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Veenman, D.

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Corporate insiders, i.e. the officers and directors of publicly traded companies, play an important role in capital markets. They determine business strategies, influence financial reporting outcomes and additional disclosures, and frequently trade the stock market by buying and selling their companies' securities. Using publicly available information on legal insider trading activity, this dissertation empirically examines questions related to the tension between the accounting information provided by corporate insiders and their trading decisions on personal accounts.

Insider Trading

David Veenman

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The Interrelation between Accounting Information, Stock Prices, and Reported Insider Trades

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Insider Trading

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and Reported Insider Trades

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Promotor: Prof. Dr. A.C. Hodgson

Overige leden: Prof. D. Hillier
Prof. Dr. L.A.G.M. van Lent
Prof. Dr. B.G.D. O'Dwyer
Prof. Dr. W.P. Rees

Faculteit der Economie en Bedrijfskunde

Preface

It was around 1999-2000 when I became interested in stock markets. Of course, who wasn't interested in stocks at that time when markets were booming and appeared to be a moneymaking machine? The primary reason for my interest was that the value of the shares in Koninklijke PTT Nederland (KPN) that I got as a savings investment in 1994 had increased by multiple factors. I liquidated part of this investment and started to buy and sell some shares in other companies. Unfortunately I did not have a clue as to what drove the high stock prices in the 1990s and saw my investment portfolio decline after the "bubble" burst. At that time, my main source of investment advice came from analysts that used charts and rulers to predict the future direction of the market. Now, although I liquidated all my remaining (small) share holdings, I believe that investment advice should come from analysts that focus on "fundamentals" rather than charts and rulers. In this PhD dissertation, I analyse the relation between the fundamental signals provided by companies' financial statements and the decisions by corporate insiders (who are involved in the financial reporting process) to trade their own firms' securities.

Doing a PhD can sometimes be a tough and lonely process. However, enjoying the continuous learning process and being in a stimulating environment makes it so much easier. I would like to thank my colleagues at the Amsterdam Business School for creating such an environment. In addition, I thank Allan Hodgson for the supervision, Bart van Praag for motivating me to start doing the PhD in the first place, Joost Impink for all the help, feedback, and laughs, and Igor Goncharov, Sanjay Bissessur, Bill Rees, Erik van der Veer, Roel Boomsma, and Anja Bast for their helpful comments and suggestions. I believe my semester visit at the University of Wisconsin-Madison also significantly contributed to the quality of this dissertation and my academic skills in general. Thanks to the PhD students and faculty members at Grainger Hall. In particular, I thank Holly Skaife for her efforts in making the visit possible.

The Limperg Financial Accounting courses were very useful in gaining knowledge of the fundamental topics and methods used in the research field. I thank Peter Easton for coming to

Tilburg to share his great knowledge and answering tons of my questions. I would also like to thank Wei Zhang for all the help on the research project on executive stock option exercises presented in chapter 4. More generally, the three research papers benefited from the helpful comments and suggestions made by workshop participants at the Amsterdam Business School, University of Tilburg, University of Wisconsin-Madison, and University of Maastricht, PhD students at the 2006 Humboldt University of Berlin Summer School for Empirical Accounting Research, the 2008 Monash University PhD Accounting and Finance Symposium in Prato, and the 2009 EAA doctoral colloquium, and conference participants at the EAA annual conference 2007 in Lisbon, the 2007 ARNN conference at Leuven University, the 2008 EAA annual conference in Rotterdam, the 2009 EAA annual conference in Tampere, and the 2009 AAA annual conference in New York.

Lastly, I thank my family (pap, mam, Bart) for creating the best possible environment to grow up in and for all the trust and support. Céline, thank you for being part of my life and for the continuous patience and support during the process of writing this dissertation.

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1 Introduction

1.1 THE ROLE OF CORPORATE INSIDERS IN CAPITAL MARKETS

“Because managers’ insider knowledge is a source of both value and distortion in accounting data, it is difficult for outsider users of financial statements to separate true information from distortion and noise”. (Palepu et al. 2007, 9)

The trading of securities by corporate insiders, i.e. officers and directors of publicly listed companies, has attracted wide attention from economics, legal, finance, and accounting scholars. In the general public perception, insider trading is an illegal and unfair act because of asymmetric information. Information asymmetry arises because insiders have direct access to information about the failure or success of their products or have specific information about forthcoming disclosures which affect the firm’s stock price. Also, because top-level corporate executives have discretion over the quality of their firms’ accounting and additional voluntary disclosures, these insiders have the ability to change the level of information asymmetry and, hence, the amount of private information available to them.

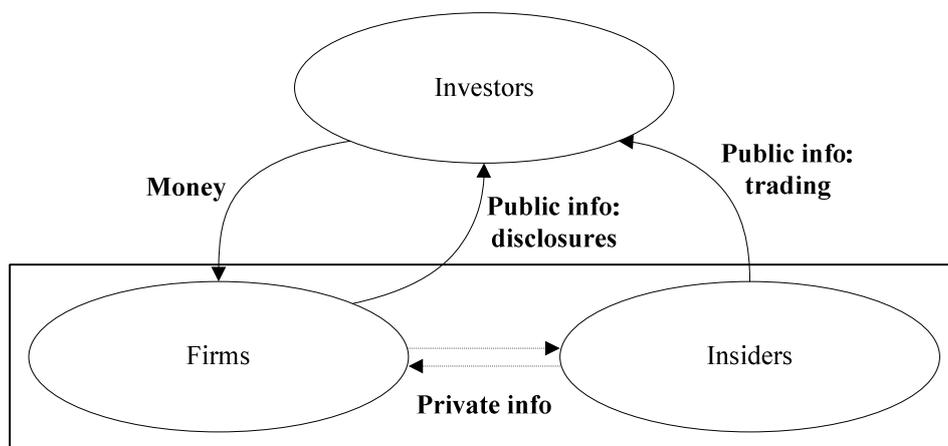
In the legal definition, insider trading is the purchasing and selling of securities by corporate insiders that have potential access to non-public and price-sensitive information. This trading is frequent as a result of stock-based compensation, generally occurs in periods after price-sensitive information events such as earnings announcements, and is highly visible to outside investors through public disclosures. The extremely low incidence of alleged illegal insider trading cases, relative to the incidence of trading around the world, suggests that the vast majority of insider trades can be regarded as legal.

Evidence in prior empirical research suggests that, on average, insider share trades predict the long-term prospects of a company. That is, insider trades are associated with subsequent stock price changes and performance realisations in predictable ways. This evidence is consistent with insiders having access to private information that they use in their decisions to trade. In this regard, some posit that insider trades and their subsequent

disclosures may be beneficial to shareholders because these trades signal a piece of private information and therefore help uninformed outside investors to better understand the fundamental value of a firm's securities. Others even argue that allowing insiders to trade on their information advantage is an efficient mechanism of providing rewards for value enhancing efforts. In this dissertation, I present three empirical studies (Chapters 4-6) that examine unresolved questions regarding the link between insider trades and the information, and noise in information, that is provided in firms' accounting disclosures. Before I briefly introduce these studies in section 1.2, the discussion below first outlines some key concepts underlying this dissertation.

To highlight the role of insiders in the capital market, Figure 1.1 presents a schematic representation of the flows of information between investors, publicly listed firms, and insiders. The diagram is an extremely simplified representation of the real world, since it ignores important players such as financial intermediaries (banks, venture capitalists), information intermediaries (independent auditors, analysts, rating agencies), capital market regulators (the U.S. SEC or Dutch AFM), accounting standards boards (the FASB or IASB), or industry competitors. In the diagram, money flows from investors (savers) to firms (entrepreneurs) with ideas for innovations. Firms use the invested money to process their ideas and develop and market their products.

Figure 1.1
Flows of Information between Investors, Firms, and Insiders



To account for the actions taken with investors' capital, firms are required to communicate the economic value created or destroyed through public accounting disclosures. These disclosures are subject to specific reporting requirements and are verified by independent auditors. Because entrepreneurs typically have better information and have incentives that differ from those of investors (shareholders), the accounting disclosures help investors to separate good from bad investments. Without credible financial reporting, the classical adverse selection problem may arise: investors are not able to make the separation between good and bad investments. This leads to the potential breakdown of the market (Akerlof 1970; Healy and Palepu 2001). Extant literature suggests that accounting disclosures affect investor decision making and that accounting earnings and its components are associated with stock prices (see Kothari 2001 for an overview).

While the above discussion refers to firms, Figure 1.1 makes a more specific distinction between firms and its insider managers. Firms are the economic entities in which money is invested, while insider managers are those that make business decisions. The separation of ownership (by investors) and control (by insiders) in publicly listed companies results in moral hazard problems. Self-interested insiders have incentives to expropriate outsiders' investments if their interests are not properly aligned and full monitoring is not possible (e.g., Fama 1980; Fama and Jensen 1983). Several solutions are available to alleviate such problems, of which the most common solution is to encourage managerial ownership. In theory, insiders are more likely to act in the interests of shareholders when they own shares, as their wealth becomes a function of their value destroying (or enhancing) actions (Jensen and Meckling 1976). Such ownership, however, can also have the detrimental effect of shifting the focus of insiders to short-term stock price changes at the expense of long-term value creation. That is, they have incentives to trade on their private information advantage and thereby profit from new or exiting shareholders, and/or change the noise in accounting disclosures to alter the value of their ownership in the short-term.

Figure 1.1 depicts the private information flows between the firm as an economic entity and its insider managers. The flows of private information go both directions, because *i*) insiders have direct access to information that affects the value of the firm, such as new product innovations, the likelihood that current R&D activities will generate cash in the future, or sales order developments; *ii*) insiders "create" private information through their value enhancing efforts; and *iii*) insiders have discretion over the precision of the information flow to investors, that is, they have control over the noise in accounting disclosures and thereby affect the level of private information that is retained within the firm. If disclosures

are more precise, managers require higher compensation because the profitability of trading on private information is lower (Baiman and Verrecchia 1996).

Noise in accounting disclosures arises from several factors. For example, accounting information consists of summary figures of the economic events that created value during a period. The aggregation of accounting data can hide part of the information that investors require to fully understand the private information available to managers. Such an information gap may be overcome by management's supplementary disclosures. However, full disclosure of private information about a firm's business strategies and expected outcomes is often deterred by proprietary information costs. Full disclosure may be beneficial to investors, but also to competitors, thereby hurting a firm's competitive position. In addition, managers may be reluctant to make subjective supplementary disclosures of forward-looking information as a result of legal liability.

Noise in accounting disclosures may also result from the application of accrual accounting, which relies on expectations of the future cash consequences of current economic activities. Due to their intimate knowledge of the firm, managers are entrusted with making the required accrual estimates and are provided with flexibility to make accounting numbers best reflect the underlying business reality. Within this flexibility, management's accounting choices are determined by debt and compensation contracts as well as political considerations (Watts and Zimmerman 1978; Watts and Zimmerman 1990). However, because it is sometimes difficult, if not impossible, to predict the future cash outcomes of current activities, noise from *unintentional* estimation errors is introduced. In addition, the flexibility given to management may result in noise from *intentional* errors because insider managers, with their equity ownership, have incentives to make biased assumptions to distort accounting earnings and, hence, stock price. Accrual accounting may therefore introduce noise from both unintentional as well as intentional errors.

Financial statement analysis is a tool that can be used to get at management's private information using publicly available accounting information (Palepu et al. 2007). However, because of noise in aggregated financial statement data, financial statement analysis may not fully reveal insiders' private information. Additional information is therefore necessary for investors to separate noise from true, "permanent", accounting earnings. In this dissertation I argue that legal insider trades, as reported to stock market regulators and publicly disclosed, may provide such additional information. The primary motivation for this reasoning is that insider trading is one of the most direct signals of management's private information. The arrow pointing from insiders to investors in Figure 1.1 depicts this information flow as a form

of supplementary disclosure to investors. Be it opportunistically, unintentional, or as a form of voluntary disclosure, managers are less likely to purchase (sell) their firms' equity when future prospects are poor (optimistic). As a result, reported insider trades may signal the information necessary for financial statement users to separate noise from true value in accounting data.

1.2 OUTLINE

In this dissertation, I examine several aspects of the tension between accounting information and reported insider trades. The recurring theme is that both accounting information and reported insider trades are associated with levels and changes in stock prices. The presented studies focus on legal insider trades which are reported to the market regulator of the respective country (U.S. or the Netherlands). The terms "insider", "manager", "director", "officer", and "executive" are used interchangeably to refer to corporate insiders, which are assumed to have a distinct information advantage over other market participants due to their intimate knowledge of the firm and their access to – and influence on – information sources such as financial reporting.

Chapter 2 first presents a broad overview of prior research on insider trading. It starts with some definitions and a description of regulation on insider trading. Next, it discusses research papers examining the predictive ability of insiders and the relation between insider trades and material news events, stock market inefficiencies, accounting information, information asymmetries in a more general sense, and voluntary disclosures. The chapter concludes with a discussion of literature that discusses the benefits and drawbacks of allowing insiders to trade their own firms' equity.

Chapter 3 discusses the role of stock options in corporate insiders' compensation packages. First, the mechanics and incentive effects of stock options are explained, because the payoff structure of stock options is more complex than that of ordinary shares. Second, insights are provided into the rise and fall of stock option compensation – in particular in the U.S. – in recent years. An important determinant of variation in the mix between options and shares in compensation packages over time is the accounting treatment of employee stock options. This has important implications for research focused on insider trades, stock option exercises in particular. Lastly, option compensation has come under scrutiny after the

accounting scandals around the turn of the century. In addition to creating incentives to manipulate accounting numbers, options have proven an effective tool for insiders to make easy profits through practices such as “backdating”.

Chapter 4 investigates the information content of insider option versus share trades. Information content is the extent to which transactions reflect price-sensitive information. In the study, information content is measured by the extent to which trades are associated with future changes in firms’ annual earnings performance and contemporaneous abnormal accounting accruals. Despite the relative importance and unique role of stock options in compensation packages, prior research has been primarily concerned with insiders’ decisions to purchase and sell shares. One explanation is that researchers previously assumed that insiders sell all shares acquired upon option exercise and hence, exercises can simply be regarded as regular share sales. Using transactions by U.S. executives, however, the study first shows that many option exercises are not associated with share sales. Next, it examines whether different incentives induced by stock options versus shares result in differences in information content between insider option exercises and regular purchases and sales of shares. I predict that insiders’ disposition trades through stock options are more likely associated with opportunistic behaviour than their direct dispositions of share holdings.

Chapter 5 analyses a manually collected set of insider transactions in the Netherlands. In light of global differences in disclosure requirements between managers’ personal insider trades and their trades on behalf of the firm (i.e., share repurchases and equity issues), the study examines the market timing ability of managers versus firms. This analysis is facilitated by the specific institutional setting in the Netherlands prior to October 2005. Information content is measured by the extent to which transactions are associated with subsequent stock price changes. In addition, I attempt to separate managers’ trading on private information versus their trading in reaction to market mispricing of public available information. Market mispricing is approximated using the divergence between theoretical equity values and observed market prices.

Chapter 6 examines a large sample of disclosures of insider trades in the U.S. In that study, I examine a potential way in which insider trades and their subsequent disclosure may be beneficial to shareholders. I test whether reported insider trades help investors to resolve uncertainty regarding the implications of previously reported earnings information for the market valuation of a company. This analysis is motivated by prior research, which suggests that equity investors initially underreact to earnings announcements (adjusting stock prices upward and downward too conservatively after good news and bad news announcements,

respectively) and that this underreaction may be explained by earnings “information uncertainty”. More specifically, due to imperfect information, investors are initially unable to isolate the part of a firm’s reported earnings that is “permanent” and relevant for equity valuation. Previous research suggests that estimation error in accounting accruals is an important determinant of earnings information uncertainty, with greater underreaction to earnings announcements in firms with more noisy accruals. In the study, I test whether disclosures of insider equity purchases are associated with stock price revisions and, if so, whether these price revisions are increasing in accrual noise.

Finally, chapter 7 presents a summary and discussion of the main conclusions and limitations of the empirical chapters 4 through 6. The dissertation closes with a summary of the research findings in Dutch.

2 Literature Review

2.1 INTRODUCTION: INSIDER TRADING DEFINITIONS AND REGULATIONS

The existence and enforcement of laws on insider trading is a relatively recent phenomenon in many countries. Bhattacharya and Daouk (2002) find that in 103 of their surveyed countries, only 34 had laws in place before 1990 of which only nine countries enforced those laws. These figures increased rapidly during the 1990s to 87 and 38 in 1998, respectively. By far the earliest country to adopt insider trading laws was the United States in 1934. Because the majority of literature that is discussed in this chapter and two out of my three empirical chapters (Chapters 4 and 6) focus on reported insider trades in the U.S., this section only discusses the definitions and regulations of insider trading in the U.S., unless specifically noted otherwise.¹ For a summary of regulation in the Netherlands, see Section 5.2.3.

Rule 10b-5 under section 10(b) of the Securities and Exchange Act of 1934 prohibits the purchase or sale of a security of any issuer (traded company) on the basis of material non-public information. Material information is defined as information that will affect the market's assessment of the value of securities when made public. Insiders in possession of such material non-public information are required to either *disclose* this information or *abstain* from trading. While section 10(b) applies to anyone, section 16(a) defines "insiders" more formally as officers, directors, and large shareholders of more than ten percent of any equity class of securities of the issuing company. These insiders are required to report to the Securities and Exchange Commission (SEC) all transactions made in the securities of the issuer. The "short-swing" rule under section 16(b) of the Act prevents short-term trading opportunities to insiders by allowing shareholders to recover the profits made by an insider when purchasing and selling (or selling and purchasing) within a period of six months. Section 16(c) further prohibits short selling by insiders.

¹ Bhattacharya and Daouk (2002, 77) state that "...because of availability of data, and because of a long evolution of common law on insider trading, nearly all empirical research on insider trading has been concentrated in the United States".

In addition to country-level regulation on insider trading, firms also have policies and restrictions on trading by their company employees in order to reduce litigation risks. Bettis et al. (2000) find that 92 percent of their sample firms have policies that restrict the trading by their insiders. In addition, 78 percent of firms have explicit blackout periods during which trading is prohibited. Consistent with these restrictions, the research shows that purchasing and selling by insiders in these firms is successfully suppressed during the blackout periods. In countries such as the the Netherlands and the U.K., blackout periods are imposed at the country-level rather than the firm-level (Kabir and Vermaelen 1996; Hillier and Marshall 2002b).

Penalties for illegal insider trading were significantly increased during the 1980s through the Insider Trading Sanctions Act of 1984 (ITSA) and the Insider Trading and Securities Fraud Enforcement Act of 1988 (ITSFEA). Civil and criminal fines were substantially increased, maximum jail terms were increased, whistleblowing was introduced, and companies could be held liable for illegal insider trading by their employees (Meulbroek 1992). Garfinkel (1997) examines the effect of ITSFEA on insider trading activity around earnings announcements. He finds that after ITSFEA, insiders are more likely to postpone their trades until after earnings announcements. At the same time, however, insiders postpone their sales transactions until after positive earnings announcements, suggesting that profitable trading has shifted from before to after new information releases. Seyhun (1992a) documents that the insider trading sanctions introduced in the 1980s did not deter insiders from (profitable) trading, showing that both the trading volume and profitability of insider trades have substantially increased in the period after 1984.

The Sarbanes-Oxley Act of 2002 (SOX) has had a significant impact on disclosures of insider trades. While in the pre-SOX period insiders were required to report their trading activity before the tenth day of the next calendar month, SOX cut down the filing lag to two business days as of August 29th 2002. Also, before SOX insiders could report their trading activities on both SEC Forms 4 and 5. Under special circumstances, trades could be reported on Form 5 and not be filed until the end of the fiscal year. Consistent with SOX reducing insiders' ability to file their trading on Form 5, Cheng et al. (2007) find that pre-SOX insider selling activity (reported on Form 5) is highly predictive of future stock returns, more predictive than sales that are filed on the more timely disclosed Form 4. As discussed in Section 2.2, regular share sales reported on Form 4 are generally found to be (at maximum) a weak predictor of future stock returns.

Lastly, rule 10b5-1 of the Securities and Exchange Act, enacted in October 2000, provides protection against litigation for insiders who pre-plan their trades while not in possession of material non-public information. Jagolinzer (2009), however, presents evidence suggesting that trading within this safe harbour does not solely reflect uninformed trading. There appear to be loopholes, for example the fact that trades can occur during blackout periods where the information advantage of insiders is greatest. Also, the rule does not require an insider to abstain from trading when material non-public information is obtained in the period after the trading plan has initiated. Jagolinzer (2009) finds evidence of predictable stock returns around pre-planned insider sales under the safe harbour provided by rule 10b5-1. Similar to Cheng et al. (2007), these patterns are stronger than for regular share sales reported on SEC Form 4. In addition, it appears as if many 10b5-1 plan initiations are associated with subsequent adverse news disclosures, while plan terminations are associated with positive subsequent news events. These findings are consistent with opportunistic insider trading.

2.2 DO REPORTED INSIDER TRADES REFLECT PRIVATE INFORMATION?

While empirical research on the information content of accounting disclosures initiated approximately four decades ago after the publication of studies such as Ball and Brown (1968), Beaver (1968), and Fama et al. (1969), empirical research on the information content of insider trades initiated around the same time. The theoretical framework underlying early empirical studies on insider trading is based on the hypothesis that the stock market is efficient in the semi-strong or strong form (Fama 1970; Fama 1991). Consistent with securities regulation and theoretical finance models of informed trading (Glosten and Milgrom 1985; Kyle 1985; O'Hara 1998), insiders are assumed to have asymmetric information and be better informed about the prospects of the firm than the average investor.

One of the earliest studies presenting empirical evidence on the information content of insider trades is Lorie and Niederhoffer (1968). The paper is motivated by the SEC's interest in monitoring insiders in order to ensure that insiders do not exploit their information advantage. Also, the interest of the investment community suggests the importance of information on insider trades for investors' assessments of future stock price movements. In that period of time, information on insiders' trading activity was published on a monthly basis

in the SEC's "Official Summary". This publication contained information on insider trades that took place approximately five weeks in the past (Lorie and Niederhoffer 1968).

Consistent with the views of investors, analysts, and regulators, Lorie and Niederhoffer (1968) show that insider trades are associated with large subsequent price changes, suggesting insiders are able to predict the direction of the future movements of their firms' stock. When insiders purchase large amounts of shares, stock price outperforms the market during a period of approximately six months. These findings suggest that the stock market is not efficient in its strongest form. That is, individuals are able to make excess returns as a result of special access to price-sensitive information.

Jaffe (1974) provides supporting evidence for the predictive ability of insider trades, but also concludes that only intensive trading is associated with profits that outweigh transaction costs. Results further suggest that outsiders are able to profit from trading on the information published in the Official Summary, providing evidence against the semi-strong form of market efficiency, that is, efficient pricing of publicly available information. Analysing a broader sample of insiders and the characteristics of their trades, Finnerty (1976) provides corroborative evidence that insiders are able to outperform the market, refuting the strong-form of market efficiency. Baesel and Stein (1979) show that the results on the trading of U.S. insiders extend to the Canadian setting. In addition, they document that insider trades by bank directors, that is, insiders who are also directors at Canadian chartered banks, are significantly more informative than trades by regular insiders, consistent with a view that such insiders have superior information.

Using a standard market model approach, Rozeff and Zaman (1988) find that outsiders can make profitable investments using the information in the Official Summary. These findings provide supporting evidence for the "anomalous" evidence presented in prior research. However, the authors also predict and find that the "insider trading anomaly" is caused by the mismeasurement of abnormal returns. Assuming average transaction costs of 2% and controlling for predictable variation in stock returns as a result of firm size and earnings-to-price ratios, abnormal returns to outsiders – who trade after the publication of the Official Summary – disappear and the returns to insiders are smaller than previously documented at 3-3.5%, "approaching the point of economic insignificance" (Rozeff and Zaman 1988, p.43).

Seyhun (1986) examines a comprehensive database of trades compiled by the SEC rather than focusing on the Official Summary. He finds robust evidence that insiders are able to earn excess returns by purchasing shares before price increases, and selling before price declines to

avoid the loss of holding the shares. Also, insider profitability is greater for more knowledgeable insiders (top executives) and increases with insider trading volumes. Seyhun (1986) further shows that insiders tend to buy more in smaller firms and sell more in larger firms. Using a market model approach and adjustments for bid-ask spreads, which proxy for the expected losses incurred by uninformed investors (e.g., Glosten and Milgrom 1985), results suggest that outside investors are not able to implement profitable investment strategies based on information disclosed in the Official Summary. These findings are consistent with semi-strong form market efficiency and reject the conclusions of an anomaly drawn in prior research, similar to Rozeff and Zaman (1988).

Lakonishok and Lee (2001) examine a large sample of insider trades reported to the SEC in the period 1975-1995. They find that both on the day of the trade as well as on the day of the SEC filing, there is little market movement. This finding is consistent with insider trades not reflecting private information or with the market failing to incorporate the valuation implications of the trades. Further tests show that insider trades, on average, do reflect private information. Although insiders trade as contrarians by selling after price run-ups and purchasing after price declines, their trades appear to be predictive of both aggregate and individual stock returns. These findings are strongest for insider trades in smaller firms and are concentrated in insiders' purchases. Insider sales transactions are more frequent and likely motivated by insiders' liquidity and/or diversification needs.

The evidence in Lakonishok and Lee (2001) that insider trades are associated with aggregate future market movements is consistent with prior research. Seyhun (1988) argues that information based trading by insiders is a response to all factors that affect a firm's stock price. Therefore, insiders' ability to predict individual firms' stock returns may be either due to firm-specific information or due to economywide factors that, for example, increase expected sale orders. Seyhun (1988) shows that aggregate trading activity by insiders in a month predicts returns to the market portfolio in the subsequent two months. Also, the relation between aggregate trading and future market returns is stronger for insiders in higher market risk firms. These findings suggest that aggregate insider trades could be used as a leading indicator of future economic activity. Seyhun (1992b) further shows that the effect of aggregate insider trading is economically significant, as almost 60 percent of variation in one year ahead aggregate stock returns can be predicted by aggregate net insider trades. He also shows that aggregate trading is associated with summary indicators of economic activity such as the Gross National Product. However, after controlling for these indicators, aggregate insider trades remain predictive of future stock market returns, suggesting that part of this

predictive ability stems from insiders' ability to identify situations when the stock market deviates from fundamental values.

In contrast to prior research, which mainly focused on the informativeness of insider trades to outside investors, Jeng et al. (2003) calculate the actual returns made by insiders when trading their own firms' stock. While their evidence suggests that insiders earn statistically and economically significant returns on their purchases, sales do not earn abnormal returns.² These findings are consistent with the information content conclusions of Lakonishok and Lee (2001), and suggest that sales are more likely driven by liquidity needs and diversification. These results also seem consistent with subsequent evidence presented by Aboody et al. (2008), who find that insider purchases through option exercises (where shares are held subsequent to exercises) predict positive future abnormal returns, while little evidence is found for insider sales through option exercises. Although such results appear intuitive and in line with Lakonishok and Lee (2001) and Jeng et al. (2003), in Chapter 4 I provide arguments and evidence that insiders' regular share trades reflect different incentives and information than their trades through option exercises.

2.3 THE NATURE OF INFORMATION REFLECTED IN INSIDER TRADES

This section discusses research on the sources of insiders' ability to predict future stock returns. The combined results of this research suggest that insider profitability generally stems from a long-term information advantage rather than specific private information related to short-term information releases. Also, trading profitability is a result of knowledge about one year ahead cash flow realisations, superior knowledge of the information conveyed by accounting accruals, and the ability to detect situations in which stock prices deviate from fundamental values.

2.3.1 Trading around Material Information Events

Elliot et al. (1984) are among the first to study the relation between insider trades and public information announcements. They test whether unusual insider trading activity is related to

² Using a similar research design approach, Jagolinzer (2009, 229) shows that insider sales from rule 10b5-1 participants *are* associated with abnormal returns.

public releases of information (which are assumed to affect market prices) on annual earnings, extreme dividend changes, bond rating changes, mergers, and bankruptcies. They further provide statistics on several distributional characteristics of insider trades. For example, insiders appear to sell more shares in December and purchase more in January, suggesting that taxes may play a role in trading decisions. Consistent with Seyhun (1986), sales are more likely in large firms and purchases more likely in small firms.

Results of the main tests in Elliot et al. (1984) reveal that the directions of insider trades around information releases are consistent with insiders' ability to predict future stock returns. However, the trading around such information releases appears to be insignificantly different from trading at other points in time. Rather than actively trading to exploit information, insiders appear to passively trade by selling less before good news and buying less before the release of bad news. The authors conclude that while some trades by insiders are driven by their private information advantage regarding forthcoming information events, the vast majority of trades is unrelated to these events.

Givoly and Palmon (1985) similarly analyse the extent to which observed abnormal returns can be explained by the extent to which insiders trade before public information releases. On average, the authors find no evidence of profitable trading before new information disclosures – measured by news in the Wall Street Journal – and conclude that abnormal returns after insider trades are more likely the result of the information revealed by the trade itself, generating a wave of transactions by outsiders in the same direction.

Motivated by the SEC regulations which prohibit trading on material non-public information and policies of blackout periods before earnings announcements, Sivakumar and Waymire (1994) examine the incidence and profitability of insider trades *after* quarterly earnings announcements. They argue that trading activity will increase after earnings announcements and that purchases (sales) are preceded by good (bad) news disclosures, consistent with foregone profits of trading as a result of regulations and trading bans. Empirical results present evidence consistent with increased trading after earnings announcements. However, inconsistent with foregone profits, purchases (sales) occur after bad (good) news rather than good (bad) news earnings announcements. Thus, similar to Elliot et al. (1984) and Givoly and Palmon (1985), insiders do not appear to profit from trading shortly before material information releases. Rather, it appears as if insiders use “passive” strategies by delaying their purchases and sales until bad and good news are released, respectively. Also, long-term profitability of transactions occurring after earnings

announcements suggests that insiders' information advantage is related to "broader factors that, in general, make insider trading profitable" (Sivakumar and Waymire 1994, 32).

Jagolinzer and Roulstone (2009) examine the effect of changes in insider trading regulation on the timing of insider trades before and after earnings announcements. They show that increased regulation is associated with a shift in trading from before to after earnings announcements, consistent with insiders avoiding trading before material information releases when risk of litigation is higher. However, no such results can be found for material information events other than earnings announcements. Further tests reveal that such a shift is related to a contemporaneous shift in overall firm level litigation risk, suggesting that insiders adapt their trading in response to these increased levels of risk.

Seyhun (1990) investigates insider trades by top managers at bidder firms prior to takeover announcements, in order to provide evidence on the question whether takeovers are driven by managers' personal interests. He provides some evidence of a relation between insider trades and takeover announcements, but aggregate results are weak. Agrawal and Jaffe (1995) investigate trading activity by target managers before merger announcements. Given that Section 16(b) of the Securities Exchange Act of 1934 requires any short-swing profits from buying and selling (or selling and buying) within six months to be disgorged to shareholders, while the merger forces the sale of target equity, the authors find that insider purchases decrease prior to merger announcements. These findings suggest that existing regulation deters insiders from profiting from the generally large price movements upon takeover announcements at target firms.

Looking at bankruptcy petition filings, Seyhun and Bradley (1997) are among the few researchers that establish a clear empirical link between material news events and insider trades. They show that top level insiders sell their shares prior to Chapter 11 filings to avoid losses of holding the shares. More recently, Huddart et al. (2007) show that the extent to which insiders trade before the release of material information is related to jeopardy associated with such trading. Arguing that quarterly earnings announcements are high jeopardy events, they document that insiders purchase (sell) after bad (good) news disclosures, consistent with Sivakumar and Waymire (1994). On the other hand, while arguing that the filings of annual and quarterly financial statements on Forms 10-K and 10-Q at the SEC are associated with lower jeopardy, Huddart et al. (2007) find that insiders profit from trading prior to such filings.³ Thus, while insiders' ability to predict future stock returns

³ I present related evidence in Appendix 6.1.

is unlikely related to material information releases, there is some evidence of profitable private information exploitation prior to financial statement disclosures and bankruptcy filings. Section 2.5 discusses the empirical evidence on insider trading around voluntary disclosures. Evidence on insider trading related to corporate market transactions, i.e. stock repurchases and equity issues, is discussed in Chapter 5.

2.3.2 Insider Trading and Stock Market Valuations

As noted by Seyhun (1992b), the predictive ability of insider trades can be explained by superior knowledge of business conditions as well as temporary price inefficiencies. With regard to the latter explanation, Rozeff and Zaman (1998) use insider trading activity to show that value stocks tend to be undervalued, while growth stocks tend to be overvalued. They find that market prices partly reflect investor overreaction to new information, as insiders tend to buy more shares when moving from growth (low ratio of cash flow or book value to market value) to value (high ratio) stocks. Overreaction is defined as the predictable reversal of stock returns. Also, net insider buying is higher after stock prices have declined and lower after stock prices have increased. Overall, results are consistent with insiders trading when stock prices deviate from fundamental values.

Jenter (2005) provides further evidence that insiders have contrarian views on their firms' stock prices. Focusing on the ratio of book-to-market equity as a measure of market mispricing, his findings suggest that perceived mispricing of firm stock affects managerial decision making in important ways, i.e. in personal decisions as well as firm-level decisions. In Chapter 5, I argue that the book-to-market ratio is an ambiguous measure of the extent to which prices reflect fundamental values, and I propose and test more direct (accounting-based) measures of valuation to test the extent to which insiders trade on market valuation errors, for personal as well as corporate accounts.

2.3.3 Insider Trading and Accounting Information

Extending the research on the link between insider trades and market valuation errors, Piotroski and Roulstone (2005) simultaneously examine market mispricing and superior knowledge of future cash flow realisations as sources of insiders' forecasting ability. They

argue that the results of Rozeff and Zaman (1998), who found an association between insider trading activity and growth and value firms, could alternatively be explained by insiders' cash flow forecasts since value firms tend to have higher future earnings announcement returns than growth firms. The authors find that insider trades are incrementally related to future earnings realisations and measures of misvaluation. These findings suggest that insider trades reflect both new information and information about the value of the firm given all publicly available information.

While the insider trading literature generally finds that insider sales are uninformative, Ke et al. (2003) identify a specific situation in which insider sales are related to private information. Building on prior research that suggests that the ending of a string of consecutive quarterly earnings increases is associated with a large stock price drop (e.g., Barth et al. 1999), the authors predict that insiders have incentives to sell their shares in anticipation of such an event. Consistent with this prediction, Ke et al. (2003) find that in the period from nine to three quarters before a break in consecutive earnings increases, insiders start selling more of their shares. These patterns are stronger for longer strings of earnings increases and larger negative earnings surprises at the break. Consistent with insiders avoiding legal jeopardy by not trading before short-term news releases (e.g., Elliott et al. 1984; Givoly and Palmon 1985), insider sales decline in the two quarters prior to a break in consecutive earnings increases.

Insiders' foreknowledge of future earnings realisations results from their private information about future cash flows, due to for example changes in expected sales orders, but also from their superior knowledge about the quality of reported earnings. Quality of earnings is often defined as the persistence of earnings, where the noise in accounting accruals is an important determinant of persistence. Sloan (1996) shows that the component of earnings made up of accruals has a significantly lower association with future earnings than does the cash flow component of earnings. Also, he finds that investors are initially unable to understand the valuation implications of this differential persistence and overvalue accruals. This finding that investors focus too much on bottom-line earnings suggests that accounting accruals, which are partly determined by management, may be used by insiders to "fool" the market.

Beneish and Vargus (2002) extend Sloan (1996) by splitting accruals into income-increasing and income-decreasing accruals. Given insider managers' role in the financial reporting process, their information based trading decisions are likely related to information about the quality, or persistence, of their accrual adjustments. The authors show that Sloan's

(1996) mispricing results are driven by income-increasing accruals. More importantly, the persistence of these income-increasing accruals is significantly lower when accompanied by abnormal insider selling and this result is partly explained by opportunistic accrual adjustments (earnings management within the boundaries of Generally Accepted Accounting Principles). The important implication of the study is that insiders' trading decisions may potentially be useful as a check on the quality of reported earnings.

Core et al. (2006) similarly examine whether insiders' personal and corporate trading decisions are related to Sloan's (1996) accrual anomaly. In addition, they test whether insider trades are correlated with return patterns after earnings announcements, following the post-earnings announcement drift anomaly literature. Collins and Hribar (2000) show that these anomalies are distinct phenomena. Core et al. (2006) present evidence that is consistent with insiders trading on the accrual anomaly, but not the earnings drift anomaly. While the accrual anomaly indicates that low accrual firms experience positive future abnormal returns and high accrual firms experience negative abnormal returns, they find that insiders buy more shares in low accrual firms and sell more in high accrual firms.

McVay et al. (2006) provide more evidence on the link between insider trading and earnings management. Prior research interprets a discontinuity around zero in the statistical distribution of earnings surprises as evidence of earnings management (Burgstahler and Dichev 1997; Degeorge et al. 1999; Brown and Caylor 2005). In support of this research, McVay et al. (2006) show that the likelihood that a firm will meet or just beat the earnings expectations of financial analysts is associated with subsequent insider sales. This finding suggests that insiders strategically manage earnings to meet the analyst forecast benchmark and subsequently sell their shares. While this research assumes that the analyst forecasts are exogenous, Richardson et al. (2004) show that the relation between insider trades and meeting or beating the analyst forecast is more subtle. Their evidence suggests that insiders and analysts engage in an earnings guidance game where analysts initially issue overly optimistic forecasts and subsequently lower their forecasts so that companies can more easily meet the expectations. Richardson et al. (2004) document that this game is most obvious when insiders sell shares after earnings announcements.

Evidence on a link between insider trading and accounting fraud (earnings management beyond the boundaries of Generally Accepted Accounting Principles) is mixed. Examining determinants of financial statements fraud, Dechow et al. (1996) find no evidence that insiders sell more shares in firms that are subject to enforcement actions by the SEC. On the other hand, Beneish (1999) shows that in a sample of firms investigated by the SEC, insiders tend

to sell more shares at inflated prices in years of overstated earnings than compared to insiders in other firms. Summers and Sweeney (1998) find similar evidence and document that insiders sell large quantities of shares in their firms in years of fraud. Moreover, they show that insider trading characteristics can be used to assess the likelihood that a firm has engaged in financial statements fraud. Results suggest that reduced insider buying and increased insider selling can be seen as a red flag for financial statement users and auditors.

2.3.4 Insider Profitability, Trading Activity, and Information Asymmetry

Recent empirical studies have used the frequency and profitability of insider trades to measure information asymmetry and to validate constructs of information asymmetry. For example, Aboody and Lev (2000) show that R&D is an important contributor to information asymmetry. Because R&D costs are immediately expensed in the income statement, there is no information available to investors about the potential future benefits that arise from current R&D activities. Although all investment strategies in a firm give rise to information asymmetries, the expensing of R&D results in an increased information gap between insiders and outside investors. Aboody and Lev (2000) find that gains from insider trades are significantly higher in firms with R&D activity. Also, investor reactions to disclosures of insider trades are larger in R&D firms. These findings point to R&D as an important determinant of the information gap between insiders and outsiders.

Frankel and Li (2004) examine how informativeness of financial statements, analyst coverage, and company news affect the information asymmetry between insiders and outsiders. They use the ability of insiders to profit from their private information advantage as a measure of information asymmetry. Results reveal a statistically significant negative relation between the profitability of insider trades – measured by the six month abnormal buy-and-hold returns after the trades – and the number of analysts following a firm, suggesting that increased analyst coverage results in lower information asymmetry between insiders and outside investors. Results are similar when examining the frequency of insider trades. Also, informativeness of financial statements – measured by the extent to which stock returns are correlated with reported earnings – is negatively associated with the frequency of insider trades. Firm-specific news is not associated with insider trading in the predicted way. The authors conclude that insider trading characteristics may serve as constructs of the variation in information asymmetry across firms.

In a similar vein, Huddart and Ke (2007) analyse the relation between insider trading and a firm's information environment, to provide evidence on the validity of extant proxies of information asymmetry. They rely on theoretical models of informed trade which fall into two categories. In price-taking models such as Grossman and Stiglitz (1980), individual trading does not affect market prices and the quantity traded by an informed trader is limited by risk aversion, wealth constraints, and trading rules. Price-taking models imply a positive relation between trading quantities and information asymmetry. In imperfect competition models such as Kyle (1985), informed trading does affect prices and consequently limits the amounts of trade. Such models predict no relation between insider trade quantity and information asymmetry. Notwithstanding the differential prediction regarding the relation between trading quantity and information asymmetry, both price-taking models and imperfect competition models predict greater abnormal returns and profitability to insider trades in situations of higher information asymmetry. Based on these theoretical models and using a set of commonly used measures of information asymmetry, that is: *i*) institutional holdings, *ii*) analyst coverage, *iii*) the book-to-market ratio, *iv*) loss incidence, *v*) R&D expenses, and *vi*) absolute abnormal returns to previous earnings announcements; Huddart and Ke (2007) present results which question the usefulness of institutional holdings and loss incidence as measures of information asymmetry. Their alternative interpretation is that the price-taking and imperfect competition models of informed trade have no descriptive validity.

Aboody et al. (2005) examine whether insiders exploit the sensitivity of their firm's stock to the quality of reported earnings. Francis et al. (2005) show that variation in the quality of firms' reported earnings results in variation in information asymmetry which affects the cost of equity capital. Aboody et al. (2005) extend this research by constructing a factor-mimicking portfolio based on proxies for earnings quality, and show that the profitability of insider trades in a firm is positively related to the sensitivity of firm stock returns to this earnings quality factor. Similar to Frankel and Li (2004) and Huddart and Ke (2007), this finding suggests that insider trading characteristics proxy for the information asymmetry between insiders and outside investors.

2.4 INSIDER TRADING AND VOLUNTARY DISCLOSURES

The relation between insider trading decisions and voluntary disclosures has attracted considerable interest. An important aspect of the topic is that the relation between the timing of trading and timing of voluntary disclosures is endogenous. That is, transactions may be timed around disclosures, but disclosures may also be timed around transactions.

Penman (1982) reports evidence consistent with insiders timing their trades relative to dates of management forecasts of annual earnings, holding the decision to forecast constant. For forecasts with a substantial effect on stock price, insider purchase and selling activities are associated with the directions of announcement effects in predictable ways. Noe (1999), however, shows that insiders do not profit from trading just before the release of information in management forecasts. Rather, insiders profit from their information advantage in more subtle ways, by purchasing and selling shares after bad and good news management earnings forecasts, respectively. These findings are consistent with the results for trading around earnings announcements and other news events (Elliot et al. 1984; Givoly and Palmon 1985; Sivakumar and Waymire 1994). Results suggest that insiders delay trading securities in their own firms until the information asymmetry with outside investors is relatively low, consistent with SEC regulations which require insiders to either disclose their private information or abstain from trading. Also, as Noe (1999) concludes, the interrelation between management disclosures and insider trades is more complex than previously recognised. The observed insider trading patterns are not necessarily harmful to investors when insider trades serve as a "...tool for managers to credibly communicate their private information when public disclosure is sufficiently costly" (Noe 1999, p.325).

The costliness of public disclosure can be thought of as the result of the revelation of information which is valuable to competitors or when there is litigation risk related to imprecise management projections. One form of public disclosure that involves high subjectivity and the potential for management prediction errors is the voluntary disclosure of innovation strategy by high-tech firms. Treating the occurrence of insider trades as exogenous, Gu and Li (2007) predict and find that investors perceive such voluntary disclosure as more credible when management has purchased shares in the firm prior to the disclosure. Similar to the conclusion drawn by Noe (1999), this finding implies that management may use its ability to purchase equity to signal information in addition to, or as a substitute for, other disclosures.

Cheng and Lo (2006) extend Noe's (1999) study by explicitly controlling for the endogenous relation between management's choice to trade and its choice to voluntarily disclose information. They find that in periods of increased insider purchases, more bad news forecasts are released to lower the purchase price of shares acquired. To ensure that such a result is not simply driven by the effect of disclosures on trading activity, they use an instrumental variables approach and show that predicted insider purchases are positively related to bad news forecasts. Also, while arguing that CEOs have the highest discretion over forecast issuance and timing, they show that CEO trading has a significantly stronger effect on the frequency of voluntary management earnings forecasts. Consistent with the higher litigation risk associated with insider sales and acceleration of good news or withholding of bad news, the authors find no evidence of a relation between insider sales and voluntary disclosures. Rogers (2008) provides alternative evidence on the effect of insider trading on disclosure decisions, by showing that managers adapt the quality of disclosures in response to incentives from their ability to purchase or sell the firm's stock.

Overall, the discussion on the interrelation between voluntary management disclosures and insider trading suggests that trading and disclosure decisions affect each other. Consistent with results for earnings announcements, insiders refrain from trading shortly before the release of information. This, however, does not mean that information exploitation does not occur. In fact, insiders profit in a more subtle way by passively delaying their trading until after the release of information and by timing the releases of information. Results for the timing of voluntary disclosures may extend to earnings announcements. While such announcements are mandatory, their timing is largely discretionary. For example, several empirical studies have shown that the timing of earnings announcements is related to the content of the announcements, as delayed announcements more likely contain bad news (Chambers and Penman 1984; Kross and Schroeder 1984; Bagnoli et al. 2002). Also, there is some flexibility in the timing of financial statement disclosures and delayed filings of financial statements signal bad news to the market (Impink et al. 2009). Future research may therefore examine the endogenous relation between the timing of mandatory disclosures and insider trades.

2.5 BENEFITS AND COSTS OF INSIDER TRADING

Regulation on insider trading is one of the most controversial parts of securities regulation (Bainbridge 2000). Proponents of strict regulation argue that allowing insiders to profit from their asymmetric information advantage is unfair and harms the well functioning of capital markets by eroding public confidence, lowering liquidity, crowding out costly information acquisition by outside investors, and increasing the cost of capital (Ausubel 1990; Fishman and Hagerty 1992; Seyhun 1992a).⁴ On the other hand, opponents of regulation such as Manne (1966b; 1966a) argue that insider trading may facilitate efficient price formulation because managers' trading decisions communicate their private information to the market. When prices (correctly) impound more firm-specific information, stock markets are more efficient.

Leland (1992) analytically shows that allowing insiders to trade helps stock prices better reflect valuation relevant information and it may increase economic welfare. Piotroski and Roulstone (2004) find that insider trades are negatively related to stock price synchronicity – an inverse measure of the level of firm-specific information reflected in stock price – and facilitate the incorporation of firm-specific future earnings information into stock prices. Lustgarten and Mande (1998) show that insider purchases decrease analyst forecast errors and dispersion. Their results are consistent with insider trades increasing the availability of future earnings information in the market and pushing stock prices to their fundamental values.

Meulbroek (1992) examines a unique set of data containing illegal insider trades, as opposed to the set of legal insider trades that is used in the extant literature. Her primary motivation for the study is the debate about the pros and cons of insider trading regulation. Results support the proposed efficiency benefit of insider trading (Manne 1966b; Manne 1966a; Carlton and Fischel 1983) in that insider trades trigger immediate price movements and quick price discovery. About half of the information that insiders (illegally) trade upon is impounded into prices on insider trading days before the public disclosure of the information. In addition, almost half of the price run-up that generally occurs in target firms prior to takeover announcements appears to occur on days of insider trades. A further examination of

⁴ Bhattacharya and Daouk (2002), examining the existence and enforcement of insider trading laws around the world, find that enforcement of insider trading laws (measured by the first prosecution in the country) decreases the cost of capital. The mere existence of insider trading laws is not associated with a decrease in cost of capital. In a similar vein, Bushman et al. (2005) build on the argument that insider trading crowds out costly information acquisition by outsiders. They find that analyst following increases in a country after initial enforcement of insider trading laws.

trading characteristics provides robust evidence consistent with insider trades accelerating the incorporation of private information into stock prices.

Manne (1966b; 1966a) further posits that insider trading does not significantly harm long-term investors, that is, those investors that trade on fundamentals as opposed to short-swing traders. Jeng et al. (2003, 455) provide supporting evidence that while the benefits accruing to insiders from their purchases are economically strong, outside investors "...have little to fear from these reported transactions, because insider trades make up but a tiny portion of the market". They calculate that, on average, the expected costs to investors of trading against insiders are relatively low at 10 cents for every \$10,000 transaction. Hence, notwithstanding the issue of fairness, the benefits of insider trading (i.e., conveying information) may outweigh the relatively low costs to outside investors.

Additionally, Manne (1966b; 1966a) argues that insider trading is an efficient way of compensating managers for their innovations by assigning property rights to private information (see also Carlton and Fischel 1983). In support of this argument, Roulstone (2003) documents a positive relation between the existence of firm-level trading restrictions and total executive compensation. That is, when insiders are not able to capitalise on their information advantage in periods prior to events such as earnings announcements, companies pay a compensation premium. These findings are consistent with the role of insider trading in the rewarding and motivating of employees.

More generally, legal insider trading is a result of stock-based compensation. Stock-based compensation alleviates agency problems, resulting from the separation of ownership and control, by aligning the interests of managers and shareholders (Jensen and Meckling 1976; Demsetz and Lehn 1985). Core and Guay (1999) show that firms use equity compensation in an effective manner. Modelling optimal levels of CEO compensation based on cross-sectional determinants observed in prior research, they show that firms actively manage new equity grants in response to deviations from optimal equity incentive levels. Core and Larcker (2002) present comparable evidence for a sample of firms that impose minimum ownership requirement plans. They find that ownership and firm performance prior to adoption of such plans are low, whilst significant increases in ownership and firm performance are observed in the two-year period following adoption. These results suggest that mandated increases in equity ownership from suboptimal levels have the intended effect of improved firm performance.

Of course, the collapse of the stock market and corporate scandals around the turn of the millennium, in which insider equity incentives allegedly played a major role, has produced

significant evidence to counter this argument. Manne acknowledges this point and notes that "...[m]y second 'positive' argument for insider trading, that it could perform well as part of an executive compensation package, has been the more forcefully attacked, and it is perhaps less robust than I and other proponents had originally assumed" (Manne 2005, 5).⁵ Important to note, however, is that the perverse incentives in these scandals were particularly driven by the large compensation resulting from poorly structured stock option plans (Jensen 2001) and not solely insiders' ability to trade their own firm's stock.⁶

An argument that can be made against the price-efficiency argument of insider trading is that the private information that insiders trade upon could simply be revealed through other information sources. A problem, however, is the credibility of such other information sources. As in Gu and Li (2007), it is difficult for investors to fully interpret the implications of information conveyed in subjective forward-looking projections that occur in highly uncertain environments. Also, proprietary costs and legal liability may preclude managers from fully disclosing their private information in disclosures. The ability for managers to give an incremental signal to investors by purchasing shares in their companies helps the market to better understand the credibility and content of these disclosures and the likelihood that future benefits will occur.

Similar to voluntary disclosures, there is variation in the extent to which mandatory financial statement disclosures fully reveal information that pushes stock prices to their fundamental values. A large literature suggests that investors initially underreact to new information in earnings announcements (e.g., Foster et al. 1984; Bernard and Thomas 1989; Nichols and Wahlen 2004). This underreaction is increasing in the uncertainty about the implications of past earnings changes for the future (Freeman and Tse 1989) and one driver of such uncertainty is the noise in accounting accruals. Low quality accruals can be caused by economic factors that are beyond managerial discretion (Dechow and Dichev 2002). Therefore, even with insiders providing the most credible (as possible) financial reports, stock prices may not reflect fully the implications of financial statement information and investors require additional disclosures of management's private information to revise their valuations of the firm's stock (Dechow and Schrand 2004; Francis et al. 2007). Without insider trades, which can be argued are most closely linked to management's private information, price efficiency might not be established. In Chapter 6 of this dissertation, I therefore examine the

⁵ For anecdotal evidence on the link between insider trading and financial fraud, see for example SEC Accounting and Auditing Enforcement Release (AAER) No. 875, 901, 923, 945, 965, 993, 1022, 1051, 1066, 1089, 1101, 1105, 1112, 1372, 1559, 1697, 1721, 1851, 1904, or 2146.

⁶ See Ball (2009) for a discussion of the major causes of the accounting scandals at the turn of the millennium.

extent to which insider purchase decisions (and the subsequent disclosures of the trades) help push prices to their fundamental values when there is increased uncertainty about the implications of previously announced earnings in low accrual quality firms.

2.6 SUMMARY

This chapter summarised the broad literature that examines the information reflected in reported insider trades. Early research has primarily focused on the extent to which corporate insiders profitably time their trades, that is, whether trading decisions are associated with subsequent abnormal changes in share price. Results of this research suggest that insider trades are associated with favourable future stock return patterns, but mainly for purchases rather than sales. Research on insider trading around material news events suggests that insiders' ability to predict future price movements likely stems from their superior knowledge regarding long-term future prospects. The evidence suggests that insiders refrain from trading on private information when risk of litigation is high, such as shortly before earnings announcements. However, insiders do appear to alter the timing and contents of disclosures around their trading.

More recently, reported insider trades have been linked to the accounting choices made by the same insider managers. As discussed in Chapter 1, insiders have incentives to exploit or affect the noise in accounting accruals. Accordingly, several studies have linked accounting accrual adjustments to insider trades and have shown that insider trading is related to accruals and earnings quality. In Chapter 4, I extend this literature by examining whether insider option exercises reflect information about future earnings and current earnings quality. Current earnings quality may be affected by earnings management incentives that are induced by trading opportunities. While the literature has been focused on insider managers' decisions to trade shares, little research has examined stock option exercises. Option exercises are an important extension of the research given that options have differential incentive effects than ordinary shares. To provide an introduction to the empirical analysis in Chapter 4, Chapter 3 presents a discussion of the importance of stock options in executive compensation packages and theoretical explanations for the use of options and their unique payoff structure.

3 The Role of Stock Options in Executive Compensation

3.1 INTRODUCTION

A stock option is a contract between a buyer and seller that gives the buyer the right to purchase (call option) or sell (put option) a fixed number of shares against a pre-determined strike price at or before a certain point in time. American-style options may be exercised during a specified period of time, while European-style options can be exercised only at the expiration date. The focus in this chapter and the next chapter will be on American-style call options, because almost all stock options granted to company employees take this form. Put options, which give the right to sell shares, are virtually non-existent in executive compensation and are in conflict with incentive alignment.

In general, employee stock options are awarded with an exercise price equal to the concurrent market price (at-the-money), with a life-span of ten years and vesting periods of three to four years (Murphy 1998). These options are not tradable on a market and are generally subject to forfeiture when an employee leaves the firm. When, after the vesting period, an employee decides to exercise her options, the company issues new shares. Further, many companies provide so-called cashless exercise programs where employees directly receive the spread between the current market price and the exercise price of the options.

An important motivation for companies to award stock options is to attract employees without having to spend cash. In return for their services, firms provide employees with the right to purchase equity at a fixed price and subsequently sell the acquired shares at a premium. This makes options particularly attractive for high growth firms that need to preserve cash to stimulate their growth (Botosan and Plumlee 2001). Also, using stock option compensation instead of cash bonuses attracts highly motivated and entrepreneurial employees who believe they can enhance firm value (Hall and Murphy 2003; Ittner et al. 2003). Further, vesting restrictions and forfeiture provide retention incentives.

Option compensation skyrocketed during the 1990s (see section 3.5). Why did companies choose to reward their employees mainly with options rather than shares? The

objectives mentioned in the previous paragraph could all be achieved alternatively by granting restricted shares instead of options. Several explanations are mentioned in the literature: taxes, accounting rules, and the asymmetric payoff structure of options with their amplified profit potential. Options provide an advantage over other forms of compensation because the option grant is not treated as a taxable event until options are exercised. For companies, so-called nonqualified stock options provide a tax deduction at the time of exercise. Incentive effects through the payoff structure of options are explained in section 3.3 and the role of accounting rules is outlined in section 3.4.

While theoretical and empirical research suggests that stock options are an effective means of incentivising executives to take actions that maximise firm value, the last two decades have shown that not only executive officers, but also lower-level employees are heavily rewarded with stock options. For example, Hall and Murphy (2003) show that in 2002 more than 90% of the total fair value of option grants was awarded to employees ranked lower than the top five executives.

Bergman and Jenter (2007) suggest that the popularity of option compensation to lower level employees is a puzzle for standard economic theory. They argue that "...any positive incentive effects should be diminished by free rider problems and overshadowed by the cost of imposing risk on employees" (p. 668). The authors posit that companies compete with equity markets to supply equity capital to employees and propose two potential explanations, first, employee sentiment towards stock options and, second, overvaluation of the traded equity. Building on prior research (e.g., Benartzi 2001) which found that employee optimism towards firm equity is explained by prior stock price performance, employees are predicted to extrapolate more strongly from past performance when valuing options due to their amplified payoff structure. Bergman and Jenter (2007) show that employee optimism is the main driver of the heavy use of option compensation for rank and file employees. Option grants increase with prior stock returns, investment opportunities, and cash flows and balances, while they decrease with interest burden, leverage, and financial distress. On the other hand, little evidence is found for the explanation of overvaluation of the traded equity. Thus, the heavy use of option compensation to reward rank-and-file employees appears to be explained by employees' preferences towards options over traded equity.

3.2 VALUATION

Option pricing theory predicts that in the absence of dividend payouts, early exercise of an American-style call option is never optimal. If an option holder plans to hold on to the acquired shares after exercising, he is better off holding the options for the same period to *i*) delay payment of the strike price, and *ii*) not bear the risk that the stock price will fall below the strike price. If the option holder plans to sell the acquired shares, he is always better off selling the option rather than exercising and selling, due to the time value of the option (Hull 2005).

In practice, arguments against early exercise appear not to hold for options held by company employees. Several studies have found that employee stock options are exercised multiple years before expiration (Huddart 1994; Huddart and Lang 1996; Heath et al. 1999; Hall and Murphy 2002; Bettis et al. 2005). An explanation for such behaviour is that employees cannot be compared to regular stock market investors – who can fully diversify the idiosyncratic risk of firms' securities – because they are overinvested in their companies' stock in addition to their wages coming from the same company. In addition, employees are not allowed to sell their options on the market.

As a result of employees' early exercise decisions, general option valuation models may not generate reliable estimates of the values of employee stock options. However, when one controls for early exercise by using an expected time to exercise rather than the options' time to expiration, general models may produce option values that approximate the true values to employees (Hemmer et al. 1994). The most well-known model of option valuation is the Black and Scholes (1973) model modified by Merton (1973) to accommodate for dividend payouts (BSM). Although this model was developed to value exchange traded options, it is generally accepted as a method to approximate the value of employee options when the aforementioned early exercise decisions are accounted for. For example, the International Accounting Standards Board (IASB) allows companies to use the BSM model to determine the fair value of stock options granted during the year. Also, the BSM model is accepted among academics to estimate the values and sensitivities of employee stock options (e.g., Core and Guay 2002).

The value of a call option is determined by six input factors, that is, *i*) the strike (exercise) price; *ii*) current stock price; *iii*) stock price volatility; *iv*) the risk-free interest rate; *v*) time to maturity (expected time to exercise); and *vi*) the dividend yield. The total value of

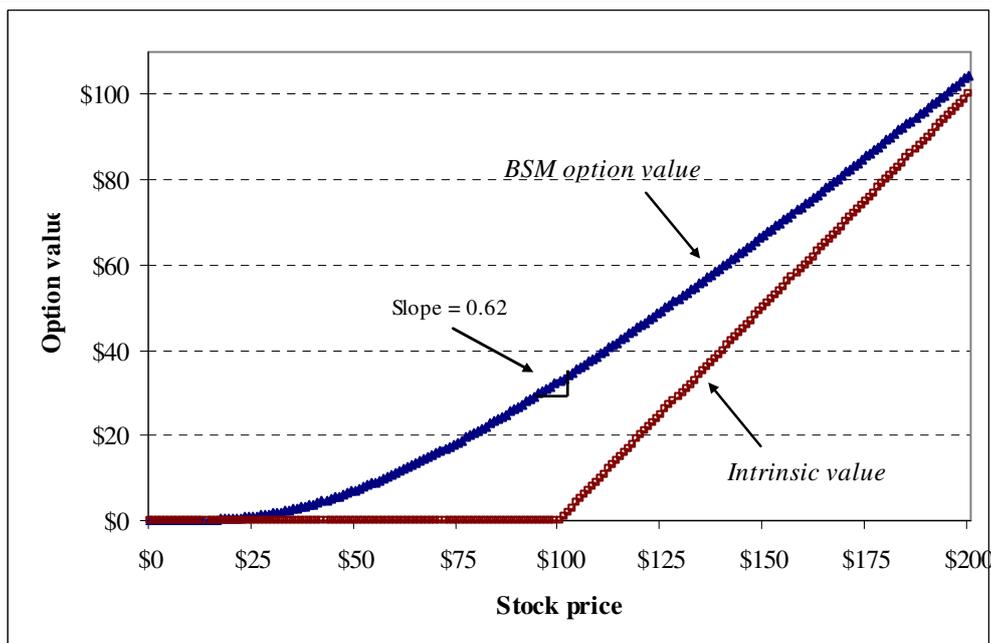
an option is the sum of its *intrinsic value*, that is, the difference between the strike price and the current market price, and its *time value*. The time value of an option captures the probability that the value of an option increases in the future due to the volatility of the underlying stock. Based on the six input parameters, the BSM model to value call options can be stated as follows:

$$V = Se^{-dT} N(Z) - Xe^{-rT} N(Z - \sigma\sqrt{T}) \quad (3.1)$$

where $Z = \frac{\ln(S/X) + T(r - d + \sigma^2/2)}{\sigma\sqrt{T}}$, N is the cumulative probability function for the standardized normal distribution, S is the share price, X is the option exercise price, σ is stock return volatility, r is the natural logarithm of the risk-free interest rate, T is the time to maturity (in years), and d is the natural logarithm of the dividend yield.

Figure 3.1 shows how the BSM value of a typical employee stock option is determined by its intrinsic value and its time value, and how total value changes with the underlying stock price. Option values are calculated for 200 values of the underlying stock, where the hypothetical option has an exercise price of \$100, volatility of 30%, risk-free rate of 7%, expected time to exercise of 7 years, and dividend yield of 3%.

Figure 3.1
Stock Option Valuation



BSM option values for an employee stock option with an exercise price of \$100, volatility of 30%, risk-free rate of 7%, expected time to exercise of 7 years, and dividend yield of 3%.

As shown in this example, the intrinsic value of an at-the-money option, i.e. an option with a strike price equal to the market price, equals zero. However, time value gives the option a significant value of \$32.83. At this market price, the total BSM value changes by \$0.62 for a dollar increase in stock price, indicated by the slope of the BSM value line. This slope is increasing with the stock price, but increases at a declining rate. The slope is more formally defined as the option “delta”, and can be calculated as the derivative of the BSM model with respect to stock price:

$$\text{Delta} = [\delta(\text{value}) / \delta(\text{price})] = e^{-dt} N(Z) \quad (3.2)$$

Calculation of the option delta is useful for examinations of the sensitivity of employees’ stock option portfolios with respect to share price changes. Further, the sensitivity of option value with respect to stock price volatility, measured by the option “vega”, is an important figure because options are used to induce risk-taking by employees (as discussed in the following section). Vega can be calculated as follows (N' is the normal density function):

$$\text{Vega} = [\delta(\text{value}) / \delta(\text{volatility})] = e^{-dt} N'(Z) S \sqrt{T} \quad (3.3)$$

3.3 INCENTIVE EFFECTS OF EXECUTIVE STOCK OPTIONS

As discussed in chapter two, equity compensation can be used as a tool to reduce agency conflicts by aligning the interests of shareholders and managers. By creating a positive linear relation between managerial wealth and stock price performance (assuming market prices reflect the true value of the firm), shareholders can induce managers to take actions that increase the value of the firm. At the same time, however, the sensitivity of managerial wealth to firm performance may have the unintended effect that risk-averse, under-diversified, managers will pass up risk increasing positive NPV projects to reduce the firm’s cash flow variability.

Smith and Stulz (1985) argue that, in order to reduce such risk-related agency problems, shareholders can adjust the “convexity” of the relation between managerial wealth and firm value. The convexity of the relation between wealth and firm value can be thought of as the sensitivity of wealth to changes in firm risk. The likelihood that managers will pass up risk-

increasing positive NPV projects can be reduced by increasing this convexity, which can be achieved by introducing more "...option-like features in a compensation plan" (Smith and Stulz 1985, 403). In contrast to shares, the value of stock options has a nonlinear relation with stock price. The nonlinearity, or convexity, is greatest when options are at-the-money and decreases when options become more and more in-the-money.

Guay (1999) empirically finds that stock options play an important role to increase the convexity of the relation between managerial wealth and firm value, while common shareholdings do not. He argues that "...because most firms are financially healthy, common stock, when viewed as an option on the firm's asset value, is generally so deep 'in-the-money' that the payoff to shareholders is effectively a linear function of firm value" (p. 45).⁷ Furthermore, the convexity of equity incentives is found to be positively related to firms' investment opportunities, consistent with managers receiving incentives to pursue valuable risk-increasing projects when the opportunity costs from underinvestment are greatest. In a similar vein, Rajgopal and Shevlin (2002) provide evidence consistent with stock options being used to reduce risk-related agency problems. For a sample of oil and gas producing firms, they find that the sensitivity of option value to stock return volatility (risk) is positively related to future exploration risk taking, and negatively related to oil price hedging. Ittner et al. (2003) suggest that, due to their payoff structure, stock options have a screening role as they are more attractive to less risk-averse employees. This is an important benefit in firms operating in risky and uncertain environments. Accordingly, Ittner et al. (2003) show that option compensation is substantially more pronounced in new-economy firms than in old-economy firms. Also, they find that lower than expected option grants and holdings by executives are associated with lower future firm performance, providing support for the usefulness of stock options in compensation packages.⁸

Recognising the technical differences underlying shares and options, Bryan et al. (2000) examine the different functions of restricted stock awards and option grants in CEO pay. The authors find strong support for theoretical predictions related to CEO stock option grants. Most importantly, the role of options in compensation and the sensitivity of options to price changes are greater in high growth firms with more sufficient investment opportunities and greater noise in earnings as a performance measure. These findings are consistent with stock options being used to incentivise managers to pursue risky value-enhancing projects. Options

⁷ Jensen and Meckling (1976) argue that shareholders in a levered firm effectively hold a European call option to buy the firm at an exercise price equal to the face value of debt.

⁸ For more evidence on the role of stock options in introducing convexity and risk-taking incentives in compensation, see for example Hemmer et al. (1999), Feltham and Wu (2001) and Williams and Rao (2006).

protect risk-averse managers from downside risk but provide high upside potential. On the other hand, the use and sensitivity of restricted stock are negatively related to investment opportunities, suggesting these awards are inefficient means to incentivise risk-averse managers. The linear payoff structure may even increase managers' aversion to take risks, as restricted stock makes them bear the potential wealth losses from risky investment projects (Smith and Stulz 1985).

Hanlon et al. (2003) further analyse the incentive effects of granted stock options by examining the association between executive option grants and future firm performance. They find that the payoff resulting from stock option grants to executives is positive and economically significant. On average, a dollar of Black-Scholes value granted is associated with almost four dollars of future operating earnings. The authors conclude that stock option grants are in line with incentive alignment. The results suggest that incentive alignment and risk-taking incentives induced by stock options have a positive effect on firm value.

However, the convexity and risk-taking incentives of stock options also have a downside. Stock options give incentives for managers to manipulate accounting numbers in order to increase option values (Bartov and Mohanram 2004; Cheng and Warfield 2005). The convexity and asymmetric payoff structure of options increases managers' incentive to take financial reporting risks, as the downside risk compared to share holdings is limited. Accordingly, recent evidence suggests that value increases associated with granted stock options (e.g., Hanlon et al. 2003) may be an artefact of management's opportunistic reporting decisions. Cornett et al. (2008) show that controlling for a positive relation between option compensation and earnings management dramatically decreases the positive impact of stock option compensation on firm performance. They suggest that the impact of option compensation on economic performance is much weaker than previously documented.

Burns and Kedia (2006) determine that stock options are the most dominant factor in executive compensation packages explaining financial misreporting. They find that the sensitivity of CEO stock option value to share price changes is positively related to the likelihood of misstatements (as measured by subsequent restatements), while other forms of compensation such as equity and restricted stock have no significant effect. Also, stock option incentives are positively related to the magnitudes of misreporting and the propensity to misreport is higher when option convexity is greater (i.e. when the options are at-the-money). These results are explained by the asymmetric payoff structure of options. The convexity in wealth introduced by options "limits the downside risk on detection of the misreporting" (p.

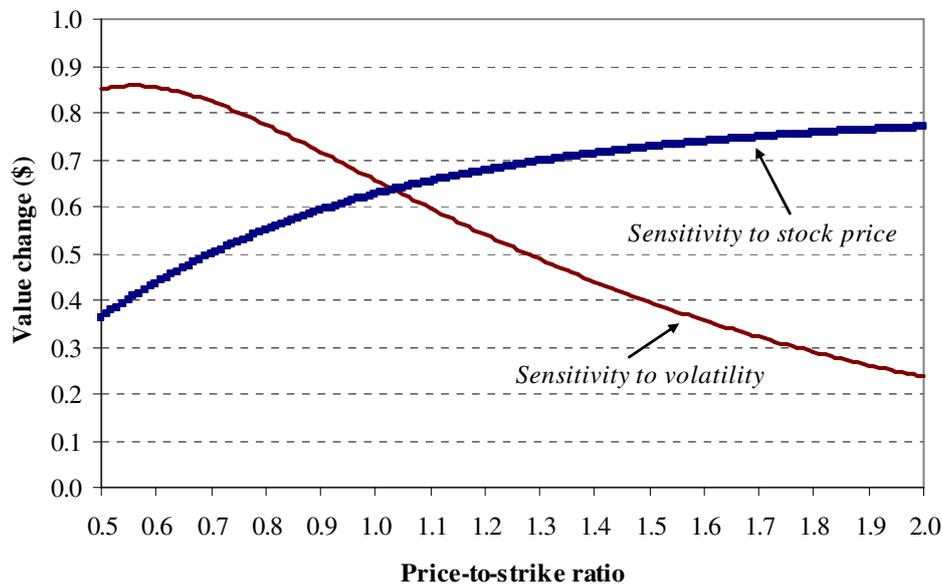
36).⁹ Convexity increases managers' willingness to take high risks such as aggressive financial reporting. Relative to the upside potential, the downside risk of discovery of the misreporting is limited because options will not be exercised when they are not in-the-money. As Feltham and Wu (2001, 7) put it, "...[o]ptions shield the manager from the down-side risk to which stock exposes the manager".

Gao and Shrieves (2002) analyse discretionary accruals to test how the different components of CEO compensation affect earnings management incentives. They predict that the nonlinear versus linear payoff structures of options and shares, respectively, have different earnings management implications. The reversing nature of discretionary accruals over subsequent years and the convexity introduced by stock options make managers time higher earnings figures (assuming these affect stock prices) to periods where the option component of compensation is relatively large and sensitivity to share price changes is high. Consistent with their predictions and Burns and Kedia (2006), they find that the value and sensitivity of stock option grants is positively related to earnings management intensity, while results for compensation in restricted stock are much weaker.

To give a better idea of the risk-taking incentives induced by stock options, Figure 3.2 illustrates how management incentives change with the price-to-strike price ratio. The graph is a replication of Core and Guay (2002, Figure 1) and presents option value sensitivities to share price changes and volatility changes for an option with the characteristics of the option in Figure 3.1, except that the stock price is fixed at \$100 and exercise prices are implied by the price-to-strike ratio. Sensitivity to share price changes is calculated as \$1 times the option delta (equation 3.2), while sensitivity to volatility is calculated as the change in value resulting from a 0.01 change in volatility, that is, the option vega (equation 3.3) times 0.01.

⁹ Palmrose et al. (2004) document that the average adjusted market reaction to restatement announcements for a sample of 403 restatements in the U.S. between 1995 and 1999 is about -9%. Burns and Kedia (2006) find an average market reaction of -10%. Dechow et al. (1996) report average announcement day returns of -8.8% for a sample of 92 firms.

Figure 3.2
Sensitivity of Option Value to Stock Price and Stock-Return Volatility as a Function of the Price-to-Strike Ratio



Replication of Core and Guay (2002, figure 1). Option input parameters are as in figure 3.1.

Figure 3.2 illustrates that the option is most sensitive to volatility for low price-to-strike ratios. Therefore, risk-taking incentives appear most effectively induced by stock options that are awarded out-of-the-money. Risk-taking incentives decline with the price-to-strike ratio because the potential downside risk relative to upside potential becomes greater. On the other hand, consistent with Figure 3.1, the sensitivity of option value to share price changes is increasing with the price-to-strike ratio and converges to unity (when the option becomes more and more similar to regular stock). Therefore, management's monetary incentives to avoid wealth declines by acting on their information advantage are greater once options are more deeply in-the-money. I examine such incentives in chapter 4.

3.4 ACCOUNTING TREATMENT

The issue of accounting for employee stock options has been subject to a long and intense debate in the U.S. In 1972, the Accounting Principles Board (APB) issued Opinion No. 25 which prescribed using an intrinsic value method for valuing stock options granted to employees. Under ABP 25, companies that issue at-the-money options to their employees

record no compensation expense in their financial statements since the intrinsic value (market price less strike price) of at-the-money options equals zero. In 1995, the Financial Accounting Standards Board (FASB) issued SFAS No. 123 (SFAS 123) which introduced, but did not require, a fair value based method of accounting for share based payments. This standard was one of the most controversial and highly debated standards issued by the FASB (Dechow et al. 1996; Botosan and Plumlee 2001). The original exposure draft that was issued required full expensing of the fair value of options. However, after high opposition and intensive lobbying the FASB ultimately let firms choose between recognition and disclosure, and allowed the fair value to be amortised over multiple years (the options' vesting periods). Once a firm chooses for recognition, it is not allowed to reverse this decision. A result of the ability of companies to choose for footnote disclosure is that among the different forms of employee compensation, stock options are accounted for differently than salaries, bonuses, and stock awards.

Companies were slow to adopt the optional standard, and instead continued to use the intrinsic value method under APB 25. As a result, only few companies expensed the fair value of options granted, while most companies reported the fair value in the notes to the financial statements.¹⁰ In December 2004, however, after stock option compensation was named as a primary driver behind the accounting scandals at firms such as Enron, the FASB issued SFAS 123(R) which revised SFAS 123 and superseded ABP 25. Effective January 2006, SFAS 123(R) requires listed companies in the U.S. to apply fair value accounting to options newly granted after June 15, 2005 and unvested options granted after 1994 (Choudhary et al. 2009). Again, there was great opposition to the introduction of the revised standard (Schlesinger 2002).

Dechow et al. (1996) analyse the economic consequences of mandatory expensing of stock options after the FASB issued SFAS 123. Building on the arguments put forward in the debate on stock option expensing regarding the costs imposed on firms, they examine the nature and extent of predicted economic consequences. Results are consistent with firms submitting a comment letter opposing mandatory expensing when top executives receive abnormally high compensation in options, suggesting that the opposition is a consequence of executives' concerns with public scrutiny over their high compensation levels. Furthermore,

¹⁰ Around 2002, in response to criticisms towards stock option compensation and the anecdotal link with accounting fraud, many companies started to voluntarily recognise the stock option compensation expense. Aboody et al. (2004a) identify 155 firms that voluntarily initiated the recognition of the fair value of options granted in the income statement under SFAS 123. They find that the likelihood of voluntary recognition is associated with a firm's participation in the capital market, private incentives of managers and directors, information asymmetry, and political costs. Further, early adopters that stated that increased reporting transparency drove their decision to switch, experience significantly positive announcement returns, consistent with increased benefits outweighing the costs of the voluntary disclosure decision.

the authors find no evidence for the argument that option expensing would increase firms' costs of raising capital because of lower reported earnings. They argue that this finding is consistent with "...the cost of capital argument being a politically palatable excuse to disguise top executives' self-interested concerns with the new financial reporting rules" (Dechow et al. 1996, 2). Also, no evidence is found that investors react to news about the probability of mandatory expensing.

Botosan and Plumlee (2001) empirically evaluate how recognition versus disclosure impacts firm performance by analyzing the effect of stock option expense on diluted EPS and return on assets, as the decision to recognise rather than disclose results in a permanent positive difference in cumulative earnings. Using a sample of 100 high-growth firms, Botosan and Plumlee (2001) find that in 1999, recognition of stock option expense in the income statement would have resulted in 14% lower reported earnings. Thus, the costs of stock options granted to employees are material.

An important question is, given that information on the value of stock options granted is available in the annual report under both recognition and disclosure (only at different positions), whether it should matter which method a company chooses. Why were companies so opposed to expensing stock options while investors receive the same set of information, be it directly in the income statement or in the notes? For example, Aboody et al. (2004b) find that market values and stock returns are negatively associated with the stock option compensation expense disclosed in the notes, as if it is a real cost to the firm and sufficiently reliably measured. On the other hand, one important explanation for the strong opposition against recognition is that many investors fixate on reported earnings and fail to look beyond earnings for value relevant information (Sloan 1996; Guay et al. 2003).

Proponents of mandatory recognition of the stock option compensation expense argue that stock options reflect costs of acquiring labour from employees and should be treated in a way similar to wages. Guay et al. (2003, 409) argue that "...[a]ccounting should reflect the true costs of doing business, and labor acquired through ESO grants is a real economic cost that firms should deduct from earnings as an expense". Also, because investors and boards fixate on earnings and often do not use the information disclosed in the notes, markets and contracts are inefficient and managers are able to extract excessive rents. Lastly, stock option grants represent a cost to existing shareholders because of the dilution that occurs when employees exercise their options and acquire shares at a discount. While opponents of recognition argue that diluted EPS figures already correct for this dilution in the denominator,

Guay et al. (2003) show that this correction is not sufficient and a correction to the numerator (i.e. earnings) is warranted in order to reflect the true economic costs to shareholders.

Opponents of recognition further argue that employee stock options reflect a transaction among shareholders and this is no real expense for the company. Another common argument put forward in the debate against expensing of options is that the value of stock options cannot be reliably measured at the grant date. Valuation models such as the BSM model are developed for exchange traded options and do not incorporate the non-transferability and forfeiture properties of employee options. Also, while market participants are able to diversify their portfolios, risk-averse employees are heavily under-diversified because of overinvestment in the company in addition to their human capital. A result is that many employees exercise their options long before expiration for diversification purposes (Huddart 1994; Huddart and Lang 1996; Heath et al. 1999; Hall and Murphy 2002; Bettis et al. 2005).¹¹

The information in a firm's financial statements, however, should reflect the costs of granting options to the firm and not the value of the options to employees. Thus, arguments that common option valuation models cannot be applied to estimate the costs of employee stock options seem to be flawed (Guay et al. 2003). Also, the fact that employees mostly exercise their options prior to expiration can be overcome by estimating the fair values of options based on an expected life rather than the time to maturity (Hemmer et al. 1994). With respect to the appropriateness of the commonly applied BSM model, Carpenter (1998) finds that BSM valuations described in SFAS 123 are not substantially different from valuations from more complex models.

Empirical evidence suggests that companies take different approaches to avoid expense recognition or minimise the total compensation expense. For example, Balsam et al. (2008) and Choudhary et al. (2009) find that firms choose to accelerate the vesting of stock options before 2006 in order to avoid large expenses required to be recognised under SFAS 123(R). Also, in the SFAS 123 recognise or disclose era, managers were inclined to manipulate the input variables for the option valuation model. Although market prices and option exercise prices are fixed, the other inputs into the valuation model, i.e. volatility, the risk-free rate, expected lives, and dividend yield estimate, are all subject to management's subjective expectations of the future.¹² For evidence on this specific type of earnings (or perception)

¹¹ Note that option valuation theory predicts that for traded options, early exercise is never optimal in the absence of dividends (e.g., Hull 2005).

¹² However, managers may also manipulate the exercise price of the options. See for more information section 3.5.

management, see for example Balsam et al. (2003), Aboody et al. (2006), Hodder et al. (2006) and Bartov et al. (2007).

In Europe, accounting for stock options in publicly listed companies is governed by IFRS 2. IFRS 2, effective January 1st 2005, is similar to SFAS 123(R) and requires firms to expense the fair value of option grants, estimated using any type of option valuation model, over the vesting period of the options.¹³ Given the similarity in accounting rules, but potentially compositions of executive compensation and differences in corporate governance across the U.S. and European countries, interesting research opportunities exist for academics to analyse the differential information content of stock option compensation expenses and the extent to which managers have incentives to underestimate the compensation expense. One step in that direction is taken by Bechmann and Hjortshøj (2009), who analyse the compensation information disclosed under Danish GAAP and later IFRS. They argue that the Danish setting is different from the U.S. setting because of significant differences in ownership concentration, corporate governance, the role of the stock market, the exercise price of granted options relative to the market price, and the intensity with which stock options are granted. The authors find that many firms fail to provide adequate disclosures. This finding appears to be more consistent with limited attention given to the compensation expense rather than managers attempting to hide the information from investors. Also, in contrast to the U.S. evidence, they find no evidence of deliberate under-reporting of the option compensation expense in Denmark.

3.5 MANIPULATION OF THE EXERCISE PRICE

While the purpose of granting options is to motivate employees to take actions that increase firm value, recent academic and anecdotal evidence suggests that managers use alternative ways to enhance the value of their options. Rather than increasing firm value and acting in the interest of shareholders, some managers influence the exercise price of awards to increase the value of their options at the expense of the shareholders. Given that options are generally granted at-the-money, such methods are *i*) the timing of grants prior to the release of positive news, *ii*) the timing of voluntary disclosures around option grants, *iii*) backdating, and *iv*) income-decreasing accounting choices.

¹³ See Bechmann and Hjortshøj (2009, Table 1) for a comparison between IFRS 2 and SFAS 123(R).

3.5.1 Timing of Option Grants

Yermack (1997) suggests that changes in firm performance related to compensation plans may be interpreted in two ways. First, value and performance changes may be driven by managers' actions, which are induced by the compensation. Second, managers may influence the terms of their compensation to receive their pay before releases of positive information which increase stock price. Yermack (1997) examines this second interpretation and finds that, on average, CEOs have the ability to influence decisions of compensation committees and receive option awards shortly before abnormal stock price increases, suggesting that option grants are timed to precede favourable news releases. Further analysis reveals that option grants are, on average, timed in advance of favourable quarterly earnings announcements. The result of this practice is that the options, which are granted at-the-money, have a lower exercise price and become in-the-money more quickly.

3.5.2 Timing of Information Releases

An alternative to timing option grants before favourable news releases is to time news releases around option grants. Aboody and Kasznik (2000) examine this alternative by analysing voluntary disclosures around option grants. For a large sample of CEO option grants from fixed award schedules, they find evidence that is consistent with CEOs managing investor expectations around option grants by delaying disclosures of good news and accelerating disclosures of bad news. Similar to Yermack (1997), such strategies lower the exercise price of granted options. Results suggest that in the months prior to option awards analyst forecasts are substantially less optimistically biased than in other months, abnormal returns are significantly higher in the post-grant period compared to the pre-grant period, and CEOs receiving options before earnings announcements are more (less) likely to issue bad (good) news forecasts than CEOs receiving options after earnings announcements.¹⁴

¹⁴ Aboody and Kasznik (2000) focus on fixed schedule awards to ensure their findings are not explained by opportunistic timing of grants as documented by Yermack (1997). When focusing on firms with variable award schedules, the authors find no evidence that the price movements around grant dates are explained by opportunistic voluntary disclosure strategies.

3.5.3 Backdating

A recently discovered approach to lowering the exercise price of options is “backdating”. Options backdating is a strategy where the date of an option grant is chosen – with the benefit of hindsight – as a date in the past with a relatively low stock price. The result is that the options are effectively granted in-the-money, but are reported as if they are granted at-the-money. A striking example is the CEO of Affiliated Computer Services Inc., who received several grants of options between 1995 and 2002 after large declines in price but exactly before sharp increases. Forelle and Bandler (2006) suggest the chances of this happening by mere luck are about one in 300 billion. Over 140 U.S. companies have allegedly been involved in these backdating activities (Wall Street Journal 2007). Backdating is possible only when there is a sufficiently large time lag between the chosen grant date and the date the grant is required to be made public. The greater the time lag, the greater the number of days in the past that can be chosen as a favourable grant date.

Recall from section 3.4 that prior to 2006, U.S. listed companies were allowed to use the intrinsic value method to account for stock options, which means that at-the-money option grants result in no expense in the income statement. When options are backdated and awarded with an exercise price that is below the market price, however, the options are technically granted in-the-money. Accordingly, backdating firms failed to record the spread between the market price on the actual grant date and the exercise price of the options as an expense. This practice resulted in many companies overstating their earnings and several firms were forced to restate their financial statements. In addition, shareholders are misled because firms grant options under shareholder-approved plans which are on file with the SEC and generally describe that options are granted with an exercise price equal to the current market price. Therefore, while the backdating of option grant dates by itself is not an illegal practice, the misleading disclosures resulting from backdating make it problematic (Forelle and Bandler 2006).

A highly influential study by Lie (2005a) provides large sample evidence consistent with backdating. While Yermack (1997) and Aboody and Kasznik (2000) found that grant dates are followed by significantly positive abnormal returns but preceded by insignificant abnormal returns, Lie (2005a) shows that, for a more recent sample, option grant dates are also preceded by significantly negative abnormal returns. He further documents that return patterns around grant dates get more intense over time, suggesting that managers get better at timing their grants. After showing that even market-model predicted returns (rather than

market model residuals) are related to option grant dates, Lie (2005a, 811) concludes that “[u]nless executives have an informational advantage that allows them to develop superior forecasts regarding future market movements that drive these predicted returns, the results suggest that the official grant date must have been set retroactively”.

While research on insider trading does suggest that some managers are able to predict market-wide movements in stock prices (e.g., Seyhun 1988; Lakonishok and Lee 2001), Heron and Lie (2007) further analyse whether predictable stock returns around option awards are explained by retroactive timing, i.e. backdating. The authors use regulatory changes around the enactment of SOX as their experimental setting, by examining whether price patterns around grant dates are attenuated post-SOX when information on grants is required to be reported within two business days. Before SOX, option grants were required to be reported on SEC Form 4 before the tenth day of the next month or on SEC Form 5 within 45 days after fiscal year end.¹⁵

Heron and Lie (2007) show that grants are on average preceded by negative abnormal returns and followed by sharp increases in prices, a pattern consistent with managers perfectly timing their option awards on days with low prices and/or with backdating. In addition, they show that post-SOX return patterns are substantially attenuated. This finding is consistent with backdating, as the time lag available to pick favourable exercise prices is significantly reduced in the new regime. Interestingly, however, the return patterns do not disappear completely. The authors suggest that more extreme return patterns that are found for smaller firms post-SOX may be explained by the fact that such firms have greater return volatility. As a result of greater return volatility, backdating is easier and more rewarding.

Why backdating is not completely eliminated in the new disclosure regime may be explained by the fact that not all firms comply with the requirements to report grant events within two business days. Heron and Lie (2007) show that in about one-fifth of cases firms do not comply with the reporting requirements. Hence, unless enforcement regarding these disclosures is enhanced, backdating may exist. Consistent with the reporting lag giving opportunities for backdating, Heron and Lie (2007) show that post-SOX reporting lags and price patterns around grants are substantially related. Those grants that are reported immediately, for which there is no theoretical possibility for backdating, no price pattern is observed. However, a pattern of negative pre-award abnormal returns and positive post-

¹⁵ For the total sample of option grants disclosed to the SEC between January 1996 and August 2002, I find that 56% of grants are disclosed on SEC Form 4, while 44% are disclosed on Form 5, with corresponding median filing delays of 39 and 256 days, respectively.

abnormal returns becomes more and more pronounced when the reporting lag is increased from two to four or more days. Thus, the results of Heron and Lie (2007) strongly support a conclusion that backdating explains most of the predictable price patterns around option grants.

Narayanan and Seyhun (2008) corroborate the findings of Heron and Lie (2007) for the post-SOX period. In addition to backdating, which involves the picking of a date that lies before the date of the board's compensation decision, the authors suggest that companies may also engage in "forward-dating", which involves waiting until after the board's compensation decision to observe stock price behaviour and then picking a date. Such a strategy may be fruitful when stock price has been falling prior to the award date. If stock price continues to fall, it is profitable to choose a date after the date of the board's compensation decision. Narayanan and Seyhun (2008) report results for option grants that are promptly disclosed which are consistent with "forward-dating".

Heron and Lie (2009) show that backdating practices are widespread. For their sample of unscheduled awards, about 18.9% of grant dates were manipulated, with 23.0% of grants being manipulated pre-SOX and 10.0% after SOX. Further, 29.2% of firms appear to have engaged in backdating and the likelihood of manipulation is higher in tech firms, smaller firms, firms with higher return volatility, and firms not audited by a Big 5 auditor. Lastly, Bernile and Jarrell (2009) report that firms alleged to have engaged in backdating (Wall Street Journal 2007) experience significant stock price declines after announcements of investigations. Further analyses lead the authors to conclude that these losses to shareholders are not consistent with direct costs (out-of-pocket costs due to investigations, lawsuits, and penalties), but more likely explained by investors' concerns over the quality and reliability of senior management at these firms.

3.5.4 Earnings Management

While the compensation literature is mainly focused on executives' incentives to increase the value of their compensation through upwards earnings management (e.g., Bartov and Mohanram 2004; Cheng and Warfield 2005; Bergstresser and Philippon 2006), the value of stock option compensation may alternatively be increased by managing earnings downward before option grants. For example, Baker et al. (2003) document that relatively large option grants are preceded by income-decreasing discretionary accounting accruals. This finding is

consistent with the good news versus bad news information timing hypothesis of Aboody and Kasznik (2000). Further, McAnally et al. (2008) show that such opportunistic behaviour explains companies' missed earnings targets. More specifically, using a sample of fixed schedule awards they show that firms are more likely to report a loss, a negative earnings change, or fail to meet analyst forecasts when the value of subsequent CEO option grants is larger. Thus, it appears as if some managers trade-off firm value to enrich themselves through mechanically lower exercise prices. Because of the reversing nature of accrual adjustments, the options will more quickly become in-the-money. Kadan and Yang (2005) also report a significantly negative association between stock option grants and discretionary accruals in grant years.

3.6 DESCRIPTIVE ANALYSIS

This section provides some evidence on the role of stock options in executive compensation for a large sample of CEOs of U.S. companies during the period 1996-2006 (the period examined in the next empirical chapter). The purpose of this analysis is to provide some insights into *i*) the large weight of stock options in executive compensation, *ii*) the decline in option compensation in recent years, and most importantly *iii*) how stock options may provide managers with different incentives than shares.

Data are obtained from Compustat's ExecuComp database, which covers firms in the S&P 500, S&P mid-cap 400, and S&P small-cap 600. This database consists of compensation data for firms' top five highest paid executives as documented in annual proxy statements. The most important statistics are the annual salary (SALARY), bonus (BONUS), fair value of stock options granted (OPTION_AWARDS_BLK_VALUE), and restricted stock grants (RSTKGRNT).^{16,17} For the total sample of 18,381 firm-years (2,681 firms) with sufficient data, the mean (median) value of annual CEO salary is \$644,138 (\$591,667); the mean (median) value of annual bonus is \$744,332 (\$341,375); the mean (median) fair value of

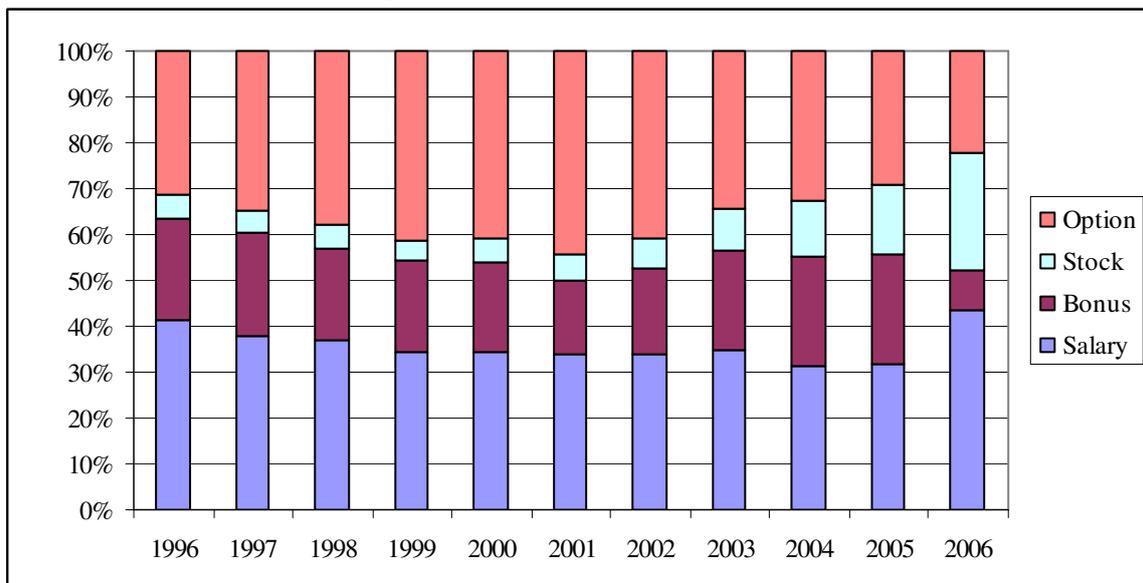
¹⁶ Total annual compensation in ExecuComp (TDC1) is calculated as the sum of these four statistics plus the payouts from long-term incentive plans (LTIP) and other compensation (OTHCOMP). For the sake of brevity, I disregard these additional items in the analysis. The average weight of these items in total compensation is relatively small.

¹⁷ As a result of FAS 123(R) financial reporting requirements, the data for option and restricted stock awards in 2006 are found in new data items labelled OPTION_AWARDS_FV and STOCK_AWARDS_FV, respectively.

options granted equals \$2,492,818 (\$632.452); and the mean (median) value of restricted stock awards is \$754,827 (\$0).

Figure 3.3 provides descriptive evidence on the composition of CEO compensation over time. For the pooled sample of years, on average 8.7% of annual compensation comes from restricted stock awards, while 19.9% is related to bonuses. The most significant portions of annual compensation are the annual salary and fair value of stock option grants with average weights of 35.7% and 35.7%, respectively. While the average role of options in CEO pay is large, Figure 3.3 suggests important shifts in the role of options over time. Consistent with prior research (see e.g., Hall and Murphy 2003) there is an almost monotonic increase in stock option compensation until approximately 2001. In 2001, 44.5% of the total value awarded to CEOs resulted from stock option grants. On the other hand, the weight of restricted stock awards in annual compensation was minimal at only 5.5%.

Figure 3.3
Average Proportions of Total CEO Compensation Made in Salary, Bonus, Restricted Stock, and Stock Options over Time for S&P 1500 Firms 1996-2006



Compensation data are obtained from ExecuComp. Total annual CEO compensation is calculated as the sum of salary (SALARY), bonus (BONUS), value of restricted stock awards (RSTKGRNT), and fair value of stock options granted (OPTION_AWARDS_BLK_VALUE). Compensation distributions are calculated for each CEO-firm-year and averaged by year.

The huge popularity of stock options during the 1990s and the early 2000s can be explained by several factors. First, as explained in section 3.4, during this period companies were not required to recognise a grant of at-the-money options as an expense over the vesting period. While FAS 123 recommended that companies expense the fair value of options granted, the FASB also allowed firms to choose the (old) intrinsic value method of accounting and provide pro-forma earnings information based on fair value expensing in the notes to the financial statements. The vast majority of companies chose not use the fair value method of accounting. Second, U.S. tax rules did not regard the granting of options as a taxable event to either the company or the manager (Hall and Murphy 2003).¹⁸ Third, their payoff structure makes stock options attractive for managers in times of rising stock prices. Relative to awards of ordinary shares, the potential value gains of granted stock options are substantially larger. Lastly, the 1990s saw a large shift in the economy with the rise of so called “new economy” or “tech” firms. Because these firms operated in risky and uncertain environments, employee attraction and retention incentives made firms grant relatively more stock options than in old economy firms (e.g., Ittner et al. 2003).

Since the burst of the stock market bubble and the financial reporting frauds discovered at Enron, Tyco, WorldCom, Xerox, etc. during the early 2000s, there has been a substantial decline in the number of companies awarding their employees with stock options. Figure 3.3 shows that while equity-based compensation (options plus restricted stock) during 2002-2006 remains a relatively constant fraction of total CEO pay (44-48%), there appears to be significant substitution between compensation in shares and options. In fact, in 2006 restricted stock awards (25.4%) outweigh stock options (22.4%) in total CEO pay.

The decline in the role of stock options in total compensation can be explained by the following (non-mutually exclusive) factors. First, the business press blamed the excessive use of stock options in executive compensation packages during the 1990s for the major corporate scandals. For example, Kranhold (2003) suggests that stock options “...motiv[at] employees to place too much emphasis on increasing the stock price at the expense of other performance measures” (see also Cassidy 2002; Michaels 2003). The academic literature also points to the influence of equity-based compensation, in particular stock options, on earnings management and material accounting misstatements (e.g., Cheng and Warfield 2005; Burns and Kedia 2006; Efendi et al. 2007). As a result of the critique on stock options, several companies such as General Electric ceased to award stock options to their top level employees (Burns and

¹⁸ For more information on the taxation upon exercise of stock options, see Chapter 4.

Kedia 2006). Second, the debate on the accounting treatment of stock option grants was reignited after the rash of corporate scandals and resulted in FAS 123(R) which mandates the expensing of the fair value of stock option grants as of 2006. This switch in regulation most likely explains the dramatic substitution of option compensation into stock compensation in 2006. Third, while managers prefer options in rapidly rising markets, they prefer stock in declining markets (Knowledge at Wharton 2003). The realisable value of options is zero for at-the-money or out-of-the-money options while shares are still valuable from the strike price down to zero. Lastly, changes in dividend policy and dividend taxation may explain the decrease in option-based compensation. Aboody and Kasznik (2008) show that the 2003 dividend tax cut in the U.S. is associated with an increase in the use of dividends (rather than share repurchases) in firms' payout policies. Since stock options are not dividend-protected, the authors predict and find a positive relation between increased dividend payouts and the switch from compensation using options to restricted stock. Hence, alignment of the interests of managers (receiving compensation) and shareholders (receiving taxable dividends) can explain part of the substitution of option compensation into stock compensation since 2003.

Table 3.1
Average Proportions of Total CEO Compensation Made in Salary, Bonus, Restricted Stock, and Stock Options across Industries for S&P 1500 Firms 1996-2006

Industry	n	Salary	Bonus	Stock	Option
1. Agriculture	54	42.3%	20.0%	7.9%	29.7%
2. Mining and construction	380	29.7%	29.0%	11.1%	30.2%
3. Food	481	32.9%	23.9%	9.8%	33.4%
4. Textiles and Printing	1,162	42.3%	20.3%	8.2%	29.3%
5. Chemicals	603	35.5%	18.7%	10.7%	35.1%
6. Pharmaceuticals	671	31.7%	12.6%	5.3%	50.4%
7. Extractive Industries	696	29.8%	21.6%	11.9%	36.7%
8. Durable Manufacturers	3,799	36.7%	20.7%	7.3%	35.3%
9. Computers	2,429	32.5%	13.8%	4.9%	48.8%
10. Transportation	912	32.6%	20.5%	9.7%	37.2%
11. Utilities	1,141	46.1%	21.2%	12.5%	20.2%
12. Retail	2,175	40.2%	19.0%	7.7%	33.0%
13. Financial services	2,243	29.7%	25.6%	10.9%	33.7%
14. Insurance and real estate	250	31.3%	21.4%	24.4%	22.8%
15. Services	1,313	36.6%	18.0%	9.3%	36.2%
16. Others	72	53.7%	19.5%	5.7%	21.1%
Total	18,381	35.7%	19.9%	8.7%	35.7%

Compensation data are obtained from ExecuComp. Total annual CEO compensation is calculated as the sum of salary (SALARY), bonus (BONUS), value of restricted stock awards (RSTKGRNT), and fair value of stock options granted (OPTION_AWARDS_BLK_VALUE). Compensation distributions are calculated for each CEO-firm-year and averaged per industry. Industry compositions are based on Easton and Pae (2004).

Table 3.1 provides the same analysis as in Figure 3.3 with the difference that relative weights of compensation components are compared across industries rather than over time. Industry compositions are based on Easton and Pae (2004). The table suggests considerable variation across industries in compensation practices. The average ratio of salary to total CEO pay ranges from 29.7% to 53.7%, while the ratio of bonus to total pay ranges from 12.6% to 29.0%. With respect to equity-based compensation, some interesting differences can be observed. First, in all industries except for insurance and real estate firms do stock options outweigh restricted stock in total compensation. Second, the highest weights for options (and lowest weights for restricted stock) are found for pharmaceutical firms (50.4%) and computer firms (48.8%). This result is consistent with theory as such companies operate in relatively risky and uncertain environments. The convexity induced by stock options will attract less risk-averse employees, which is important in firms that rely on research and development and pursue untested products, markets and business models (Ittner et al. 2003).

Next, to provide more insights into the differential incentives of managers who own shares versus options, descriptive statistics on the sensitivities of stock and option holdings are presented. Using the one-year approximation method presented by Core and Guay (2002), I calculate the sensitivities of CEOs' stock and option portfolios to a one percent change in share price. This method relies on only one year of proxy statement information to calculate the sensitivities of managers' stock and option portfolios, and is preferable to methods in earlier research which require long time-series of compensation data (e.g., Guay 1999). Data are again from ExecuComp, from the beginning of the fiscal years 1996-2006. The full sample of CEO-firm-years with sufficient data is equal to 17,786 (2,642 firms).

Table 3.2 first shows that in virtually all companies CEOs own company stock ($n=17,393$; 98%), where stock holdings are the sum of restricted (STOCK_UNVEST_NUM) and unrestricted (SHROWN_EXCL_OPTS) holdings. On average, a CEO in an S&P 1500 firm over the period 1996-2006 owns 240,744 shares with an average value of \$6,381,581. Consistent with incentive alignment, CEO wealth changes substantially by \$63,816 for a one percent change in share price. As a comparison, recall that the median values of salary and bonus for these CEOs equalled \$591,667 and \$341,375, respectively. Hence, a change in share price of ten percent can change the value of equity holdings by more than a CEO's annual salary.

To compute the value and sensitivity of CEO option holdings, I use the BSM model (equation 3.1) which is consistent with prior research. As suggested by Core and Guay (2002), total option holdings can be split up into three separate portfolios: newly granted options,

unexercisable (unvested) options, and exercisable (vested) options. Proxy statements provide detailed information on exercise prices and maturities for newly granted options. Total year-end values and sensitivities of newly granted options can thus easily be calculated using the BSM model and equation (3.2), respectively.¹⁹ However, for previously granted unexercisable and exercisable options, only the total number of options and total realisable (intrinsic) values are available. Therefore, average exercise prices and times to maturity for these portfolios have to be imputed.

To estimate the average exercise prices and maturities, I use the following procedure. First, I subtract from the number of unexercisable options the number of newly granted options. The same is done for the realisable (intrinsic) value of unexercisable options. In cases where the number of newly granted options is larger than the number of unexercisable options, the number of unexercisable options is set to zero and the remainder of newly granted options is subtracted from the number of exercisable options. Such situations may occur when certain options vest immediately when granted (Core and Guay 2002). The same procedure is applied for the realisable value of options. Realisable values are set to zero when the resulting figures are negative, as out-of-the-money options will not be exercised. Next, average exercise prices are implied using the following formula separately for a CEO's unexercisable and exercisable option portfolios:

$$\bar{X} = P - \left[\frac{REALISABLE_VALUE}{N_OPTIONS} \right] \quad (3.4)$$

where P is the stock price, $REALISABLE_VALUE$ is the intrinsic value of the option holdings, which is the difference between the market value and the exercise price to be paid when all options are exercised ($OPT_UNEX_UNEXER_EST_VAL$ and $OPT_UNEX_EXER_EST_VAL$ for unexercisable and exercisable options, respectively), and $N_OPTIONS$ is the number of options held ($OPT_UNEX_UNEXER_NUM$ and $OPT_UNEX_EXER_NUM$ for unexercisable and exercisable options, respectively).

Times to maturities for unexercisable and exercisable options are implied as follows. Exercisable options are assumed to have a shorter time to maturity than unexercisable options. The time to maturity of unexercisable options is set to the (average) time to maturity of newly

¹⁹ When multiple layers of options with varying characteristics are granted to a CEO during the same year, total value and sensitivity of such grants can be derived by simply summing the values or sensitivities of individual grants.

granted options less one year; time to maturity of exercisable options is set to the time to maturity of unexercisable options less three years. If the company did not grant new options during the year, the times to maturity for unexercisable and exercisable options are set to nine and six years, respectively.

Based on the implied exercise prices and times to maturities, the values and sensitivities of total option holdings can be derived. Table 3.2 shows that in 16,528 company-years (92%) CEOs have option holdings. The median number of options held (564,250) is substantially larger than the median number of shares held (240,744). The majority of options held is exercisable. The average BSM value of CEO option holdings is equal to \$6,578,686, which is only slightly larger than the average value of shares held (\$6,381,581). Thus, while the values of share and option holdings are almost similar, CEO portfolios contain much larger numbers of options. As a result, option holdings are much more sensitive to stock price changes: the average value of options held changes by \$104,717 for a one percent change in price, compared to \$63,816 for share holdings. An important implication of this finding is that CEOs are likely more concerned about short-term swings in stock price when they have their wealth tied to stock options rather than shares. In Chapter 4, I empirically evaluate these implications for the information content of executives' decisions to exercise their options versus their decisions to sell previously held shares.

The bottom half of Table 3.2 shows some additional statistics on CEO option holdings: weighted average values of option moneyness (i.e. the price-to-strike price ratio), delta (equation 3.2), and vega (equation 3.3) for total option holdings, newly granted options, unexercisable options, and exercisable options. The moneyness of options held is increasing with the time the options are held. The median end-of-year value of moneyness of newly granted options is 1.07. For unexercisable option holdings, this value increases to 1.28, while it is 1.48 for exercisable option holdings. Consistent with the mechanical relation between option moneyness and option delta (see Figure 3.2), the option delta is highest for options with the highest moneyness: exercisable options. In absolute terms, for every one dollar change in share price, the value of an exercisable option changes by an average of \$0.85. In relative terms, the percentage change in option value is much greater than the percentage change in stock price.

Lastly, the bottom rows of Table 3.2 depict the average vega for newly granted, unexercisable, and exercisable options. Recall that vega is a proxy for the risk-taking incentives induced on the option holder, and that vega is decreasing in option moneyness. Consistent with Figure 3.2, vega is highest for newly granted options which are least in-the-

money. Thus, consistent with the general practice of granting options at-the-money to induce risk-taking incentives, newly granted options that are least in-the-money induce the greatest convexity in CEO compensation.

Table 3.2
Descriptive Statistics on CEO Equity Incentives from Stock and Option Holdings for Holdings S&P 1500 Firms 1996-2006 (n=17,895)

		Stock (n=17,393)	Options (n=16,528)	New grants (n=12,110)	Unexerc. (n=12,856)	Exercisable (n=15,565)
Number	<i>Q1</i>	73,796	266,734	57,970	61,000	132,500
	<i>Median</i>	240,744	564,250	125,000	147,000	325,000
	<i>Q3</i>	924,828	1,204,227	300,000	333,333	734,222
Value (\$)	<i>Q1</i>	1,619,026	2,103,547	524,651	506,223	1,016,463
	<i>Median</i>	6,381,581	6,578,686	1,441,293	1,763,950	3,663,862
	<i>Q3</i>	25,000,000	18,700,000	3,803,886	5,304,987	11,200,000
Sensitivity to 1% price change (\$)	<i>Q1</i>	16,190	34,343	8,564	7,957	17,639
	<i>Median</i>	63,816	104,717	23,156	26,481	59,566
	<i>Q3</i>	250,298	287,728	60,778	78,425	177,217
Moneyness (price-to-strike)	<i>Q1</i>	-	1.08	0.92	1.03	1.11
	<i>Median</i>	-	1.37	1.07	1.28	1.48
	<i>Q3</i>	-	1.93	1.28	1.77	2.21
Delta	<i>Q1</i>	-	0.71	0.65	0.72	0.76
	<i>Median</i>	-	0.83	0.77	0.84	0.85
	<i>Q3</i>	-	0.90	0.87	0.91	0.93
Vega	<i>Q1</i>	-	5.20	9.78	6.46	3.48
	<i>Median</i>	-	10.01	17.07	11.99	7.70
	<i>Q3</i>	-	16.28	26.67	19.42	13.41

Compensation data are obtained from ExecuComp. Option values are calculated using the BSM model (equation 3.1), sensitivities to price changes (delta) and volatility (vega) are calculated using equation 3.2 and 3.3, respectively.

The descriptive statistics on vega for unexercisable and exercisable options have implications for empirical research on the effect of equity incentives on opportunistic financial reporting. For example, Cheng and Warfield (2005) and Cohen et al. (2008) find that unexercisable stock option holdings – but not exercisable option holdings – are associated with more income-increasing accruals management and/or the probability that a firm just meets or beats analyst expectations of earnings. This result is quite unexpected when one assumes that income-increasing earnings management is used by managers to increase the realisable value

of their options. Cohen et al. (2008, p.779) argue that this "...finding is somewhat unintuitive because one would expect both unexercisable and exercisable options to have similar effects on managers' incentives to manage earnings. Cheng and Warfield (2005) argue that equity incentives lead to earnings management via future trading in the company's stock, and because exercisable options are not correlated with future trading (unlike unexercisable options and ownership), these are not related to earnings management. This is likely to explain our results as well, but we do not examine this reasoning further as this is beyond the scope of our analysis". Compared with this reasoning, my descriptive statistics in Table 3.2 suggest a more formal explanation for the result. Unexercisable stock options have greater convexity (relatively more limited downside) than exercisable options. Following Burns and Kedia (2006), this suggests that CEOs have greater incentives to manage earnings in order to increase the value of their options.

3.7 SUMMARY

This chapter introduced some fundamental aspects of employee stock options. The chapter serves as the basis for the first empirical chapter, which examines the information content of U.S. executives' decisions to exercise their options and subsequently hold or sell the acquired shares. I presented the basic elements of options, option valuation, calculations of the sensitivity of option values to stock price and volatility changes, accounting treatment of employee stock options, and managers' opportunistic behaviour to reduce the exercise price of granted options. Most importantly, I discussed the incentive effects of executive stock options in terms of risk-taking. The asymmetric payoff structure of options makes these instruments different from ordinary shares. Descriptive statistics for a large sample of CEOs in S&P 1500 firms showed that stock options make CEO wealth increasingly sensitive to stock price. As a result, options may induce more opportunistic behaviour by management because of an increased focus on short-term stock price changes. A reconciliation of the descriptive statistics on risk-taking incentives for exercisable and unexercisable options (Table 3.2) with recent evidence in Cheng and Warfield (2005) and Cohen et al. (2008) suggests that a deeper understanding of the incentives induced by (and the characteristics of) stock options helps academics to understand empirically observed associations between equity incentives and earnings management. This is consistent with the reasoning of Gao and

Shrieves (2002), who argue that “...simply using the percentage of total compensation in various broad categories will fail to capture important aspects of compensation as they impact managerial incentives”.

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

Aboody 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

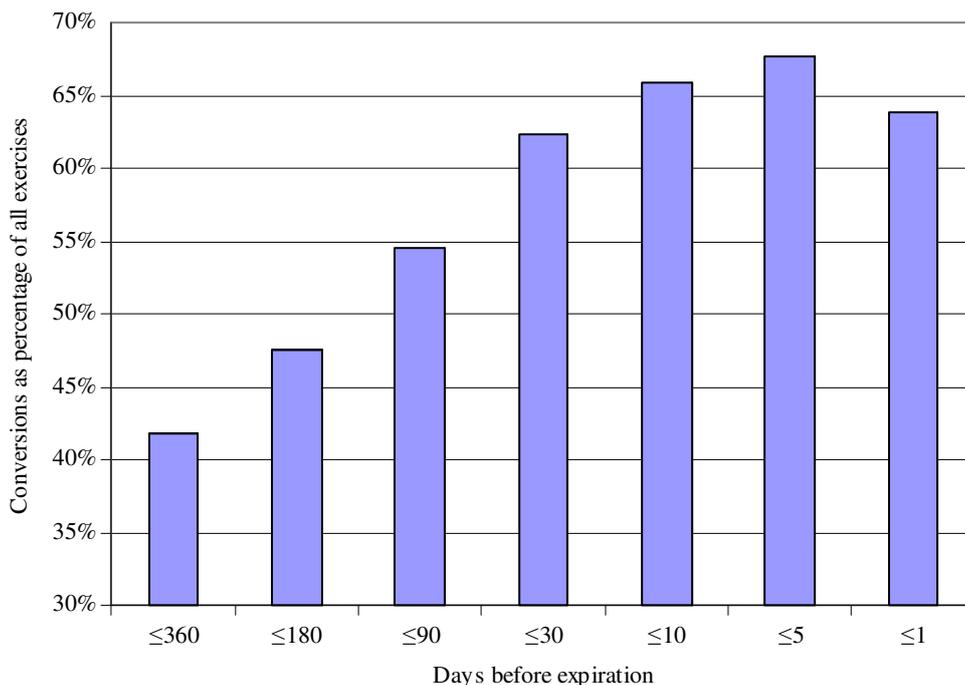
All variables are defined as in Appendix 4.1. The sample selection procedure for the full sample of firm-years is presented in Table 4.2. All continuous variables are winsorized to the 1st and 99th percentiles of their distributions.

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.

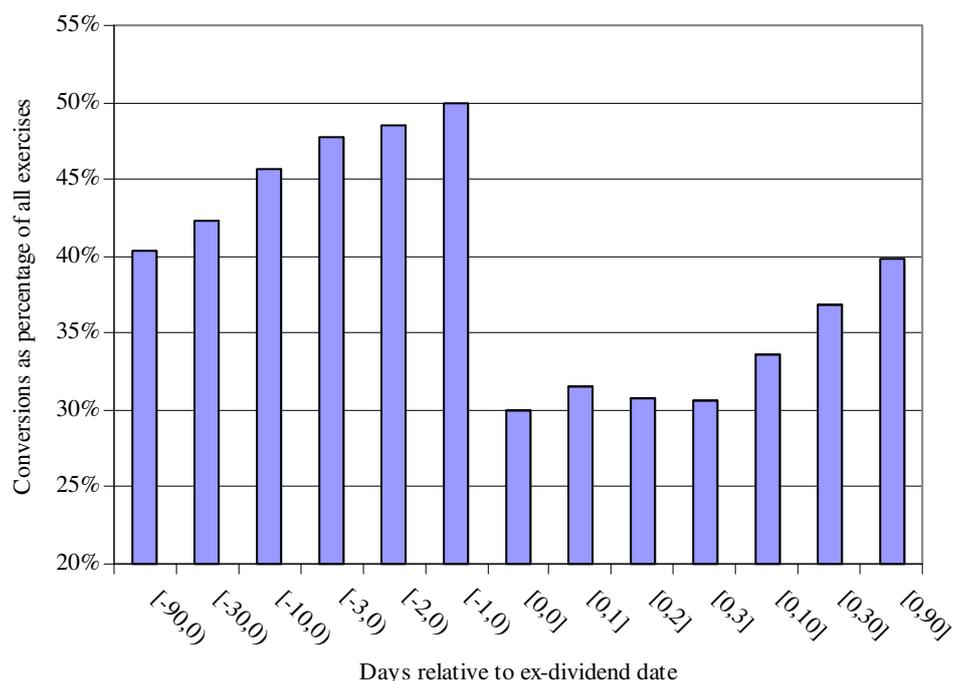
Figure 4.1
Public Information Events: Distribution of Conversion Exercises around Option Expiration



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.

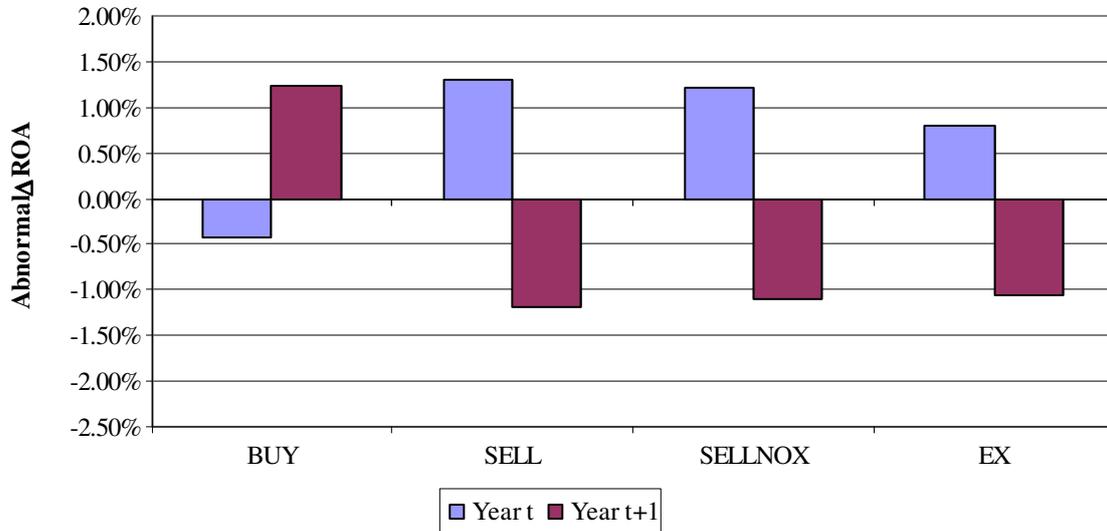
Looking at years of abnormal non-exercise related sales (*SELLNOX*), the earnings pattern is only slightly weaker, while the future earnings pattern for abnormal liquidation years (*LIQ*) is much stronger (-1.58% versus -1.19% for *SELLNOX*). Interestingly, the least significant results are found for 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.

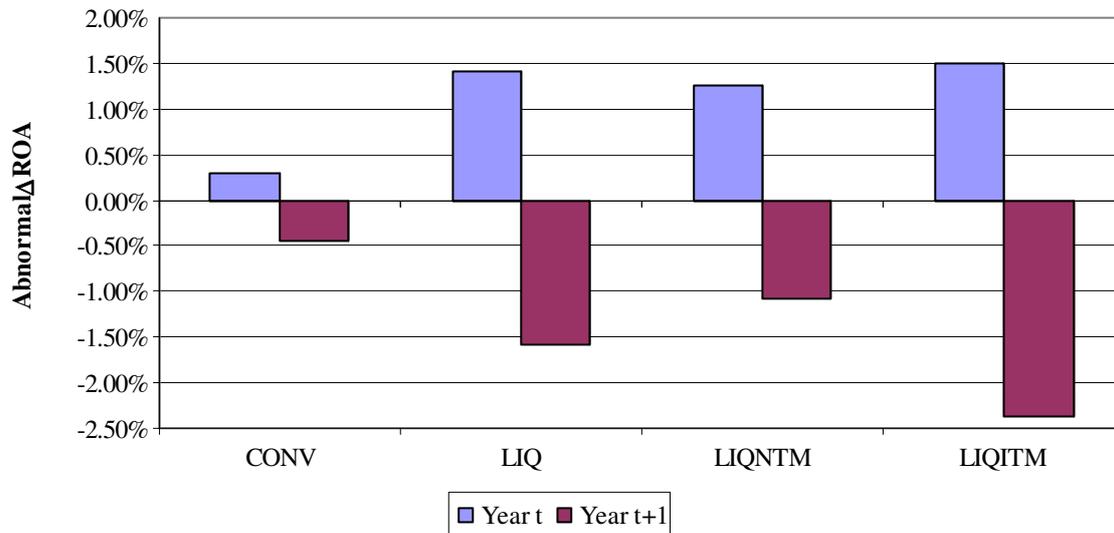
In Models 1 through 5, future (unadjusted) earnings changes are regressed on test and control variables. Moving from Model 1 to 2, regular share sales are slightly less informative than pooled share sales. Moving to Models 3 and 4 where (decomposed) option exercises are added, the negative coefficient 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>				
BUY_t	0.0030 [1.84]*	-0.0051 [2.12]**	-0.0002 [0.08]	-0.0002 [0.09]
$SELLNOX_t$	0.0022^a [1.46]	0.0020^a [0.88]	0.0065^a [3.35]***	0.0063^b [3.24]***
$CONV_t$	-0.0022 [1.43]	0.0027 [1.10]	-0.0015 [0.78]	-0.0017 [0.88]
LIQ_t	0.0035^a [2.14]**	0.0004^a [0.18]	0.0074^a [3.61]***	
$LIQNTM_t$				0.0011 [0.53]
$LIQITM_t$				0.0125^b [4.01]***
<i>Control variables</i>				
$\ln(MV)_t$	-0.0049 [14.66]***	0.0046 [9.99]***	-0.0054 [13.41]***	-0.0053 [13.31]***
BTM_t	-0.0124 [10.99]***	0.0150 [8.68]***	-0.0093 [6.94]***	-0.0093 [6.91]***
$LITIG_t$	0.0036 [2.77]***	-0.0066 [3.61]***	0.0005 [0.34]	0.0004 [0.30]
LEV_t	-0.0197 [6.24]***	0.0194 [4.26]***	-0.0181 [4.92]***	-0.0180 [4.89]***
$ISSUE_t$	0.0321 [19.02]***	-0.0477 [18.26]***	0.0140 [7.20]***	0.0139 [7.13]***
AU_t	-0.0071 [3.82]***	0.0064 [2.45]**	-0.0075 [3.29]***	-0.0075 [3.27]***
CFO_t	-0.0622 [15.05]***	0.0298 [5.04]***	-0.1074 [19.99]***	-0.1075 [20.01]***
WCA_{t-1}	-0.0144 [2.25]**	0.0490 [5.19]***	0.0251 [3.14]***	0.0252 [3.15]***
$OPTGR_t$	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.

5 Equity Market Timing by Managers and Firms – Evidence from the Netherlands

5.1 INTRODUCTION

“Although firms repurchasing stock are not required to disclose any of their trades, if management takes the same decision on a personal account, details about the trades must be promptly disclosed to the SEC and then made public in short order”. (Grullon and Ikenberry, 2000, p.48)

Insider managers in different countries have previously been shown to be successful in timing their equity trades and beating the market (e.g., Seyhun 1986; Seyhun 1998; Lakonishok and Lee 2001; Hillier and Marshall 2002a; Betzer and Theissen 2009). While insider trading on specific non-public information is prohibited in most countries (Bhattacharya and Daouk 2002), managers’ successful timing ability is often ascribed to two sources. First, managers are more sophisticated than other market participants in estimating the value of the firm and are able to identify market valuation errors (Rozeff and Zaman 1998). Second, managers’ intimate knowledge of firm operations makes them better able to predict long-run future performance (Ke et al. 2003; Piotroski and Roulstone 2005).

Equity market timing is also often argued to be an important aspect of corporate financing policies. More specifically, companies have incentives to issue equity during periods of overvaluation and repurchase during periods of undervaluation at the expense of the new or exiting shareholders (Baker and Wurgler 2002). In this chapter, I examine the differential information content of insider share trades by managers and firms in a setting where both managers and firms are treated as insiders with a potential information advantage, that is, the Netherlands. In addition, I test whether market timing ability (if any) can be explained by private information, public information, or both.

While the trading activity of officers and directors in the U.S. is publicly visible via the Securities and Exchange Commission (SEC) on a daily basis, open market transactions by these same officers and directors on behalf of the firm are subject to more flexible disclosure

requirements and are less transparent (e.g., Cook et al. 2003). While previous studies have been able to document short-term price movements around personal insider trades, it has therefore not been possible to analyse the performance around *actual* open market (re)purchases and sales (issues) by firms in the U.S. Attempts to analyse short-term price movements around these events are for the most part based on *announcements* of repurchases and offerings.³⁹

There is considerable global variation in regulation regarding corporate market transactions. For example, stock repurchases are forbidden in some countries (Grullon and Michaely 2002). In Germany, Taiwan, Hong Kong, and Japan were prohibited until only recently (Grullon and Ikenberry 2000). Several countries, such as the U.K., Canada, Hong Kong, and the Netherlands, have strict disclosure policies. In these countries, companies are regarded as corporate insiders the same as managers. Open market firm transactions (that is, repurchases and offerings) are required to be reported to the market regulator in a timely manner similar to personal insider trades. Actual trading activity is therefore observable to the market within a few days, where the exact date of trading is known. This is in sharp contrast to the U.S. setting where actual transactions are generally observed only on an annual or quarterly basis through the disclosure of financial statements, without exact information on transaction dates.⁴⁰ Whether timely disclosure of managers' trading activity on firm behalf is desirable, similar to disclosure of their personal trades, is an open empirical question.

Using a sample of publicly disclosed insider transactions by managers and firms in the Netherlands between April 1999 and September 2005, this chapter determines the differential timing ability of managers' personal trading versus their repurchase and issuance decisions. While mispricing is the most commonly named motivation for corporate transactions, I examine whether the successful timing ability of managers makes firms repurchase when the stock is undervalued and issue when it is overvalued. This comparison is relevant given the strict and consistent regulation on personal insider trading around the world (e.g., Bhattacharya and Daouk 2002) versus the large variation in regulation and disclosure of corporate equity transactions. Also, implementation of the Market Abuse Directive in the

³⁹ In addition, although corporate open market equity transactions in the U.S. are approved by company boards and formally announced, announcements are not necessarily followed by actual transactions. Several studies show that a substantial number of repurchase announcements are not carried through, resulting in differing information content (Lie 2005b; Gong et al. 2008) and the potential that firms mislead investors by announcing transactions without any intent to actually carry through (Grullon and Ikenberry 2000).

⁴⁰ The importance of examining actual transaction dates is highlighted by Friederich et al. (2002), who demonstrate that the daily return patterns around U.K. insider trading days are offsetting, so that the actual price effect is hidden when lower frequency (such as monthly) data is used.

Netherlands effective October 2005 decreased the transparency of *actual* corporate market transactions.

The empirical research design consists of two parts. First, an event study approach is used to examine short term market timing ability. Findings reveal that Dutch managers (officers and directors) are successful in timing their personal trades by beating the market, consistent with previous studies in other settings. The timing ability of firms, however, appears to be much weaker, in particular for equity issuances. Second, to provide more direct evidence on the source of information contributing to market timing ability, I test whether trading is related to private information or to market valuation errors of publicly available information (e.g., financial statements). Using accounting-based valuation models and publicly available information, the empirical findings suggest that managers' selling is related to current overvaluation of the stock rather than a specific private information advantage. Personal insider purchases, on the other hand, are associated with future stock returns after controlling for market valuation errors, suggesting that these trades and their subsequent disclosures reveal new, private, information.

This chapter contributes to the literature in several ways. First, it extends the literature on corporate insider trading by documenting the timing ability of corporate insiders in the Netherlands, showing results which are largely consistent with those in other countries. More importantly, the institutional setting in the Netherlands prior to October 2005 allows for an examination and comparison of insider trading by both managers and firms. Using data on actual transaction days, the study contemporaneously examines managers' personal trading versus their trading on behalf of the firm.

Second, this chapter provides new evidence consistent with managers acting on market valuation errors of publicly available information, using accounting-based valuation models. Little research on insider trades has attempted to disentangle managers' trading on public versus private information. In addition, the few studies that do disentangle the trading on public versus private information generally rely on the ratio of book-to-market value of equity (book-to-market ratio) as a proxy for market mispricing (Jenter 2005; Piotroski and Roulstone 2005). There is considerable debate on whether the book-to-market ratio is an appropriate construct for mispricing or whether it better reflects other phenomena such as a risk premium (Fama and French 1996). Accounting-based valuation models are, however, well developed and accepted theoretical models of valuation. Two advantages of an examination of accounting based value-to-price ratios over market-to-book ratios are that the accounting-based valuation models *i*) are invariant to accounting treatments, and *ii*) incorporate forward-

looking information in addition to the generally backward-looking (historical cost) nature of equity book value (Dong et al. 2006).

Lastly, this chapter is among the first to apply both the residual income valuation model (RIVM) and the abnormal earnings growth model (AEGM) in a valuation context. Little evidence exists on the applicability of the AEGM relative to the RIVM (Penman 2005; Brief 2007). Results presented in this study suggest little difference in empirical implications when one model or the other is used.

Two studies related to this research are Core et al. (2006) and D'Mello and Shroff (2000). Core et al. (2006) contemporaneously examine personal insider trading and repurchases, relating these decisions to the accrual and post-earnings announcement drift anomalies in the U.S. setting. Results indicate that managers' repurchase and insider trading behaviour is consistent with strategies based on the accrual anomaly. My study differs as it examines *actual* transactions rather than a proxy for repurchase activity based on financial statements, and examines whether managers trade differently on personal versus their firms' accounts. D'Mello and Shroff (2000) relate repurchase decisions in the U.S. to pre-repurchase insider trading and use the residual income valuation model to examine managers' assessments of economic value compared to the current stock price. Using perfect foresight earnings forecasts they show that managers trade on private information related to the undervaluation of the stock prior to repurchases. In contrast, this study uses accounting based valuation models to examine whether managers trade on their superior assessments of the market pricing given *publicly available* information.

5.2 MOTIVATION

5.2.1 Personal Insider Trading

“With their fundamental understanding of the firm and its industry, a firm's managers are perhaps best positioned to recognize when market prices diverge from their true value”. (Grullon and Ikenberry 2000, 36)

In support of the view that managers may be superior market participants given their intimate knowledge of firm operations, firm viability, and market conditions, many studies have shown

that managers are able to profitably time transactions in their own firms' stock. In the U.S., Seyhun (1986; 1998) finds that average share purchases of managers predict higher future stock returns, while sales predict lower returns. On average, insider purchases are consistently found to contain more relevant information than insider sales, because of insiders' liquidity needs and diversification purposes (Ofek and Yermack 2000; Lakonishok and Lee 2001; Jeng et al. 2003). In the U.K., Hillier and Marshall (2002a) determine that managers purchase after (before) price declines (run-ups) and sell after (before) price run-ups (declines), and Fidrmuc et al. (2006) show that price reactions are related to ownership structures (see also Pope et al. 1990; Friederich et al. 2002). Betzer and Theissen (2009) document similar results for Germany and additionally show that the magnitude of abnormal returns is related to ownership structure, accounting standards, and the timing relative to earnings announcements. Comparable findings are found for Canada (Baesel and Stein 1979) and Sweden (Kallunki et al. 2009), while Eckbo and Smith (1998) find no evidence of insider profitability in Norway.

With regard to more specific sources of the information revealed by insiders' trades, Rozeff and Zaman (1998) show that managers buy more in value (high book-to-market) stocks and sell more in growth (low book-to-market) stocks. Assuming that the book-to-market ratio is an appropriate construct of market mispricing, these findings suggest that managers trade in reaction to valuation errors caused by investor overreaction to information. Ke et al. (2003) further find that insiders sell in anticipation of negative future earnings news. In addition, their evidence suggests that managers avoid trading immediately prior to significant information events as a result of the costs of adverse publicity and litigation. Piotroski and Roulstone (2005) document that managers trade as contrarians, consistent with Rozeff and Zaman (1998), as well as on superior cash flow (earnings) information. More specifically, they find net insider buying to be positively related to future earnings performance, positively related to book-to-market ratios, and negatively related to recent returns. These relations are incremental, but the evidence suggest that mispricing is the primary driver of managers' personal trading decisions.

5.2.2 Repurchases and Equity Issues

Besides the research on managers' personal trades, a large stream of literature exists on purchases and sales of stock by firms. Similar to managers, firms act as market participants by purchasing and selling their own equity. Regarding repurchases of equity, the most commonly

named motivation for the timing of these transactions is the undervaluation of the stock. For example, Vermaelen (1981) finds a significantly positive stock price reaction for U.S. firms announcing repurchases, consistent with a correction for mispricing prior to the announcement. Ikenberry et al. (1995) further show that this price correction is long lasting and most pronounced for firms with low market-to-book ratios.

Dittmar (2000), using an ex-post measure of repurchase activity, shows that undervaluation is the primary driver of repurchase activity. To a lesser extent she also finds that firms repurchase to distribute excess cash, change their leverage ratios, fend off takeovers, and counter the dilution effects of executive stock option exercises. Regarding excess cash, Grullon and Michaely (2002) document that declines in dividend payments in the U.S. are accompanied by increases in repurchases. They show that repurchases are financed with cash that would otherwise be used to pay out dividends. Also, in a survey among financial executives, Brav et al. (2005) document that managers favour repurchases over dividends because they are perceived as more flexible and can be used to time the market. Survey results indicate that 86% of responding firms agree they repurchase when the stock is cheap relative to its true value. Additional interviews reveal that:

“About one-half of the interviewed CFOs say that their firm tracks repurchase timing and that their firm can beat the market, some say by \$1 or \$2 per share over the course of the year”. (Brav et al., 2005, p.514)

Although archival and survey/interview evidence points to incentives for management to time the market similar to their personal trades, rules and disclosure requirements for repurchases in the U.S. are limited (Grullon and Ikenberry 2000; Cook et al. 2003). Prior to 2004, the only guidelines were provided by SEC Rule 10b-18 providing a code of conduct which, if followed, protects companies against subsequent charges of price manipulations. However, Cook et al. (2003) show that only a limited number of firms fully comply with this code and that violations more likely occur following price declines (i.e. when the stock is more likely undervalued). The authors question the effectiveness of current regulation which does not require public disclosure of actual trading activity.

Due to limited disclosure in the U.S., most studies on repurchases rely on indirect measures of the actual numbers of shares repurchased based on quarterly or yearly disclosed figures in financial statements. Also, while actual transaction dates for open market repurchases are not available, most studies rely on the announcement dates of repurchases,

including announcements that do not result in actual repurchases (see for example Lie 2005b).⁴¹

In contrast to the U.S. setting, other countries have much stricter regulation and disclosure requirements. Some countries even prohibit or only recently allowed the use of repurchases (Grullon and Ikenberry 2000; Grullon and Michaely 2002). In the U.K., firms are treated as corporate insiders similar to managers and therefore repurchases should be disclosed in a similar way. These rules seem reasonable given the fact that market timing is the primary motivation for firms to repurchase (Dittmar 2000; Brav et al. 2005) and because firm decisions are made by senior management. Comparable to results for announcements in the U.S., Oswald and Young (2004) find that actual share repurchases in the U.K. are preceded by price declines and followed by positive abnormal returns. In addition to the stricter disclosure requirements in the U.K., the LSE Model Code prohibits trading during windows of two months prior to earnings announcements. In this regard, Keswani et al. (2007) find some evidence that while repurchases provide price support in general, prices decline during periods in which firms are not allowed to trade.

In Hong Kong, firms are also treated as corporate insiders. Zhang (2005) shows that repurchases in Hong Kong are timed to follow price declines. However, only high book-to-market firms experience positive future abnormal returns. Similar rules apply in Canada, but information on actual open market repurchases is required be disclosed only by the tenth day of the following month. Ikenberry et al. (2000) exploit this property of the Canadian setting and show that managers trade strategically. McNally et al. (2006) also find superior timing ability as repurchases are preceded by declines and followed by abnormal increases in stock price. The authors suggest that repurchases provide price support and that investors learn that the stock is undervalued.

Regulation in France is somewhat less strict. Although the authorities require firms to disclose their trading activity, this information does not become publicly available. Based on privately disclosed data from the French AMF, Ginglinger and Hamon (2007) find that repurchases are associated with price stabilisations, but do not precede run-ups in price. In addition, they provide evidence that open market repurchases lead to lower market liquidity. An overview and comparison of regulation and disclosure across these countries is provided in Appendix 5.1.

⁴¹ One U.S. based paper that does rely on actual transactions is Cook et al. (2004). However, due to limited data availability they rely on a very limited (and self-selected) subset of repurchase firms in the U.S., making results difficult to generalise.

With respect to firms' decisions to sell shares, several studies report that seasoned equity issues are repurchases in reverse. Loughran and Ritter (1995) report that firms issuing stock in seasoned equity offerings underperform the market in the subsequent five years. Spiess and Affleck-Graves (1995) find that this underperformance persists after controlling for several risk factors, suggesting that managers take advantage of firm-specific information and issue equity when the stock is overvalued. This result is confirmed by Ikenberry et al. (2000) in the Canadian setting. Teoh et al. (1998) add to this by showing that long-run underperformance is partially explained by unusually high earnings growth, low operating cash flows, and a reversal of discretionary accruals (see also Gong et al. 2008). Overall, the results of these studies are consistent with firms offering shares at times when investors overvalue the stock, either based on public information or on specific private information. Survey evidence by Graham and Harvey (2001) confirms that managers view recent stock price appreciation as an important factor in their equity issuance decisions. Baker and Wurgler (2002) suggest that firms' current capital structures may be viewed as the cumulative outcome of past equity market timing attempts from repurchases and equity issues.

Finally, since managers take the decisions of a firm to repurchase or issue new shares, several studies have examined whether personal trading is related to these corporate financing transactions. Karpoff and Lee (1991), Lee (1997), and Kahle (2000) show that equity issues are more likely motivated by overvaluation when managers sell relatively much of their personal holdings in the firm, as indicated by long-run underperformance of the stock. With regard to repurchases, Lee et al. (1992) observe changing personal trading activity before tender offer repurchases. D'Mello and Shroff (2000) find significant undervaluation of firms engaging in repurchase tender offers and show that managers have *private* information about this undervaluation prior to the repurchase.

This study differs from the studies discussed above in that it compares the timing incentives for managers' personal trades versus their trading on behalf of the firm. The comparison between firm and personal trading is facilitated by the former institutional setting in the Netherlands which provides actual transaction dates for both types of trades. In addition, in contrast to many studies which are focused on managers' private information advantage, this study examines managers' assessments of stock valuations given *publicly available* information using theoretical models of valuation, and attempts to disentangle public-information trading from private-information trading.

5.2.3 Institutional Setting

In the Netherlands, the trading of securities based on foreknowledge of inside information (“voorwetenschap”) is prohibited for anyone and treated as a crime. Inside information is defined as information that has not yet been made public and which is likely to have an impact on the market price of a firm’s traded equity. It is also prohibited to transfer inside information without fully disclosing it to the public. Oversight on stock market integrity and disclosures of price-sensitive information in the Netherlands is done by the market regulator AFM (*Autoriteit Financiële Markten*).⁴²

Prior to October 2005, rule 46b of the *Wet Toezicht Effectenverkeer* (Wte) 1995 required that issuing companies as well as executive officers and members of the board of directors publicly disclose transactions in the companies’ shares as soon as possible (“onverwijld”). Thus, firms as well as persons directly involved in policymaking and supervision are treated as corporate insiders and are assumed to have a distinct information advantage. In addition, trading by these insiders is prohibited in the two months preceding the annual earnings announcement by a Model Code introduced in 1987 (see also Kabir and Vermaelen 1996), similar to the restrictions imposed by the LSE Model Code in the U.K.

As a result of European harmonisation, the Market Abuse Directive (MAD) was implemented in the Netherlands into the Wte rules in October 2005. MAD resulted in increased penalties and restrictions on market abuse in order to protect market integrity. The trading on inside information was argued to damage investor confidence in the well functioning of markets (AFM 2007). Wte rule 46b, which required public disclosure of insider transactions, was changed to Wte rule 47a. In addition, the speed of disclosure is now more specifically defined as no later than the fifth business day following the transaction.

Although the new regulation is intended to increase transparency and integrity, a direct consequence is that firms are no longer treated as corporate insiders. Actual market transactions from repurchases are exempt from the rules against market abuse when conducted in accordance with European Commission Regulation (2273/2003). Two of the requirements of this regulation are that total repurchases on a trading day may not exceed 25% of the average daily trading volume and that the repurchase program is formally announced and approved. When conducted along the lines of the regulation, these transactions are no longer publicly visible on a timely basis after the regulatory changes effective October

⁴² Prior to October 2005, oversight was in the hands of Euronext Amsterdam.

1st, 2005.⁴³ Exception are made when trading induces company holding to reach level above or below thresholds of 5%, 10%, 15%, etc.

Given the new disclosure regime and the academic literature that suggests that managers as well as firms have incentives to time their transactions and beat the market, this paper examines reported trading in the Netherlands in the period prior to October 2005 to determine whether public disclosure of firm trading activity is desirable, similar to insiders' personal trades. Although firms' repurchases and equity issues are subject to approval and require pre-announcements, the actual timing of the trades is at the discretion of management. I investigate short-term market timing ability and the timing based upon market valuation errors of public versus private information. Valuation errors of public information refer to the market not correctly impounding all available information into prices, while valuation errors of private information refer to market prices that do not reflect the true value of the equity due to information that is known only to insiders.

5.3 DATA AND SAMPLE SELECTION

This study relies on several data sources. Insider transactions occurring between April 1st 1999 and September 30th 2005 are manually collected from the AFM website.⁴⁴ Daily stock prices and returns of firms listed on the Amsterdam Stock Exchange are obtained from Datastream. Accounting data are obtained from Compustat Global. Analyst (median) consensus split-unadjusted earnings forecasts are obtained from the I/B/E/S database.

The raw AFM sample consists of 11,784 records by managers and firms. Panel A of Table 5.1 shows how this number is reduced to 7,204 records (135 firms) after eliminating firms not listed on the Amsterdam Stock Exchange, transactions related to mergers and acquisitions⁴⁵, all transactions with irregular instruments⁴⁶, and all private transactions and transactions by other firms which are large shareholders⁴⁷.

The construction of the AFM insider trading database requires some notes, since it contains several overlapping transactions. For example, consider a manager that exercises one

⁴³ Important to note, but unrelated to this research, is that in January 2007 the Wte 1995 was incorporated into the *Wet Financieel Toezicht* (Wft) 2006 and public disclosure of insiders' trades is currently governed in Wft rule 5:60.

⁴⁴ <http://www.afm.nl/registers/default.ashx?FolderId=1558>

⁴⁵ For example, Invensys Holding Ltd. acquired Baan Company N.V. during the sample period.

⁴⁶ For example, transactions in warrants, rights, and stock appreciation rights are eliminated from the sample.

⁴⁷ For example, exchanges of equity between Aegon N.V. and Vereniging Aegon.

stock option and subsequently sells the acquired share. In this case there are three transactions on one day in the database that reflect the same disposition transaction. First, the manager sells a stock option for a price equal to zero. Second, the manager buys a share at the exercise price. Third, the manager sells the share on the market for a price greater than the exercise price. This example illustrates the importance of carefully examining every record in the AFM online database. Not doing so would result in the purchase of the share at the exercise price being treated as an acquisition, whereas in fact this transaction relates to a disposition trade.

After a careful examination of the data, seven transaction categories can be identified (see Panel B of Table 5.1). First, for managers 744 transactions are purchases and 985 are regular sales of shares. With regard to the exercise of stock options, 343 records are related to the exercise of options without subsequent selling of shares while 2,565 records are related to exercises with subsequent sales.

Next, two types of company transactions are identified that are relevant for this study. First, 623 transactions are related to new issues of shares (in the database: the firm acquires shares for a price equal to zero and sells shares for a price greater than zero, or directly sells shares that were previously held in treasury account). Next, 796 records are related to open market repurchases. The remaining 1,148 transactions are categorised as miscellaneous and this group consists of, for example, stock and option grants. This final category is beyond the scope of this research and therefore eliminated from the sample.

To highlight the differences between types of transactions, Panel B of Table 5.1 provides further descriptive statistics on the median number of shares traded and the median prices for acquisitions and dispositions. Median shares traded in managers' personal transactions range from 2,000 for share purchases to 4,750 for option conversions. The median price per share in purchase transactions equals €13.25, while managers sell shares for €24.95, on average. Comparable to direct purchases of shares, purchases through the conversion of options occur at a median price of €14.21. This figure is somewhat higher at €16.45 when managers sell shares in option liquidation exercises, with a median sell price of €28.50.

Table 5.1
Insider Transaction Sample Selection

Panel A: Data filtering

	n
Transactions in AFM website between April 1 st 1999 and September 30 th 2005	11,784
Eliminate:	
Firms without listing on Amsterdam Stock Exchange	-1,849
Takeover related transactions	-41
Transactions with irregular instruments	-361
Transactions by large shareholders or private transactions	-2,329
Final sample of transactions	7,204

Panel B: Transaction identification

	n	Median no. shares traded	Median acquisition price (€)	Median disposition price (€)
Managers:				
Share purchases	744	2,000	13.25	-
Share sales	985	2,500	-	24.95
Exercise-and-hold	343	4,750	14.21	-
Exercise-and-sell	2,565	2,409	16.45	28.50
Firms:				
Issues	623	398,522	-	11.55
Repurchases	796	150,000	18.60	-
Miscellaneous:				
Other transactions	1,148	-	-	-

Panel C: Transaction event days and months

	n (days)	n (months)	No. firms
Managers:			
Net purchases (<i>BUY</i>)	441	188	83
Net sales (<i>SELL</i>)	1,125	489	82
Firms:			
Issues (<i>ISS</i>)	377	98	60
Repurchases (<i>REP</i>)	726	101	33

Insider transactions in the Netherlands between April 1st 1999 and September 30th 2005 are manually collected from the online AFM insider filings database. Event study transaction days are defined as “net purchases” (*BUY*) when the aggregate number of shares purchased by all managers within the same firm on the same day is greater than the aggregate number of shares sold. Event study transaction days are defined as “net sales” (*SELL*) when the aggregate number of shares sold by all managers within the same firm on the same day is greater than the aggregate number of shares purchased. Transaction days are defined as “issues” (*ISS*) when a company engages in seasoned equity issues, while event study transaction days are defined as “repurchases” (*REP*) when a company engages in stock repurchases.

Company transactions involve much larger numbers of shares than managerial transactions. The median number of shares issued per transaction equals 398,522. The average price at which the company offers shares is relatively low at €11.55. Next, with stock repurchases a firm buys back on average 150,000 shares per transaction for a median price of €18.60.

Interestingly, these descriptive statistics indicate a first difference between acquisition and disposition transactions for managers and firms. For managers, the average price for sales is substantially higher than for purchases (€24.95 versus €13.25), while the average disposition price for equity offerings is well below the average acquisition price for repurchases (€11.55 versus €13.25). While such figures suggest that trading by managers may be more likely driven by under- or overpricing of the stock, these results are only preliminary and could well be explained by differences in firm characteristics, most likely firm size, between offering and repurchasing firms which drive the level of the stock price.

Next, multiple observations are aggregated per transaction day and trading directions are categorised based on number of shares underlying the transactions. Similar to the study presented in chapter 4, option conversions (exercise-and-hold) by managers are separated from option liquidations (exercise-and-sell). In this regard, manager acquisition trades are categorised as direct share purchases only and option conversions are eliminated.⁴⁸ Managerial disposition trades are categorised as direct share sales plus option liquidations.

Based on the categorisations presented above and the total numbers of shares involved, I observe 441 manager acquisition (*BUY*) firm-days (83 firms) and 1,125 manager disposition (*SELL*) firm-days (82 firms). Next, 377 company disposition (*OFF*) firm-days (60 firms) and 726 company acquisition (*REP*) firm-days (33 firms) are found. On the monthly level, I define 188 months as *BUY*, 489 as *SELL*, 98 as *ISS*, and 101 as *REP*.

5.4 RESEARCH METHODS

5.4.1 Abnormal Returns around Actual Trading

Abnormal share price performance is examined in the time window from 120 days before to 120 days after actual trading (Hillier and Marshall 2002a). In order to ensure that correlations between firm size and both stock returns and insider activity are not spurious, daily stock returns are adjusted for the average performance of similar sized firms. Therefore, at the beginning of each calendar month all firms available in the sample are sorted into ten equally-sized portfolios based on firm size (market capitalisation). Next, the return for firm i on day t

⁴⁸ Recall from chapter 4 that option conversions without subsequent share sales less likely reflect managers' private information. These transactions are more likely driven by non-information motivations such as tax incentives, pending expiration and dividend payments. Hence, option conversions are not included as managerial acquisition trades. Results are qualitatively unchanged when conversions are included.

(R_{it}) is adjusted for the equally weighted average return of firm i 's corresponding daily size portfolio ($R_{i(p)t}$).

Alternatively, one could use a market model or market model adjusted for firm size as in for example Gregory et al. (1997). However, nonsynchronous trading biases the parameter estimates from such models estimated on a daily basis. In my sample of daily returns, 18% of firm-trading-days have a zero return. Therefore, I adjust returns using the size-portfolio adjustment as in Lakonishok et al. (1994) and Fidrmuc et al. (2006).

5.4.2 Market Mispricing of Publicly Available Information

5.4.2.1 Residual Income Valuation

Given an assumption of no arbitrage, the value of a firm's equity (V_t^*) equals the present value of expected dividends (PVED) given all currently available information (Preinreich 1938):

$$V_t^* = \sum_{i=1}^{\infty} \frac{E_t[d_{t+i}]}{(1+r_e)^i} \quad (5.1)$$

where d_t is (net) dividends at time t , r_e is the cost of equity capital, and $E_t[.]$ is an expectations operator given information available at time t . Using the additional assumption of clean surplus accounting, i.e. all gains and losses affecting equity flow through the income statement, equation (5.1) can be reformulated to a model that expresses value in terms of reported and expected accounting numbers (see e.g., Ohlson 1995):

$$V_t^* = bv_t + \sum_{i=1}^{\infty} \frac{E_t[x_{t+i} - r_e bv_{t+i-1}]}{(1+r_e)^i} = bv_t + \sum_{i=1}^{\infty} \frac{E_t[ae_{t+i}]}{(1+r_e)^i} \quad (5.2)$$

where:

bv_t is the book value of equity from the latest publicly available balance sheet in period t ;

x_{t+i} is net income in period $t+i$;

ae_{t+i} is abnormal earnings in period $t+i$, defined as net income minus a charge for the opportunity cost of equity funds used ($x_{t+i} - r_e bv_{t+i-1}$).

To implement this residual income (abnormal earnings) valuation model (RIVM) in practice, a finite version of the model is required. Motivated by the availability of financial analysts' forecasts of earnings, the current study adopts a forecast horizon of three years. In this regard, a method similar to Bradshaw (2004) is employed, where abnormal earnings fade (or grow) with a rate ω after year three:

$$V_t = bv_t + \frac{ae_{t+1}}{(1+r_e)} + \frac{ae_{t+2}}{(1+r_e)^2} + \frac{ae_{t+3}}{(1+r_e)^3} + \frac{\omega(ae_{t+3})}{(1+r-\omega)(1+r_e)^3} \quad (5.3)$$

where ω is equal to one plus the growth rate in residual income beyond the forecast horizon ($1 + g_{ri}$). Two values for ω are used. The first is the residual income autoregressive parameter from Bradshaw (2004) of 0.68, which suggests that residual income fades towards zero in about ten years after year $t+3$. The economic argument that is often applied for fading residual income towards zero is that in the long-run, competitive pressures will drive down abnormal profitability. However, in the case that accounting is not unbiased such an assumption may not hold. That is, conservative accounting depresses book values and mechanically leads to differences between book values and market values (Feltham and Ohlson 1995). Such differences may be persistent when firms continue to grow through positive NPV projects while accounting remains conservative (Easton 2009). A result is that residual income will persist for a much longer period. Hence, again similar to Bradshaw (2004), the second value used for ω is equal to 1, which means that residual income in year $t+3$ is persistent. The cost of equity capital r_e is based on the CAPM, where market beta is estimated using a maximum of 60 monthly returns prior to month t and the Amsterdam Allshare Index is used for the market return. The risk-free rate and risk premium are set to 5%, but results do not change when alternative values are used.⁴⁹

The calculations of expected residual income in years 2 and 3 require estimates of equity book values in years 1 and 2. Because generally not forecasted by financial analysts, the clean-surplus relation is applied with an assumption of constant dividend payout to derive expected book values as follows:

⁴⁹ Frankel and Lee (1998) show that cross-sectional variation in residual income value-to-contemporaneous price is not sensitive to different assumptions on the costs of equity capital. As a check for robustness, several different constant discount rates are used. Untabulated tests indicate that results are not affected by using different discount rates.

$$bv_{t+1} = bv_t + x_{t+1} - d_{t+1} = bv_t + (1 - k)x_{t+1} \quad (5.4)$$

where:

d_{t+1} is dividends in year $t+1$;

k is a constant firm-specific dividend payout ratio.

The dividend payout ratio is assumed constant over time and is calculated from the most recently available financial statements. In case that $k > 1$ the average payout from the most recent three years is used. In case of negative earnings the ratio is calculated as $d_t / [0.06 * assets_t]$ (Lee et al. 1999). Finally, k is winsorized at 1.

Each firm-month is required to have both a one-year and a two-year-ahead analyst earnings forecast.⁵⁰ If a three-year ahead forecast is not available, the I/B/E/S long-term growth rate [ltg] is used to calculate forecasted earnings in year $t+3$. If ltg is not available, the return on equity in year $t+3$ is set equal to return on equity in year $t+2$ and then earnings in year $t+3$ are implied from $roe_{t+3} * bv_{t+2}$ (see Bradshaw, 2004 p.34). In this research, equation (5.3) is estimated on a monthly basis similar to Lee et al. (1999). That is, for each firm-month the intrinsic value is estimated using only information that is publicly available at that point in time. Next, the estimate of intrinsic value V_{it} is compared to contemporaneous (unadjusted I/B/E/S) stock price P_{it} by calculating V/P ratios to assess relative degree of under- or overvaluation by investors (Lee et al. 1999; Dong et al. 2006). Frankel and Lee (1998) and Ali et al. (2003) provide evidence that validates this construct as a measure for market mispricing, as it is significantly related to future stock returns through subsequent price corrections. The relation with future returns is stronger than for traditional valuation multiples such as earnings-to-price or forward earnings-to-price ratios.

5.4.2.2 Publicly Available Information

To ensure that V/P ratios are based on publicly available information, one needs to assess for each firm-month which book value number to use. For example, for the calculation of V for a December fiscal-year-end firm at the end of January 2000, do we use fiscal-year 1999 or

⁵⁰ Additional data requirements are that equity book values and forecasts of one- and two-year ahead earnings are non-negative.

1998 book value? Generally speaking, many firms have not had their earnings announcement at the end of January, and have not disclosed their full financial statements. Hence, it seems obvious to use book value from fiscal-year 1998 and use the earnings forecast for 1999 as eps_{t+1} . Next, when earnings for this firm are announced at the beginning of February, the I/B/E/S forecast of eps_{t+1} in this month will be updated from fiscal 1999 earnings to fiscal 2000 earnings. Therefore, expected earnings shift by one year and book value should also shift. However, because full financial statements are released later than the earnings announcement, actual fiscal 1999 book value cannot be used as the anchor in equation (3). Therefore a “synthetic” book value is computed for this month based on the clean surplus relation with actual earnings that were just announced. Assuming that financial statements are available at the end of the fourth month after fiscal year end, these synthetic book values are used until the fourth month after fiscal year end and thereafter actual reported book values are applied (see Lee and Swaminathan 1999).

5.4.2.3 Abnormal Earnings Growth Valuation

Ohlson (2005) demonstrates that the RIVM is not consistent with clean surplus on a per-share basis. Therefore, as a check for robustness, I apply the more recently developed abnormal earnings growth (AEGM) valuation model (Ohlson and Juettner-Nauroth 2005) which is not anchored on equity book value and does not rely on clean surplus. Besides clean surplus, another advantage is that while RIVM requires book value and forecasts of residual income, the AEGM model shows how to convert analysts’ forecasts of earnings into value. This is an advantage since analysts forecast earnings, not residual earnings (Penman 2005).

A straightforward derivation of the AEGM model is presented in Easton (2004), which again starts with the assumption of no-arbitrage:

$$P_0 = \frac{P_1 + d_1}{(1 + r_e)} \quad (5.5)$$

That is, the current value of a stock can be defined as the present value of total shareholder wealth in the next year. Adding and subtracting a capitalised earnings term yields:

$$P_0 = \frac{eps_1}{r_e} - \frac{eps_1}{r_e} + \frac{P_1 + d_1}{(1 + r_e)} \quad (5.6)$$

In a similar way, P_1 can be expressed in terms of eps_2 , r_e , and P_2 . Substitution of this expression for P_1 into the expression for P_0 leads to:

$$\begin{aligned}
P_0 &= \frac{eps_1}{r_e} - \frac{eps_1}{r_e} + \frac{\left[\frac{eps_2}{r_e} - \frac{eps_2}{r_e} + \frac{P_2 + d_2}{(1+r_e)} \right] + d_1}{(1+r_e)} \\
&= \frac{eps_1}{r_e} - \frac{eps_1}{r_e} + \frac{eps_2}{r_e(1+r_e)} - \frac{eps_2}{r_e(1+r_e)} + \frac{P_2 + d_2}{(1+r_e)^2} + \frac{d_1}{(1+r_e)} \\
&= \frac{eps_1}{r_e} + \left[\frac{eps_2}{r_e(1+r_e)} + \frac{r_e d_1}{r_e(1+r_e)} - \frac{eps_1(1+r_e)}{r_e(1+r_e)} \right] \\
&\quad + \left[\frac{r_e d_2}{r_e(1+r_e)^2} - \frac{eps_2(1+r_e)}{r_e(1+r_e)^2} \right] + \frac{P_2}{(1+r_e)^2} \\
&= \frac{eps_1}{r_e} + \frac{agr_2}{r_e(1+r_e)} + \frac{[r_e d_2 - (1+r_e)eps_2]}{r_e(1+r_e)^2} + \frac{P_2}{(1+r_e)^2}
\end{aligned} \tag{5.7}$$

where $agr_2 = eps_2 + rdps_1 - (1+r_e)eps_1$ is the expected abnormal growth in accounting earnings in year $t+2$, defined as cum-dividend earnings minus a term representing normal accounting earnings that is expected given earnings and dividends in period $t-1$ and the required rate of return r_e . Recursive substitution of P_2, P_3, P_4 , etc. in equation (5.7) leads to:

$$P_0 = \frac{eps_1}{r_e} + \sum_{\tau=2}^{\infty} \frac{agr_{\tau}}{r_e(1+r_e)^{\tau-1}} \tag{5.8}$$

where $agr_{\tau} = eps_{\tau} + rdps_{\tau-1} - (1+r_e)eps_{\tau-1}$. In contrast to the RIVM which is anchored on book value, the AEGM in equation (5.8) is anchored on capitalised earnings. Similar to the RIVM implementation, a finite forecast horizon with an assumption about growth in abnormal earnings growth beyond the horizon is necessary in order to implement the AEGM valuation. Therefore, abnormal earnings growth is calculated for two years ahead and thereafter a growth rate g_{agr} is assumed:

$$V_t = \frac{eps_{t+1}}{r_e} + \frac{agr_{t+2}}{r_e(1+r_e)} + \frac{agr_{t+2}(1+g_{agr})}{(r_e - g_{agr})r_e(1+r_e)} \tag{5.9}$$

where:

$agr_{t+2} = eps_{t+2} + r_e d_{t+1} - (1+r_e)eps_{t+1}$ is abnormal growth in earnings in year $t+2$;

g_{agr} is growth in abnormal growth in earnings beyond year $t+2$ (either 0% or 4%).

5.5 EMPIRICAL FINDINGS

5.5.1 Transaction Timing and Abnormal Returns

This section discusses the stock price performance around actual insider trades by managers (officers and directors) and firms in the Netherlands. The abnormal returns surrounding managers' personal purchases and sales are presented in Panel A of Figure 5.1. The performance around issues and repurchases is given in Panel B.

Consistent with previous studies in other institutional settings (e.g., Seyhun, 1996, 1998; Hillier and Marshall, 2002; Betzer and Theissen, 2008), managers of Dutch firms are successful in timing their personal trades. Insider sales are, on average, preceded by a sharp run-up in stock price starting about 80 days before the event. This suggests that managers act as contrarians, trading against prior price movements. Around the day on which the selling takes place, stock price has reached a peak and slightly declines in the subsequent period. Hence, managers appear to time their sales after sharp price run-ups and before price declines to avoid the loss of holding the shares. Similarly, managers buy shares when prices are relatively low. After the trade, a sharp price reaction is observed in the short interval after the event. In addition, prices keep rising on average and managerial purchases are predictive of future stock returns. Consistent with prior research (e.g., Lakonishok and Lee, 2001; Jeng et al., 2003), the absolute abnormal price performance after insider purchases is much greater than that observed after insider sales. On the other hand, the run-up prior to sales is greater than the absolute decline in price prior to purchases. Hence, prior returns are important for both types of trades, but are more important for sales.

Based on the hypothesis that firms time the market in a similar way, one could expect that firms similarly trade as contrarians. However, in contrast to managerial purchases, Panel B reveals that the price performance prior to repurchases is relatively stable around zero. Also, in contrast to managerial sales, equity issues are preceded by a decline in price rather than a run-up. Thus, prior price movements (hence potential market mispricing) appear not as important for firm trades as compared to managers' personal actions. Moreover, looking at the abnormal returns after the events, results do not suggest that Dutch firms successfully time their repurchases and issues before price run-ups and declines, respectively. For repurchases, slightly positive returns are observed after the event, but these are much less pronounced than

for managers' personal purchases. To better draw conclusions, Table 5.2 presents the statistical significance of abnormal returns for several time intervals.

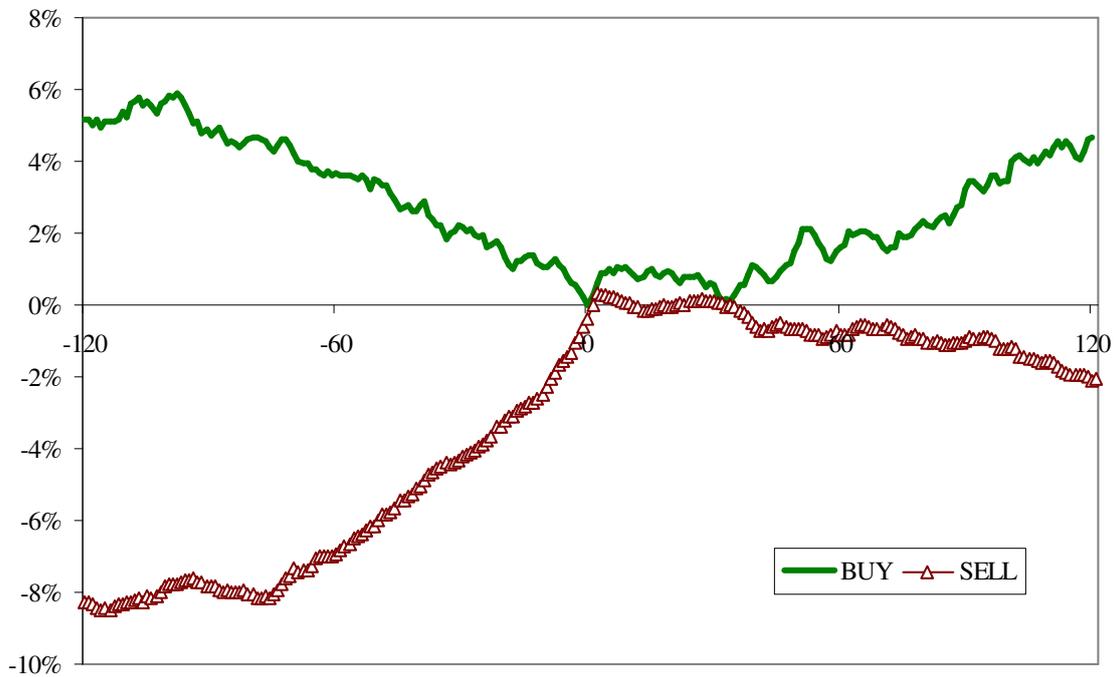
Panel A of Table 5.2 shows that abnormal returns of -5.02% for the 120 days leading up to managerial purchases are reliably different from zero (p-value: 0.0386). However, statistical significance disappears for the shorter time intervals prior to the event. Looking at post-trade performance, abnormal returns become significantly positive no longer than two days after the purchase, with economically and statistically significant returns for several longer time intervals. In contrast, abnormal returns around managers' sales are observed mainly before the event. The pre-transaction run-up in price equals +8.26% and is highly significant (p-value: 0.0000), while abnormal returns stay significant through the day of the trade. Negative abnormal returns after the trade of -2.04% are reliably different from zero for the 120 day window (0.0110), but less significant in economic terms compared to the +4.67% for purchases.

Analysing results for firm transactions in Panel B, returns are significantly negative before firms issue additional equity. Hence, in contrast to managers' personal sales, selling on the firms' accounts appears *inconsistent* with trading on potential overvaluation. Looking at post-trade performance, we observe a significant but inconsistent positive price reaction two and three days after the event. Also, longer-term abnormal returns are unreliably different from zero. For repurchases, abnormal returns in the 60 day window prior to trading are significantly negative. This finding is consistent with the academic literature that suggests that repurchases are timed to coincide with low market prices.

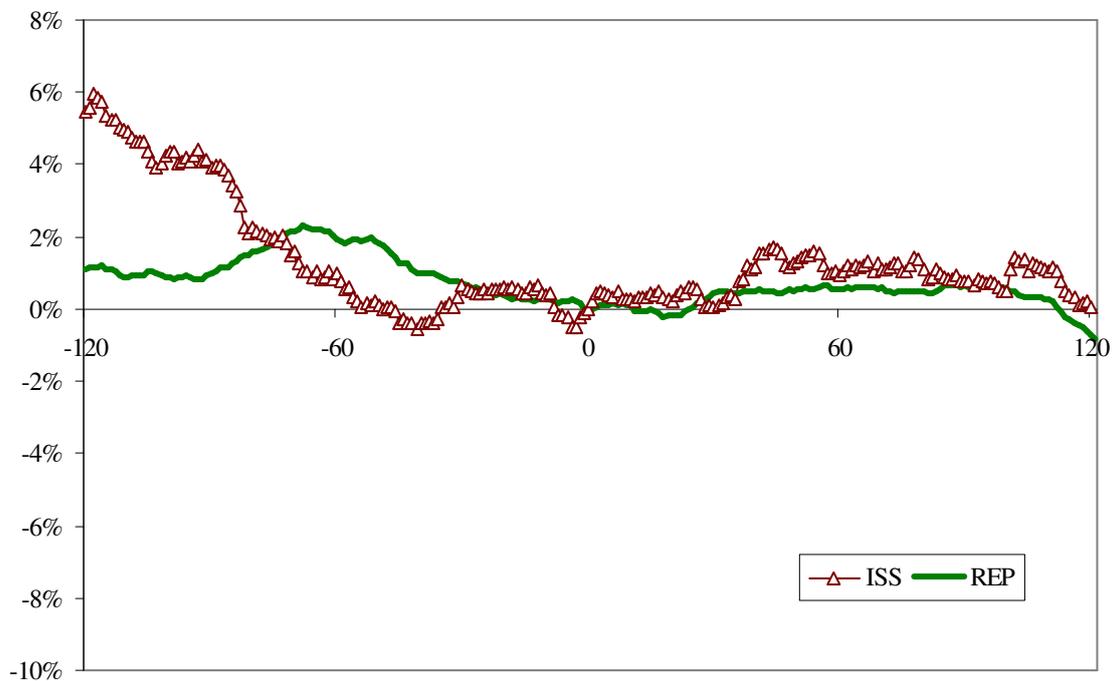
In summary, while managers' personal trades are correlated with prior and future price movements, results for actual firm repurchases and seasoned equity issues are weak. Equity issues in particular show inconsistent price patterns regarding the mispricing hypothesis. Thus, first evidence suggests that managers may be more concerned with stock price movements when trading for their own accounts compared to their trading on behalf of the firm. New issues may be more likely motivated by firms' financing needs for new investments, while repurchase timing may be partially obscured by needs to distribute excess cash, alter leverage ratios, fend off takeovers, or to counter the effects of dilution due to executive stock option exercises.

Figure 5.1
Event Study Abnormal Returns

Panel A: Purchases and sales by managers



Panel B: Equity issues and repurchases



Cumulative abnormal returns are based on daily size-adjusted stock returns. Event study transaction days are defined as “net purchases” (*BUY*) when the aggregate number of shares purchased by all managers within the same firm on the same day is greater than the aggregate number of shares sold. Event study transaction days are defined as “net sales” (*SELL*) when the aggregate number of shares sold by all managers within the same firm on the same day is greater than the aggregate number of shares purchased. Transaction days are defined as “issues” (*ISS*) when a company engages in seasoned equity issues, while event study transaction days are defined as “repurchases” (*REP*) when a company engages in stock repurchases.

Table 5.2
Event Study Abnormal Returns

Panel A: Purchases and sales by managers

	<i>BUY</i>		<i>SELL</i>	
	CAR	p-value	CAR	p-value
[-120,0]	-5.02%	0.0386	8.26%	0.0000
[-60,0]	-3.60%	0.0088	6.97%	0.0000
[-10,0]	-1.04%	0.0821	2.28%	0.0000
[-3,0]	-0.63%	0.1115	1.04%	0.0000
[-2,0]	-0.55%	0.1250	0.90%	0.0000
[-1,0]	-0.38%	0.2194	0.62%	0.0000
[0,0]	-0.21%	0.3635	0.37%	0.0006
[0,1]	0.29%	0.1746	0.31%	0.0057
[0,2]	0.59%	0.0188	0.26%	0.1024
[0,3]	0.87%	0.0030	0.27%	0.1445
[0,10]	0.96%	0.0256	-0.03%	0.9143
[0,60]	1.61%	0.1251	-0.81%	0.1499
[0,120]	4.67%	0.0048	-2.04%	0.0110

Panel B: Equity issues and repurchases

	<i>ISS</i>		<i>REP</i>	
	CAR	p-value	CAR	p-value
[-120,0]	-5.42%	0.0032	-1.09%	0.1053
[-60,0]	-0.81%	0.4925	-1.94%	0.0002
[-10,0]	-0.44%	0.3743	-0.28%	0.2483
[-3,0]	0.49%	0.1005	-0.23%	0.1198
[-2,0]	0.50%	0.0492	-0.14%	0.2492
[-1,0]	0.22%	0.3384	-0.02%	0.8659
[0,0]	0.10%	0.5731	0.00%	0.9394
[0,1]	0.21%	0.1797	0.05%	0.4264
[0,2]	0.45%	0.0401	0.11%	0.2624
[0,3]	0.50%	0.0483	0.12%	0.3455
[0,10]	0.27%	0.5588	-0.05%	0.8034
[0,60]	0.96%	0.3628	0.56%	0.2260
[0,120]	0.05%	0.9742	-0.85%	0.1631

Cumulative abnormal returns are based on daily size-adjusted stock returns. Event study transaction days are defined as “net purchases” (*BUY*) when the aggregate number of shares purchased by all managers within the same firm on the same day is greater than the aggregate number of shares sold. Event study transaction days are defined as “net sales” (*SELL*) when the aggregate number of shares sold by all managers within the same firm on the same day is greater than the aggregate number of shares purchased. Transaction days are defined as “issues” (*ISS*) when a company engages in seasoned equity issues, while event study transaction days are defined as “repurchases” (*REP*) when a company engages in stock repurchases.

5.5.2 Transaction Timing and Value-to-Price Ratios

Prior research suggests that managers’ ability to predict future stock returns is explained by their ability to detect market valuation errors as well as their foreknowledge of long-term

future performance. Therefore, to provide more evidence on the source of the ability to beat the market, I examine the association between trading activity and the extent to which market prices deviate from fundamental values. More specifically, I test for predictable differences in V/P ratios based on the accounting-based valuation models presented in section 5.4.

Prior research has also attempted to provide empirical evidence on the relation between market valuation errors and insider trades. However, studies such as Rozeff and Zaman (1998), Piotroski and Roulstone (2005), and Jenter (2005) rely on the book-to-market ratio as a measure of under- or overvaluation. A problem with a focus on book-to-market ratios in this context is that the academic literature has reached no consensus about whether this ratio is a useful valuation measure, a priced risk factor (Fama and French 1993; Ali et al. 2003), a measure of growth expectations (Skinner and Sloan 2002), a proxy for information asymmetry (Dong et al. 2006), or driven by unconditional accounting conservatism (Beaver and Ryan 2005; Roychowdhury and Watts 2007) and differences in accounting treatments across industries.⁵¹ Hence, it could well be that differences in book-to-market ratios found in the insider trading literature are a manifestation of differences in unobservable firm characteristics. To resolve this issue, my study relies on theoretical valuation models based on reported and expected accounting information, one model which is widely accepted (RIVM), and one model which is relatively new (AEGM) but has some desirable features over the RIVM (Ohlson 2009; Easton 2009).

Table 5.3 presents descriptive statistics on firm characteristics and V/P ratios for months with and without actual trading.⁵² Panel A presents means and medians for these firm-months of firm size (natural logarithm of total assets), number of monthly I/B/E/S earnings forecasts (a proxy for analyst following), market beta, leverage, and value-to-price ratios. Comparing these statistics, I find that firms with managerial sales are larger than firms with purchases, and these firms have higher analyst following. In addition, firms with insider selling have slightly higher systematic risk as suggested by average betas. Compared to firms with personal trading, firms with repurchases and equity offerings are larger and more highly levered.

The last four columns of Panel A present mean and median V/P ratios, where V/P_1 is based on RIVM with $\omega = 0.68$, V/P_2 is based on RIVM with $\omega = 1.00$, V/P_3 is based on AEG

⁵¹ Note that the outcomes of both valuation models are not affected by conservatism. For example, holding everything else constant in the RIVM, conservatism depresses current book value (and thus the book-to-market ratio) while future abnormal earnings (earnings less opening book value times the expected rate of return) are higher and offset the negative effect of conservatism on equity book value.

⁵² All continuous variables are winsorized to the 1st and 99th percentiles of their distributions.

with $g_{agr} = 0.00$, and V/P_4 is based on AEG with $g_{agr} = 0.04$. Results for all four value-to-price ratios suggest that managers buy shares when stock price is low relative to fundamental values, while they sell when price is relatively high.⁵³ For firm insider trading, findings indicate that repurchase months do not have substantially different value-to-price ratios than issue months, suggesting that valuation errors less likely explains these transactions.

Panel B of Table 5.3 shows the statistical difference of the variables between insider trading months and the holdout sample of firm-months in which no trading is observed. First, firms in which managers or firms are active as insiders are significantly larger than other firms on the Amsterdam Stock Exchange. Similarly, while the mean number of analyst forecasts equals 11.44 for the holdout sample, average analyst following is significantly greater for firms with insider trading activity. Further, *SELL* months have significantly higher systematic risk and lower leverage.

Value-to-price ratios are significantly lower in *SELL* months. Consistent across the four implementations, results suggest that managers sell when the stock is overvalued based on available public information. For managerial buying, V/P_2 is significantly higher than in the holdout sample, but this result does not hold for the other ratios and the non-parametric test statistic. For *ISS* as well as *REP* months, value-to-price ratios are not reliably different from the holdout sample.

Overall, these findings suggest that managers sell shares when the stock is overvalued, implying they are better able to value the firm's stock than the market, even when only considering publicly available information. Hence, the superior timing ability of managers can at least to some extent be ascribed to their view on investors' stock valuations. This finding is potentially relevant for policy makers and regulatory bodies since it suggests that managers do not necessarily trade on specific non-public information. In section 5.5.4, I tests insiders' predictive ability for long-run future returns (i.e., 6, 12, and 18 month buy-and-hold abnormal returns) after controlling for V/P ratios in order to differentiate between public and private information trading.

⁵³ Consistent with Penman (2005), the AEG based V/P ratios have substantially higher means and standard deviations in the total sample of observations than the RIVM estimates. Although this finding reduces the ability to interpret the magnitude of the ratio as under- or overvaluation, it is not necessarily bad for the research design since we are only interested in cross-sectional variation in V/P ratios. In a similar way, I am not concerned with the fact that the RIVM V/P ratios are on average not equal to one. A deviation of the average from one is caused by the assumptions on costs of equity and growth. Therefore, since we are interested in cross-sectional variation rather than the magnitude of value-to-price ratios I do not consider this to be a particular problem.

Table 5.3
Univariate V/P Results

Panel A: Characteristics and V/P ratios for sub-samples of insider trading activity									
	n	$\ln(TA)$	<i>NEST.</i>	<i>BETA</i>	<i>LEV</i>	V/P_1	V/P_2	V/P_3	V/P_4
<i>BUY</i>									
mean	188	6.96	16.17	0.98	0.16	0.80	1.26	2.41	3.71
median		6.71	13.00	0.83	0.15	0.70	1.09	1.89	2.86
<i>SELL</i>									
mean	489	7.59	18.15	1.04	0.13	0.58	0.89	1.56	2.31
median		6.89	15.00	0.87	0.12	0.50	0.82	1.27	1.57
<i>ISS</i>									
mean	98	8.30	18.15	1.03	0.18	0.77	1.11	2.30	3.66
median		7.82	16.00	0.94	0.16	0.72	1.06	1.64	2.19
<i>REP</i>									
mean	101	7.94	17.36	0.97	0.18	0.81	1.17	2.17	3.37
median		7.56	13.00	0.86	0.15	0.71	1.10	1.69	2.30
Panel B: Holdout sample comparison and statistical significance									
	n	$\ln(TA)$	<i>NEST.</i>	<i>BETA</i>	<i>LEV</i>	V/P_1	V/P_2	V/P_3	V/P_4
<i>Holdout sample</i>									
mean	7,090	6.39	11.44	0.95	0.16	0.82	1.18	2.38	3.85
<i>BUY</i>									
mean difference		0.57	4.73	0.03	0.01	-0.02	0.08	0.02	-0.14
p-value (t-test)		0.0003	0.0000	0.4727	0.3659	0.5736	0.0847	0.8855	0.6929
p-value (rank test)		0.0108	0.0001	0.7676	0.2267	0.1040	0.8825	0.3221	0.1479
<i>SELL</i>									
mean difference		1.20	6.70	0.09	-0.02	-0.23	-0.29	-0.83	-1.54
p-value (t-test)		0.0000	0.0000	0.0012	0.0002	0.0000	0.0000	0.0000	0.0000
p-value (rank test)		0.0000	0.0000	0.0549	0.6761	0.0000	0.0000	0.0000	0.0000
<i>ISS</i>									
mean difference		1.91	6.71	0.08	0.03	-0.05	-0.07	-0.08	-0.19
p-value (t-test)		0.0000	0.0000	0.2380	0.0620	0.3215	0.2877	0.7134	0.6949
p-value (rank test)		0.0000	0.0010	0.1545	0.1481	0.4158	0.1545	0.7541	0.4648
<i>REP</i>									
mean difference		1.55	5.91	0.02	0.02	-0.01	-0.01	-0.22	-0.48
p-value (t-test)		0.0000	0.0000	0.7813	0.1347	0.8486	0.9318	0.3137	0.3198
p-value (rank test)		0.0000	0.0000	0.4821	0.0018	0.2709	0.9191	0.9177	0.7566

Descriptive statistics are based on months of insider trading by firms and managers. $\ln(TA)$ equals the natural logarithm of total assets, *NESTIM* equals the number of analyst forecasts available for the month (a proxy for analyst following), *BETA* is the CAPM beta estimated using a maximum of 60 months of prior stock returns, *LEV* is the ratio of long-term debt (including the current portion of long-term debt) to total assets, and *V/P* is the value-to-price ratio based on alternative implementations of the *RIVM* (1 and 2) and *AEGM* (3 and 4). Firm-months are defined as *BUY* (*SELL*) when the aggregate number of shares purchased (sold) during the month is greater than the number of shares sold (purchased). Firm-months are defined as *ISS* (*REP*) when the aggregate number of shares issued (repurchased) during the month is greater than the number of shares repurchased (issued). All continuous variables are winsorized to the 1st and 99th percentiles of their distributions.

5.5.3 *Multivariate Analyses*

Results for the cross-sectional differences in value-to-price ratios in the previous section were univariate and based on pooled data. Hence, it could be that the lower value-to-price ratios for *SELL* months are driven by one of the other factors such as risk or firm size. Therefore, I now turn to multivariate regressions to determine the relation between *V/P* ratios and trading activity. These analyses also control for the fact that value-to-price ratios are not stable over time and affected by market conditions (Lee et al. 1999) by including fixed effects for calendar years and months.

Table 5.4 first presents Pearson and Spearman correlations across the *V/P* ratios and firm characteristics. The correlations between 0.43 and 0.79 for the four valuation ratios suggest that these ratios are positively correlated, but still sufficiently different. Valuation ratios are lower for large firms and even more so for firms with higher analyst following, suggesting such firms are more likely overvalued. *BETA* is significantly negatively related with the valuation ratios, which is partly explained by its mechanical effect through r_e . Unreported statistics show that multicollinearity between the explanatory variables is of no serious concern.

Table 5.4
Correlation Matrix

	<i>V/P</i> ₁	<i>V/P</i> ₂	<i>V/P</i> ₃	<i>V/P</i> ₄	<i>ln(TA)</i>	<i>NEST.</i>	<i>BETA</i>	<i>LEV</i>
<i>V/P</i> ₁		0.76	0.55	0.43	-0.05	-0.34	-0.23	-0.01
<i>V/P</i> ₂	0.79		0.66	0.56	-0.15	-0.34	-0.42	-0.01
<i>V/P</i> ₃	0.57	0.69		0.96	-0.17	-0.30	-0.27	-0.05
<i>V/P</i> ₄	0.45	0.58	0.98		-0.16	-0.26	-0.29	-0.06
<i>ln(TA)</i>	-0.03	-0.12	-0.13	-0.10		0.66	-0.17	0.32
<i>NESTIM</i>	-0.36	-0.34	-0.32	-0.28	0.59		0.06	0.17
<i>BETA</i>	-0.25	-0.46	-0.39	-0.43	-0.13	0.17		-0.10
<i>LEV</i>	0.05	0.06	-0.01	-0.01	0.43	0.21	-0.09	

Pearson (Spearman) correlations are reported above (below) diagonal. All variables are defined as in Table 5.3. Bold text indicates statistical significance at a level of 0.05 or better.

Table 5.5 presents results of the multivariate regressions. The dependent variable in the regressions is the average value of the four value-to-price ratios. I take the natural logarithm of one plus V/P because V/P is highly skewed. Standard errors are adjusted for heteroskedasticity and clustering on the firm level (Petersen 2009).

In Model 1, V/P is regressed on BUY and $SELL$. The coefficient on $SELL$ of -0.1774 is highly significant, confirming that managers sell shares when the stock is overpriced relative to fundamental value, after controlling for time variation in V/P . Similar to the results in Table 5.3, coefficients on BUY in Model 1 and ISS and REP in Model 2 are not reliably different from zero. Next, Models 3 and 4 include the firm characteristics (size, analyst following, and beta) to identify whether results are driven by these factors. Again strong evidence is found that managerial share sales are associated with significantly lower value-to-price ratios. In addition, after controlling for the set of firm characteristics, V/P is significantly higher in BUY months. These findings are consistent with managers purchasing shares in undervalued stocks, while selling shares in overvalued stock given all information available to the market. Whether these relations explain managers' ability to predict future returns is examined in the following section.

Lastly, results for firms issuing new shares are consistent with the results in the event study tests. That is, while issues occur after average price declines (see Figure 5.1, Panel B), I find that ISS months are associated with significantly higher value-to-price ratios. Hence, firms' timing of share sales are substantially different than managers' timing of sales as an opposite and unpredicted positive relation is found with V/P . For REP , no significant association is found with V/P , which is consistent with the univariate results, but inconsistent with management timing these trades.

5.5.4 Tests of Public versus Private Information Trading

In this final section, I test the relation between reported trading and future buy-and-hold abnormal returns, while controlling for the relation between trading and market valuation errors of public information. Using logistic regressions, I analyse the extent to which the propensity to trade is explained by future abnormal returns while controlling for V/P , prior returns, and firm characteristics. If trading is significantly related to future returns after controlling for these factors, I interpret this as evidence of trading on private information.

Table 5.5
Multivariate V/P Results

	Dependent variable:			
	$\ln(1+V/P)_t$	$\ln(1+V/P)_t$	$\ln(1+V/P)_t$	$\ln(1+V/P)_t$
	Model 1	Model 2	Model 3	Model 4
BUY_t	0.0374 [0.74]		0.0832 [2.49]**	
$SELL_t$	-0.1774 [4.82]***		-0.0855 [3.02]***	
ISS_t		-0.0228 [0.32]		0.1053 [2.09]**
REP_t		-0.0537 [0.67]		0.0548 [1.10]
$\ln(TA)_t$			-0.0205 [1.68]*	-0.0217 [1.78]*
$NESTIM_t$			-0.0078 [2.82]***	-0.0080 [2.90]***
$BETA_t$			-0.2862 [10.85]***	-0.2880 [10.86]***
LEV_t			-0.1171 [0.77]	-0.1033 [0.68]
Year dummies	Included	Included	Included	Included
Month dummies	Included	Included	Included	Included
Observations	7,937	7,937	7,937	7,937
Adjusted R ²	0.0711	0.0621	0.2815	0.2794

OLS regressions of (the natural logarithm of one plus) the firm-month specific V/P ratio on insider trading indicators and control variables. The dependent variable is the average value of the four firm-month specific value-to-price ratios based on *RIVM* and *AEGM*. $\ln(TA)$ equals the natural logarithm of total assets, *NESTIM* equals the number of analyst forecasts available for the month (a proxy for analyst following), *BETA* is the CAPM beta estimated using a maximum of 60 months of prior stock returns, and *LEV* is the ratio of long-term debt (including the current portion of long-term debt) to total assets. Firm-months are defined as *BUY* (*SELL*) when the aggregate number of shares purchased (sold) during the month is greater than the number of shares sold (purchased). Firm-months are defined as *ISS* (*REP*) when the aggregate number of shares issued (repurchased) during the month is greater than the number of shares repurchased (issued). Statistical significance is based on robust standard errors adjusted for heteroskedasticity and clustering on the firm level. All continuous variables are winsorized to the 1st and 99th percentiles of their distributions.

Results are presented in Table 5.6. Panel A presents the logistic estimations with the *BUY* and *SELL* indicators as dependent variables. For each trading direction, I test for an association with buy-and-hold returns for 6, 12, and 18 months in the future.

Consistent with the event study results, managerial purchases are associated with negative pre-event abnormal returns. This relation is not significant, which can be explained by the inclusion of *V/P*.⁵⁴ After controlling for the significantly positive effect of *V/P* on the propensity to buy, future returns have a positive relation with the dependent variable. This relation is most pronounced for the 6 month holding period. These findings suggest that managers' ability to predict future returns is explained by both private information and their ability to detect market valuation errors of publicly available information. For managerial sales, however, I find no association with future abnormal returns, which suggests that managers' timing ability with regard to their personal share sales stems only from their ability to detect market valuation errors of public information.

In Panel B, results for seasoned equity issuance are consistent with prior research. That is, 12 and 18 month buy-and-hold returns are significantly negative (Spiess and Affleck-Graves 1995; Teoh et al. 1998). However, these transactions appear inconsistent with the literature that suggests that management has incentives to issue shares when the stock is overvalued (Ikenberry et al. 2000; Graham and Harvey 2001), as *ISS* has a significantly positive relation with *V/P*. Again, results show no association between *REP* and prior returns, *V/P*, and future returns.

⁵⁴ When *V/P* is removed from the estimation, the coefficient on prior returns becomes statistically significant.

Table 5.6
Tests of Public versus Private Information Trading

Panel A: Purchases and sales by managers

	Dependent variable:					
	<i>BUY_t</i>	<i>BUY_t</i>	<i>BUY_t</i>	<i>SELL_t</i>	<i>SELL_t</i>	<i>SELL_t</i>
	Model 1 $\tau=6$	Model 2 $\tau=12$	Model 3 $\tau=18$	Model 4 $\tau=6$	Model 5 $\tau=12$	Model 6 $\tau=18$
<i>BHAR_{t-6}</i>	-0.5525 [1.48]	-0.5833 [1.54]	-0.5997 [1.52]	1.0530 [4.35]***	1.0564 [4.23]***	1.0303 [4.06]***
<i>BHAR_{t+\tau}</i>	0.9583 [2.34]**	0.5747 [1.92]*	0.4910 [1.67]*	0.0235 [0.11]	0.0298 [0.15]	-0.0053 [0.03]
<i>ln(1+V/P)_t</i>	0.5807 [2.66]***	0.5448 [2.38]**	0.5632 [2.47]**	-0.7979 [2.45]**	-0.8010 [2.45]**	-0.7985 [2.48]**
Year dummies	Included	Included	Included	Included	Included	Included
Month dummies	Included	Included	Included	Included	Included	Included
Table 5.5 contr.	Included	Included	Included	Included	Included	Included
Observations	7,513	7,235	6,948	7,513	7,235	6,948
Pseudo R ²	0.0667	0.0642	0.0648	0.0924	0.0903	0.0879

Panel B: Equity issues and repurchases

	Dependent variable:					
	<i>ISS_t</i>	<i>ISS_t</i>	<i>ISS_t</i>	<i>REP_t</i>	<i>REP_t</i>	<i>REP_t</i>
	Model 1 $\tau=6$	Model 2 $\tau=12$	Model 3 $\tau=18$	Model 4 $\tau=6$	Model 5 $\tau=12$	Model 6 $\tau=18$
<i>BHAR_{t-6}</i>	-0.1100 [0.15]	-0.1207 [0.16]	-0.1802 [0.23]	-0.1453 [0.25]	-0.0762 [0.14]	-0.1611 [0.29]
<i>BHAR_{t+\tau}</i>	-0.5353 [1.19]	-0.6327 [2.13]**	-0.5605 [1.90]*	0.1804 [0.29]	-0.7365 [1.46]	-0.3791 [0.87]
<i>ln(1+V/P)_t</i>	0.8081 [2.04]**	0.7541 [1.84]*	0.7836 [1.89]*	0.3350 [0.80]	0.3922 [0.96]	0.3648 [0.89]
Year dummies	Included	Included	Included	Included	Included	Included
Month dummies	Included	Included	Included	Included	Included	Included
Table 5.5 contr.	Included	Included	Included	Included	Included	Included
Observations	7,513	7,235	6,948	7,513	7,235	6,948
Pseudo R ²	0.1044	0.1081	0.1120	0.1203	0.1233	0.1190

Logistic regressions of trading indicator variables on prior size-adjusted buy-and-hold returns (*BHAR_{t-6}*), the *V/P* ratio, control variables from Table 5.5, and future $\tau=6$, $\tau=12$, and $\tau=18$ month size-adjusted buy-and-hold returns (*BHAR_{t+\tau}*). *V/P* is the average value of the four firm-month specific value-to-price ratios based on *RIVM* and *AEGM*. Firm-months are defined as *BUY* (*SELL*) when the aggregate number of shares purchased (sold) during the month is greater than the number of shares sold (purchased). Firm-months are defined as *ISS* (*REP*) when the aggregate number of shares issued (repurchased) during the month is greater than the number of shares repurchased (issued). Statistical significance is based on robust standard errors adjusted for heteroskedasticity and clustering on the firm level. All continuous variables are winsorized to the 1st and 99th percentiles of their distributions.

5.6 SUMMARY AND CONCLUSIONS

This chapter extended the literature on corporate insider trading and equity market timing by examining the timing of *actual* open market stock transactions by managers as well as firms, using models of equity valuation to examine the motivations behind these trades. Using data from the Netherlands, where both managers and firms were required to report their trading activity prior to October 2005, this study shows that managers are more sophisticated market participants when trading on their personal accounts, and less so when acting in similar transactions on behalf of the firm. These findings contrast with recent survey evidence that suggests that managers time their firms' transactions to exploit temporary market mispricing (Brav et al., 2005; Graham and Harvey, 2001).

The chapter presents new evidence that managers' share sales are signals of market overvaluation of publicly available information about the firm. Firm-months with insider sales have relatively low value-to-price ratios compared to a sample of holdout firms after controlling for firm characteristics. This finding is important as successful timing ability is explained by managers' personal assessments of stock values given all publicly available information, rather than their specific private information advantage. On the other hand, I find that personal purchases reflect both superior information as well as signals of market undervaluation. These results suggest that timely disclosures of insider trades may potentially increase the efficiency with which investors value firms' traded equity. Findings for firm transactions, however, are inconsistent with a timing hypothesis, or are at best weak.

The implications drawn from the comparison between managers and firms are that timely public disclosure of firms' open market transactions appears not as desirable as in the case of managers' personal trades. In light of the recent switch in Dutch regulation due to European harmonisation and the limited disclosure in countries such as the U.S., this chapter showed that average actual equity issuance and repurchase timing reflects little valuation relevant information. In the following chapter, I further examine the relevance of disclosures of personal insider trades in the U.S. setting, where since 2002 insider managers are required to disclose their personal trading activity within two business days. Specifically, I test the extent to which disclosures of insider purchases resolve uncertainty regarding the valuation implications of past earnings, thus enhancing price efficiency with regard to earnings information.

APPENDIX 5.1

Country	Disclosure req.	Firm as “insider”	Trading dates
US*	No	No	No
UK	1 business day	Yes	Yes
Hong Kong	1 business day	Yes	Yes
Canada	10th day next month	Yes	Yes
France	Monthly (non-public)	No	No
The Netherlands**	5 business days	Yes	Yes

* In December 2003, amendments were made to SEC Rule 10b-18 to enhance transparency. Disclosure is required for repurchases during the previous fiscal quarter, including number of shares purchased and the average transaction price.

** These figures apply until the end of September 2005. In October 2005, regulation was changed as a result of implementation of the Market Abuse Directive and companies are no longer treated as corporate insiders.

6 Information Uncertainty and the Relevance of Reported Insider Trades

6.1 INTRODUCTION

On February 9th 2009, Motorola's stock price increased by more than four percent after the company disclosed that its two top executives had purchased substantial amounts of shares in the firm. The stock, which had lost about two-thirds of its value in less than a year, benefited from the signal conveyed by management after the company announced a significant quarterly loss one week earlier (BusinessWeek 2009). The purpose of this chapter is to examine the usefulness of reported insider trades to equity investors, in particular when there is uncertainty about the valuation implications of previously announced quarterly earnings.

Information asymmetry and agency conflicts between insiders and outside investors feed the demand for financial reporting and additional disclosures. Additional disclosures may reduce information asymmetry in situations where accounting earnings do a poor job of reflecting economic performance (Dechow and Schrand 2004) or when voluntary disclosures are highly subjective (Gu and Li 2007). One of the most direct signals that may reduce the information gap between insiders and outsiders is management's decision to trade their own firm's equity. Information about such decisions is readily available to investors through the SEC's Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system. Between 2003 and 2007, over 3 million unique reports were filed on EDGAR, of which by far the most were Form 4 filings of changes in beneficial ownership (33.03%).⁵⁵

This chapter focuses on a large sample of insider purchases filed on SEC Form 4 to determine the implications of these filings for investor decision making. The research is motivated by the well documented investor underreaction to earnings information and associated subsequent price drifts (Foster et al. 1984; Bernard and Thomas 1989; Bernard and Thomas 1990; Abarbanell and Bernard 1992; Ball and Bartov 1996). Brav and Heaton (2002)

⁵⁵ See <http://ftp.sec.gov>. Second are the current reports of material developments (Form 8-K, 14.19%), the filing of current reports by foreign issuers next (Form 6-K, 3.63%). In comparison, only 3.02% of observations are 10-Q (quarterly financial statements) filings and 1.26% are 10-K (annual financial statements) filings.

suggest that rational investors may initially place lower weights on more uncertain information signals. When uncertainty is resolved in subsequent periods, stock prices move towards the values implied by the information. In this regard, Francis et al. (2007) document that information uncertainty contributes to initial investor underreaction to earnings announcements and subsequent price drifts when uncertainty is resolved. Building on the insider trading literature which suggests that managers' personal purchase decisions reflect private information (Seyhun 1986; Seyhun 1988; Beneish and Vargus 2002; Jeng et al. 2003; Piotroski and Roulstone 2005), I hypothesise that insider purchase disclosures provide an important source of information to equity investors that resolves information uncertainty. That is, I predict that market reactions to disclosures of insider purchases are increasing in uncertainty about the implications of past earnings changes for future earnings.

Using the variation in the extent to which working capital accruals map into cash flows as a measure of uncertainty (e.g., Dechow and Dichev 2002; Francis et al. 2005), empirical results support the prediction. After controlling for other characteristics of insider trades and firms' information environments, I find that insider purchases trigger significantly larger market reactions in firms with lower quality accruals. This effect is concentrated only in observations where the previously announced change in quarterly earnings is positive, consistent with investors relying on insider trades to revise their initial assessments of the implications of past earnings for future earnings.

Additional tests reveal that investors' price reactions are positively related to future earnings innovations, consistent with insider trades and their subsequent disclosures accelerating the incorporation of future earnings information into stock prices (Roulstone 2008). However, further tests reveal that this effect is driven by low accrual quality firms with positive past earnings changes. These findings suggest that insider trades convey information about the valuation implications of past earnings and not necessarily about forthcoming earnings disclosures. In addition, the association between market reactions and accrual estimation errors appears to be driven by estimation error resulting from management discretion. Hence, the evidence suggests that insider purchase filings appear to confirm the credibility of subjective accrual adjustments by company management.

This chapter contributes to several streams of literature. First, it extends the literature on insider trading by analysing the implications of disclosures of trades for investor decision making. Making use of the regulatory setting after SOX and electronic filing on EDGAR – which make insider trades promptly visible to the market – this study adds to prior research

(Lakonishok and Lee 2001; Brochet 2010) by showing how the usefulness of these disclosures varies with uncertainty about the valuation implications of past earnings changes.

Also, the chapter adds empirical evidence to the debate regarding the pros and cons of allowing insiders to trade their own firm's equity (e.g., Manne 1966b; Manne 1966a; Carlton and Fischel 1983; Lustgarten and Mande 1998). Results suggest that when insider trading is allowed, disclosures of trades help to push prices towards their fundamental values. In this regard, the fundamental difference with prior research is that this study links information in insider trades to past (publicly available) earnings information rather than (private) information related to forthcoming earnings disclosures.

Roulstone (2008) documents that insider trades are related to future earnings news and that reported trades are associated with lower subsequent earnings announcement returns and more information leakage. These findings suggest that insider trades convey valuation relevant information to the market. My study adds to Roulstone (2008) by examining market reactions to insider trade filings and linking the information content of trades to previously released earnings information rather than forthcoming disclosures. Results in this chapter suggest that the association between reported insider trades and future earnings announcement news may be more subtle than previously documented and, at least partly, explained by the market updating its beliefs about the implications of prior earnings signals.

Second, the chapter adds to the literature focused on investor underreaction to earnings information and post-earnings announcement drift (e.g., Foster et al. 1984; Bernard and Thomas 1989). Because of imperfect information, investors are initially uncertain about the implications of earnings changes for future earnings. Additional information disclosures, such as subsequent earnings announcements (Freeman and Tse 1989) or dividend changes (Koch and Sun 2004) may resolve this uncertainty and contribute to the price drift after earnings announcements. Francis et al. (2007) show that in firms with lower quality accruals the initial reactions to earnings are more muted and subsequent drifts are greater. Results in this study suggest that the most direct signal of management's private information (i.e., insider purchases) plays a role in resolving such uncertainty and facilitates efficient pricing of the past earnings signal.

Lastly, the chapter extends a more general stream of research examining the usefulness of filings made on EDGAR. While such research has focused on investor use of information filed in Form 10-K/Q filings (Asthana and Balsam 2001; Griffin 2003; You and Zhang 2009) or Form 8-K filings (Lerman and Livnat 2009), relatively little attention has been paid to the usefulness of the single most frequently filed piece of information, i.e. insider ownership

reports on Form 4. The findings of this chapter add to this line of literature by showing that, on average, Form 4 filings result in economically significant belief revisions about the value of the firm.

6.2 BACKGROUND LITERATURE AND INSTITUTIONAL SETTING

A large body of literature has examined the information content of reported insider trades. Robust findings in this literature are that insiders, i.e. corporate officers and directors; earn abnormal returns when trading their firms' shares (e.g., Jaffe 1974; Finnerty 1976; Elliott et al. 1984; Seyhun 1986; Pope et al. 1990; Seyhun 1998), trade as contrarians (Rozeff and Zaman 1998; Jenter 2005), trades are related to future earnings information (Beneish and Vargus 2002; Ke et al. 2003; Piotroski and Roulstone 2005; Roulstone 2008), trading profitability is related to empirical proxies for information asymmetry (Frankel and Li 2004; Aboody et al. 2005; Huddart and Ke 2007), and aggregate insider trading predicts future market movements (Seyhun 1988; Seyhun 1992b). As insiders generally acquire shares through compensation, insider sales are primarily driven by consumption and diversification needs and reflect much less private information than insider purchases (Jeng et al. 2003; Lakonishok and Lee 2001; Rozeff and Zaman 1998). For sub-samples of insider sales, however, there is some evidence consistent with sales being motivated by insiders' private information related to earnings management (Beneish and Vargus 2002; Bartov and Mohanram 2004) and fraud (Summers and Sweeney 1998; Beneish 1999).

An important issue is whether profitable trading by insiders should be allowed, an issue subject to heated debate. Proponents of strict regulation on insider trading argue that allowing insiders to profit from their asymmetric information advantage is unfair and harms investor confidence and market liquidity (e.g., Ausubel 1990; Fishman and Hagerty 1992). On the other hand, Manne (1966b; 1966a) argues that insider trading facilitates efficient price formulation because managers' trading decisions may communicate their private information to the market. In this regard, Leland (1992) shows that allowing insiders to trade makes stock prices better reflect information and potentially increases welfare. Piotroski and Roulstone (2004) find that insider trades are negatively related to stock price synchronicity (an inverse measure of the level of firm-specific information reflected in stock price) and facilitate the incorporation of firm-specific future earnings information into stock prices. Lustgarten and

Mande (1998) show that insider purchases decrease analyst forecast errors and dispersion. Lastly, Gu and Li (2007) show that insider purchases increase the credibility of subsequent qualitative and subjective voluntary disclosures. These findings are consistent with insider trades conveying private information to the market and improving stock price efficiency.

Manne (1966b; 1966a) also posits that insider trading does not significantly harm long-term investors (those investors that trade on fundamentals as opposed to short-swing traders). Jeng et al. (2003, 455) provide supporting evidence that while the benefits to insiders from their purchases are economically strong, outside investors "...have little to fear from these reported transactions, because insider trades make up but a tiny portion of the market". They calculate that, on average, the expected costs to investors of trading against insiders are relatively low at 10 cents for every \$10,000 transaction. Hence, notwithstanding the issue of fairness, the benefits of insider trading (i.e., conveying information) may outweigh the relatively low costs to outside investors.⁵⁶

Although the extant literature shows that insider trades reveal signals about the future prospects of a firm, little direct evidence exists on the effect of disclosure of trading activity on investor decision making. Moreover, the scarce evidence that exists is mixed. Lakonishok and Lee (2001) find little market response to both the execution and public disclosure of transactions in the U.S. On the other hand, using trades reported in the U.K., Fidrmuc et al. (2006) find economically significant market reactions to insider purchases and smaller reactions to insider sales filings.⁵⁷ The authors mainly attribute their difference in findings with the U.S. setting to the more timely filing requirements in the U.K. However, since the

⁵⁶ Additionally, Manne argues that insider trading is an efficient way of compensating managers for producing information which is of value to the firm and incentivises them to further develop additional valuable innovations (see also Carlton and Fischel 1983). Of course, the collapse of the stock market and rash of corporate scandals around the turn of the millennium, in which insider equity incentives played a major role, has produced significant evidence to counter this argument. Manne acknowledges this point and notes that "...[m]y second 'positive' argument for insider trading, that it could perform well as part of an executive compensation package, has been the more forcefully attacked, and it is perhaps less robust than I and other proponents had originally assumed" (Manne 2005, 5). Note, however, that the perverse incentives in these scandals were particularly driven by the large compensation resulting from poorly structured stock option plans (Jensen 2001) and not only insiders' ability to trade their own firm's stock.

⁵⁷ More specifically, Lakonishok and Lee (2007) report five day cumulative abnormal returns CAR[0,+4] around insider purchase (sales) filings of 0.13% (-0.23%). Fidrmuc et al. (2006) report five day abnormal returns around insider purchase (sales) filings of 1.65% (-0.49%). Aboody and Lev (2000) also report market reactions to insider filings in the U.S. between 1985 and 1997. In contrast to Lakonishok and Lee (2001), they report statistically significant three day abnormal returns CAR[0,+2] around insider purchase (sales) filings between 0.39% and 0.58% (-0.28% and -0.47%). However, median market reactions are close to zero. Indirect evidence on the market reaction to the disclosure of insider trades is presented in Givoly and Palmon (1985) and Beneish and Vargus (2002). Givoly and Palmon (1985) show that insider trades do not occur in anticipation of firm-specific news releases and conclude that post-trading abnormal returns are explained by disclosure of the trades. Beneish and Vargus (2002) find that income-increasing accruals are more persistent when accompanied by insider purchases. Their market rationality test fails to reject the null of efficient pricing, suggesting that outside investors correctly respond to the information reflected in insider purchases.

passage of SOX, the SEC requires U.S. corporate insiders to publicly disclose their trading activity within two business days. Consistent with increased usefulness of information in the disclosures, Brochet (2010) documents that price reactions and trading volumes around insider purchase filings are significantly higher in the post-SOX period.

In addition to speedier disclosure after SOX, information on insider trades has become more easily accessible to investors through electronic filing. Since 1996, U.S. listed companies are required to make most of their SEC filings in electronic form on EDGAR. As a result, firms' periodic reports are accessible more easily and available to investors in a more timely fashion and at lower cost. Several studies show that electronic filing on EDGAR has significantly increased the usefulness of periodic 10-K and 10-Q filings to investors. While little market movement was observed in the pre-EDGAR period (e.g., Easton and Zmijewski 1993)⁵⁸, Asthana and Balsam (2001) find a significant change in market reaction in the post-EDGAR period. Griffin (2003) further corroborates a significant market response to these filings on the filing day through two days after the filing. You and Zhang (2009) also examine 10-K filings in the post-EDGAR period and document that market reactions to 10-K reports are positively related to future earnings. Finally, Balsam et al. (2002) and Callen et al. (2006) find that the release of detailed accrual and cash flow information in 10-K and 10-Q filings helps investors to reevaluate the valuation implications of previously announced earnings. Overall, the evidence in recent studies is consistent with electronic filing on EDGAR contributing to the information distribution to investors.

Although electronic filing on EDGAR was required for most SEC disclosures, insider trading reports were initially exempt from electronic filing requirements (SEC 2005). Electronic filings of Form 3 (statement of initial beneficial ownership), Form 4 (statement of changes in beneficial ownership), and Form 5 (annual statement of changes in beneficial ownership) were voluntary and could still be made in paper form because of hardship exemption (SEC 2005).⁵⁹ Hence, many transactions by corporate insiders reported on Form 4 were not visible on EDGAR. As of June 30, 2003, however, SOX section 403 requires all insider reports be made available through the EDGAR system in fixed Extensible Markup Language (XML) formats. Even for firms that previously voluntarily filed their insider

⁵⁸ Easton and Zmijewski (1993) find only weak evidence of a market reaction for filings which are not preceded by preliminary earnings announcements. In addition, they find substantial time lags between the SEC's receipt of a filing and the date at which the filing is eventually made public.

⁵⁹ Prior to SOX, some transactions were exempt from filing on Form 4 and could be disclosed in a delayed manner on Form 5, which had to be disclosed annually within 45 days of the fiscal year end. Consistent with arguments that these delayed filings allowed management to hide their opportunistic trades from the market, Cheng et al. (2007, 779) show that sales disclosed on Form 5 predict large negative abnormal returns. SOX significantly reduced the possibility to delay disclosure of trades on Form 5.

ownership reports on EDGAR, the availability of these reports in fixed computer-readable XML formats has significantly reduced the processing costs of the information.⁶⁰ To summarize, the regulatory regime post-SOX with increased speed of reporting and electronic filings of insider trades provides a powerful setting to investigate the impact of insider trades on investor decision making.

6.3 HYPOTHESIS DEVELOPMENT

Extant literature has examined the extent to which accounting earnings are related to stock market valuations. Initial price reactions to earnings information have been shown to vary with factors such as a firm's information environment, uncertainty, predictability, expected rates of return, growth opportunities, and the persistence of earnings (Atiase 1985; Kormendi and Lipe 1987; Collins and Kothari 1989; Easton and Zmijewski 1989; Lipe 1990; Imhoff and Lobo 1992). Predictable patterns of abnormal stock returns in the months after earnings announcements, i.e. post-earnings announcement drift (PEAD), suggest that investors and analysts initially underweigh the valuation implications of current earnings changes (or unexpected earnings) for future earnings (Foster et al. 1984; Bernard and Thomas 1989; Bernard and Thomas 1990; Abarbanell and Bernard 1992; Ball and Bartov 1996).

Delayed reactions to earnings signals may be explained by initial uncertainty regarding the permanence of the signals. Investors need additional disclosures to resolve this uncertainty and reassess the implications of past earnings for future earnings.⁶¹ Assume that investors do not have perfect information and that an announced quarterly earnings change ($\Delta QEARN$) is either permanent or transitory. In situations of perfect information, the response coefficient for permanent earnings changes (ERC^{perm}) should be greater than that for transitory changes (ERC^{trans}). Investors with imperfect information assign a probability p to the earnings change being permanent and a probability $(1 - p)$ to the change being transitory, such that the initial price reaction to the earnings change is a weighted average reaction:

⁶⁰ Another important and frequently filed piece of information on EDGAR is firms' disclosures of material events (e.g., auditor changes, change in fiscal year end, acquisitions or disposals of assets) on Form 8-K. After Form 4, Form 8-K is the most frequently filed piece of information on EDGAR. Carter and Soo (1999) and Lerman and Livnat (2009) show these filings are value relevant. However, Carter and Soo (1999) also show that value relevance is concentrated only in those filings that occur on time, suggesting that timeliness is also an important factor in the usefulness of other SEC filings to investors.

⁶¹ Chen et al. (2002) show that managers are more likely to disclose complementary balance sheet information in earnings press releases in order to resolve uncertainty in firms where current earnings are less informative or where there exists greater uncertainty about future earnings.

$$R_{initial} = [pERC^{perm} + (1-p)ERC^{trans}] \Delta QEARN$$

If subsequent news is released that confirms (contradicts) the previous earnings change, investors are expected to increase (decrease) probability p to p^* (Δp) that the earnings change is permanent. The price reaction to this subsequent news is then equal to (Freeman and Tse 1989):

$$R_{subseq} = \Delta p [ERC^{perm} - ERC^{trans}] \Delta QEARN$$

Freeman and Tse (1989) find that subsequent quarterly earnings announcements are a source of information that helps investors to revise their initial probability estimates of the persistence of prior earnings changes. As a result, a large part of PEAD can be explained by delayed reactions to the implications of past earnings for future earnings. Koch and Sun (2004) build on existing evidence of a link between dividend changes and earnings persistence and find that dividend changes provide a piece of information that helps investors to reassess the valuation implications of previously reported earnings.

While equity value is determined by the present value of expected future free cash flows, the usefulness of earnings information to investors varies with the extent to which it can be used to assess the amounts, timing, and uncertainty of future cash flows. Accrual accounting serves to improve earnings as a summary measure of firm performance by smoothing out the volatility and negative serial correlation in cash flows and incorporating management's forward-looking private information (Dechow 1994; Subramanyam 1996). Evidence in Dechow et al. (1998), Barth et al. (2001), and Kim and Kross (2005) suggests that accruals increase the ability of earnings to predict future cash flows.⁶²

Accruals involve judgment and estimates on behalf of managers. Therefore, unexpected levels of accruals are often linked to earnings management, i.e. managers' deliberately intervene in the reporting process with the intent to obtain private gains or to influence contractual outcomes (Schipper 1989; Healy and Wahlen 1999). Accruals management impairs the ability of earnings to reflect future cash flows. However, the inability of accruals to predict future cash flows may also be caused by unintentional error.⁶³ Dechow and Dichev

⁶² Using out-of-sample prediction tests, Finger (1994) finds that cash flows are superior in predicting future cash flows over short-term horizons, while cash flows and earnings have similar predictive ability over longer-term horizons. Subramanyam and Venkatachalam (2007) report that earnings are more highly correlated with ex-post intrinsic equity values (based on a perfect foresight dividend discount model) than operating cash flows.

⁶³ Unintentional errors occur, for example, in firms operating in volatile and uncertain environments where it is difficult for management to make reliable estimates of events in future. In this regard, Lev et al. (2009) mention the estimates managers need to make about uncertain future pension asset returns and the estimates of future cash flows from tangible and intangible assets for impairment tests. Another cause of unintentional error is that

(2002) define earnings quality as the extent to which accruals map into lagged, current, and future cash flows and suggest that the quality of earnings and accruals is decreasing in the magnitude of accrual estimation error.⁶⁴

Zhang (2006) shows that initial underreaction and subsequent price drifts are more pronounced in firms with greater information uncertainty. Similarly, Francis et al. (2007) show that uncertainty from accrual estimation error contributes to PEAD as investors rationally place less weight on earnings signals in firms with noisier accruals. Post-announcement abnormal returns arise when initial uncertainty is resolved and rational investors update their beliefs about the valuation implications of past earnings as additional information is disclosed (Brav and Heaton 2002). Therefore, there is a positive association between accrual estimation error and the magnitude of investors' post-announcement belief revisions (Δp) at new information events.

This study builds on the information content of insider purchases and variation in the degree to which accounting accruals provide reliable forward-looking information in order to examine whether insider purchase filings help resolve uncertainty regarding the valuation implications of past earnings. Dechow and Schrand (2004) argue that when earnings quality is low, additional disclosures of management's private information are more valuable to investors.⁶⁵ As discussed in the previous section, one of the most direct signals of management's private information is their decision to purchase firm equity on personal account. Accordingly, I predict that the usefulness to investors of information disclosed in insider purchase filings, measured by signed market reactions, is greater in firms with more uncertainty regarding the implications of past earnings for future earnings.

H1: Price reactions to insider purchases are inversely related to accruals quality.

When disclosures of insider trades help investors to reevaluate past earnings information, then the association between market reactions and accrual quality should be concentrated in cases where the insider trade confirms the sign of the past earnings signal. Koch and Sun

companies do not have proper systems of internal controls over financial reporting. For example, lack of training of employees involved in financial reporting results in a higher likelihood of unreliable estimates. Asbaugh-Skaife et al. (2008) find that firms reporting weaknesses in internal controls have lower quality accruals and conclude that this lower quality is more likely explained by unintentional rather than intentional error.

⁶⁴ Analyzing the association between the cost of equity capital and accounting-based and market-based earnings attributes, Francis et al. (2004) show that the Dechow and Dichev (2002) measure of earnings quality matters most to investors. Francis et al. (2005) use this measure as a proxy for the information uncertainty associated with earnings and show that investors require higher rates of return for firms with more information uncertainty.

⁶⁵ Dechow and Schrand (2004, p.5) define the quality of earnings as the extent to which the earnings figure "accurately reflects the company's current operating performance, is a good indicator of future operating performance, and is a useful summary measure for assessing firm value".

(2004) show that when the sign of a dividend change confirms the sign of a previous earnings change, market reactions to dividend changes are positively related to past earnings changes. This finding suggests that the market uses information in dividend changes to revise their expectations of the persistence of previous earnings changes.

Given the focus in this paper on insiders' purchases, I predict that the positive association between information uncertainty and market reactions to insider purchases is most pronounced for cases with positive past earnings changes. Results confirming this prediction would suggest that insider purchase filings may contribute to the drift after earnings announcements by resolving part of the uncertainty that initially leads investors to underweigh the earnings signal. Most importantly, such results would provide evidence consistent with a view that insider trades communicate private information to the market and facilitate efficient pricing of past earnings information.

H2: The association between accrual quality and the price reaction to insider purchases is concentrated in filings that occur after positive earnings changes.

Note that this study focuses on information in insider purchases, not sales, for the following reasons. First, compared to sales, share purchases are relatively infrequent. The ratio of purchase-to-sales transactions over the 2003 to 2007 period is almost one-to-seven, because many insiders acquire shares through their compensation packages from stock options or restricted share awards. Share sales are therefore generally triggered by managers' liquidity needs or their needs to diversify the overexposure to the idiosyncratic risk of the firm. Second, sales transactions less likely reflect management's private information due to the higher litigation risk associated with sales (Cheng and Lo 2006; Roulstone 2008). Third, purchases are costly because managers put their own wealth at stake (Fidrmuc et al. 2006).⁶⁶ Lastly, recent evidence by Brochet (2010) suggests that investors do not, on average, respond to reported insider sales.

⁶⁶ In some cases, insider share purchases may be interpreted as bad news. For example, Fidrmuc et al. (2006, 2940) posit that in firms where managers already own large stakes, the positive signal of a purchase may be dampened by the increased risk of entrenchment, i.e. insiders "with substantial voting power may become unaccountable and/or exploit their private benefits at the expense of other shareholders".

6.4 RESEARCH DESIGN

6.4.1 Sample and Data

Table 6.1 presents an overview of the sample selection criteria and data filtering procedure for insider filings. Initially, over 1.3 million transactions by U.S. corporate officers and directors, reported on SEC Form 4 between January 2003 and December 2007, are obtained from the Thomson Reuters insider filings data feed. Similar to Frankel and Li (2004), several data filters are applied to ensure the consistency of data used in subsequent tests. First, all observations with Thomson cleanse code “A” (“numerous missing or invalid data elements”) or “S” (“security did not meet collection requirements”) are dropped. Next, observations with incomplete data (e.g., transaction price is missing) are deleted. 5.4% of observations are lost because no match was found with the CRSP database based on CUSIP identifier⁶⁷, 0.5% of cases are related to firms not listed on NYSE, AMEX, or NASDAQ, and another 1.1% is lost because no match was found with the Compustat database. This procedure results in a sample of 1,224,724 insider transactions.

After matching transactions with Compustat and CRSP identifiers, observations are dropped with non-common shares underlying the transactions, when no price or return data is available on the transaction date or filing date, when the number of shares traded is greater than 25% of the number of shares outstanding or daily trading volume, and when the transaction price is outside of the daily price range reported on CRSP. Lastly, all trades reported with a delay of more than 90 days are eliminated, because these filings do not reflect timely information signals. This procedure results in a final sample of 1,076,413 transactions.

6.4.2 Dependent Variable

The dependent variable in this study is the price reaction to the filing of insider trades. Following Lakonishok and Lee (2001), price reaction is measured as the cumulative abnormal return starting on the filing date and ending four days after the event: $CAR[0,+4]$. Daily abnormal returns are calculated by subtracting from the cum-dividend daily return the average

⁶⁷ The firm identifier used in the Thomson data is CUSIP. The CRSP file “stocknames” is used to match the Thomson data with CRSP. For those companies that have a changing CUSIP over time, the historical eight-digit CUSIP identifier (NCUSIP) is used. Companies with no changes are matched by header CUSIP.

return of similar sized firms using the NYSE/AMEX/NASDAQ year-end cutoffs (CRSP file “erdport1”). Next, all 1,076,413 transactions are aggregated by filing date and subsequently each firm-filing date is characterised as “purchase” or “sale” based on aggregate net trading. This procedure results in a sample of 29,338 purchase filing events and 138,432 sales filing events. The requirement of a match with a quarterly earnings announcement not earlier than 120 days before the event and the requirement of data to compute the accrual quality metric (see the following section) reduce the numbers of observations to 14,634 and 98,136 for purchase and sale filings, respectively.

Table 6.1
Sample Selection and Data Filtering Procedure

Panel A: Database Matching and Data Consistency Filters

	n	%
Transactions by officers/directors reported on SEC form 4	1,332,079	100.0%
Less: Thomson cleanse code "A" or "S"	-13,043	-1.0%
Less: records with missing values	-1,760	-0.1%
Less: no match (N)CUSIP - PERMNO	-71,666	-5.4%
Less: no NYSE/AMEX/NASDAQ firm	-6,721	-0.5%
Less: no match PERMNO - GVKEY	-14,165	-1.1%
Sample with matched identifiers	1,224,724	91.9%
Less: CRSP share class other than 10 or 11 (non-common shares)	-81,403	-6.1%
Less: no price/return data on CRSP daily stock file	-7,423	-0.6%
Less: number of shares traded >25% of shares outstanding	-50	0.0%
Less: number of shares traded >25% of CRSP daily volume	-25,759	-1.9%
Less: transaction price outside CRSP bidlo-askhi range	-28,852	-2.2%
Less: filing delay >90 days	-4,824	-0.4%
Sample of transactions	1,076,413	80.8%

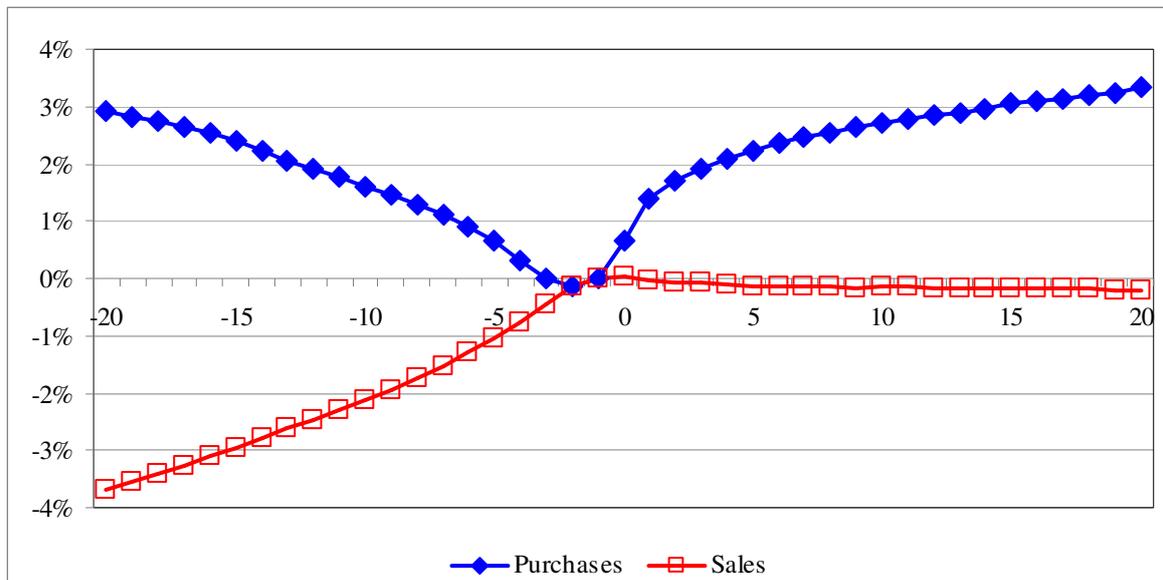
Panel B: Filing Events

	Purchases	Sales
Sample of filing events	29,338	138,432
Less: observations not matched after quarterly earnings announcement	-3,244	-9,720
Less: observations without sufficient data to compute accrual quality	-11,460	-30,576
Sample of filing events test sample	14,634	98,136
Mean CAR%	2.091	-0.105

Transactions by officers and directors filed on SEC Form 4 between 1/1/2003 and 12/31/2007 are collected from Thomson Reuters. Insider transaction data are first matched with CRSP prices and returns data based on historical (N)CUSIP identifiers. Next, data are matched with Compustat identifiers using the CRSP/Compustat Merged link table. CAR% is the five day cumulative size-adjusted return (in percentage), where daily size-adjusted returns are computed using the NYSE/AMEX/NASDAQ end-of-year market capitalization deciles (CRSP file “erdport1”).

Consistent with previous literature, preliminary statistics reveal that the mean market reaction to insider sales filings ($CAR\%=-0.105\%$) is small in economic terms. On the other hand, a large market reaction is observed around purchase filings. Mean five day cumulative abnormal returns equal 2.091%, economically significant and larger than documented in Lakonishok and Lee (2001), but in line with recent evidence by Brochet (2010). Figure 6.1 provides a graphical interpretation of abnormal returns in the window around the report date of insider trades. Sales filings appear to be primarily related to the previous run-up in stock price and trigger little reaction on the report date, while a sharp price increase is observed after the reporting of insider purchases. From this point onwards, the paper focuses only on the information conveyed by insider purchases.⁶⁸

Figure 6.1
Cumulative Abnormal (Size-Adjusted) Returns around Filing of Insider Share Trade:
Purchases (n=14,634) versus Sales (n=98,136)



Insider trading events are defined and selected as in Table 6.1. The x-axis denotes the event window from 20 trading days before the event until 20 trading days after the event. Cumulative abnormal returns on the y-axis are calculated as the sum of daily differences between the raw daily cum-dividend stock return less the NYSE/AMEX/ NASDAQ size portfolio adjustment from the CRSP database (CRSP file “erdport1”).

⁶⁸ A multivariate analysis of variation in the market reaction to insider sales reveals no significant relation between price reactions and any of the firm and filing characteristics used in subsequent tests. This finding is consistent with insider sales largely being driven by managers’ needs to diversify and consume as a result of stock-based compensation packages, and investors price these events accordingly.

An alternative explanation for an average positive price reaction to insider purchase filings is that the abnormal returns are driven by events that insiders opportunistically anticipate. On the one hand, risk of litigation and firms' self-imposed trading restrictions (e.g., Bettis et al. 2000) reduce the possibility that insiders trade (and thus report their trades) shortly before significant events such as earnings announcements. On the other hand, recent evidence by Huddart et al. (2007) suggests that some insiders do condition their trades on forthcoming disclosures when litigation risk is relatively low. The authors show that while insiders avoid trading before earnings announcements, they profit from trading before 10-K and 10-Q filings. Therefore, Appendix 6.1 provides an examination of several company information disclosures around insider filings and creates an event window that is uncontaminated by these disclosures. The full sample of filings ($n=14,634$) is reduced to 11,097 observations with a clean event window. The average market reaction to purchase filings in the uncontaminated sample ($CAR\%^{clean}$) equals 2.037%.

6.4.3 Test Variable

Following Francis et al. (2007), accruals quality based on Dechow and Dichev (2002) and McNichols (2002) is used as the proxy for information uncertainty related to reported earnings. Accruals quality is measured by the extent to which working capital accruals map into past, current, and future operating cash flows. Because of the role of accruals in conditional conservatism, the estimation model additionally controls for conditional conservatism by including an interaction term for negative current operating cash flows (Ball and Shivakumar 2006).⁶⁹ More specifically, the main explanatory variable AQ is calculated as the 3-5 year standard deviation of the residual from the following regression which is estimated by year and three-digit SIC industry using all firms in the Compustat/CRSP universe:⁷⁰

⁶⁹ Ball and Shivakumar (2006) also propose using the *change* in cash from operations as a proxy for economic gains and losses during the fiscal year. However, in the sample examined in this paper using the *level* of cash from operations as the proxy for economic gains and losses result in a higher average adjusted R-squared (36.9% for *level* vs. 34.2% for *change*) for the industry-year regressions. In order to minimize the noise entering the residual in (1) because of correlated omitted variables, the *level* of cash from operations is used as the proxy for economic gains and losses. Results are qualitatively unchanged using the *change*, using the original Dechow and Dichev (2002) model (average adj. R-squared: 26.2%) or the augmented model proposed by McNichols (2002) (32.2%).

⁷⁰ At least 10 observations are required per industry-year group. If less than 10 observations are available I use the two-digit SIC code or one-digit SIC code.

$$WCA_{it} = \beta_0 + \beta_1 OCF_{it-1} + \beta_2 OCF_{it} + \beta_3 OCF_{it+1} + \beta_4 \Delta SAL_{it} + \beta_5 PPE_{it} + \beta_6 DOCF_{it} + \beta_7 DOCF_{it} * OCF_{it} + \varepsilon_{it} \quad (6.1)$$

where WCA_{it} are working capital accruals for firm i in year t , computed as net income before extraordinary items (Compustat Fundamentals Annual data item IBC) plus depreciation and amortisation (DPC) minus cash flow from operations (OANCF). OCF_{it} equals the cash flow from operations in year t for firm i , ΔSAL_{it} is the change in revenues (SALE) relative to year $t-1$, and PPE_{it} equals gross property plant and equipment (PPEGT). Finally, $DOCF_{it}$ is an indicator variable equal to one when the level of OCF_{it} is negative, and zero otherwise. All variables are deflated by average total assets (AT). In order to mitigate the influence of extreme observations, all variables (and all other continuous variables introduced in later sections) are winsorized at the 1st and 99th percentiles of their distributions. When matching insider filings with accrual quality to test $H1$, the accrual quality metric is assumed to be available to the market three months after a firm's fiscal year end, similar to Francis et al. (2007).⁷¹

To test $H2$, insider filing events are matched with the most recent quarterly earnings announcements that occurred at least one day (and not more than 120 days) before the filing event. Following prior research (Freeman and Tse 1989; Bernard and Thomas 1990; Collins and Hribar 2000; Core et al. 2006) I focus on the seasonally differenced change in earnings ($\Delta QEARN$), which is calculated as the difference between the current quarter earnings before extraordinary items (Compustat Fundamentals Quarterly data item IBQ) and that of the same quarter one year earlier, deflated by total assets of the same quarter one year earlier (ATQ).

6.4.4 Control Variables

To isolate the effect of accruals quality on the market reaction to reported insider purchases ($CAR\%$), two sets of control variables are created. The first set relates to a firm's information

⁷¹ Dechow and Dichev (2002) show that this metric – inversely related to quality – is negatively correlated with firm size and positively correlated with the operating cycle, the variability in sales, cash flows, and accruals, the incidence of losses, and the absolute value of accruals. Furthermore, the metric is negatively correlated with the persistence of earnings, incremental to the effect of accrual levels on earnings persistence (Sloan 1996). Francis et al. (2004) show that the Dechow and Dichev (2002) metric of accruals quality is most strongly related to other accounting-based characteristics of earnings, i.e. persistence, predictability, and smoothness.

environment. The second set of variables relates to the information reflected in the SEC Form 4 filing. All variables are defined more explicitly in Appendix 6.2.

As Figure 6.1 suggested, prior declines in stock price are an important determinant of insiders' purchase decisions. Therefore, a variable equal to the cumulative abnormal return over the 60 days prior the filing is created. This variable is anticipated to have a negative correlation with $CAR\%$, i.e. larger price declines result in larger positive price reactions consistent with insiders trading as contrarians. Firm size is an important factor related to the information asymmetry between insiders and outsiders and, accordingly, studies have found insiders of smaller firms to be trading more profitably than those in larger firms (e.g., Seyhun 1998). At the same time, accruals quality is lower in smaller firms (Dechow and Dichev 2002) and investors' initial (under)reaction to earnings information varies with firm size (Bernard and Thomas 1989). The book-to-market ratio is included to control for insiders buying relatively more shares in high book-to-market (value) firms (Rozeff and Zaman 1998) and its association with AQ .

Callen et al. (2006) suggest that sophisticated investors are more knowledgeable than the average investor and find that the information in 10-K filings is less relevant in firms with higher institutional ownership. Similarly, Balsam et al. (2002) argue that sophisticated investors have more timely sources of information and are able to more quickly see through the implications of accruals for future performance. Therefore, in this study, institutional ownership is used to control for the fact that sophisticated investors may rely less on management's additional private information signals such as from insider trades.

Next, analyst following is related to the information asymmetry between insiders and outsiders. The evidence in Frankel and Li (2004) suggests that analyst following is related to the profitability and information content of insider trades. Also, they show that analyst following is negatively related to the usefulness of financial statements to investors. Analyst following is obtained from the I/B/E/S database and set to zero when a firm is not covered by I/B/E/S (Frankel and Li 2004, 241). A variable capturing a firm's age, measured by the number of years since the company was first covered by the CRSP database, is included to control for differences in information asymmetry, financial statement informativeness, and investors' needs for additional disclosures (Lang 1991).

Lastly, consistent with Brochet (2010), indicator variables for loss firms and R&D firms are included in the analyses. Previous research has shown that the incidence of losses and R&D expenses both complicate the use of earnings for forecasting future cash flows. Hayn (1995) posits that because investors have the option to liquidate the firm's assets, losses are

less informative than profits about future prospects. Her empirical results confirm that investors do not value losses, and earnings response coefficients are biased downwards in pooled samples of profit and loss firms. Since losses are associated with increased uncertainty about a firm's future prospects, signals from insider trades are expected to assist investors in assessing the probability of a return to profitability. In addition, losses are negatively correlated with accruals quality (Dechow and Dichev 2002). Since R&D expenses are associated with increased uncertainty about the relevance of reported earnings, investors are expected to react more strongly to insider purchases in R&D firms (Aboody and Lev 2000).

The second set of variables relates to the information reported in insider filings. Prior research suggests that the amount of private information reflected in insider purchases is increasing in trading intensity. To the extent that insider trades may be driven by the quality of accruals, I control for trading intensity as a percentage of shares outstanding. Similarly, signals are potentially more credible when there is consensus trading among insiders, such as in the anecdotal case of Motorola (BusinessWeek 2009). An indicator variable is created to capture whether multiple insiders report trading activity on the same day. Lastly, two indicator variables are created that identify whether the filing involved the trading by a CEO or CFO. These insiders are generally assumed to have most intimate knowledge of a firm's future prospects and financial reporting process.

6.5 EMPIRICAL RESULTS

6.5.1 Descriptive Statistics

Panel A of Table 6.2 presents descriptive statistics on the test and control variables. The proxy for information uncertainty, accruals quality (AQ), has a mean (median) value of 0.058 (0.040). The average pre-filing abnormal return in firms where insiders buy shares is negative (-5.109%), consistent with contrarian trading. There is substantial variation in the size of firms included in the sample. The average firm represented in the sample (mean $\ln(MV)$ equals 5.945) is slightly larger than the average firm represented in the intersection of Compustat and CRSP firms over the sample period (untabulated mean $\ln(MV)$ equals 5.593). The average book-to-market ratio equals 0.526. Consistent with prior literature (e.g., Callen et al. 2006, 1027), the average percentage of shares held by institutional investors is around

50%. Further, the median firm in the sample is not followed by analysts, while mean analyst following equals 3.498. The natural logarithm of (one plus) analyst following is used in subsequent tests in order to control for the high skewness in this variable. More than one-third of observations (34.7%) reports a quarterly loss, and 46.2% reports R&D expenses. Lastly, the average seasonally differenced earnings change is centered around zero, with an interquartile range from -0.820% to 0.843% of total assets.

Table 6.2
Descriptive Statistics for Insider Purchase Filings Sample

Panel A: Descriptive Statistics Dependent Variable, Test Variables, and Control Variables

	n	Mean	St. Dev	Q1	Median	Q3
<i>Dependent variable</i>						
<i>CAR%</i>	14,634	2.091	6.999	-1.592	1.117	4.675
<i>CAR%</i> ^{clean}	11,097	2.037	6.851	-1.605	1.101	4.579
<i>Test variable</i>						
<i>AQ</i>	14,634	0.058	0.055	0.022	0.040	0.074
<i>Firm characteristics</i>						
<i>CARPRE%</i>	14,634	-5.109	24.271	-17.461	-4.921	6.698
<i>BETA</i>	14,634	1.230	0.986	0.517	1.026	1.713
<i>ln(MV)</i>	14,634	5.945	1.934	4.551	5.790	7.219
<i>BTM</i>	14,634	0.526	0.514	0.252	0.463	0.700
<i>INST</i>	14,634	0.541	0.303	0.277	0.580	0.797
<i>NUMEST</i>	14,634	3.498	5.743	0.000	0.000	5.000
<i>AGE</i>	14,634	20.376	15.417	10.000	15.000	28.000
<i>LOSSQ</i>	14,634	0.347	0.476	0.000	0.000	1.000
<i>RND</i>	14,634	0.462	0.499	0.000	0.000	1.000
<i>AQEARN%</i>	14,634	0.165	4.927	-0.820	0.083	0.843
<i>Filing characteristics</i>						
<i>INTENS%</i>	14,634	0.031	0.077	0.002	0.009	0.028
<i>MULTI</i>	14,634	0.131	0.337	0.000	0.000	0.000
<i>CEO</i>	14,634	0.211	0.408	0.000	0.000	0.000
<i>CFO</i>	14,634	0.088	0.283	0.000	0.000	0.000

Panel B: Average Market Reactions by AQ Quintiles

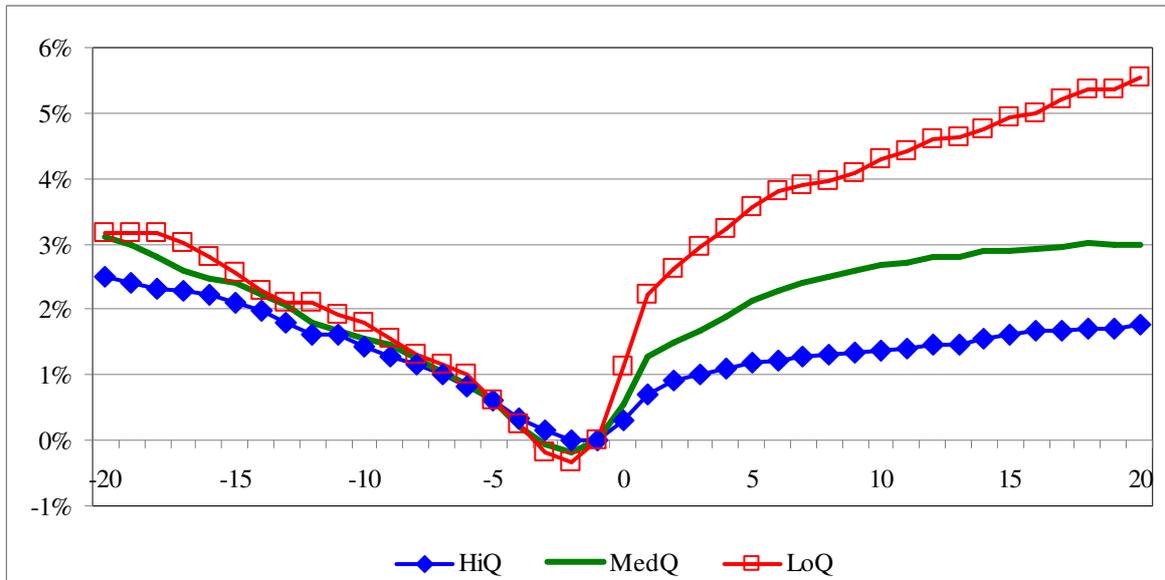
<i>AQ</i> quintile	Q1	Q2	Q3	Q4	Q5	Q5-Q1
<i>AQ</i>	0.012	0.025	0.039	0.064	0.146	0.134
<i>CAR%</i>	1.090	1.578	1.904	2.585	3.236	2.146

All variables are defined as in Appendix 6.2. Quintiles of accrual quality (*AQ*) are constructed yearly based on the complete Compustat/CRSP population with available data to calculate the *AQ* measure.

Among the set of filing characteristics, median trading intensity is 0.009% of outstanding shares. This figure suggests that the average purchase itself is unlikely to (mechanically) trigger a market movement. The mean of trading intensity equals 0.031% suggesting the

variable is skewed to the right. In 12.9% of observations two or more insiders are found to trade in consensus. Lastly, the CEO (CFO) is involved in 21.1% (8.8%) of the trades reported.

Figure 6.2
Cumulative Abnormal (Size-Adjusted) Returns around Filing of Insider Purchases
(n=14,634) Partitioned by AQ Portfolios



Insider trading events are defined and selected as in Table 6.1. The x-axis denotes the event window from 20 trading days before the event until 20 trading days after the event. Cumulative abnormal returns on the y-axis are calculated as the sum of daily differences between the raw daily cum-dividend stock return less the NYSE/AMEX/NASDAQ size portfolio adjustment from the CRSP database (CRSP file “erdport1”). Quintiles of accrual quality (*AQ*) are constructed yearly based on the complete Compustat/CRSP population with available data to calculate the *AQ* measure. HiQ refers to filing events in firms with high quality accruals (quintile 1), MedQ refers to filing events in firms with medium quality accruals (quintile 3), LoQ refers to filing events in firms with low quality accruals (quintile 5).

Some preliminary evidence on the relation between accrual quality and market reactions to insider trades is reported in Panel B of Table 6.2. For every year and all observations with available data on Compustat/CRSP, firms are assigned to quintiles based on the level of *AQ* (higher *AQ* indicates lower quality). Panel B reports the mean values of *AQ* and *CAR%* per accrual quality quintile. Consistent with *H1*, *CAR%* increases monotonically from 1.090% in Q1 to 3.236% in Q5. Similar evidence is provided in Figure 6.2, where the cumulative abnormal returns of Figure 6.1 are plotted for portfolios of high accrual quality (Q1), medium quality (Q3), and low quality (Q5). While pre-event abnormal returns are not substantially different, a large difference in event reactions between high and low accrual quality firms is visible.

Table 6.3
Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 <i>AQ</i>		-0.01	0.41	-0.31	-0.15	-0.24	-0.15	-0.26	0.32	0.33	0.11	0.02	0.11	0.04
2 <i>CARPRE%</i>	-0.05		-0.06	-0.09	0.12	-0.14	-0.04	0.02	-0.11	-0.05	-0.07	-0.04	-0.04	-0.02
3 <i>BETA</i>	0.38	-0.10		-0.10	-0.08	-0.02	0.03	-0.27	0.31	0.33	0.08	0.00	0.06	0.05
4 <i>ln(MV)</i>	-0.38	-0.06	-0.08		-0.25	0.61	0.57	0.37	-0.34	-0.06	-0.18	0.00	-0.16	-0.07
5 <i>BTM</i>	-0.21	0.09	-0.15	-0.22		-0.07	-0.14	0.03	0.02	-0.17	0.05	0.01	-0.01	-0.01
6 <i>INST</i>	-0.24	-0.11	0.03	0.65	-0.03		0.38	0.11	-0.23	-0.03	-0.08	0.03	-0.14	-0.02
7 <i>ln(NUMEST)</i>	-0.17	-0.05	0.06	0.48	-0.14	0.43		0.04	-0.19	0.04	-0.09	0.01	-0.09	-0.03
8 <i>AGE</i>	-0.32	0.03	-0.30	0.29	0.13	0.10	-0.06		-0.22	-0.07	-0.11	0.00	-0.11	-0.06
9 <i>LOSSQ</i>	0.32	-0.13	0.30	-0.35	-0.02	-0.23	-0.15	-0.23		0.18	0.12	0.04	0.14	0.06
10 <i>RND</i>	0.35	-0.07	0.32	-0.07	-0.25	-0.03	0.07	-0.09	0.18		0.03	-0.02	0.00	0.03
11 <i>INTENS%</i>	0.30	-0.11	0.19	-0.49	0.09	-0.25	-0.20	-0.25	0.25	0.10		0.13	0.12	0.00
12 <i>MULTI</i>	0.01	-0.04	0.00	0.01	0.02	0.03	0.01	-0.01	0.04	-0.02	0.11		0.22	0.17
13 <i>CEO</i>	0.12	-0.04	0.05	-0.16	0.01	-0.14	-0.09	-0.11	0.14	0.00	0.22	0.22		-0.03
14 <i>CFO</i>	0.05	-0.03	0.05	-0.07	-0.02	-0.02	-0.01	-0.06	0.06	0.03	0.02	0.17	-0.03	

Pearson (Spearman) Correlations are Reported Above (Below) the Diagonal. All variables are defined as in Appendix 6.2. Bold text indicates that correlations are statistically significant at a level of 0.05 or better.

Table 6.3 presents pairwise and rank correlations between accruals quality (inversely related to AQ) and the control variables. Consistent with Dechow and Dichev (2002), AQ is negatively related to firm size and positively related to the incidence of accounting losses. Furthermore, AQ is negatively correlated with book-to-market, institutional holdings, analysts following, and firm age, and positively related to market beta and R&D activity. Also, CEO trading is associated with higher trading intensity and more likely in smaller firms and firms with lower quality accruals. Moreover, the CEO or CFO is more likely to trade in consensus with other insiders. The highest absolute correlations between the firm characteristics are found among firm size, institutional holdings, age, and analyst following.⁷²

6.5.2 Multivariate Regression Analysis

The following multivariate regression model is used to test the relation between accruals quality and the market reaction to insider purchase filings after controlling for other factors related to the magnitude of market reaction and/or accruals quality:

$$\begin{aligned} CAR\%_{it} = & \beta_0 + \beta_1 AQ_{it} + \beta_2 CARPRE_{it} + \beta_3 BETA_{it} + \beta_4 \ln(MV)_{it} + \beta_5 BTM_{it} \\ & + \beta_6 INST_{it} + \beta_7 \ln(NUMEST)_{it} + \beta_8 AGE_{it} + \beta_9 LOSSQ_{it} + \beta_{10} RND_{it} \\ & + \beta_{11} INTENS\%_{it} + \beta_{12} MULTI_{it} + \beta_{13} CEO_{it} + \beta_{14} CFO_{it} + \varepsilon_{it} \end{aligned} \quad (6.2)$$

where all variables are defined as in Appendix 6.2. Table 6.4 presents results of OLS regressions of equation (6.2). Significance levels are based on Rogers standard errors adjusted for heteroskedasticity and two-way clustering by firm and time (Petersen 2009). Year dummies are included to control for unobservable time effects.

Model 1 in Table 6.4 provides estimation results for equation (6.2). Consistent with $H1$, AQ has a significant positive impact on $CAR\%$ after controlling for other factors (p-value: 0.053). Among the firm characteristics control variables, prior returns have the predicted negative sign, consistent with Figures 6.1 and 6.2 and the contrarian nature of insider trades. Market beta is significantly positively related to market reactions, while firm size has a significantly negative relation. Both book-to-market and analyst following have a marginally significant positive impact. The filing characteristic variables show associations that are in line with predictions. The most significant coefficient is found for insider trading intensity,

⁷² An analysis of variance inflation factors indicates that multicollinearity is of no concern when including all variables in Table 6.3 in a multivariate regression model.

suggesting that market reactions are increasing in the number of shares traded. To a lesser extent, market reactions are more positive when multiple insiders trade or when the CFO trades. Consistent with an information hierarchy hypothesis, trading by the CEO is associated with a 0.600% larger positive market reaction.

In Models 2 and 3, observations are split based on the sign of the most recent quarterly earnings change. *H2* predicts that the association between accrual estimation error and *CAR%* is concentrated in cases where the trading confirms the previously reported earnings change, thus where $\Delta QEARN$ is positive. In line with this prediction, the relation between *AQ* and *CAR%* is insignificant for the negative earnings change sample (p-value: 0.576) and significantly positive for the positive earnings change sample (p-value: 0.027). These findings are consistent with the insider filings providing information that resolves uncertainty regarding the valuation implications of past earnings information.

Note also that investors react more strongly to information in CEO and CFO trades when the earnings change is negative. For example, market reactions to CEO trades are 0.721% higher than for non-CEO trades in the negative earnings change sample, but only 0.489% higher in the positive earnings change sample. The premium for CFO trades is even higher at 0.735% in the negative earnings change sample, while insignificant for the positive sample.

To gauge the economic significance of the relation between *AQ* and *CAR%*, Models 4-6 replicate Models 1-3 with the difference that *AQ* is replaced by indicator variables (Q_j_AQ) capturing whether a filing occurs in a low or high quality firm. Results of Model 4 show that market reactions for the two lowest quality portfolios are 0.539% (Q4) and 0.714% (Q5) higher, respectively, than reactions in firms with the highest quality accruals (Q1). Model 6 shows that the price reaction premium in Q5 firms increases to 1.271% when focusing only on the positive earnings changes sample. Coefficients on the indicator variables in Model 5 are not significant and suggest that there is no accrual quality effect in such cases.

To ensure that these findings are not driven by insiders preempting information disclosures, Table 6.5 replicates 6.4 for observations with a clean event window ($CAR\%^{clean}$). Results are robust when contaminated observations are eliminated. The coefficients on *AQ* in Models 1 and 3 increase to 5.805 (p-value: 0.010) and 7.732 (p-value: 0.018), respectively. In Model 4, the average price reaction premium for low accrual quality firms is 0.994% and increases to a high of 1.493% when negative earnings change observations are dropped. Thus, after controlling for other firm and filing characteristics, the differential market reaction to insider filings between low and high quality firms appears to be economically significant.

Table 6.4
Multivariate Analyses of Market Reactions to Insider Purchase Filings

<i>Test variable</i>	Dependent variable:					
	<i>CAR%</i>	<i>CAR%</i>	<i>CAR%</i>	<i>CAR%</i>	<i>CAR%</i>	<i>CAR%</i>
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
		$\Delta QEARN\% < 0$	$\Delta QEARN\% > 0$		$\Delta QEARN\% < 0$	$\Delta QEARN\% > 0$
<i>Test variable</i>						
<i>AQ</i>	4.017 *	1.447	6.851 **			
<i>Q2_AQ</i>				0.146	-0.115	0.320
<i>Q3_AQ</i>				0.116	0.011	0.228
<i>Q4_AQ</i>				0.539 **	0.538	0.546 *
<i>Q5_AQ</i>				0.714 ***	0.164	1.271 ***
<i>Firm characteristics</i>						
<i>CARPRE%</i>	-0.010 **	-0.022 ***	0.000	-0.010 **	-0.022 ***	0.000
<i>BETA</i>	0.454 ***	0.533 ***	0.369 ***	0.455 ***	0.543 ***	0.366 ***
<i>ln(MV)</i>	-0.235 ***	-0.123	-0.290 ***	-0.224 ***	-0.113	-0.278 ***
<i>BTM</i>	0.442 *	0.771 **	0.239	0.458 **	0.808 **	0.252
<i>INST</i>	-0.249	-0.486	-0.102	-0.248	-0.466	-0.142
<i>ln(NUMEST)</i>	0.116 *	0.133	0.100	0.120 *	0.142	0.094
<i>AGE</i>	-0.001	-0.003	0.000	0.000	-0.002	0.001
<i>LOSSQ</i>	0.039	0.161	0.040	0.030	0.158	0.016
<i>RND</i>	0.181	0.394	0.022	0.156	0.362	0.005
<i>Filing characteristics</i>						
<i>INTENS%</i>	12.396 ***	12.911 ***	11.407 ***	12.334 ***	12.888 ***	11.280 ***
<i>MULTI</i>	0.403 *	0.467	0.308	0.416 *	0.484	0.321
<i>CEO</i>	0.600 ***	0.721 ***	0.489 **	0.589 ***	0.701 ***	0.480 **
<i>CFO</i>	0.518 **	0.735 **	0.303	0.515 **	0.725 **	0.306
Year dummies?	Included	Included	Included	Included	Included	Included
n	14,634	6,647	7,987	14,634	6,647	7,987
Adj. R ²	0.048	0.057	0.041	0.048	0.057	0.042

OLS regressions with robust standard errors adjusted for heteroskedasticity and clustering by firm and time. Variables are defined as in Table A2. *Q#_AQ* (#=2..5) are indicator variables for *AQ* quintile portfolio membership; quintiles of accrual quality (*AQ*) are constructed yearly based on the complete Compustat/CRSP population with available data to calculate the *AQ* measure. *, **, *** denote significance at the 0.10, 0.05, and 0.01 level, respectively (two-tailed).

Table 6.5
Multivariate Analyses of Market Reactions to Insider Purchase Filings: Clean Event Window

	Dependent variable:					
	$CAR\%^{clean}$	$CAR\%^{clean}$	$CAR\%^{clean}$	$CAR\%^{clean}$	$CAR\%^{clean}$	$CAR\%^{clean}$
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
		$\Delta QEARN\% < 0$	$\Delta QEARN\% > 0$		$\Delta QEARN\% < 0$	$\Delta QEARN\% > 0$
<i>Test variable</i>						
<i>AQ</i>	5.805 ***	3.547	7.732 **			
<i>Q2_AQ</i>				0.278	0.134	0.339
<i>Q3_AQ</i>				0.100	0.101	0.117
<i>Q4_AQ</i>				0.668 **	0.729 *	0.619 *
<i>Q5_AQ</i>				0.994 ***	0.433	1.493 ***
<i>Firm characteristics</i>						
<i>CARPRE%</i>	-0.010 **	-0.025 ***	0.002	-0.010 **	-0.025 ***	0.002
<i>BETA</i>	0.430 ***	0.547 ***	0.330 **	0.434 ***	0.575 ***	0.311 **
<i>ln(MV)</i>	-0.203 ***	-0.122	-0.244 ***	-0.190 ***	-0.109	-0.226 ***
<i>BTM</i>	0.543 **	0.728 *	0.441	0.559 **	0.744 *	0.463
<i>INST</i>	-0.187	-0.458	0.108	-0.195	-0.461	0.071
<i>ln(NUMEST)</i>	0.098	0.061	0.106	0.099	0.061	0.099
<i>AGE</i>	-0.003	-0.006	0.001	-0.002	-0.006	0.001
<i>LOSSQ</i>	0.008	-0.040	0.318	0.000	-0.041	0.279
<i>RND</i>	0.249	0.475 *	0.045	0.229	0.452	0.027
<i>Filing characteristics</i>						
<i>INTENS%</i>	11.486 ***	11.662 ***	11.050 ***	11.415 ***	11.625 ***	10.910 ***
<i>MULTI</i>	0.357	0.626 *	0.083	0.382	0.664 *	0.093
<i>CEO</i>	0.510 **	0.550 *	0.470 *	0.498 **	0.518 *	0.469 *
<i>CFO</i>	0.588 **	0.647 *	0.560	0.585 **	0.635 *	0.572
Year dummies?	Included	Included	Included	Included	Included	Included
n	11,097	5,023	6,074	11,097	5,023	6,074
Adj. R ²	0.047	0.058	0.041	0.048	0.058	0.042

OLS regressions with robust standard errors adjusted for heteroskedasticity and clustering by firm and time. Variables are defined as in Table A2. $Q\#_AQ$ ($\#=2..5$) are indicator variables for AQ quintile portfolio membership; quintiles of accrual quality (AQ) are constructed yearly based on the complete Compustat/CRSP population with available data to calculate the AQ measure. *, **, *** denote significance at the 0.10, 0.05, and 0.01 level, respectively (two-tailed).

Overall, the empirical evidence supports *H1* and *H2* and is consistent with SEC Form 4 insider filings assisting market participants to reassess the implications of previously reported earnings for future earnings. These findings suggest that significantly positive market reactions to insider purchase filings in the post-SOX era (Brochet 2010) and the association between insider trades and future earnings announcement returns (Roulstone 2008) can partly be explained by the uncertainty that these trades resolve regarding the valuation implications of past earnings changes, rather than insiders' private information related to forthcoming information disclosures in isolation.

6.6 ADDITIONAL ANALYSES

6.6.1 The Association between Market Reactions and Future Earnings Innovations

Do investor reactions correctly reflect the implications of past earnings changes for the future or do investors irrationally respond to insider trades in low accrual quality firms? A separation between perceived and fundamental reasons for price responses is important in light of the argument that insider trades may enhance price efficiency. For example, Abarbanell and Bushee (1997, 1) argue that an examination of the link between fundamental signals (in this case reported insider trades) and future earnings innovations allows a researcher to "...test directly the validity of the economic intuition that underlies the original construction of the signals". Therefore, to test whether insider purchase disclosures accelerate information on future earnings – through revisions in expectations about the persistence of past earnings – into stock price, I now examine the association between *CAR%* and actual future earnings innovations:

$$\begin{aligned}
 FUTURE\%_{it} = & \beta_0 + \beta_1 CAR\%_{it}^{clean} + \beta_2 Q_2 CAR\%_{it}^{clean} + \beta_3 Q_3 CAR\%_{it}^{clean} + \beta_4 Q_4 CAR\%_{it}^{clean} \\
 & + \beta_5 Q_5 CAR\%_{it}^{clean} + \beta_6 QEARN\%_{it} + \beta_7 \Delta QEARN\%_{it} + \beta_8 LOSSQ_{it} \\
 & + \beta_9 \ln(MV)_{it} + \beta_{10} BTM_{it} + \gamma_2 Q_2 + \gamma_3 Q_3 + \gamma_4 Q_4 + \gamma_5 Q_5 + \varepsilon_{it}
 \end{aligned} \quad (6.3)$$

where *FUTURE%*_{*it*} is the sum of the subsequent four quarterly (seasonally differenced) earnings changes (in percentage of total assets). This equation is based on the clean event window abnormal returns (*CAR%*^{*clean*}) to ensure that the relation between *FUTURE%* and market reactions is not mechanical. *Q_jCAR%*^{*clean*} (*j*=2...5) is an interaction term between the

market reaction and accruals quality portfolio membership. The model also includes other variables that might be predictive of future earnings: the level of current quarterly earnings ($QEARN\%$), the change in current return on assets ($\Delta QEARN\%$), losses ($LOSSQ$), firm size, and book-to-market. Quintile indicator variables (Q_j) for accruals quality portfolio membership are included at the end of equation (6.3) to allow the intercept to vary by AQ portfolio.

If, regardless of accrual quality, insider purchase filings accelerate future earnings information into stock prices, then the coefficient on $CAR\%^{clean}$ is expected to be positive. If insider purchases resolve relatively more uncertainty about the persistence past earnings changes in low accrual quality firms, then *i*) the incremental coefficient on $Q_5CAR\%^{clean}$ is expected to be significantly positive, and *ii*) this effect should be strongest for the sample of positive earnings changes where the trade confirms the earnings signal. Results are presented in Table 6.6.

Table 6.6
Analyses of Aggregate Future Earnings Changes on Market Reactions Mediated by Accrual Quality

	Dependent variable:			
	$FUTURE\%$ Model 1	$FUTURE\%$ Model 2	$FUTURE\%$ Model 3 $\Delta QEARN\% < 0$	$FUTURE\%$ Model 4 $\Delta QEARN\% > 0$
<i>Event window CAR mediated by accrual quality</i>				
$CAR\%^{clean}$	0.182 ***	0.079	0.104	0.013
$Q2_AQ * CAR\%^{clean}$		-0.029	0.004	-0.019
$Q3_AQ * CAR\%^{clean}$		-0.137	-0.178	-0.037
$Q4_AQ * CAR\%^{clean}$		0.079	-0.015	0.174
$Q5_AQ * CAR\%^{clean}$		0.304 ***	0.168	0.435 ***
<i>Control variables</i>				
$QEARN\%$	-0.612 ***	-0.604 ***	-0.436 ***	-0.436 *
$\Delta QEARN\%$	0.440 ***	0.434 ***	-0.487 **	0.574 ***
$LOSSQ$	-1.864 **	-1.987 **	-1.894 **	-1.352
$\ln(MV)$	-0.147	-0.175	-0.092	-0.150
BTM	0.201	0.212	0.631	0.204
Year dummies?	Included	Included	Included	Included
Q_j_AQ dummies?	Included	Included	Included	Included
n	9,995	9,995	4,398	5,597
Adj. R ²	0.078	0.086	0.085	0.137

OLS regressions with robust standard errors adjusted for heteroskedasticity and clustering by firm and time. Variables are defined as in Appendix 6.2. Q_j_AQ ($j=2..5$) are indicator variables for AQ quintile portfolio membership; quintiles of accrual quality (AQ) are constructed yearly based on the complete Compustat/CRSP population with available data to calculate the AQ measure. *, **, *** denote significance at the 0.10, 0.05, and 0.01 level, respectively (two-tailed).

Model 1 presents results of estimating a partial version of equation (6.3) without interactions. Consistent with the economic validity of the signal that investors respond to, a positive relation is observed between market reactions and future earnings innovations. However, when dummy interactions are included in Model 2, the significantly positive coefficient on $CAR\%^{clean}$ disappears (p-value: 0.212). This finding suggests that in high accrual quality firms there is no significant association between insider filing reactions and future earnings innovations. Consistent with predictions, the coefficient on the interaction with low accrual quality firms is significantly positive. Although the relation between price reactions and future earnings innovations is significantly positive for Q4 firms (0.079 + 0.079, p-value: 0.024), this relation is not significant incremental to that for high quality firms (p-value: 0.407). Also confirming predictions and the evidence presented in Tables 6.4 and 6.5, Model 4 shows that the significantly positive coefficient on $Q_5CAR\%^{clean}$ is confined to cases where the insider purchase confirms the previous earnings change.

To summarise, the findings in Table 6.6 are consistent with investors responding to reported insider trades for fundamental reasons. These findings suggest that for low accrual quality firms, reported insider purchases resolve part of the uncertainty about the valuation implications of past earnings and enhance price efficiency. Also, the relation between insider trades and future earnings information appears to be more subtle than previously documented in the literature.

6.6.2 Innate versus Discretionary Quality of Accruals

Dechow and Dichev (2002) show that their measure of accrual quality varies in predictable ways with characteristics of a firm's information environment. Francis et al. (2005) use these characteristics to distinguish between accruals quality resulting from economic fundamentals and accruals quality resulting from management choice. They find that "innate" accruals quality has larger capital market effects than "discretionary" accruals quality in terms of the cost of equity capital. Because discretionary quality of accruals stems from opportunism as well as information conveyance, cost of equity effects are lower than for accruals quality from innate determinants.

Similar to Francis et al. (2005), AQ is separated into a component resulting from economic fundamentals (innate quality) and from management choice (discretionary quality).

The innate portion of accrual quality is determined by estimating the following linear regression model on a yearly basis:

$$AQ_{it} = \beta_0 + \beta_1 \ln(TA)_{it} + \beta_2 \sigma(OCF)_{it} + \beta_3 \sigma(SALES)_{it} + \beta_4 \ln(CYCLE)_{it} + \beta_5 NEGEARN_{it} + \varepsilon_{it} \quad (6.4)$$

where $\ln(TA)$ is the natural logarithm of total assets; $\sigma(OCF)$ is the 3-5 year standard deviation of the ratio of cash flow from operations to average total assets; $\sigma(SALES)$ is the 3-5 year standard deviation of the ratio of sales to average total assets; $\ln(CYCLE)$ is the natural logarithm of the operating cycle, measured as the sum of days receivables (ratio of average receivables to average sales per day) and days inventory (ratio of average inventory to average sales per day); and $NEGEARN$ is the proportion of firm-years reporting negative earnings before extraordinary items in the most recent 3-5 years.

Innate quality of accruals is defined as the fitted value from the above estimation: AQ_INNATE . The residual portion (ε) is labeled discretionary quality of accruals: AQ_DISCR .⁷³ Table 7 presents results of estimating equation (6.2) with AQ replaced by either AQ_INNATE or AQ_DISCR . Recall from Tables 6.4 and 6.5 that AQ was positively related to market reactions for the positive earnings changes sample only. When focusing on the innate portion of accrual quality, however, Models 1-2 in Table 6.7 show that investors react more strongly to insider trades in low innate accrual quality firms when the past earnings change is negative. No significant association is found for the positive earnings change sample. These findings suggest that when accrual quality is low due to economic fundamentals, for example accounting losses, investors rely more heavily on insider trading signals in “bad news” firms. On the other hand, looking at the discretionary portion of accrual quality in Models 3-4, results suggest that the positive association between market reactions and accrual estimation error is due to the error resulting from management projections about future events. Hence, insider purchases appear to resolve more uncertainty when subjective managerial estimates have a higher likelihood of error.

The finding on the relation between insider purchase filings and discretionary quality of accruals adds to evidence in for example Balsam et al. (2002), who show that investors are able to separate “managed” earnings from true earnings when firms file their quarterly financial statements on Form 10-Q. Results of Table 6.7 are consistent with Form 4 purchase filings assisting market participants to reassess the usefulness of previously reported earnings

⁷³ The yearly regressions have an average adjusted R-squared of 36.88%.

for their forecasting and valuation. Consistent with Gu and Li (2007), who show that insider purchases can serve as a form of disclosure to enhance the credibility of following subjective voluntary disclosures, these findings suggest that managers may use their ability to trade to signal that their accrual adjustments are credible. This finding also suggests that studies examining whether low quality accruals are due to intentional or unintentional errors, for example in firms with internal control weaknesses (Doyle et al. 2007; Ashbaugh-Skaife et al. 2008), might use insider purchases to potentially enhance their tests.

Table 6.7
Innate versus Discretionary Quality of Accruals Tests

	Dependent variable:			
	$CAR\%^{clean}$	$CAR\%^{clean}$	$CAR\%^{clean}$	$CAR\%^{clean}$
	Model 1	Model 2	Model 3	Model 4
	$\Delta QEARN\% < 0$	$\Delta QEARN\% > 0$	$\Delta QEARN\% < 0$	$\Delta QEARN\% > 0$
<i>Test variable</i>				
<i>AQ_INNATE</i>	20.598 ***	4.228		
<i>AQ_DISCR</i>			-0.947	7.348 **
<i>Firm characteristics</i>				
<i>CARPRE%</i>	-0.026 ***	0.002	-0.025 ***	0.002
<i>BETA</i>	0.433 ***	0.418 ***	0.611 ***	0.396 ***
<i>ln(MV)</i>	-0.001	-0.243 ***	-0.140	-0.297 ***
<i>BTM</i>	0.938 **	0.375	0.631 *	0.364
<i>INST</i>	-0.294	0.057	-0.476	0.060
<i>ln(NUMEST)</i>	0.057	0.081	0.039	0.095
<i>AGE</i>	-0.003	-0.001	-0.007	-0.001
<i>LOSSQ</i>	-0.330	0.385	-0.015	0.482
<i>RND</i>	0.364	0.159	0.548 **	0.097
<i>Filing characteristics</i>				
<i>INTENS%</i>	11.729 ***	11.161 ***	11.764 ***	11.165 ***
<i>MULTI</i>	0.614 *	0.122	0.631 *	0.070
<i>CEO</i>	0.576 **	0.472	0.556 *	0.486 *
<i>CFO</i>	0.604	0.545	0.665 *	0.571
Year dummies?	Included	Included	Included	Included
n	5,023	6,074	5,023	6,074
Adj. R ²	0.061	0.039	0.058	0.041

OLS regressions with robust standard errors adjusted for heteroskedasticity and clustering by firm and time. All variables are defined as in Appendix 6.2. *, **, *** denote significance at the 0.10, 0.05, and 0.01 level, respectively (two-tailed).

6.6.3 Alternative Measures of Accruals Quality

The Dechow and Dichev (2002) measure of accruals quality is based on a 3-5 year standard deviation of the accrual model residual. Because this measure relies on multiple years of data, it is highly autocorrelated in a mechanical sense and may therefore be a noisy proxy for current year accruals quality. Therefore, similar to prior research (e.g., Ashbaugh-Skaife et al. 2008) accruals quality is additionally measured as the absolute value of abnormal accruals estimated using the Modified Jones (1991) model adjusted for performance (Dechow et al. 1995; Kothari et al. 2005) and conditional conservatism. Abnormal accruals are calculated as the residual from the following regression which is estimated by year and industry group:

$$TACC_{it} = \beta_0 + \beta_1(1/AT_{it-1}) + \beta_2(\Delta SAL_{it} - \Delta REC_{it}) + \beta_3 PPE_{it} + \beta_4 OCF_{it} + \beta_5 DOCF_{it} + \beta_6 DOCF_{it} * OCF_{it} + \varepsilon_{it} \quad (6.5)$$

where $TACC_{it}$ equals total accruals calculated as the difference between net income before extraordinary items and cash from operations, scaled by lagged total assets. ΔREC_{it} equals the change in receivables (“RECT”) relative to year $t-1$. All other variables are defined as before.

For each industry-year group the observations are partitioned into deciles based on lagged return on assets. Performance-adjusted abnormal accruals (AAC) are calculated by subtracting from firm-year i 's abnormal accruals the median abnormal accruals of its matched industry-year-performance group (excluding firm-year i). Similarly, performance-adjusted abnormal working capital accruals (AWC) are computed by replacing the dependent variable in (6.5) by working capital accruals and excluding PPE_{it} from the estimation. Compared to AQ , which has an autocorrelation coefficient of 0.879, the absolute values of AAC and AWC have much lower autocorrelation coefficients of 0.309 and 0.298, respectively.

Table 6.8 presents results of estimating equation (6.2) with the absolute values of abnormal accruals as the explanatory variables. Models 1 and 2 present results for absolute abnormal total accruals ($IAACI$); Models 3 and 4 present results for absolute abnormal working capital accruals ($IAWCI$). Consistent with the earlier findings, there is a significantly positive relation between the inverse measure of accrual quality and market reactions to insider trades. Again, this relation is confined to observations where the insider purchases confirm the past earnings changes. In Model 3, there is some evidence of a marginally significant relation between absolute abnormal working capital accruals and market reactions

in the negative earnings changes sample (p-value: 0.074). However, the relation is again strongest in the positive earnings changes sample (p-value: 0.001). Results presented earlier in Tables 6.4 and 6.5 thus appear to be robust to alternative measures of accrual quality.

Table 6.8
Alternative Measures of Information Uncertainty: Unsigned Abnormal (Working Capital) Accruals

<i>Test variable</i>	Dependent variable:			
	<i>CAR%</i> ^{clean}	<i>CAR%</i> ^{clean}	<i>CAR%</i> ^{clean}	<i>CAR%</i> ^{clean}
	Model 1 <i>ΔQEARN%</i> <0	Model 2 <i>ΔQEARN%</i> >0	Model 3 <i>ΔQEARN%</i> <0	Model 4 <i>ΔQEARN%</i> >0
<i>IAACI</i>	2.920	7.036 ***		
<i>IAWCI</i>			3.701 *	7.689 ***
<i>Firm characteristics</i>				
<i>CARPRE%</i>	-0.026 ***	0.002	-0.026 ***	0.002
<i>BETA</i>	0.593 ***	0.380 ***	0.589 ***	0.374 ***
<i>ln(MV)</i>	-0.119	-0.245 ***	-0.116	-0.240 ***
<i>BTM</i>	0.717 *	0.465	0.727 *	0.458
<i>INST</i>	-0.486	0.199	-0.486	0.144
<i>ln(NUMEST)</i>	0.043	0.085	0.045	0.086
<i>AGE</i>	-0.006	0.001	-0.006	0.001
<i>LOSSQ</i>	-0.036	0.286	-0.040	0.331
<i>RND</i>	0.459 *	0.137	0.467 *	0.161
<i>Filing characteristics</i>				
<i>INTENS%</i>	11.647 ***	11.182 ***	11.608 ***	11.078 ***
<i>MULTI</i>	0.615 *	0.149	0.612 *	0.143
<i>CEO</i>	0.542 *	0.500 *	0.545 *	0.484 *
<i>CFO</i>	0.669 *	0.505	0.661 *	0.493
Year dummies?	Included	Included	Included	Included
n	4,989	6,025	4,989	6,025
Adj. R ²	0.059	0.044	0.059	0.045

OLS regressions with robust standard errors adjusted for heteroskedasticity and clustering by firm and time. All variables are defined as in Appendix 6.2. *, **, *** denote significance at the 0.10, 0.05, and 0.01 level, respectively (two-tailed).

6.6.4 Correlated Omitted Risk Factor?

An alternative explanation for the results in Tables 6.4 and 6.5 is that the accrual quality measure is correlated with an unobservable risk factor that is omitted from the regression model. Although such an explanation does not seem consistent with results in Table 6.6, evidence from recent research suggests that accruals quality may be a risk factor that is priced

by the market (Francis et al. 2005; Ecker et al. 2006) or may capture a beta effect through the positive correlation between beta and accrual noise when beta is measured with error (Core et al. 2008). Recall from Table 6.3 that *AQ* and *BETA* are highly positively correlated. Therefore, I test whether results are robust to an alternative measure of abnormal returns based on the Fama and French (1993) three-factor model augmented by Carhart (1997) to control for momentum and augmented to control for a potential cost of capital effect in *AQ* (Francis et al. 2005; Aboody et al. 2005). Specifically, for every firm-event, the following regression is estimated using a time series of daily returns in the period from 200 days until 21 days before the event:

$$R_{id} - R_d^F = \beta_0 + \beta_1(R_d^M - R_d^F) + \beta_2SMB_d + \beta_3HML_d + \beta_4UMD_d + \beta_5AQF_d + \varepsilon_{id} \quad (6.6)$$

where R_{id} is firm i 's return on day d ; R_d^F is the risk-free rate on day d ; R_d^M is the market return on day d ; SMB_d is the small-minus-big portfolio factor on day d ; HML_d is the high-minus-low book-to-market portfolio factor on day d ; UMD_d is the up-minus-down momentum portfolio factor on day d ; and AQF_d is the accruals quality portfolio factor on day d . The SMB_d , HML_d , and UMD_d factors are obtained from Kenneth French's Online Data Library.⁷⁴ The accruals quality factor portfolio is constructed as follows. At the beginning of each calendar month, quintile portfolios are constructed for all firms with the *AQ* variable and daily returns available on CRSP, where the *AQ* variable is assumed to be available three months after fiscal year end. Next, average returns are calculated during the month for every day-quintile portfolio combination. AQF_d is then calculated as the daily difference in average returns between the low accruals quality firms (Q5) and the high accruals quality firms (Q1).

After estimating equation (6.6) using the time series of daily returns for each firm-event, cumulative daily event window abnormal returns are calculated using the parameter estimates obtained from the estimation. Because of data constraints, the sample of observations is reduced to $n=13,345$ for the full sample and $n=10,109$ for the clean event window sample. Untabulated statistics reveal that the average abnormal returns to purchase filings are 2.163% and 2,109%, respectively. For the clean event window sample, the difference in market reaction between low and high *AQ* firms equals 2.204%. In the multivariate analyses, this difference equals 1.210% for the positive earnings changes sample. All inferences are unchanged when this alternative method of abnormal returns measurement is used.

⁷⁴ http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

6.7 SUMMARY AND CONCLUSIONS

This chapter examined the effect of earnings information uncertainty on the usefulness of disclosures of insider trades to equity investors. Usefulness is measured by the extent to which disclosures trigger stock price revisions, while information uncertainty is measured by the noise in accounting accruals. Using share purchases reported on SEC Form 4 between 2003 and 2007, I find that price reactions to reported insider trades are increasing in accrual estimation error. This finding is consistent with insider trading and its subsequent disclosure resolving part of the uncertainty associated with previously reported earnings. Further tests show that this effect is confined to cases where the purchase decisions confirm previously reported positive changes in quarterly earnings. This result is consistent with investors using insider trading decisions as a form of additional disclosure, in order to revise their initial assessments of the implications of past earnings for future earnings.

Additional tests show that price reactions are positively associated with future earnings innovations, consistent with insider trade filings accelerating the incorporation of future earnings information into stock price. Further tests, however, show that this effect is driven by low accrual quality firms with positive past earnings changes. This finding is consistent with insider trades conveying information about the valuation implications of past earnings and not necessarily about forthcoming information disclosures as suggested in prior research. In this regard, the fundamental difference between this study and previous research on corporate insider trading is that it links insider trades to past information disclosures rather than future information disclosures.

Results of the association between accrual estimation error and stock price reactions to insider trades are robust to alternative specifications of accruals quality, excluding contaminated event windows, controls for factors affecting the quality of accruals such as losses and R&D activity, and alternative measures of abnormal returns. When the quality of accruals is separated into an innate component resulting from economic fundamentals and a component resulting from management discretion, results show that the association between market reactions and accrual estimation error in positive earnings change firms is a result of error in management's projections of the future. Thus, stock prices act as if investors use insider trades as a signal to resolve uncertainty about the reliability of management's accrual adjustments.

Results of this study are potentially useful to several interest groups. For regulators, findings suggest that the new reporting rules on ownership reports after SOX contribute to stock price efficiency, by accelerating the incorporation of value relevant earnings information into stock prices. For investors and managers, findings suggest that disclosures in the form of managers' equity purchases decrease the information asymmetry between these parties. Lastly, the study provides guidance for future academic research by suggesting that, for example, insider trading signals may be used in studies that examine whether noisy accounting accruals are a result of intentional versus unintentional errors (e.g., Francis et al. 2005; Ashbaugh-Skaife et al. 2008). Also, the established link between insider trading disclosures and accruals quality suggests that insider trades may be an important mediating factor in the relation (if any) between accounting information and the cost of capital, thus suggesting a potential role of insider trade filings in studies examining the effect of the precision of accounting information on firm risk and cost of capital (e.g., Botosan et al. 2004). Another extension of the research would be to examine if and how financial analysts process the information in insider trades.

APPENDIX 6.1: CLEAN EVENT WINDOW CONSTRUCTION

This Appendix serves to highlight that the dependent variable in this study, the market reaction to insider filings ($CAR\%$), is caused by investors responding to the reported trades, and not by subsequent disclosures that insiders opportunistically anticipate. For the sample of 14,634 insider filing events, earnings announcements are obtained from the Compustat's quarterly fundamentals table (RDQ), 10-K/Q and 8-K filing dates are obtained from the EDGAR database, and management earnings forecasts are obtained from First Call's Company Issued Guidance database. These information events are subsequently matched with the 10 day trading window around insider filings.

Panel A of Table A6.1 presents descriptives on the abnormal returns around matched information events. Of the 14,634 insider filing events, 2,830 are matched with earnings announcements, 3,482 with 10-K and 10-Q filings, 691 with management earnings forecasts, and 5,753 with 8-K filings of material events. As suggested by absolute abnormal returns and consistent with Huddart et al. (2007), earnings announcements trigger larger price revisions (7.667%) than 10-K/Q filings (4.201%).⁷⁵ Abnormal returns to matched earnings announcements and management forecasts are substantially negative, suggesting that insiders are unlikely to profit from trading before these events. Similarly, management forecasts (7.544%) trigger larger absolute reactions than 8-K filings (5.166%). Given the larger impacts of announcements and forecasts on prices, these events are associated with higher litigation risk.

Panel B splits the matched information events into pre- and post- insider filing events. Consistent with prior research, insiders do not tend to trade before earnings announcements with 95.0% of trades occurring in the days after rather than before the announcements. This result is consistent with Sivakumar and Waymire (1994) and the litigation risk of trading before earnings announcements. It is also consistent with trading blackout periods that companies individually impose (Bettis et al. 2000). Furthermore, while purchase filings mostly occur after the earnings announcements, they occur after bad news earnings announcements as indicated by large negative abnormal returns (-3.768%).

In contrast to the activity around earnings announcements, the distribution of insider filings pre- and post-10-K/Q filings is more leveled. Consistent with Huddart et al. (2007), insiders appear to profit from anticipating forthcoming 10-K and 10-Q filings. Next,

⁷⁵ In comparison, Huddart et al. (2007, Table 1) report absolute market reactions of 6.4% and 4.4% to earnings announcements and 10-K/Q filings, respectively.

consistent with higher litigation risk, management forecasts show the same pattern as that observed for earnings announcements. Activity is observed after (90.2%) rather than before (9.8%) the forecasts. Again, trades occur after bad news earnings forecasts (-4.734%). These findings are consistent with Noe (1999) and Cheng and Lo (2006) and suggest that trading prior to management forecasts is unlikely to explain the observed market reactions. Further, new evidence is presented consistent with some insiders profiting from trading prior to 8-K filings.

Panel C shows that although some insiders preempt information in forthcoming disclosures, the economically significant abnormal returns to insider purchase filings of 2.091% are not materially affected by these events. After excluding trade filings that occur prior to or concurrent with the matched information events, the market reaction remains stable at 2.0-2.1%. The clean event window abnormal returns to insider purchase filings ($CAR_{\%}^{clean}$) are equal to 2.037%. To summarise, these analyses suggest that investors respond to the reported insider trades and that price reactions are not simply driven by insiders anticipating major forthcoming information events such as 10-K and 10-Q filings.

Table A6.1

Information Events around Insider Purchase Filings: Earnings Announcements (EA), 10-K/Q Filings (10KQ), Management Earnings Forecasts (MF), and 8-K Filings (8K)

Panel A: Abnormal Returns to Matched Information Events

Matched event	n	Mean	St. Dev	Q1	Median	Q3
<i>CAR_EA%</i>	2,830	-3.486	10.455	-8.314	-2.040	2.112
<i>CAR_10KQ%</i>	3,482	0.279	6.495	-2.300	0.095	2.859
<i>CAR_MF%</i>	691	-4.051	10.109	-8.457	-2.310	1.753
<i>CAR_8K%</i>	5,753	-0.575	8.283	-3.197	-0.135	2.640
<i>CAR_EA%</i>	2,830	7.667	7.916	2.073	5.044	10.660
<i>CAR_10KQ%</i>	3,482	4.201	4.960	1.148	2.492	5.308
<i>CAR_MF%</i>	691	7.544	7.851	1.928	4.981	10.243
<i>CAR_8K%</i>	5,753	5.166	6.499	1.176	2.918	6.509

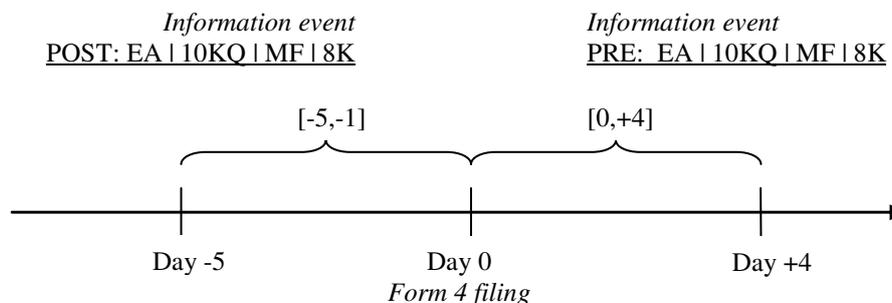
Panel B: Information Event Abnormal Returns Conditioned on Insider Purchase Filings

	n	%	Mean	p-val
<i>CAR_EA%</i> <i>PRE_EA</i>	141	5.0	1.881	0.043
<i>CAR_EA%</i> <i>POST_EA</i>	2,689	95.0	-3.768	0.000
<i>CAR_10KQ%</i> <i>PRE_10KQ</i>	1,523	43.7	1.008	0.000
<i>CAR_10KQ%</i> <i>POST_10KQ</i>	1,959	56.3	-0.288	0.164
<i>CAR_MF%</i> <i>PRE_MF</i>	68	9.8	2.213	0.055
<i>CAR_MF%</i> <i>POST_MF</i>	623	90.2	-4.734	0.000
<i>CAR_8K%</i> <i>PRE_8K</i>	2,121	36.9	0.898	0.000
<i>CAR_8K%</i> <i>POST_8K</i>	3,632	63.1	-1.435	0.000

Panel C: Market Reaction to Insider Purchase Filings Excluding Potential Information Trading

	n	Mean
<i>CAR%</i>	14,634	2.091
<i>CAR%</i> <i>NO_PRE_EA</i>	14,493	2.090
<i>CAR%</i> <i>NO_PRE_10KQ</i>	13,111	2.101
<i>CAR%</i> <i>NO_PRE_MF</i>	14,566	2.089
<i>CAR%</i> <i>NO_PRE_8K</i>	12,513	2.036
<i>CAR%</i> <i>NO_PRE_EA_10KQ_MF_8K</i> (clean event window)	11,097	2.037

CAR_EA% is the 3-day cumulative size-adjusted return around a quarterly earnings announcement, *CAR_10KQ%* is the 3-day cumulative size-adjusted return around an annual or a quarterly report filing on Form 10-K or 10-Q, respectively, *CAR_MF%* is the 3-day cumulative size-adjusted return around a management earnings forecast event, and *CAR_8K%* is the 3-day cumulative size-adjusted return around a material information event filing on Form 8-K. *PRE_EVENT* denotes a situation where an information event occurs in the event window [0,+4]. *POST_EVENT* denotes a situation where an information event occurs prior to the event window [-5,-1]:



The sample selection for insider purchase filing events is described in Table 6.1; p-values are based on standard errors adjusted for heteroskedasticity and clustering by firm and time.

APPENDIX 6.2: VARIABLE DEFINITIONS

Variable	Definition
<i>CAR%</i>	Five day cumulative size-adjusted return (in percentage) starting on the event day [0,+4], where daily size-adjusted returns are computed using the NYSE/AMEX/NASDAQ end-of-year market capitalization deciles (CRSP file “erdport1”).
<i>CAR%^{clean}</i>	Five day cumulative size-adjusted return (in percentage) starting on the event day [0,+4] for those observations with a clean event window (see Table A6.1).
<i>AQ</i>	Standard deviation of accrual estimation error over the most recent 3-5 years based on the modified Dechow and Dichev (2002) model adjusted for conditional conservatism . See equation (6.1).
<i>AQ_INNATE</i>	Innate portion of accrual quality (<i>AQ</i>), calculated as the fitted value from yearly regressions of <i>AQ</i> on economic determinants of accrual quality (Francis et al. 2005). See equation (6.4).
<i>AQ_DISCR</i>	Total accrual quality (<i>AQ</i>) less innate accrual quality (<i>AQ_INNATE</i>).
<i>AAC</i>	Performance-adjusted abnormal accruals, calculated from the Modified-Jones model adjusted for the role conditional conservatism. See equation (6.5).
<i>AWC</i>	Performance-adjusted abnormal working capital accruals, calculated from the Modified-Jones model adjusted for conditional conservatism.
<i>CARPRE%</i>	60 day cumulative size-adjusted returns prior to the event (in percentage).
<i>BETA</i>	CAPM beta calculated using monthly data based on the CRSP value-weighted (cum-dividend) market index and a maximum of 60 months prior to the event month.
<i>ln(MV)</i>	Natural logarithm of firm market capitalisation at fiscal year end (PRCC_F * CSHO)
<i>BTM</i>	Book value of equity (CEQ) divided by market capitalisation at fiscal year end.
<i>INST</i>	Percentage of shares held by institutional investors at the end of the previous calendar quarter, based on SEC 13-F filings (Thomson Reuters).
<i>NUMEST</i>	Number of analysts following the firm in the month of the insider filing event from the I/B/E/S database, set to zero when missing.
<i>AGE</i>	Numbers of years since company was first covered by the CRSP database.
<i>LOSSQ</i>	Indicator variable equal to one if quarterly earnings before extraordinary items (IBQ) are negative for most recent earnings announcement (RDQ), zero otherwise.
<i>RND</i>	Indicator variable equal to one when firm reports R&D expenses (XRD), zero otherwise.
<i>ΔQEARN%</i>	Seasonal random walk change in earnings: earnings before extraordinary items (IBQ) less earnings before extraordinary items in the same quarter of last year, as percentage of total assets (ATQ) of the same quarter last year.
<i>INTENS%</i>	Aggregate number of shares traded by all insiders in one firm on an event day as percentage of shares outstanding (CRSP daily stock file data item SHROUT).
<i>MULTI</i>	Indicator variable equal to one when multiple insiders report transactions on the same day, zero otherwise.
<i>LATE</i>	Indicator variable equal to one when insider transactions are filed with the SEC more than four days after the transaction date.
<i>CEO</i>	Indicator variable equal to one when trading insider is CEO, zero otherwise.
<i>CFO</i>	Indicator variable equal to one when trading insider is CFO, zero otherwise.
<i>FUTURE%</i>	Sum of the subsequent four quarterly earnings changes (<i>ΔQEARN</i>) in percentage.
<i>QEARN%</i>	Quarterly earnings before extraordinary items (IBQ) as percentage of total assets at the end of the previous fiscal quarter (ATQ).

7 Summary and Conclusions

This dissertation presents empirical research examining corporate insider trades. It focuses on the opportunistic side as well as the potential beneficial role of insider trades and their disclosures in the stock market. Corporate insiders are the officers and directors of publicly traded companies. Insider trades are the transactions that these insiders make in their firms' securities. These trades are legal, occur frequently, and are generally observable to the market within a few days. Trading on material non-public information is illegal and, when discovered, subject to severe penalties. Nevertheless, top level corporate insiders generally have better insights into the long-term prospects of the firm given their knowledge of firm operations, industry conditions, consumer demand, and their involvement in the financial reporting process. Insiders' decisions to purchase new shares are therefore unlikely to occur when prospects are poor, while decisions to sell previously held shares are unlikely to occur when prospects are very optimistic.

Corporate insiders play an important role in the research areas of accounting and financial economics. Information asymmetry and agency conflicts between insider managers and outside investors feed a demand for financial reporting and supplementary disclosures. Due to their intimate knowledge of the firm's business operations, managers are entrusted with the financial reporting process, making assumptions and estimates about future events. These managers, however, typically have incentives that are not in line with those of shareholders. Stock-based compensation can be used to alleviate such agency problems. When managers own shares, theory suggests they are more likely to act in the interests of shareholders. Subject to restrictions, such share holdings may subsequently be liquidated or increased by the manager by trading on the market. Relying on publicly reported trades by insiders, this dissertation examines several aspects of the tension between the accounting information provided by insider managers and the trading of these managers.

Three empirical research papers are presented. Chapter 4 first examines whether stock option exercises by U.S. executives signal information about future earnings performance and the quality of currently reported earnings. 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 may induce more risk taking in terms of opportunistic financial reporting. In addition, options have the ability to make total managerial wealth extremely sensitive to stock price changes. In contrast to prior research, I take into account the special features of options and predict that insider trades in options signal different information than regular trades in shares. The study shows that insiders' decisions to unload their positions through option liquidations are more informative with respect to future firm performance than are regular sales of shares. This higher information content is increasing in the moneyness of options exercised. In addition, deep in-the-money option liquidations are associated with more income-increasing earnings management and a higher likelihood of material misstatements. Results of the study suggest that managers act more opportunistically while trading in their options than in their shares, consistent with recent concerns regarding the adverse incentives that excessive stock option compensation may create. Effective governance and internal control systems appear to be needed in order for firms to benefit from the potentially useful role of stock options in compensation.

Chapter 5 examines the information reflected in trading decisions of Dutch corporate insiders and presents evidence suggesting that these insiders are able to successfully time the equity market by buying shares before prices go up, while selling before prices fall. Although prior research suggests that insiders have incentives to time both their personal as well as their firms' trades (repurchases and issues), results further suggest that insiders are relatively more successful in timing their personal trades. More specifically, Dutch insider managers are able to anticipate future stock price changes only when trading for personal accounts. In addition, personal insider share sales appear to be driven by market mispricing (public information) rather than new (private) information. Abnormal stock price changes after personal share purchases reflect both new information as well as market mispricing. Hence, insiders' trades may not only reflect their private information advantage, but also (or only) signal information about potential market mispricing. Overall, I find that while disclosures of insiders' personal trades potentially help push stock prices towards their fundamental values, benefits of timely disclosure on actual firm trading are limited, at least in the setting and period investigated.

In chapter 6, I document statistically and economically significant stock price revisions following the public disclosure of insider share purchases in the U.S., suggesting that insider trades signal information and that investors rely on these disclosures to reassess the value of a firm. The magnitude of the price revision varies with firm and insider characteristics. For example, larger stock price revisions suggest that trades by CEOs and CFOs reveal more

valuable information. Consistent with insider trades resolving part of the uncertainty in accounting information, I further document that stock price changes are increasing in accrual noise. This association appears to be driven by previous good news earnings announcements, suggesting that the insider disclosures provide investors with a confirmatory signal that the previous earnings change is permanent. After receiving the additional signal by management, investors correct for their previously conservative reaction at the earnings announcement. Next, I find that the extent to which insider filings accelerate the incorporation of future earnings information into stock prices is increasing in accrual noise, again for firms with positive past earnings news. Overall, these findings suggest that insider trading disclosures may enhance market efficiency, that is, the extent to which stock prices reflect the fundamental value of a firm's equity given all publicly available information. When accounting disclosures are noisy, investors rely on additional disclosures of management's information and managers may use their ability to trade their firms' securities to provide additional information signals to reduce such noise.

One common finding in all three studies is that insider share purchases are a positive information signal to outsiders. When purchasing shares and putting their wealth on the line, managers may signal their commitment and optimism about the future prospects of the firm. Chapter 4 shows that insider buying is positively associated with future earnings innovations; chapter 5 shows that insider buying is associated with positive short- and long-term future abnormal stock returns; and chapter 6 shows that the forward-looking nature of insider purchases disclosed to the market facilitates more efficient market pricing of accounting information. Together, these findings suggest that information on insider trades, in particular managers' purchase decisions, can be an important source of complementary information in the forecasting and valuation components of financial statement analysis.

Overall, the results of the empirical studies presented in this dissertation have implications for regulators concerned with restricting opportunistic behaviour and rent extraction by managers, as well as facilitating timely disclosures of insider trades; compensation committees that grant shares and stock options to employees; company insiders concerned with investor misvaluation of the stock and the noise in signals from financial statements; investors relying on financial statements and additional disclosures of management's private information; and future research in accounting and financial economics.

The studies are also subject to some caveats. In empirical research, inferences drawn from statistical tests rely on model specifications and the accuracy of measures used. For

example, inferences on earnings management rely on measures based on regression residuals from a simple model that explains a fairly complicated accrual accounting process. This model is widely accepted and used in the literature, but at the same time heavily criticised. I therefore rely on several alternative tests and alternative specifications of the accrual model to minimise concerns that my findings are driven by measurement error in the earnings management construct. Also, while my tests control for many correlated variables, the extent to which these variables fully control for unobservable factors depends on the appropriateness of the use of linear regression models. Another important caveat is, as in all research on insider trades, that the analyses rely on insider trades that are reported to the market regulators (the SEC in the U.S. and the AFM in the Netherlands). If insiders opportunistically trade their firms' equity, they are more likely to do so in ways that are not publicly visible. Therefore, there is a possibility that the most informative trading decisions of corporate insiders do not show up in the databases used. However, this has more likely biased my results against, rather than in favour of, finding any results. Also, insiders in high profile fraud cases such as Enron actually did report their (illegal) trading activity to the SEC and are thus represented in the data examined in this dissertation.

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Nederlandstalige Samenvatting (Dutch Summary)

Dit proefschrift beschrijft de resultaten van empirisch onderzoek naar de informerende rol van aandelentransacties door insiders. Onderzocht zijn zowel de mogelijke negatieve (opportunistische) kanten alsmede de positieve invloeden die deze transacties en hun publieke bekendmaking kunnen hebben op de aandelenmarkt. Insiders zijn gedefinieerd als de bestuurders en commissarissen van beursgenoteerde bedrijven. Insidertransacties zijn de transacties van deze personen in de aandelen van het bedrijf waarvoor zij werkzaam zijn. Deze transacties zijn legaal, komen frequent voor en worden doorgaans binnen afzienbare tijd publiek bekend gemaakt. In de meeste landen is het handelen op basis van materiële voorkennis strafbaar. Niettemin hebben topmanagers over het algemeen betere inzichten in de lange termijn verwachtingen van hun bedrijf dan de gemiddelde belegger. Ook zijn deze insiders nauw betrokken bij de financiële verslaggeving en hebben zo invloed op de precisie van informatie die naar buiten wordt gebracht. Besluiten van insiders om aandelen in hun bedrijf (bij) te kopen zullen daarom relatief weinig voorkomen wanneer de vooruitzichten slecht zijn, terwijl besluiten om aandelen te verkopen relatief weinig zullen voorkomen wanneer de vooruitzichten optimistisch zijn.

Insiders spelen een belangrijke rol in wetenschappelijk vakgebieden als accountancy en financiële bedrijfseconomie. Door informatieasymmetrie en agencyconflicten tussen managers en aandeelhouders is de vraag naar externe verslaggeving en complementerende openbaarmakingen ontstaan. Vanwege hun informatiepositie binnen het bedrijf hebben managers de verantwoordelijkheid voor de financiële verslaggeving, waarbij aannames en voorspellingen over toekomstige economische gebeurtenissen moeten worden gemaakt. Echter, deze managers hebben vaak belangen die niet in lijn liggen met die van aandeelhouders. In theorie kan gedeeltelijke beloning in aandelen of opties zulke agencyproblemen verminderen. Wanneer managers een belang hebben in het bedrijf zullen zij eerder geneigd zijn om keuzes te maken die in het belang zijn van aandeelhouders. Binnen bepaalde beperkingen kan dit aandelenbezit vervolgens vergroot of geliquideerd worden door de managers. Dit proefschrift maakt gebruik van publiekelijk beschikbare informatie over

transacties van insiders om verschillende aspecten binnen het spanningsveld tussen insidertransacties en informatie in externe verslaggeving te onderzoeken.

Drie empirische onderzoeken worden gepresenteerd. In het eerste onderzoek wordt gekeken naar de signalen die optie uitoefeningen van topbestuurders in de V.S. geven over de toekomstige winstgevendheid van bedrijven en de kwaliteit van de huidige verslaggeving. Terwijl theorie en voorgaand onderzoek impliceren dat aandelenopties managers motiveren om in onzekere, maar waarschijnlijk winstgevende, projecten te investeren, kunnen opties ook negatieve prikkels creëren in termen van meer opportunistische financiële verslaggeving. Daarnaast kunnen opties het vermogen van managers zeer gevoelig maken voor koersschommelingen. In tegenstelling tot bestaande onderzoeken houdt het onderzoek in hoofdstuk 4 rekening met de verschillende prikkels die opties en aandelen kunnen creëren. Het onderzoek beargumenteert en toont aan dat de besluiten van insiders om hun posities te liquideren via opties meer (negatieve) informatie geven over toekomstige winstgevendheid van bedrijven dan reguliere verkopen van aandelenbezit. Daarnaast blijkt dat dit signaal sterker wordt naarmate het verschil tussen aandelenkoers en uitoefenprijs van de opties (“moneyness”) groter wordt. Liquidaties van aandelen door optie uitoefeningen zijn tevens gerelateerd aan opwaartse winststuring door bedrijven en een grotere kans op materiële verslaggevingfouten. Samengevat toont het onderzoek aan dat managers meer opportunistische keuzes maken wanneer zij beloond worden met opties in plaats van aandelen. Alhoewel het toekennen van opties in theorie voordelen met zich meebrengt zullen bedrijven maatregelen moeten nemen om de negatieve aspecten van opties niet de boventoon te laten voeren, door bijvoorbeeld te investeren in corporate governance en interne beheersingssystemen.

In het tweede onderzoek wordt gekeken naar de informatiewaarde van transacties van insiders op de Nederlandse markt. Dit onderzoek toont aan dat, vergelijkbaar met bestaande onderzoeken in andere landen, insiders in Nederland het juiste moment kiezen voor hun transacties door aandelen te kopen voor koersstijgingen en te verkopen voor koersdalingen. Terwijl bestaand onderzoek beargumenteert dat managers prikkels hebben om zowel persoonlijke transacties als transacties voor het bedrijf (terugkopen en uitgiften van aandelen) uit te voeren rond koersschommelingen, suggereren de resultaten van dit onderzoek dat Nederlandse managers alleen succesvol zijn in het timen van hun persoonlijke transacties. Daarnaast laat het onderzoek zien dat de voorspellende waarde van verkooptransacties door insiders eerder verklaard wordt door het verkeerd waarderen van publieke informatie door de markt, dan door specifieke niet-publieke informatie over de toekomst van het bedrijf. Aan de

andere kant blijken de aankooptransacties door insiders een reactie op zowel publieke als niet-publieke informatie te zijn. Concluderend kan worden gesteld dat insider transacties zowel aan niet-publiekelijk (“inside”), als aan publiekelijk beschikbare informatie kunnen worden gerelateerd. Onverwijldde publieke melding van persoonlijke insider transacties, maar niet zozeer van bedrijfstransacties, kan daarom een belangrijke rol vervullen in de efficiëntie van de aandelenmarkt door signalen te geven over de fundamentele waarde van een bedrijf.

Het derde en laatste onderzoek laat zien dat, in de V.S., publieke meldingen van insider transacties (aankopen van aandelen) geassocieerd zijn met significante koersreacties. Dit impliceert zowel dat insidertransacties nieuwe informatie bevatten als dat de markt de publieke bekendmaking gebruikt om de waarde van een aandeel te herzien. De sterkte van de koersreactie hangt af van bedrijfs- en insiderkarakteristieken. Sterkere koersstijgingen na meldingen van aandelenaankopen door bestuursvoorzitters (CEOs) en financieel directeurs (CFOs) suggereren bijvoorbeeld dat transacties van deze insiders meer waardevolle informatie bevatten dan transacties van de overige insiders. Vervolgens toont het onderzoek aan dat koersstijgingen sterker zijn naarmate de potentiële ruis in de financiële verslaggeving groter is. Deze relatie wordt gevonden voor bedrijven die voorafgaand aan de transacties positief winstnieuws naar buiten brachten. Deze bevinding impliceert dat de markt gebruik maakt van publieke meldingen van insidertransacties om onzekerheden over de kwaliteit van gerapporteerde winsten weg te nemen. Na het verkrijgen van de additionele informatie van het management corrigeert de markt voor de, in eerder onderzoek aangetoonde, te conservatieve reactie op de bekendmaking van kwartaal- of jaarcijfers. Additionele testen bevestigen deze conclusie door aan te tonen dat koersstijgingen na meldingen van insidertransacties positief gecorreleerd zijn met toekomstig winstnieuws, maar alleen voor bedrijven met meer potentiële ruis in de verslaggeving en met voorafgaand positief winstnieuws. Samengevat toont het onderzoek aan dat insidertransacties en de daarop volgende publieke bekendmaking een positief effect kunnen hebben op de manier waarop aandelenprijzen de toegevoegde waarde van accountinginformatie weergeven.

Een algemene bevinding van de onderzoeken is dat aandelenaankopen door insiders een positief signaal geven aan de markt. Door hun belang in het bedrijf te vergroten en hun vermogen op het spel te zetten kunnen managers hun toewijding aan het bedrijf en hun optimisme over de toekomst naar buiten brengen indien dat in andere vormen, zoals de externe verslaggeving of additionele vrijwillige openbaarmaking, niet mogelijk is. In hoofdstuk 4 wordt aangetoond dat aandelenaankopen door insiders gecorreleerd zijn met toekomstige gerapporteerde winsten. In hoofdstuk 5 wordt aangetoond dat aandelenaankopen

door insiders gecorreleerd zijn met korte en lange termijn schommelingen in aandelenkoersen. In hoofdstuk 6 wordt aangetoond dat publieke meldingen van insidertransacties nuttig kunnen zijn voor de efficiënte verwerking van publiek beschikbare informatie in financiële verslagen. Gecombineerd impliceren deze bevindingen dat insider transacties, vooral aandelenaankopen, een belangrijke bron van additionele informatie kunnen zijn voor de voorspellings- en waarderingscomponenten in een jaarrekening analyse (“financial statement analysis”).

De bevindingen in dit proefschrift hebben implicaties voor toezichthouders die belang hebben bij enerzijds het inperken van opportunistisch gedrag en oneerlijke verrijking door bedrijven en managers, en anderzijds de onverwijlde publicatie van informatie over insider transacties. Verder is het onderzoek relevant voor beloningscommissies die de keuze hebben om aandelen of opties toe te kennen aan werknemers, insiders die belang hebben bij een correcte waardering van het bedrijf op de markt, investeerders die informatieverstrekkingen nodig hebben om juiste beslissingen te kunnen nemen en als laatste voor toekomstig wetenschappelijk onderzoek in de vakgebieden accountancy en financiële bedrijfseconomie.

Bij de conclusies in dit proefschrift moeten enkele kanttekeningen worden geplaatst. In empirisch onderzoek worden de getrokken conclusies beïnvloed door de gekozen modellen, methoden, en maatstaven. Conclusies over winststuring en verslaggevingruis zijn bijvoorbeeld gebaseerd op modellen die op een vereenvoudigde manier zeer complexe processen binnen de financiële verslaggeving trachten weer te geven. Deze modellen zijn de standaard in het vakgebied, maar onderhevig aan kritiek. Het onderzoek wordt daarom aangevuld met alternatieve testen en modellen om deze kritiek, op zijn minst ten dele, te weerleggen. Daarnaast hangt de kracht van het corrigeren voor gecorreleerde factoren af van de juistheid van het gebruik van lineaire regressiemodellen. Tot slot moet worden genoemd dat de analyses gebaseerd zijn op transacties die gerapporteerd zijn aan de beurswaakhond (de Amerikaanse SEC en de Nederlandse AFM). Als insiders opportunistisch handelen zullen zij dit doen langs wegen die niet publiek zichtbaar zijn. Dit kan ertoe leiden dat de meest informatieve transacties van insiders niet gebruikt worden in de analyses. Echter, opportunistische insidertransacties in fraudegevallen zoals Enron zijn wel degelijk gerapporteerd aan de beurswaakhond en dus beschikbaar in de databases die gebruikt zijn voor het onderzoek.

Curriculum Vitae

David Veenman was born on February 9, 1983, in Amsterdam, the Netherlands. He obtained a Master degree in Business Economics (Cum Laude) and a Bachelor degree in Econometrics at the University of Amsterdam in 2006. From 2006 till 2010 he was a PhD Candidate in Accounting at the Amsterdam Business School. During this period he was involved in the teaching and coordination of the Bachelor course Financial Statement Analysis (EV1) and supervised Bachelor and Master theses. In addition, he worked as a part-time market data analyst at Markit Group Amsterdam in 2006-2007. In the academic year 2008-2009 he spent a semester as a visiting scholar at the School of Business of the University of Wisconsin-Madison, United States. Starting in September 2010 he will continue his work at the Amsterdam Business School as an Assistant Professor in Accounting. His research interests are in the area of financial accounting, including topics such as the quality of financial reporting, timeliness of financial disclosures, valuation, and the role of executive compensation and insider trading in capital markets.