asset deflation, *ii*) controls for problems related to omitted scale factors, and *iii*) makes the abnormal accrual measure more symmetric.

³⁶ At least 20 observations are required per industry-year group. If less than 20 observations are available, the two-digit SIC code or one-digit SIC code is used.

overreaction in stock price, measured by the book-to-market ratio. Further, to control for the transitory nature of earnings changes, the current change in earnings is included in the regression model. Because of conditional conservatism, negative earnings changes are more transitory than positive changes. I therefore control for negative earnings changes separately using a dummy interaction following Basu (1997). To control for the transitory nature of the accrual component of earnings (Sloan 1996), total accruals in year t are included. Lastly, following Soliman (2008), the change in asset turnover is added.

The earnings management tests include factors that have been shown by prior research to be related to accruals and the propensity of earnings management. First, size and growth are used to control for their relation with insider trades. Skinner and Sloan (2002) argue that growth firms have greater earnings management incentives because such firms are unusually punished for earnings shortfalls. Next, following Cheng and Warfield (2005) and Cahan and Zhang (2006), an indicator variable is added for high litigation industries. Leverage is included to control for incentives to manage earnings to avoid violating debt covenants (DeFond and Jiambalvo 1994). An indicator variable for new equity issuance is added to control for earnings management around seasoned equity offerings (Teoh et al. 1998). A Big-N auditor indicator variable is used to capture variation in accrual quality across large and small audit firms (Becker et al. 1998). Cash flow from operations is included to control for the negative cross-sectional correlation between cash flows and accruals (Dechow and Dichev 2002). The level of accruals is added to control for the transitory nature of accruals and, lastly, a variable measuring option grant intensity is added to capture potential downward earnings management around large option grants (Baker et al. 2003; McAnally et al. 2008).

4.4.5 Descriptive Statistics

Table 4.3 presents descriptive statistics for the variables described in the previous sections. On average, ΔROA_{t+1} is slightly negative but has a median value of 0.000. While abnormal accruals (AAC_t) are zero by construction, the performance-adjusted abnormal accruals ($AACADJ_t$) are slightly negative as a result of the performance matching procedure. The average of unsigned performance-adjusted abnormal accruals is 8.6% of total assets, while positive abnormal accruals are on average 8.1% of total assets and negative abnormal accruals are on average -9.2% of total assets.

Among the control variables, firm size is highly skewed. Therefore, the natural logarithm of market capitalisation will be used in the regression model. The average book-to-market ratio equals 0.619, which is consistent with market prices incorporating more information than book values. On average, 33.0% of firms operate in high-litigation industries, 18.1% issue new equity, and 84.7% have a large auditor. Total accruals are substantially more negative than working capital accruals as a result of depreciation. Finally, firms grant options equal to 0.5% of total shares outstanding, on average.

Table 4.3
Descriptive Statistics Dependent and Control Variables

	n	Mean	St. Dev	Q1	Median	Q3
<i>Dependent variables</i>						
ΔROA_{t+1}	33,865	-0.004	0.181	-0.048	0.000	0.037
$AACADJ_t$	33,865	-0.005	0.127	-0.058	0.000	0.056
$ AACADJ_t $	33,865	0.086	0.093	0.025	0.057	0.112
$AACADJ_t > 0$	16,986	0.081	0.081	0.025	0.055	0.108
$AACADJ_t < 0$	16,879	-0.092	0.103	-0.116	-0.058	-0.025
<i>Control variables</i>						
MV_t	33,865	1684.901	5545.253	45.059	183.402	809.380
BTM_t	33,865	0.619	0.522	0.267	0.487	0.813
ΔROA_t	33,865	-0.004	0.184	-0.048	0.000	0.038
ACC_t	33,865	-0.071	0.133	-0.113	-0.057	-0.011
ΔATO_t	33,865	-0.015	0.246	-0.109	0.000	0.092
$LITIG_t$	33,865	0.330	0.470	0.000	0.000	1.000
LEV_t	33,865	0.165	0.195	0.001	0.101	0.268
$ISSUE_t$	33,865	0.181	0.385	0.000	0.000	0.000
AU_t	33,865	0.847	0.360	1.000	1.000	1.000
ACC_{t-1}	33,865	-0.067	0.137	-0.113	-0.055	-0.006
WCA_{t-1}	33,865	-0.007	0.127	-0.047	-0.002	0.043
CFO_t	33,865	0.040	0.210	-0.006	0.077	0.146
$OPTGR_t$	33,865	0.005	0.012	0.000	0.001	0.005

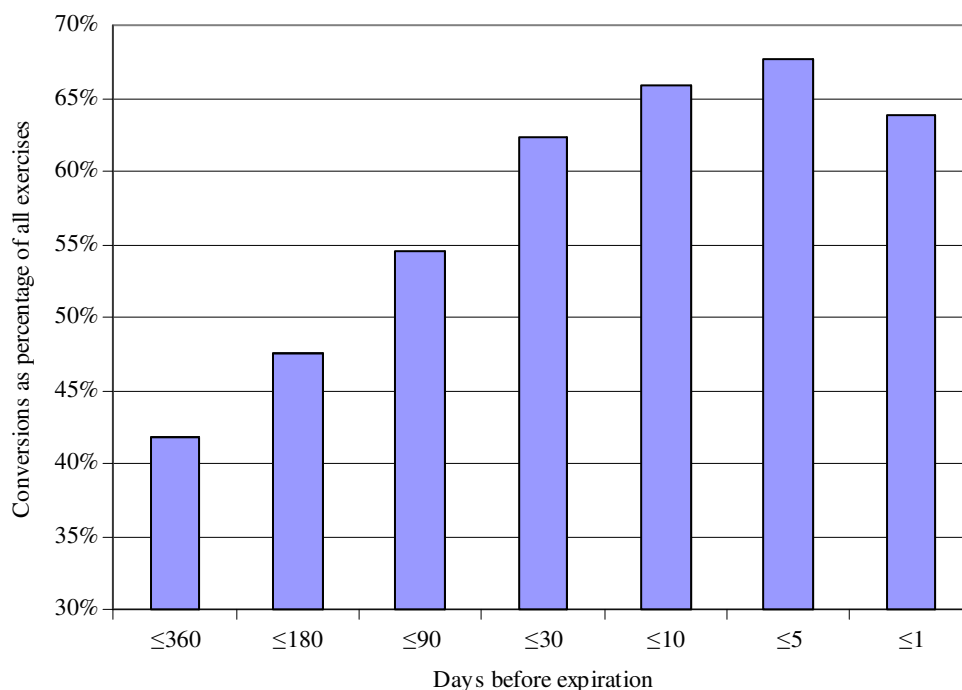
All variables are defined as in Appendix 4.1. The sample selection procedure for the full sample of firm-years is presented in Table 4.2. All continuous variables are winsorized to the 1st and 99th percentiles of their distributions.

4.4.6 Non-Information Events as Motivations for Conversion Exercises

Figure 4.1 shows how conversion exercise activity relates to option expiration dates. While descriptive statistics showed that 30% of exercises are conversions (Table 4.1), this ratio

increases to 42% for exercises that occur within 360 calendar days prior to expiration. Consistent with impending expiration as a motivation for conversion, shortening the time window prior to expiration gradually increases the percentage of conversions. More than half of all exercises (55%) are identified as conversions when occurring within 90 days prior to expiration. The ratio further increases to a high of 68% for exercises that occur within five days prior to expiration. Unreported tests indicate that all percentages mentioned above are significantly greater than the average of 30% for the total sample. Hence, this analysis shows that upcoming expiration of the options is an important exogenous, non-information factor driving conversions.

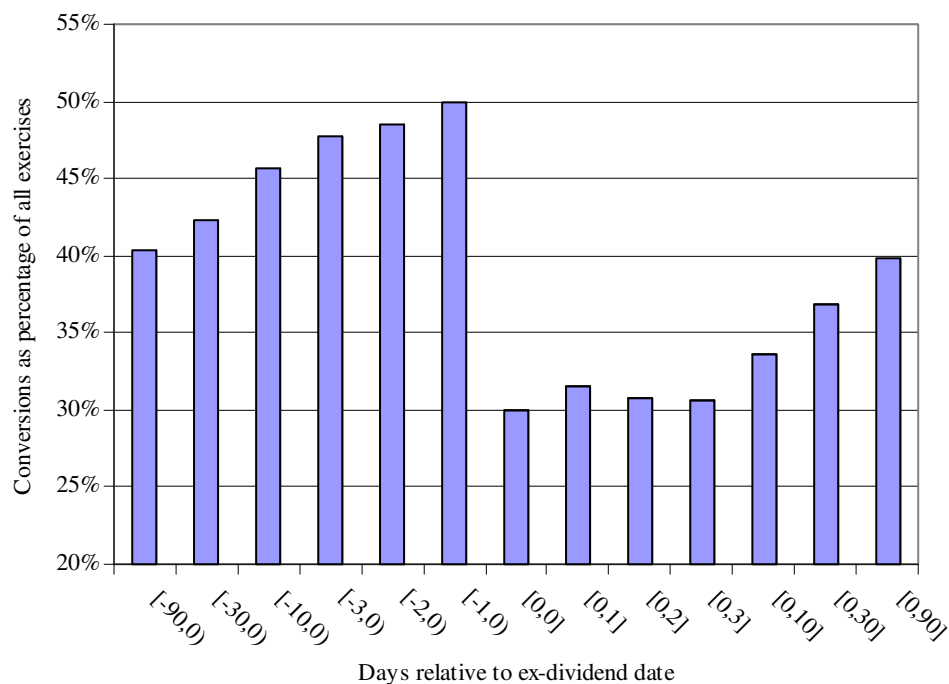
Figure 4.1
Public Information Events: Distribution of Conversion Exercises around Option Expiration



Ratio of conversion exercises to all stock option exercises for several time windows prior to option expiration. Stock option exercises from 1996 to 2006 are obtained from the Thomson Financial insider filings database. An option exercise is defined as a conversion when the exercise is not accompanied by share sales within a period of 30 calendar days after the exercise date. An option exercise is defined as liquidation when all the shares acquired through exercise are sold on the open market within a period of 30 calendar days. All other exercises are defined as partial liquidation transactions.

In a similar vein, the role of dividends in conversion exercises is analysed. We examine the ratio of conversions to all exercises around firms' ex-dividend dates. Ex-dividend dates are obtained from CRSP and exercise behaviour is examined over a window starting 90 calendar days prior to and ending 90 days after the event.³⁷ Results are presented in Figure 4.2.

Figure 4.2
Public Information Events: Distribution of Conversion Exercises around Ex-Dividend Dates



Ratio of conversion exercises to all stock option exercises for several time windows around ex-dividend dates. Ex-dividend dates are obtained from the CRSP monthly event files. Stock option exercises from 1996 to 2006 are obtained from the Thomson Financial insider filings database. An option exercise is defined as a conversion when the exercise is not accompanied by share sales within a period of 30 calendar days after the exercise date. An option exercise is defined as liquidation when all the shares acquired through exercise are sold on the open market within a period of 30 calendar days. All other exercises are defined as partial liquidation transactions.

The 180-day window around ex-dividend dates shows an average ratio of conversions to total exercises of 40%. This is higher than the average of 30% for the total sample and suggests a positive relation between conversion and dividend payouts. Looking more closely at windows

³⁷ On average, the time lag between the dividend announcement and the ex-dividend date equals 18 calendar days, which suggests that the ex-dividend date is publicly known information.

surrounding the ex-dividend date, the percentage of conversions gradually increases prior to the event. For the day prior to an ex-dividend date, the percentage of conversions increases to 50%. Interestingly, on the ex-dividend date itself conversions activity drops to 30%. Subsequent to the event, the conversion ratio gradually increases back to the average level. Overall, these results are consistent with the notion that ex-dividend dates are a non-information motivation for a manager to convert options and retain the shares.

4.5 EMPIRICAL FINDINGS

4.5.1 Future Earnings Innovations

Table 4.4 and Figure 4.3 present a univariate analysis of earnings changes in years t and $t+1$. All figures are adjusted for the average performance of similar sized firms using the same decile partitions as in Panel B of Table 4.2.

BUY years show an abnormally large positive change in earnings performance in year $t+1$ (+1.23%), consistent with share purchases reflecting positive private information. The performance around *SELL* years has an opposite pattern. Abnormal change in ROA is significantly positive in year t (+1.29%), turning significantly negative in year $t+1$ (-1.19%).

Table 4.4
Univariate Evidence on Changes in Annual Earnings Performance in Years of Abnormal Trading

Direction	Firm-years	Abnormal ΔROA_t	p-value	Abnormal ΔROA_{t+1}	p-value
<i>BUY</i>	3,766	-0.42%	0.1573	1.23%	0.0000
<i>SELL</i>	5,826	1.29%	0.0000	-1.19%	0.0000
<i>SELLNOX</i>	4,156	1.21%	0.0000	-1.10%	0.0000
<i>EX</i>	4,878	0.81%	0.0001	-1.06%	0.0000
<i>CONV</i>	2,983	0.30%	0.2752	-0.44%	0.0960
<i>LIQ</i>	2,875	1.39%	0.0000	-1.58%	0.0000
<i>LIQNTM</i>	2,167	1.26%	0.0000	-1.08%	0.0000
<i>LIQITM</i>	1,405	1.50%	0.0009	-2.36%	0.0000

Overview of changes in earnings performance in fiscal years t and $t+1$ where abnormal insider activity is measured over fiscal year t . ΔROA_t is defined as in Appendix 4.1. Abnormal ΔROA_t equals the change in return on assets adjusted for the average change in return on assets of firms in the same size decile during the year. Firm-year abnormal trading directions (*BUY*, *SELL*, etc.) are defined as in Appendix 4.1.

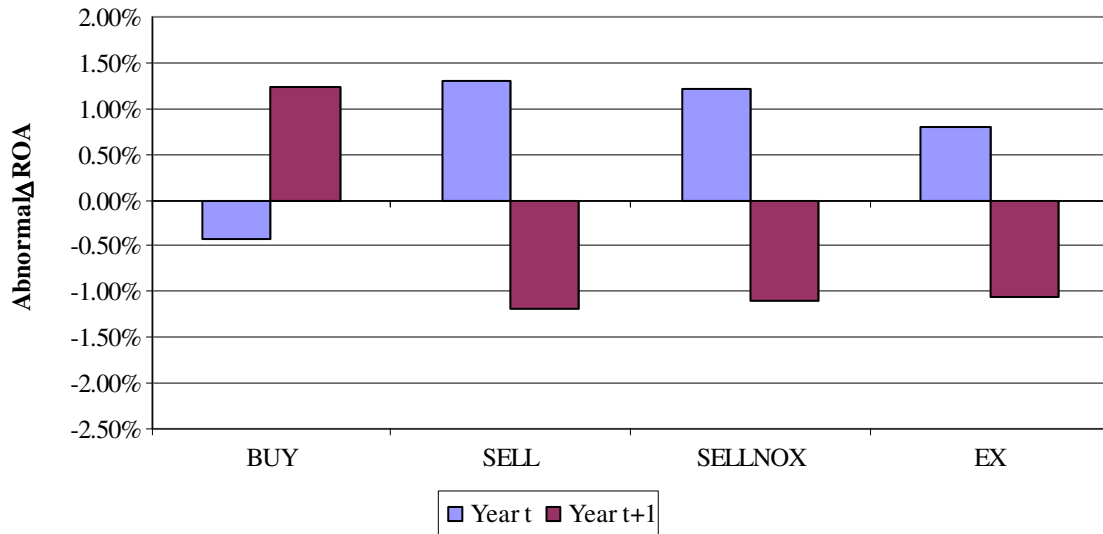
Looking at years of abnormal non-exercise related sales (*SELLNOX*), the earnings pattern is only slightly weaker, while the future earnings pattern for abnormal liquidation years (*LIQ*) is much stronger (-1.58% versus -1.19% for *SELLNOX*). Interestingly, the least significant results are found for abnormal conversion years (*CONV*). Current year abnormal performance is not significantly different from zero, while future performance is slightly negative and only marginally significant. This finding appears to be consistent with the prediction that conversions reflect different incentives than regular share purchases. Finally, the most dramatic pattern is found for abnormal liquidation years of deep in-the-money options (*LIQITM*), with year $t+1$ abnormal earnings changes equal to -2.36% (versus -1.19% for *SELLNOX*). This finding is consistent with such exercises being more informative for forecasting and valuation than are regular sales of previously held shares.

To the extent that the results presented in Table 4.4 are potentially driven by the transitory nature of earnings changes or other correlated omitted factors, Table 4.5 presents multivariate OLS regressions. Note that the trading indicator variables may be overlapping (that is, a firm-year can be classified as *SELLNOX* as well as *LIQ*). This multivariate analysis therefore also assists in isolating the information content of each trading direction. Significance levels and t-statistics are all based on robust standard errors adjusted for heteroskedasticity and clustering on the firm level (Petersen 2009). In addition, industry- and year-fixed effects are included in the analyses.

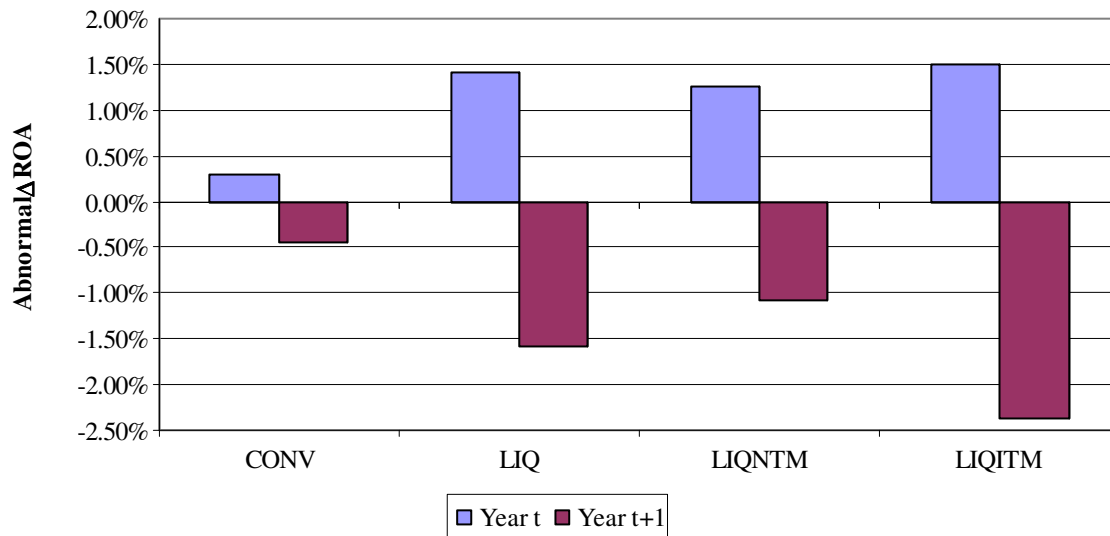
In Models 1 through 5, future (unadjusted) earnings changes are regressed on test and control variables. Moving from Model 1 to 2, regular share sales are slightly less informative than pooled share sales. Moving to Models 3 and 4 where (decomposed) option exercises are added, the negative coefficient on *SELLNOX* becomes insignificantly different from zero. Consistent with *H1a*, Model 4 shows that liquidation exercise is associated with significantly more negative changes in future earnings performance than regular selling of shares. Consistent with *H1b*, this difference increases when liquidation exercises are decomposed based on option moneyness (Model 5). The information content of liquidation exercises thus appears to be concentrated in exercises of deep in-the-money options. Lastly, consistent with *H2*, results suggest that conversion exercises have no information content and regular equity purchases are significantly more informative with respect to future earnings performance.

Figure 4.3a

Abnormal Changes in Annual Earnings Performance: Purchases, Sales, and Option exercises

**Figure 4.3b**

Abnormal Changes in Annual Earnings Performance: Conversion versus Liquidation



Overview of changes in earnings performance in fiscal years t and $t+1$ where abnormal insider activity is measured over fiscal year t . ΔROA_t is defined as in Appendix 4.1. Abnormal ΔROA_t equals the change in return on assets adjusted for the average change in return on assets of firms in the same size decile during the year. Firm-year abnormal trading directions (BUY, SELL, etc.) are defined as in Appendix 4.1.

Table 4.5
Multivariate Analysis of Changes in Future Annual Earnings Performance

	Dependent variable:				
	ΔROA_{t+1} Model 1	ΔROA_{t+1} Model 2	ΔROA_{t+1} Model 3	ΔROA_{t+1} Model 4	ΔROA_{t+1} Model 5
<i>Test variables</i>					
<i>BUY_t</i>	0.0109 [3.93]***	0.0111 [4.01]***	0.0109 [3.93]***	0.0106^a [3.83]***	0.0106^a [3.83]***
<i>SELL_t</i>	-0.0061 [3.06]***				
<i>SELLNOX_t</i>		-0.0049 [2.08]**	-0.0039 [1.65]*	-0.0036^b [1.53]	-0.0032^b [1.33]
<i>EX_t</i>			-0.0064 [3.09]***		
<i>CONV_t</i>				0.0005^a [0.21]	0.0010^a [0.37]
<i>LIQ_t</i>				-0.0116^b [4.48]***	
<i>LIQNTM_t</i>					-0.0011 [0.45]
<i>LIQITM_t</i>					-0.0216^b [5.51]***
<i>Control variables</i>					
<i>ln(MV)_t</i>	0.0017 [3.71]***	0.0016 [3.46]***	0.0018 [3.90]***	0.0019 [4.05]***	0.0019 [4.05]***
<i>BTM_t</i>	-0.0028 [1.33]	-0.0028 [1.34]	-0.0028 [1.33]	-0.0028 [1.33]	-0.0028 [1.33]
<i>ΔROA_t</i>	-0.1417 [9.75]***	-0.1415 [9.74]***	-0.1419 [9.77]***	-0.1417 [9.75]***	-0.1408 [9.68]***
<i>D_t</i>	-0.0136 [6.67]***	-0.0134 [6.60]***	-0.0136 [6.70]***	-0.0138 [6.75]***	-0.0137 [6.72]***
<i>D*ΔROA_t</i>	-0.1615 [6.72]***	-0.1617 [6.73]***	-0.1613 [6.71]***	-0.1616 [6.72]***	-0.1629 [6.77]***
<i>ACC_t</i>	-0.3732 [26.93]***	-0.3735 [26.96]***	-0.3732 [26.95]***	-0.3732 [26.95]***	-0.3734 [26.97]***
<i>ΔATO_t</i>	0.0682 [12.06]***	0.0682 [12.06]***	0.0681 [12.05]***	0.0681 [12.05]***	0.0678 [12.00]***
Industry dummies?	Included	Included	Included	Included	Included
Year dummies?	Included	Included	Included	Included	Included
n	33,865	33,865	33,865	33,865	33,865
Adj. R ²	0.1741	0.1740	0.1741	0.1742	0.1745

OLS regressions of changes in annual earnings performance in year $t+1$ on test and control variables. All variables are defined as in Appendix 4.1, except for D_t , which is an indicator variable equal to 1 if $\Delta ROA_t < 0$, and 0 otherwise. The sample selection procedure for the full sample of firm-years is presented in Table 4.2. All continuous variables are winsorized to the 1st and 99th percentiles of their distributions. Industry portfolios are based on two-digit SIC codes. Calculated t-statistics are based on robust standard errors adjusted for heteroskedasticity and clustering on the firm-level (Petersen 2009). *, **, *** denote significance at the 0.10, 0.05, and 0.01 level, respectively (two-tailed).

^{a,b} indicate that the paired coefficients on test variables are significantly different at the 0.10 level or better.

4.5.2 Earnings Management

Table 4.6 presents results for the earnings management tests, where the association between option exercises and unsigned and signed abnormal accruals is analysed. Model 1 tests the contemporaneous relation between unsigned abnormal accruals and abnormal buying, selling, conversion, and liquidation. Although the coefficients are not significantly different, results suggest that *LIQ* – but not *SELLNOX* – is associated with earnings management. To further analyse these relations, the sample is split into positive and negative abnormal accruals, consistent with Cohen et al. (2008) and regressions are estimated separately.

Consistent with the use of upwards earnings management, we find that in Model 3 both *SELLNOX* and *LIQ* are positively associated with income-increasing abnormal accruals. Although the coefficient on *LIQ* (0.0091) is higher than the coefficient on *SELLNOX* (0.0069), an F-test suggests that the coefficients are not statistically different. This result is not consistent with *H1c*. However, when we further decompose liquidations in Model 5, we find that income-increasing accruals are significantly higher for *LIQITM* firm-years than for *SELLNOX* firm-years. Thus, *H1c* can be accepted for the comparison between regular share sales and liquidations of deep in-the-money exercises. Again, conversion exercises and near-the-money liquidations appear to have no information content.

Lastly, with regard to some of the control variables, note that firms hiring a large auditor have less negative and positive abnormal accruals, which is consistent with the conjecture that these auditors constrain extreme accruals (e.g., Becker et al. 1998). Further, consistent with Baker et al. (2003) and McAnally et al. (2008), results suggest that stock option grants are associated with income-decreasing earnings management.

Table 4.6
Earnings Management Tests: Performance-Adjusted Abnormal Accruals

	Dependent variable:			
	$ AACADJ_t $	$AACADJ_t < 0$	$AACADJ_t > 0$	$AACADJ_t > 0$
	Model 1	Model 2	Model 3	Model 4
<i>Test variables</i>				
BUY_t	0.0024 [1.45]	-0.0037 [1.49]	0.0000 [0.02]	0.0001 [0.03]
$SELLNOX_t$	0.0025^a [1.64]	0.0017^a [0.74]	0.0069^a [3.76]***	0.0067^b [3.65]***
$CONV_t$	-0.0017 [1.02]	0.0025 [1.00]	0.0001 [0.03]	-0.0001 [0.06]
LIQ_t	0.0032^a [1.98]**	0.0032^a [1.35]	0.0091^a [4.48]***	
$LIQNTM_t$				0.0022 [1.04]
$LIQITM_t$				0.0143^b [4.66]***
<i>Control variables</i>				
$\ln(MV)_t$	-0.0051 [14.85]***	0.0048 [9.55]***	-0.0054 [14.14]***	-0.0054 [14.04]***
BTM_t	-0.0122 [10.73]***	0.0159 [8.92]***	-0.0076 [5.80]***	-0.0076 [5.77]***
$LITIG_t$	0.0050 [3.73]***	-0.0078 [3.97]***	0.0021 [1.41]	0.0020 [1.36]
LEV_t	-0.0197 [6.27]***	0.0175 [3.70]***	-0.0185 [5.46]***	-0.0184 [5.44]***
$ISSUE_t$	0.0347 [19.67]***	-0.0547 [19.72]***	0.0110 [5.64]***	0.0108 [5.56]***
AU_t	-0.0082 [4.37]***	0.0063 [2.22]**	-0.0100 [4.62]***	-0.0100 [4.62]***
CFO_t	-0.0624 [14.26]***	0.0263 [4.05]***	-0.1147 [21.07]***	-0.1148 [21.07]***
ACC_{t-1}	-0.0518 [8.71]***	0.0843 [9.16]***	-0.0083 [1.31]	-0.0082 [1.30]
$OPTGR_t$	0.0617 [1.27]	-0.1303 [1.74]*	0.0065 [0.11]	0.0055 [0.09]
Industry dummies?	Included	Included	Included	Included
Year dummies?	Included	Included	Included	Included
n	33,865	16,879	16,986	16,986
Adj. R ²	0.1207	0.1238	0.1609	0.1611

OLS regressions of abnormal accruals in year t on test and control variables. All variables are defined as in Appendix 4.1. The sample selection procedure for the full sample of firm-years is presented in Table 4.2. All continuous variables are winsorized to the 1st and 99th percentiles of their distributions. Industry portfolios are based on two-digit SIC codes. Calculated t-statistics are based on robust standard errors adjusted for heteroskedasticity and clustering on the firm-level (Petersen 2009). *, **, *** denote significance at the 0.10, 0.05, and 0.01 level, respectively (two-tailed).

^a indicates that the paired coefficients on test variables are *not* significantly different at the 0.10 level.

^b indicates that the paired coefficients on test variables are significantly different at the 0.10 level or better.

To summarize, the evidence presented in these sections is largely consistent with the stated predictions. The earnings forecasting tests suggest that liquidation exercises are significantly more informative for forecasting and valuation than are regular sales of previously held shares. This difference becomes even stronger when options are deeply in-the-money, consistent with greater incentives for managers to trade on disappointing future earnings information when the anticipated wealth loss avoided is larger. Also consistent with our predictions – and with the evidence of an association with non-information events such as expiration and ex-dividend dates – the empirical results suggest that regular equity purchases are significantly more informative for future earnings than conversion exercises of options. In fact, in none of our multivariate analyses do conversion exercises have some information content. This finding is consistent with our conjecture that the short-term abnormal returns after conversion exercises in Aboody et al. (2008) are likely driven by ex-post timing (backdating) rather than ex-ante timing on price-sensitive information. Results for the earnings management tests are largely similar, as liquidation exercises of deep in-the-money stock options are associated with significantly higher income-increasing accruals.

4.6 ADDITIONAL ANALYSES

4.6.1 Abnormal Working Capital Accruals

To add more credibility to our earnings management tests, the analyses of Table 4.6 are replicated using abnormal working capital accruals because these are more easily manipulated (e.g., Becker et al. 1998). Table 4.7 presents the results. Consistent with the earlier analyses, *LIQ* has a positive association with unsigned abnormal accruals. Interestingly, years of abnormal buying are also associated with higher unsigned abnormal accruals. Moving to Model 2 for the negative accruals sub-sample, I find that *BUY* is associated with significantly lower income-decreasing abnormal working capital accruals. This finding is consistent with the result for stock option grants (*OPTGR*) and Sawicki and Shrestha (2008), who find that insider buying is associated with downwards earnings management. Further, results for liquidation exercises versus sales of previously held shares are consistent with the earlier examination of abnormal total accruals.

Table 4.7
Additional Tests: Performance-Adjusted Abnormal Working Capital Accruals

	Dependent variable:			
	AWCADJ _t	AWCADJ _t <0	AWCADJ _t >0	AWCADJ _t >0
	Model 1	Model 2	Model 3	Model 4
<i>Test variables</i>				
<i>BUY_t</i>	0.0030 [1.84]*	-0.0051 [2.12]**	-0.0002 [0.08]	-0.0002 [0.09]
<i>SELLNOX_t</i>	0.0022^a [1.46]	0.0020^a [0.88]	0.0065^a [3.35]***	0.0063^b [3.24]***
<i>CONV_t</i>	-0.0022 [1.43]	0.0027 [1.10]	-0.0015 [0.78]	-0.0017 [0.88]
<i>LIQ_t</i>	0.0035^a [2.14]**	0.0004^a [0.18]	0.0074^a [3.61]***	
<i>LIQNTM_t</i>				0.0011 [0.53]
<i>LIQITM_t</i>				0.0125^b [4.01]***
<i>Control variables</i>				
<i>ln(MV)_t</i>	-0.0049 [14.66]***	0.0046 [9.99]***	-0.0054 [13.41]***	-0.0053 [13.31]***
<i>BTM_t</i>	-0.0124 [10.99]***	0.0150 [8.68]***	-0.0093 [6.94]***	-0.0093 [6.91]***
<i>LITIG_t</i>	0.0036 [2.77]***	-0.0066 [3.61]***	0.0005 [0.34]	0.0004 [0.30]
<i>LEV_t</i>	-0.0197 [6.24]***	0.0194 [4.26]***	-0.0181 [4.92]***	-0.0180 [4.89]***
<i>ISSUE_t</i>	0.0321 [19.02]***	-0.0477 [18.26]***	0.0140 [7.20]***	0.0139 [7.13]***
<i>AU_t</i>	-0.0071 [3.82]***	0.0064 [2.45]**	-0.0075 [3.29]***	-0.0075 [3.27]***
<i>CFO_t</i>	-0.0622 [15.05]***	0.0298 [5.04]***	-0.1074 [19.99]***	-0.1075 [20.01]***
<i>WCA_{t-1}</i>	-0.0144 [2.25]**	0.0490 [5.19]***	0.0251 [3.14]***	0.0252 [3.15]***
<i>OPTGR_t</i>	0.1069 [2.20]**	-0.1579 [2.15]**	0.0595 [0.97]	0.0588 [0.96]
Industry dummies?	Included	Included	Included	Included
Year dummies?	Included	Included	Included	Included
n	33,865	16,904	16,961	16,961
Adj. R ²	0.1097	0.1051	0.1484	0.1486

OLS regressions of abnormal working capital accruals in year t on test and control variables. All variables are defined as in Appendix 4.1. The sample selection procedure for the full sample of firm-years is presented in Table 4.2. All continuous variables are winsorized to the 1st and 99th percentiles of their distributions. Industry portfolios are based on two-digit SIC codes. Calculated t-statistics are based on robust standard errors adjusted for heteroskedasticity and clustering on the firm-level (Petersen 2009). *, **, *** denote significance at the 0.10, 0.05, and 0.01 level, respectively (two-tailed).

^a indicates that the paired coefficients on test variables are *not* significantly different at the 0.10 level.

^b indicates that the paired coefficients on test variables are significantly different at the 0.10 level or better.

4.6.2 Likelihood of Material Misstatements

Dechow et al. (2009) analyse a large sample of SEC Accounting and Auditing Enforcement Releases (AAERs) to determine what factors predict material accounting misstatements. They find that during misstated firm-years, accruals and sales are abnormally high, real performance is declining, and firms raise new financing. Further, consistent with Jensen's (2005) theory of overvalued equity, misstating firms have higher market-to-book ratios and higher prior stock returns. Based on these determinants, Dechow et al. (2009) develop an accounting misstatement prediction model, which can be applied to individual firms to compute the probability of material misstatements. The output of this prediction model, the F-score, indicates an increased likelihood of material misstatements for values greater than 1.³⁸ As an additional test, I calculate F-scores to test whether option liquidation exercises are associated with a different probability of earnings misstatements than regular sales of previously held shares.

Results are presented in Table 4.8. As a result of additional data requirements, the sample is reduced to 30,460 firm-year observations. Although Dechow et al. (2009) suggest that the raw F-score may be used in empirical tests, I control for firm size and book-to-market to ensure that results are not driven by these factors which are related to insiders' propensity to trade. Further, I estimate both OLS regressions with the F-score as the dependent variable (*FSCORE*) and logit regressions with an indicator variable (*FHIGH*) for firm-years with F-scores greater than 1.

The empirical results reveal that firm-years with abnormal insider buying are associated with a decreased likelihood of material misstatements. This finding can be interpreted as evidence that insider purchase decisions more likely reflect superior knowledge of future cash flows rather than a reversal in deflated earnings, but is also consistent with lower enforcement against firms that manage earnings downwards relative to firms that manage earnings upwards. With respect to the hypotheses, I again find that liquidation exercises of deep in-the-money options are significantly more informative than regular sales of shares. This result holds for both the *FSCORE* model as well as the *FHIGH* model. Interestingly, the coefficient on *CONV* has the opposite sign of that on *BUY*. This result is consistent with a greater propensity to misreport in firms where managers have option holdings (Burns and Kedia 2006).

³⁸ For an example of the exact computation of this variable on an individual firm level, see Dechow et al. (2009, p.30). They show that Enron had an F-score of 1.86 in fiscal year 2000.

Table 4.8
Additional Tests: Likelihood of Material Misstatements

	Dependent variable:			
	$FSCORE_t$	$FSCORE_t$	$FHIGH_t$	$FHIGH_t$
	Model 1	Model 2	Model 3	Model 4
	(OLS)	(OLS)	(Logit)	(Logit)
<i>Test variables</i>				
BUY_t	-0.0439 [4.51]***	-0.0442 [4.53]***	-0.1997 [4.86]***	-0.2007 [4.87]***
$SELLNOX_t$	0.1444^a [13.08]***	0.1416^b [12.96]***	0.6297^a [15.20]***	0.6216^b [15.00]***
$CONV_t$	0.0602 [5.14]***	0.0570 [4.87]***	0.2617 [5.53]***	0.2507 [5.27]***
LIQ_t	0.1195^a [9.91]***		0.6606^a [13.22]***	
$LIQNTM_t$		0.0131 [1.14]		0.2217 [3.83]***
$LIQITM_t$		0.2004^b [10.59]***		0.9381^b [13.13]***
<i>Control variables</i>				
$\ln(MV)_t$	0.0079 [3.96]***	0.0082 [4.06]***	0.0106 [1.25]	0.0114 [1.34]
BTM_t	-0.0216 [2.74]***	-0.0212 [2.69]***	-0.1019 [3.48]***	-0.1002 [3.43]***
Industry dummies?	Included	Included	Included	Included
Year dummies?	Included	Included	Included	Included
n	30,460	30,460	30,460	30,460
Adj. R ² (1,2) Pseudo-R ² (3,4)	0.0436	0.0452	0.0468	0.0480

OLS and logit regressions of the probability score of material misstatements (Dechow et al. 2009) in year t on test and control variables. All variables are defined as in Appendix 4.1. The sample selection procedure for the full sample of firm-years is presented in Table 4.2. All continuous variables are winsorized to the 1st and 99th percentiles of their distributions. Industry portfolios are based on two-digit SIC codes. Calculated t -statistics are based on robust standard errors adjusted for heteroskedasticity and clustering on the firm-level (Petersen 2009). *, **, *** denote significance at the 0.10, 0.05, and 0.01 level, respectively (two-tailed).

^a indicates that the paired coefficients on test variables are *not* significantly different at the 0.10 level.

^b indicates that the paired coefficients on test variables are significantly different at the 0.10 level or better.

Lastly, coefficients on the size and book-to-market variables support the inclusion of these variables as controls. Larger firms and growth firms are more likely to have material misstatements. Untabulated tests suggest that additionally controlling for the other control factors employed in Tables 6 and 7 do not alter the qualitative interpretation of the results.

4.7 SUMMARY AND CONCLUSIONS

This study examined whether executives' decisions to exercise their stock options, and subsequently hold (conversion) or sell (liquidation) shares acquired upon exercise, signal information about firms' future earnings performance and current earnings quality. While the majority of previous studies on insider trading focus on post-trading abnormal stock returns, this study analysed changes in the firm's future operating performance, an important driver of changes in firm value. An analysis of changes in future earnings performance allows to isolate managers' trading on their private information advantage, while an analysis of stock prices or returns captures both managers' superior knowledge of future cash flows as well as their ability to detect market valuation errors (Piotroski and Roulstone 2005).

The analyses build on the different payoff structures of stock options versus shares. While theory and empirical evidence suggest that stock options motivate managers to pursue more risky but valuable investments, options also make managerial wealth more sensitive to price changes and induce more risk taking in terms of opportunistic financial reporting. In this study, I predict and find that managers' decisions to unload their positions through option liquidations are more informative with respect to future firm performance than are regular sales of shares, and this higher information content is increasing in the moneyness of options exercised. Further, deep in-the-money option liquidations are associated with significantly higher income-increasing accruals and a higher likelihood of material misstatements. For managers' purchases of shares, only regular purchases are informative for future earnings performance, while purchases through conversion exercises are driven by non-information factors such as option expiration and ex-dividend dates.

These findings are relevant for future research. While many studies on corporate insider trading either pool managers' regular sales with sales from option exercises (Beneish and Vargus 2002; Piotroski and Roulstone 2005) or disregard the relevance of option related sales (Fidrmuc et al. 2006; Jin and Kothari 2008), this study shows that option liquidation exercises provide important and unique information signals for forecasting and valuation purposes and assessments of the quality of reported earnings. Also, the findings suggest that the recent switch in U.S. compensation policies from option grants to awards of restricted stock may have beneficial effects for shareholders by reducing management incentives for opportunistic financial reporting.

This chapter focused on the extent to which reported insider share trades and option exercises are associated with changes future earnings performance to identify managers' private information. A focus on future stock price changes would have been less useful to detect private information since insiders may react to the mispricing of their stock based on public as well as private information. In the next chapter, I employ accounting based valuation models to more closely identify motivations behind insider trading decisions and to separate public versus private information motivations. The valuation models can be used to determine the fundamental value of a firm's stock and these models produce less ambiguous measures to detect market valuation errors than the measures used in prior research. Also, while the current chapter analysed share trades versus stock option exercises as an extension of the literature, the next chapter exploits the unique Dutch institutional setting to test the information content of share trading by managers versus firms as corporate insiders.

APPENDIX 4.1: VARIABLE DEFINITIONS

Variable	Definition
BUY_t	Indicator variable for firm-years with <i>abnormal</i> insider buying, equal to 1 when the number of shares traded as a percentage of shares outstanding is greater than the median of similar sized firms with buying activity, 0 otherwise.
$SELL_t$	Indicator variable for firm-years with <i>abnormal</i> insider selling.
$SELLNOX_t$	Indicator variable for firm-years with <i>abnormal</i> non-exercise related insider selling.
EX_t	Indicator variable for firm-years with <i>abnormal</i> option exercise.
$CONV_t$	Indicator variable for firm-years with <i>abnormal</i> option conversion.
LIQ_t	Indicator variable for firm-years with <i>abnormal</i> option liquidation.
$LIQNTM_t$	Indicator variable for firm-years with <i>abnormal</i> liquidation of "near-the-money" options (price-to-strike ratio < 4).
$LIQITM_t$	Indicator variable for firm-years with <i>abnormal</i> liquidation of "deep in-the-money" options (price-to-strike ratio > 4).
ΔROA_{t+1}	Change in ROA in year $t+1$, where ROA is defined as the ratio of income before extraordinary items (Compustat data item IBC) to lagged total assets (AT).
$AACADJ_t$	Performance-adjusted abnormal accruals, calculated as the residuals of the Modified Jones (1991) model (see equation (2)), adjusted for the average abnormal accruals of firms with similar performance (Kothari et al. 2005).
$AWCADJ_t$	Performance-adjusted working capital abnormal accruals.
MV_t	Market capitalisation at the beginning of year t (PRCC_F * CSHO).
BTM_t	Market-to-book ratio at the beginning of year t (CEQ / [PRCC_F * CSHO]).
ΔTO_t	Change in asset turnover, where asset turnover is calculated as the ratio of revenues (SALE) to average total assets (AT).
$LITIG_t$	Indicator variable for high litigation industries, equal to 1 for SIC codes 2833-2836, 3570-3577, 3600-3674, 5200-5961, 7370-7374, and 8731-8734, 0 otherwise.
LEV_t	Leverage, computed as ratio of long-term debt (DLTT) to total assets (AT).
$ISSUE_t$	Indicator variable for firms with new equity issues, equal to 1 if the split-adjusted difference in shares outstanding has increased by more than 10% relative to year $t-1$, 0 otherwise.
AU_t	Big N audit indicator variable, equal to 1 if the firm is audited by a Big N auditor, 0 otherwise.
ACC_{t-1}	Total accruals in year $t-1$, calculated as the difference between income before extraordinary items (IBC) and cash flow from operations (OANCF), scaled by lagged total assets (AT).
WCA_{t-1}	Working capital accruals in year $t-1$, calculated as the difference between income before extraordinary items (IBC) and cash flow from operations (OANCF) plus depreciation and amortisation (DPC), scaled by lagged total assets (AT).
CFO_t	Cash flow from operations (OANCF) scaled by lagged total assets (AT).
$OPTGR_t$	The aggregate number of stock options granted from the Thomson Reuters insider filings database, scaled by number of shares outstanding.
$FSCORE_t$	F-score: scaled probability of material accounting misstatements, calculated from Dechow et al. (2009).
$FHIGH_t$	Indicator variable equal to 1 for firms with $FSCORE > 1$, 0 otherwise.