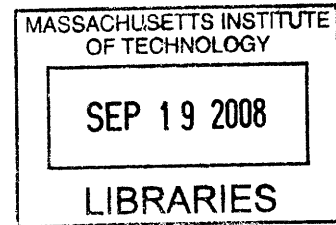


Corporate Governance and Insider Trading

by

Konstantin A. Rozanov

A.B. Government
Harvard University, 2003



SUBMITTED TO THE SLOAN SCHOOL OF MANAGEMENT IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY IN MANAGEMENT
AT THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

SEPTEMBER 2008

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**Submitted to the Sloan School of Management
on June 26, 2008 in Partial Fulfillment of the
Requirements for the Degree of Doctor of Philosophy in
Management**

ABSTRACT

I investigate the relation between corporate governance and insider trading by corporate executives. Despite the general view that trade on non-public information adversely affects capital market participants, the impact of corporate governance on such trading remains relatively unexplored in prior research. I propose an empirical measure that relies on a predicted pattern in stock returns to identify transactions that are more likely to be based on private information and provide evidence to validate the construct. Using this measure, I find that good corporate governance, identified through board and ownership characteristics that have been linked to more effective monitoring of management in prior research, is negatively related to opportunistic insider trading. In supplementary analysis, I provide evidence on the robustness of this relation to an alternative hypothesis and to potential endogeneity. Overall, I conclude that good corporate governance helps to attenuate opportunistic insider trading.

Thesis Supervisor: S.P. Kothari

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Acknowledgements

I would like to thank my dissertation committee members, S.P. Kothari (chair), Joseph Weber, and Rodrigo Verdi, for their steadfastness in guiding me through the Ph.D. program and improving my qualities as a researcher and a professional. I am obliged to the MIT Sloan School of Management for the rigorous and comprehensive education.

S.P. Kothari has uniquely shaped my perspective on economics, finance, and accounting. I always felt that he held me to the highest intellectual and personal standards. Despite my multifaceted experience as a Ph.D. candidate, I am genuinely humbled by my conviction that I have yet to fully meet those expectations. From the day Professor Kothari introduced me to the program and through the very present, he has always been and continues to be an unexampled role-model. I am profoundly grateful for the privilege of having had Professor Kothari as my mentor.

I would like to sincerely thank Joseph Weber, who has exerted tremendous effort to ensure my continued progress at every stage of the program. Professor Weber prompted me to grow as an academic by illustrating the complexity of studied phenomena and by demanding analytical meticulousness. I am grateful for his subtle yet unfeigned solicitude and for his encouragement throughout my time at MIT.

I would also like to express my appreciation to Rodrigo Verdi. His passion for research and engaged dedication to Ph.D. candidates nourished me with the much-needed optimism as I journeyed through the thesis-writing process. Professor Verdi offered stringent yet constructive advice that produced an impetus for my research.

I feel the deepest gratitude for the unconditional love and care of my mother and father. I cannot adequately express the value of their sacrifices on my behalf. Their tireless aspirations to help me become a better person have always been the illuminating beacon that steered me to the conscientious path. My father has always challenged me to engage the seemingly unfeasible and to have confidence in doing so. My mother devoted time and effort to instill discipline and ethics so that I could achieve what I set out to pursue.

I am grateful to my grandparents for lessons that their lives have taught me and to my sister and brother for enriching my world. I am grateful to Valerie Kuo for her unlimited thoughtfulness and friendship.

I am thankful for all of the opportunities that life has given me.

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1. Introduction

This paper investigates whether good corporate governance attenuates opportunistic insider trading by corporate executives. Despite public and academic interest in the subject of insider trading, prior research on the impact of corporate governance on insider trading is relatively limited. A principal challenge in studying this relation is the ability to identify the kind of insider trading that corporate governance is likely to affect. The issue is further complicated by the lack of consensus in the literature as to whether trade on non-public information is unambiguously bad (Bainbridge, 2001; Haddock, 2002).

In this study, I define opportunistic insider trading as trade in corporate stock by corporate insiders that is based on non-public information. Such insider trading exposes the corporation and the outside shareholders to potentially significant costs, including adverse selection and the risk of a securities-law violation, while allowing corporate executives to profit from their informational advantage relative to other market participants. Consistent with the perspective reflected in U.S. and international securities laws, I assume that the costs to outside shareholders of information-based trading outweigh the benefits and refer to such trading as opportunistic.

To the extent that opportunistic insider trading imposes a significant cost on outside shareholders, these shareholders are likely to rely on various measures to curtail such trading. In the absence of frictionless capital markets, good corporate governance is a means for outside shareholders to protect the return on their invested capital (Fama and Jensen, 1983; Shleifer and Vishny, 1997). In particular, certain characteristics of the corporate board and the ownership structure have been previously linked to more effective monitoring of corporate management (e.g., Weisbach, 1988; Agrawal and Mandelker, 1990; Lipton and Lorsch, 1992; Healy et al.,

1999; Klein, 2002b). I examine the relation between opportunistic insider trading and board size, board independence, institutional ownership, and ownership concentration. If good corporate governance helps to mitigate opportunistic insider trading, then I expect corporate governance characteristics that reflect good corporate governance to be negatively associated with the likelihood that a trade in corporate stock by a corporate executive is based on non-public information.

To test the hypothesis, I propose an empirical measure to identify insider trades that are more likely to be based on non-public information. The measure relies on a predicted pattern in stock returns around insider transactions that are based on non-public information. Prior literature suggests that the profitability of an insider trade reflects the materiality of the insider's informational advantage (Rogoff, 1964). Corporate executives can maximize the profits from trade in corporate stock by either timing their trades to exploit mispricing or by inducing mispricing through inaccurate disclosures prior to a scheduled trade. I expect that, on average, firm-specific returns around such opportunistic trades will follow a predictable pattern, one favorable to the insider transaction, which I capture with the *PricePattern* measure. The value of *PricePattern* is higher (lower) for more favorable pre- and post-transaction returns around an insider purchase (sale).

Most of my empirical analysis relies on a sample of insider purchase transactions. This sample is more likely to include a greater proportion of trades based on non-public information than a sample of sell transactions, which are exposed to higher litigation risk (Kim and Verrecchia, 1994; Baiman and Verrecchia, 1996; Rogers, 2004; Cheng and Lo, 2006) and are more likely to be motivated by factors other than private information, such as liquidity and diversification needs (Lakonishok and Lee, 2001; Huddart and Ke, 2007). Since *PricePattern*

measures opportunism with noise, any regression analysis is expected to be more powerful for an insider-purchase than an insider-sell sample to the extent that a greater portion of the variation in *PricePattern* for the buy relative to the sell sample is explained by information-based trading. Moreover, to the extent that litigation risk mitigates the incidence of opportunistic insider selling, the residual role for alternative control mechanisms, such as corporate governance, is more likely to be limited.

I conduct a series of construct validity tests in order to provide reassurance that *PricePattern* identifies transactions that are more likely to be based on non-public information and more likely to be opportunistic. First, I find that insider purchase transactions with the highest values of *PricePattern* are also those that earn the highest abnormal returns over the six-month period following the month of the trade. Although this relation is partially mechanical, it nevertheless suggests that insiders are more likely to rely on non-public information for and are able to profit from these trades. Second, I find that management earnings guidance is more likely to be biased in favor of the insider trade for a sub-sample of transactions with values of *PricePattern* reflecting a greater likelihood of information-based trading. This observation suggests that insiders are more likely to intentionally mislead the market in order to profit from insider trading for high (low) *PricePattern* buy (sell) transactions. Third, I find that the probability of a securities class action following a corporate stock purchase by an executive is higher for high *PricePattern* transactions, which suggests that such insider trading is more likely to reflect behavior that violates securities laws.

Using the *PricePattern* measure to test the hypothesis, I find that certain firm characteristics, which have been previously linked to more effective monitoring of potential agency problems, are negatively associated with opportunistic insider trading. In particular, I

find that *PricePattern* is negatively related to a more balanced board size, to greater board independence, and to greater ownership concentration. These findings support the hypothesis that good corporate governance helps to attenuate opportunistic insider trading.

To shed more light on the observed relation between good corporate governance and opportunistic insider trading, I perform a set of supplementary tests. First, to the extent that good corporate governance is likely to have a greater impact on more material transactions, I expect to observe a stronger relation between the examined corporate governance characteristics and opportunistic insider trading for larger trades and find evidence consistent with this prediction. Second, I explore the impact of different types of institutional investors on opportunistic insider trading. While I find no relation between *PricePattern* and institutional ownership in general, I do find that trades in corporate stock by corporate executives are more (less) likely to be based on non-public information at firms that have a higher proportion of ownership by transient (dedicated) institutional investors. Third, I use an alternative method to identify opportunistic insider trading that relies on a trade-motivated bias in management earnings guidance. Albeit weak, the results using this approach are generally consistent with my original findings.

A significant concern with the interpretation of the results is that the relation between corporate governance and insider trading is potentially endogenous. The conclusion that good corporate governance restricts opportunistic insider trading is theoretically motivated, yet an alternative hypothesis of reverse causality is also plausible. To address this issue, I examine insider trading for a subset of firms that have recently replaced their CEO. A new CEO is less likely to have had a significant impact on the firm's board and ownership structure. Building on this logic, a systematic relation between good corporate governance and opportunistic insider trading for this subset of transactions is more (less) likely to reflect the effect of corporate

governance (insider trading) on insider trading (corporate governance). For this subset of transactions, I find that greater board independence and greater ownership concentration are still negatively associated with opportunistic insider trading, which suggests that the relation between good corporate governance and opportunistic insider trading is unlikely to be driven purely by reverse causality. Notwithstanding, further analysis is warranted to rule out alternative sources of endogeneity.

This study contributes to the literature on insider trading and corporate governance along several dimensions. First, the findings relate to the broader debate on the costs of corporate insider trading by demonstrating that good corporate governance is associated with a lower incidence of certain insider transactions (Bainbridge, 2001; Haddock, 2002). It is unlikely that good corporate governance would restrict a behavior unless that behavior was perceived to adversely affect investors. Second, the results are consistent with the view that good corporate governance, serving as a complement to market forces, contracts, and regulations, can help to protect outside shareholders from opportunistic managerial behavior arising from agency problems. The paper contributes to the extant corporate-governance literature and the debate on whether governance matters by exploring a new setting involving a managerial behavior that is ex ante expected to be opportunistic (Fama and Jensen, 1983; Shleifer and Vishny, 1997; Bebchuk and Fried, 2003; Weisbach, 2007). Third, I develop a measure of opportunistic insider trading that can be used by practitioners and researchers as an additional tool to identify insider trading that is based on non-public information or to draw inferences about the effectiveness of corporate governance at a firm. The construct validity tests provide reassurance that the proposed measure identifies insider transactions that are more likely to be based on non-public information and to be opportunistic.

The remainder of the study is organized as following. In Section 2, I provide an overview of insider-trading law and regulation, summarize prior research on insider trading, and develop the hypothesis. In Section 3, I propose a measure of opportunistic insider trading, outline the hypothesis test, and describe the sample. In Section 4, I discuss several construct validity tests for the proposed measure. In Section 5, I highlight the empirical results. Finally, in Section 6, I conclude and identify opportunities for further analysis.

2. Hypothesis Development and Literature Review

2.1 Insider-Trading Law and Regulation

This sub-section provides a brief overview of U.S. law and regulation pertaining to insider trading by corporate executives. Historically, documented trading by corporate executives in their corporate stock based on material non-public information dates as far back as the early years following the Declaration of Independence (1776) when the U.S. capital markets started to emerge. More than a century later, the foundations of modern insider trading law were set forth in the Securities Exchange Act of 1934. Since then, legal and regulatory reforms have been implemented in the U.S. and abroad to prevent trade motivated by private information.

In his history of Wall Street, Charles Geisst (2004) recounts several notable cases of trade on private information prior to the Exchange Act. William Duer, a merchant speculator in New York City and a prominent 18th century historical figure, “had the distinction of being the first individual to use knowledge gained from his official position to become entangled in speculative trading; in effect, he was the first inside trader” (p. 12). Eventually, the Treasury charged Duer with malfeasance and sent him to debtors’ prison, where he eventually died in 1799. More than a century later, the U.S. Senate started taking significant steps to control opportunistic practices

in the U.S. capital markets. After establishing the Federal Reserve in 1913 to regulate the supply of money in the banking system, the government began to scrutinize the NYSE, focusing on “inside information that many corporate leaders had concerning their own companies but failed to make public... they used the information to trade in their own stock” (p. 133). Two decades later, on the heels of the stock market crash on Black Tuesday of October 29, 1929 and the subsequent Great Depression, the Exchange Act was passed.

The Securities Exchange Act of 1934 provides the statutory basis for today’s legal and regulatory restrictions on insider trading. Prior to the Exchange Act, common law embodied some restrictions on insider trading, albeit disparate and limited in scope. The Exchange Act introduced specific guidelines relating to insider trading and authorized the Securities and Exchange Commission, established under Section 4 of the act, to regulate securities trading in general. Section 16 of the Exchange Act specifically targets Directors, Officers, and Principal Stockholders, defined as holders of ten percent or more of the corporate stock. Sub-section 16(a) requires that corporate insiders disclose beneficial ownership in the event of an IPO or if newly elected to the company at the time that the deal becomes effective and changes to beneficial ownership within 10 days after the end of any month in which such a change occurs. Sub-section 16(b) provides for automatic recovery by the company of any profits made by insiders on short-swing trading, defined as securities purchased (sold) and sold (purchased) within a 6-month period. More broadly, Section 10 of the Exchange Act focuses on Manipulative and Deceptive Devices, and sub-section 10(b) makes unlawful trading that employs manipulation or deception or violates rules and regulations prescribed by the SEC to protect public interest and investors.

The Exchange Act itself does not explicitly define or restrict insider trading. In 1942, the

SEC promulgated Rule 10b-5 as a first step in that direction. The Rule makes unlawful (1) “to defraud”, (2) “to make untrue statement of material fact or to omit to state a material fact necessary in order to make the statements made... not misleading”, and (3) “to engage in... fraud or deceit upon any person, in connection with the purchase or sale of any security”. In 1961, the SEC introduced the concept of “disclose or abstain” in an enforcement action against Cady, Roberts & Co., arguing that an insider in possession of material non-public information must disclose such information before trading, or if disclosure is impossible or improper, must abstain from trading under Rule 10b-5. Cady, Roberts & Co. had sold stock of Curtiss-Wright Corporation knowing that the latter had decided to reduce its quarterly dividend.

The SEC ruling became a legal precedent when the Second Circuit Court of Appeals held in 1968 that several insiders of Texas Gulf Sulphur (TGS) had violated the law by breaching the “disclose or abstain” concept. After TGS discovered significant mineral deposits and acquired rights to the land, its senior management ordered that the discovery remain strictly confidential, and in the meantime, insiders with the private information acquired significant amounts of the company’s options and stock. The stock price moved from \$18 per share in the fall of 1963 to \$58 per share after the discovery was made public in the spring of 1964.

Initially, in 1971, the SEC interpreted the “disclose or abstain” concept to require that non-public information be a factor in the insider’s decision to affect the transaction, the so-called “use test”. However, in 1978, the SEC embraced the “mere possession test” as means to determine if the “disclose or abstain” concept had been breached.

Subsequent cases, including those before the Supreme Court such as *Chiarella v. United States* (1980), *Dirks v. SEC* (1983), and *United States v. O’Hagan* (1997) reviewed the “disclose or abstain” concept, particularly as it applies to non-insiders. In 1998, in *SEC v. Adler*, the

Eleventh Circuit Court evaluated the “use” versus “possession” test. Building on prior Supreme Court cases, the Eleventh Circuit Court rejected the “possession” test and held that the “use” test is more consistent with the “fraud and deception” language in Section 10 of the Exchange Act and the SEC Rule 10b-5. Moreover, the “use” test is more likely to capture scienter. However, recognizing the unduly high burden of proof that the “use” test imposes on the SEC, the court also held that a “strong inference of use” arises in the case of knowing possession, and that an insider could attempt to rebut the inference by providing evidence that there was no causal connection. Moreover, the court noted that the SEC had the authority to establish a rule that would implement the possession standard. On October 23, 2000, the SEC did just that when it introduced Rule 10b5-1.

SEC Rule 10b5-1 states that “manipulative and deceptive devices” prohibited under the Exchange Act and under Rule 10b-5 include the purchase or sale of a security of an issuer “on the basis of” material non-public information about that security or issuer. The rule defines “on the basis of” as being aware of the material non-public information when making the trade, subject to several affirmative defenses outlined in sub-section 10b5-1(c), including written trading plans.

In addition to the explicit restrictions outlined in Rule 10b5-1, current insider trading law and regulation includes more stringent disclosure requirements and stiffer penalties for violations. On August 29, 2002, in compliance with Section 403 of the Sarbanes Oxley Act (SOX) signed on July 30 of that year, the SEC adopted Rule 16a-3g that requires insiders to disclose on Form 4 any change in ownership of the issuer’s stock before the end of the second business day following the day of the transaction. As of July 30, 2003, these reports must be filed electronically with the SEC, and the SEC as well as the issuer must publish the reports by

the end of the business day following the filing date.

Penalties for insider trading have increased dramatically, particularly during the widely publicized insider trading scandals of the 1980s involving Michael Milken, Denis Levine, Martin Siegel, and Ivan Boesky, among others. The Insider Trading Sanctions Act of 1984 imposed civil penalties of up to three times the profits or losses avoided as a result of an insider trading violation. The act also increased penalties from \$10,000 to \$100,000 for certain criminal violations of the Exchange Act. The Insider Trading and Securities Fraud Enforcement Act of 1988 imposed civil penalties on controlling persons of up to the greater of \$1 million or treble the controlled person's profits or avoided losses resulting from the violation, thereby encouraging companies to implement improved internal controls. Under the act, individuals who communicate private information, known as "tippers", to others who then trade, known as "tippees", could also be deemed liable and subject to similar penalties as those who traded in violation of the Exchange Act. The act increased criminal penalties from \$100,000 to \$1 million (\$2.5 million in the case of a legal person) and prison terms from 5 to 10 years. Moreover, the act authorized the SEC to pay bounty to informers, and it also allowed individuals who claim damages to file suit. Additionally, defendants in insider trading cases also typically face charges of fraud, tax evasion, and obstruction of justice.

In the United States, insider trading law and regulation has evolved dramatically over the last century, reflecting a strong public interest in restricting trade by corporate insiders in corporate stock based on material non-public information. Internationally, a large fraction of countries have also adopted insider trading rules. However, in many countries that have insider-trading restrictions today, rules were only established during or after the 1980s, and the first enforcement of these rules came significantly later (Bhattacharya and Daouk, 2002).

2.2 Prior Research on Insider Trading

This study builds upon and extends the literature on insider trading. A significant amount of prior research in this area focuses on the association between insider trading and subsequent stock returns. The majority of studies find that corporate insiders earn abnormal returns on their trades of corporate stock (Rogoff, 1964; Glass, 1966; Lorie and Niederhoffer, 1968; Jaffe, 1974; Noe, 1999; Jagolinzer, 2007) and that the trades have significant predictive power with respect to future returns (Meulbroek, 1992; Lakonishok and Lee, 2001).¹ In addition, insider selling is also a significant predictor of accounting fraud, which adversely affects stock returns (Summers and Sweeney, 1998). These findings suggest that insiders exploit a material informational advantage when trading in corporate stock, but they do not speak to whether such trading is opportunistic, whether it is beneficial or harmful to outside investors.

Several recent papers explore the relation between information asymmetry and cross-sectional differences in insider trading (Aboody et al., 2005; Rogers and Stocken, 2005; Huddart et al., 2007). The studies document a positive relation between insider-trading profits and information asymmetry, although the results are somewhat mixed. Similarly, Frankel and Li (2004) find that increased financial statement informativeness and greater analyst following reduce the association between insider trades and subsequent stock returns. To the extent that greater information asymmetry allows for greater agency costs, the positive association between insider-trading profits and information asymmetry suggests that higher profitability of insider transactions reflects higher agency costs.

Along similar lines, some studies examine opportunistic insider trading indirectly by analyzing the impact of litigation risk on insider-trading behavior. Private litigants, who have

¹ A few studies find that corporate insiders earn excess returns that are on average small (Seyhun, 1986; Jeng et al., 2003) and do not appear to rely on insider information when trading (Elliot et al., 1984; Givoly and Palmon, 1985).

suffered losses due to price declines, play a significant role in the enforcement of disclosure and insider-trading regulation (Niehaus and Roth, 1999). Empirical evidence suggests that insiders alter trading behavior when litigation risk is high. Beneish et al. (2005) find that insiders at firms with deteriorating performance use accruals to inflate earnings so as to push defaults to future periods when selling corporate stock but refrain from doing so when they trade closer to the event of the default. Likewise, Huddart and Ke (2007) find that insiders tend to trade on information in subsequent 10K and 10Q filings only during low litigation periods. Moreover, Piotroski and Roulstone (2007) find that insider trading varies with both the magnitude and the direction of future earnings surprises, suggesting that corporate insiders consider litigation risk to be higher in the presence of material non-public information.

Prior empirical evidence also suggests that the effect of litigation risk on insider trading is asymmetric for insider selling versus insider buying. For example, Cheng and Lo (2006) find that managers tend to issue more bad-news disclosures and withhold more good-news disclosures prior to insider purchases, but they do not alter disclosure behavior analogously ahead of insider sales. On the contrary, Rogers (2004) finds that managers tend to improve disclosure quality prior to insider sales. Furthermore, Kim and Verrecchia (1994), Baiman and Verrecchia (1996), and Rogers (2004) find that managers provide lower quality disclosures prior to purchasing shares to avoid fully disclosing private information. By documenting that insiders alter trading behavior as a result of litigation risk, these studies suggest that some insider transactions are opportunistic or at least perceived to be such.

A study closely related to mine (Jagolinzer, 2007) explores the impact of a specific control mechanism on the profitability of insider transactions. While SEC Rule 10b5-1, issued in 2000, further restricts the ability of corporate insiders to trade on private information, it also

recognizes the insiders' need to trade for liquidity and diversification purposes. To that end, the rule provides an affirmative defense for transactions that are executed as part of explicitly defined trading plans under SEC Rule 10b5-1(c), and many corporate insiders lock into such trading plans to protect the firm and themselves from litigation. Jagolinzer (2007) finds that even under these plans, insiders continue to earn significant abnormal profits from their trades. To the extent that the profitability of an insider transaction reflects an opportunistic informational advantage, these results suggest that either the trading plans are not effective at preventing opportunistic insider trading or are put into place specifically then, when opportunistic insider trading is expected to be particularly problematic. Jagolinzer's (2007) findings raise doubt as to whether good corporate governance in general can mitigate opportunistic insider trading.

My paper extends the literature by building on evidence from prior research to identify insider trading that is more likely to be driven by non-public information and by testing whether firm characteristics that reflect good corporate governance are negatively associated with the identified trading behavior.

2.3 Insider Trading and the Role of Corporate Governance

The underlying question investigated in this paper is whether good corporate governance mitigates opportunistic insider trading. I investigate whether corporate governance affects the decision to use non-public information when trading. Thus, I condition the empirical tests on trading and do not model the determinants of a trade taking place. While this approach limits the scope of inferences that can be drawn from the analysis, the focus of the study is to distinguish opportunistic from non-opportunistic transactions for those insiders who do trade as opposed to exploring the propensity of corporate insiders to trade in corporate stock in general. I define

opportunistic insider trading as trade in corporate stock by corporate insiders that is motivated by non-public information and argue that while such trading is undertaken by the insiders for their own financial gain, it potentially imposes significant costs on the firm and the outside shareholders.

Although there is an unresolved debate amongst economists and jurists weighing the social costs and benefits of insider trading (Bainbridge, 2001; Haddock, 2002), corporations have an interest in restricting information-based insider trading for several reasons. First, the informational asymmetry associated with insider transactions imposes a direct adverse-selection cost on outside investors and thereby decreases liquidity (Manove, 1989; Chung and Li, 2003). Second, such insider trading decreases confidence in the capital markets among investors who hold the fundamental view that insider trading is inconsistent with principles of fairness or that inside information is the sole property of the corporation (Bainbridge, 2001). Diminished confidence has the potential to increase the cost of capital and thus lower the value of a firm. Finally, current U.S. laws and regulations expressly prohibit trade in corporate stock that is based on material non-public information. Hence, information-based insider trading raises the risk of litigation, of losing key leadership, and of sending a negative signal about the firm's compliance and internal control systems.

These arguments must be weighed against the opposing view that information-based insider trading benefits investors. Milton Friedman has stated, "You want more insider trading, not less" (Harris, 2003). Information-based insider trading contributes to the efficient pricing of securities by conveying non-public information to the capital markets (Manne, 1966; Carlton and Fischel, 1983). For example, corporations often face the need to withhold certain strategic information from the public, and information-based insider trading allows for this non-public

information to be impounded in stock prices while keeping the information itself private (Manne, 1966). Although insider trading does not usually represent a significant fraction of the trading volume, insider trades have been shown to impact prices, suggesting that the private information does get impounded in prices (Keown and Pinkerton, 1981; Meulbrock, 1992).

In this study, notwithstanding the ambiguity regarding the trade-off between the informational costs and benefits of information-based insider trading, I assume that the costs of such trading outweigh the benefits from the perspective of a corporation, and thus, corporations have an interest in restriction such trade. This assumption is consistent with the legal and regulatory reforms that have been implemented in the U.S. and abroad to prevent information-based insider trading. Thus, I refer to such insider trading as opportunistic.

Despite the potential negative impact of opportunistic insider trading on outside shareholders, there is evidence suggesting that corporate insiders engage in such trading. Academic research continues to document that corporate insiders earn abnormal profits on trade in corporate stock, and at the same time, capital market regulators and participants express concern over the prevalence and magnitude of transactions based on non-public information (Ortega and Sheer, 2007).² Despite improvements in the scope and enforcement of insider-trading laws and regulations since the Securities Exchange Act of 1934, the unabated concern expressed by capital market regulators and participants regarding information-based insider trading suggests prior efforts are insufficient at curtailing the opportunistic use of private information in the trade of corporate stock. This leads me to investigate whether good corporate governance, complementing legal and market mechanisms, can help to mitigate opportunistic

² For instance, Walter Ricciardi, a deputy director of enforcement at the SEC, has on numerous occasions expressed his view that insider trading is surging. Likewise, a recent *New York Times* article (Morrissey, 2007) opened a paragraph with the following observation: “Reports of insider trading and securities fraud have become frequent these days.”

insider trading by corporate executives.

There is reason to expect that good corporate governance can reduce opportunistic insider trading. The modern public company is characterized by a separation of ownership and control (Berle and Means, 1932). Agency theory suggests that in the presence of information asymmetry, managers are able to exercise self-interest at the cost of other shareholders (Jensen and Meckling, 1976). Opportunistic insider trading is such an agency problem when corporate executives profit from the trading at a potential cost to outside shareholders. Under the neoclassical view of the firm, a critical role for corporate governance is to maximize shareholder welfare by mitigating agency costs and protecting outside investors from opportunistic managerial behavior (Fama and Jensen, 1983).³ In fact, prior literature in finance and accounting suggests that good corporate governance does mitigate agency costs associated with the separation of ownership and control (Shleifer and Vishny, 1997; Bushman and Smith, 2001); however, this research offers limited evidence on whether good corporate governance mitigates opportunistic insider trading specifically. Consequently, I postulate the following hypothesis, which is stated in alternative form:

Hypothesis: Good corporate governance is negatively associated with opportunistic insider trading.

Notwithstanding my hypothesis, there are a few factors that work against finding evidence of a relation between corporate governance and insider trading. A key challenge in analyzing the impact of corporate governance on insider trading is being able to distinguish

³ The neoclassical theory of the firm suggests that the firm is merely a means for an entrepreneur to overcome transaction costs (Coase, 1937). The ultimate purpose of the firm is to maximize shareholder value (Friedman, 1970). Yet, some dismiss this philosophy in favor of a richer theory of the firm that also considers the needs of other stakeholders (Evan and Freeman, 1990; Freeman, 1994; Donaldson and Preston, 1995). The analysis in this study is relevant under the stakeholder society view of the firm as well, for it focuses on the opportunistic behavior of corporate insiders that likely comes at a cost to all stakeholders.

opportunistic insider transactions from trades which are not based on private information. Doing so is critical because corporate governance is unlikely to mitigate non-opportunistic insider transactions. Yet, trade in corporate stock by corporate insiders is unavoidable, particularly at firms that employ equity-based compensation. Therefore, in order to test the relation between corporate governance and insider trading, I propose an empirical method, which is outlined in Section 3, to identify insider transactions that are more likely to be driven by non-public information.

Failure to identify opportunistic insider trading is not the only reason to expect that no relation between corporate governance and insider trading is found. A potential concern is that even if good corporate governance in general reduces opportunistic insider trading, I may find no relation with the particular governance characteristics examined in this study. Larcker et al. (2007) argue that many of the governance measures used in prior research have a very modest level of reliability and construct validity. To address this concern, Sub-Section 2.4 outlines the specific firm characteristics used to identify good corporate governance in this study and provides motivation for their inclusion.

Another concern arises out of the view that corporate governance is largely irrelevant. Among others, proponents of the managerial power theory argue that existing control mechanisms, including corporate governance, do not prevent managers from exercising self-interest at a cost to shareholders (Bebchuk and Fried, 2003; Weisbach, 2007). Core et al. (2006) reexamine the argument that weak corporate governance causes stock market underperformance (Gompers et al., 2003) and find evidence that does not support the hypothesis. Instead, the authors conclude that period-specific returns or differences in expected returns likely explain the documented abnormal returns for good governance firms. To the extent that good corporate

governance does not prevent managers from engaging in opportunistic behavior in general, it is not any more likely to have an impact on opportunistic insider trading.

In summary, despite the hypothesized negative relation between good corporate governance and opportunistic insider trading, I expect to find no such relation if I fail to identify opportunistic insider trading or if good corporate governance does not help to restrict such trading behavior. Thus, so as not to overstate the significance of any results, I remain agnostic about the direction of the relation in the empirical analysis and rely mostly on two-tailed significance tests. For exposition and clarity purposes, however, I do tabulate the predicted sign of the relation between each corporate governance characteristic and opportunistic insider trading. These predicted signs are based on the dominant view in prior research and are in line with my hypothesis.

2.4 The Corporate Board and the Ownership Structure

In this study, I adopt Shleifer and Vishny's (1997) view of corporate governance as a means by which the suppliers of finance to corporations assure themselves of getting the expected return on their investment. While there are numerous firm characteristics that reflect good corporate governance, I focus on two dimensions of the corporate board and two dimensions of the corporate ownership structure. Through their role in monitoring corporate executives, the board and the shareholders are arguably among the most fundamental components of corporate governance. Certain characteristics of the board and of the ownership structure have been found to reflect more effective monitoring, and I use these characteristics as my measures of good corporate governance.

The choice to focus the empirical analysis on these broad dimensions of corporate governance as opposed to narrower control mechanisms, such as company policies on insider

trading, involves several trade-offs. On the one hand, broad corporate governance encompasses numerous objectives, of which mitigating opportunistic insider trading is only one, and is thus relatively less exposed to potential endogeneity. For example, narrow control mechanisms are likely implemented in response to a specific issue, rendering the direction of causality and the predicted sign of the relation between the corporate governance mechanism and opportunistic insider trading unclear, as in early sociological studies of law enforcement and crime.

On the other hand, since broad corporate governance attributes are not specifically tailored to mitigate opportunistic insider trading, finding a relation may prove difficult. Moreover, the broad governance mechanisms are choice variables, and the characteristics and circumstances of individual firms determine their ultimate structure. In my empirical analysis, I assume that the determinants of the firm-specific value-maximizing level of the examined governance attributes are not systematically correlated with the propensity of that firm's corporate officers to engage in opportunistic insider trading. I further explore potential endogeneity in Sub-Section 5.2.4.

2.4.1 Board Size

From a legal perspective, the board of directors is the first and foremost body responsible for governing the affairs of a corporation because directors have a fiduciary duty to look after the best interests of the shareholders. In general, conventional corporate governance wisdom suggests that smaller boards and more independent boards are more effective at carrying out this fiduciary duty (Colley et al., 2003). Smaller boards are more likely to consist of individuals for a specific reason and are more likely to build internal trust and act decisively (Lipton and Lorsch, 1992; Jensen, 1993). Some evidence in the literature is consistent with these views. For example, smaller boards are associated with higher equity valuations (Yermack, 1996; Huther,

1997; Eisenberg et al., 1998). However, Yermack (1996), among others, suggests that larger boards lead to more effective monitoring. Klein (2002b) argues that board monitoring increases in board size because the responsibilities can be distributed over a greater number of monitors. Consistent with this alternative view, Adams and Mehran (2002) find that board size is positively associated with banking firm performance. Anderson et al. (2004) find that the cost of debt is inversely related to board size.

Considered jointly, the evidence suggests that there are costs to having boards that are either too large or too small, and the relation between board size and effective monitoring is likely to be non-monotonic. Not surprisingly, some studies find mixed results when using board size as a proxy for governance and others omit board size from the analysis. For example, Karamanou and Vafeas (2005) find mixed evidence on the association between board size and the quality of financial disclosures, while Ajinkya et al. (2005) do not consider board size in their analysis of variation in disclosure quality. Moreover, optimal board size is likely determined by firm- and industry-specific characteristics. In a study examining the evolution of board structure during the 10 years following a firm's IPO, Boone et al. (2007) find that board size increases in the size of the firm, is associated with the firm's competitive environment, and unlike board independence, reflects a trade-off between firm-specific benefits and costs of monitoring.

In order to capture the complex relation between board size and effective monitoring, I measure *BoardSize* as the absolute value of the deviation of the number of directors serving on the firm's corporate board from the median number of directors serving on the corporate boards in the firm's industry, size quintile, and year. To the extent that this median captures an optimum, the greater the deviation from this median, the less effective is the monitoring by the board. The *BoardSize* measure operationalizes this prediction, which is based on evidence in

prior research as outlined above. I expect *BoardSize* to be positively associated with my measure of opportunistic insider trading. To my knowledge, such a measure has not been used in prior research.

2.4.2 Board Independence

Board independence is another attribute that has been linked to effective governance. Independent boards are more likely to protect the interests of shareholders against managerial opportunism than boards that consist predominantly of corporate insiders and affiliates. Prior research has argued that directors benefit from prestige, reputation, learning opportunities, and networking by serving on a corporate board (Fama and Jensen, 1983; Lorsch and MacIver, 1989). Outside directors who do not monitor corporate executives effectively are more likely to lose these benefits than those who do. Gilson (1990) finds that directors are held accountable for corporate failures as evidenced through greater board turnover following such events. Similarly, Srinivasan (2005) finds that accounting restatements increase the likelihood that an outside director will lose his or her position on the restating firm's corporate board as well as directorships at other firms.

Consistent with this view, prior research suggests that boards with a higher fraction of outside directors are more effective at mitigating agency problems. For example, Weisbach (1988) finds that independent boards are more likely to remove poorly performing CEOs. Robenstein and Wyatt (1990) find that board independence is associated with greater appreciation in shareholder wealth. Several studies find that greater board independence is associated with a lower likelihood of accounting fraud (Dechow et al., 1996; Beasley, 1996; Farber, 2003) and lower levels of earnings management (Peasnell et al., 1998, Chtourou et al., 2001; Klein, 2002a; Peasnell et al., 2005). Likewise, Ajinkya et al. (2005) find that management

guidance is less optimistically biased, more accurate, and more precise when the issuing firm has a greater fraction of outside directors. More broadly, Sengupta (2004) finds that firms with more independent boards are more likely to release quarterly earnings earlier.

A few studies question the benefits of board independence. These studies suggest that information asymmetry and fear of litigation may reduce the ability of outside directors to control opportunistic managerial behavior (Mace, 1986; Jensen, 1993; Drymiotes, 2007). Moreover, outside directors may be appointed by and have allegiance to the management and board culture in general discourages conflict, rendering the effects of board independence weak or non-existent (Bushman et al., 2004, Vafeas, 2000; Larcker et al., 2007). However, the broader consensus in the literature, supported by analytical papers that derive optimal board structure (e.g., Harris and Raviv, 2006), is that while outside directors on the board could potentially lead to information loss, they are more likely to reduce agency costs.

As with board size, I examine whether *BoardIndependence*, measured as the number of outside directors divided by the total number of directors serving on the corporate board, is associated with opportunistic insider trading. To the extent that more independent boards help to attenuate opportunistic insider trading, I expect *BoardIndependence* to be negatively associated with my measure of opportunistic insider trading.

2.4.3 Institutional Ownership

Notwithstanding the function of the board, some shareholders choose to actively monitor the affairs of a corporation themselves. As Adam Smith noted more than two centuries ago, shareholders have a more direct incentive than directors serving on the corporate board to monitor the management. “The directors of [joint stock] companies, however, being the managers rather of other people’s money than their own, it cannot well be expected, that they

should watch over it with the same anxious vigilance [as stockholders]” (Smith, 1776). Prior research documents that certain ownership-structure characteristics, such as the proportion of institutional holdings or the level of ownership concentration, are associated with the shareholders’ willingness and ability to monitor the management. A key argument underlying the effective corporate governance role of concentrated shareholders and institutional investors is that they have relatively more value at stake and have a greater incentive, and potentially greater means, to monitor managers.

In general, prior studies find that a higher proportion of institutional ownership is associated with improved corporate governance (Healy et al., 1999; Noe, 2002). Several studies find that greater institutional ownership is associated with greater shareholder protection, increased firm value, and improved performance (Mallette and Fowler, 1992; Denis and Serrano, 1996; Gillan and Starks, 2000). Likewise, as with firms that have greater board independence, management guidance is less optimistically biased, more accurate, and more precise for firms with greater dispersed institutional ownership (Ajinkya et al., 2005). A few studies have raised concerns, however, about potential costs of high institutional ownership. For example, Baysinger et al. (1991) suggest that some institutional investors attempt to benefit at the cost of other shareholders. Moreover, Bushee (1998) finds cross-sectional variation in the corporate governance role of different types of institutional investors.

I measure *InstitutionalOwnership* as the fraction of shares held by institutional investors and examine whether this governance characteristic is associated with opportunistic insider trading. If higher institutional ownership results in more effective monitoring, then I expect *InstitutionalOwnership* to be negatively associated with my measure of opportunistic insider trading.

2.4.4 Ownership Concentration

Economic theory suggests that agency costs arise as a result of the separation of ownership and control, so to the extent that concentrated ownership, in contrast to diffuse ownership, reduces such separation, ownership concentration is likely to result in lower agency costs. Consistent with this view, several studies suggest that blockholders tend to actively promote long-term performance and to discipline management (Alchian and Demsetz, 1972; Shleifer and Vishny, 1986; Shleifer and Vishny, 1997).

In general, however, prior empirical evidence on the association between ownership concentration and indicators of good corporate governance, such as firm value, is somewhat mixed. Several studies find that ownership concentration has no effect or a non-linear effect on firm value (Demsetz and Lehn, 1985; Himmelberg et al., 1999; Demsetz and Villalonga, 2001; Holderness, 2003). Nevertheless, many of these studies conclude that diffuse ownership exacerbates agency problems notwithstanding the ambiguous impact on overall firm value. Other studies do find a positive relation between ownership concentration and firm value (Morck, Shleifer, and Vishny, 1988; McConnell and Servaes, 1990; Dittmar and Mahrt-Smith, 2007), and more direct tests of the relation between ownership concentration and monitoring of management find the association to be positive (Agrawal and Mandelker, 1990). These results are consistent with the argument that the free-rider problem makes it cost ineffective for small shareholders to act as monitors of management (Grossman and Hart, 1980).

I evaluate the relation between ownership concentration, as a proxy for good corporate governance, and opportunistic insider trading. I measure *OwnershipConcentration* as the fraction of shares held by all beneficial owners of more than 5 percent of the company's common stock. If higher ownership concentration reduces the ability of corporate officers to engage in

opportunistic insider trading, then I expect *OwnershipConcentration* to be negatively associated with my measure of opportunistic insider trading.

3. Research Design and Data

3.1 Measure of Information-Driven Insider Trading

In order to investigate the relation between corporate governance and opportunistic trade in corporate stock by corporate officers, I rely on a predicted pattern in stock returns to identify trades that are more likely to be based on non-public information. I test the hypothesis by estimating the association between the measure of opportunistic insider trading and good corporate governance, as captured by the characteristics of the corporate board and the corporate ownership structure.

Building on logical reasoning and evidence in the literature, I argue that firm-specific stock returns are more likely to follow a predictable pattern around opportunistic insider transactions. As discussed in Section 2, prior research documents that insiders earn abnormal profits on transactions in corporate stock. Some academics and practitioners have interpreted these profits to indicate that insiders act opportunistically by trading on private information. Prior research also documents that corporations make trade-motivated disclosure choices, which suggests that some insiders seek to opportunistically affect stock prices in advance of insider transactions so as to increase trading profits. On the basis of these findings, I expect firm-specific returns around opportunistic insider trading by corporate executives to follow a predictable pattern, one favorable to the insider transactions.

The presence of private information about a firm that has not been impounded in stock prices provides a potential opportunity for those in possession of the information to profit

through trade in that firm's stock. In particular, when the stock price experiences a significant negative deviation from strong-form efficiency, an insider can maximize trading profits by purchasing the stock at the peak of the deviation and waiting for the stock price to increase when the private information becomes public. Moreover, to the extent that the negative deviation occurred as a result a decline in stock price, an insider can maximize trading profits by avoiding the purchase of the stock before the decline occurs.

In a semi-strong form efficient market, excess stock returns are expected to be zero on average. However, in the two scenarios described above, an opportunistic insider trade, *ceteris paribus*, is expected to be followed by positive abnormal returns and preceded by negative abnormal returns, respectively. Thus, while abnormal returns can be found around any insider trade by coincidence, to the extent that the abnormal returns around an insider trade exhibit the specific pattern described above, it is more likely that the insider transaction is driven by private information. I identify insider transactions that are more likely to be based on material non-public information by measuring the value of *PricePattern* for each insider trade.⁴ *PricePattern* is measured as the natural logarithm of the ratio of two excess returns. The denominator is the market-adjusted gross return over the 20 trading days preceding the insider transaction, and the numerator is the analogous return over the 20 trading days following the insider transaction.

I focus on relatively short-window returns for two reasons. First, the signal to noise ratio declines monotonically as the return-measurement window is extended beyond a given horizon. Thus, returns in the period around the transaction are more likely to contain any information motivating the transaction, and returns that occur a significant amount of time before or after the transaction are more likely to reflect unrelated or confounding information. Second, this

⁴ If more than one insider trade occurs on a single day for a firm, these trades are aggregated and treated as a single transaction for the purpose of the analysis.

approach allows the assessment of individual transactions without the need for an extended time series of returns, which is particularly relevant for those who monitor insider trading. A limitation of this approach is that a portion of the initial stock-price decline and a portion of the subsequent stock-price gain plausibly occur outside this window. Thus, the approach likely fails to identify all opportunistic trades. Another limitation is that I am unable to observe whether the trading insiders actually profit from the transactions. To address this latter concern, I examine six-month returns following insider trades as a construct validity test; this analysis is outlined in Section 4.

I compute *PricePattern* by estimating excess returns as the difference between the stock price return and the contemporaneous market return so as to capture as much firm-specific variation as possible. In order to ensure that the measure increases monotonically with the decrease (increase) in pre- (post-) transaction returns, I use gross returns, calculated as 1 plus the market-adjusted return. Consequently, both the numerator and denominator of the return ratio are positive even if either one or both of the net returns is negative. I use the natural logarithm of the return-ratio to improve the measure's distributional properties, an adjustment that does not affect inferences. Additionally, prior literature suggests that insiders are less likely to engage in numerous forms of opportunism when selling corporate stock due to higher litigation risk. Moreover, insiders frequently sell corporate stock to meet diversification and liquidity needs. Thus, I focus my analysis on insider-acquisition transactions.

PricePattern captures the pattern, described above, in stock returns around information-driven insider transactions; it increases with larger positive excess returns after the trade and with larger negative excess returns before the trade. Therefore, I expect that the larger the value of *PricePattern* for an insider trade, the more likely is that trade to be based on non-public

information. In Section 4, I provide empirical evidence that is consistent with this expectation and helps to validate the construct. Of note is that for a violation, the law requires materiality in the information on which an insider trade is based. I do not identify a threshold for materiality; rather, I assume that trades span a continuum, where some transactions will be based on more significant information than others, resulting in greater profit potential, greater adverse selection, and higher litigation risk. Hence, to the extent that outside shareholders view higher *PricePattern* purchase transactions as opportunistic, such transactions present a potentially powerful setting to explore the relation between corporate governance and insider trading.

3.2 Hypothesis Test

In order to test my hypothesis on the relation between corporate governance and opportunistic insider trading, I estimate the association between the four corporate governance characteristics and the pattern in stock returns around insider transactions. Equation (1) captures the association between the governance characteristics and the measure of opportunistic insider trading. If insider trades at firms with a smaller (larger) value of a corporate governance characteristic are less likely to be opportunistic, then I expect the coefficient β on that characteristic to be positive (negative).

$$\begin{aligned}
 PricePattern_{i,t} = & \alpha + \beta_1 BoardSize_{i,t} + \beta_2 BoardIndependence_{i,t} + & (1) \\
 & \beta_3 InstitutionalOwnership_{i,t} + \beta_4 OwnershipConcentration_{i,t} + \\
 & \delta_1 Size_{i,t} + \delta_2 BM_{i,t} + \delta_3 SharesTraded_{i,t} + \delta_4 Volatility_{i,t} + \sum_Y \delta_Y Year + \\
 & \sum_I \delta_I Industry + \varepsilon_{i,t}
 \end{aligned}$$

I control for several factors that are expected to affect the return-based measure either through an impact on returns or through influence on opportunistic insider trading. Firm size and the book-to-market ratio are associated with stock returns. To some degree, these two financial

characteristics, along with industry classification, also capture cross-sectional differences in information asymmetry and other factors that likely affect the insider trading behavior of corporate officers. Therefore, in equation (1), I include *Size*, measured as the natural logarithm of the firm's market capitalization of equity; *BM*, measured as the book-to-market ratio of the value of the firm's equity; and industry fixed effects, using the Fama-French (1997) industry classifications.

Additionally, insider transactions can affect stock prices, so I expect to observe a mechanical relation between more significant transactions and *PricePattern*. To control for the price impact of large transactions, I include *SharesTraded* as a control variable in the model. *SharesTraded* is a ranked measure of the number of shares traded scaled by the total number of shares outstanding. Likewise, more volatile stocks are more likely to experience a large reversal in returns even in the absence of opportunistic insider trading, so I include *Volatility*, measured over 60 trading days preceding the 20-trading-day pre-transaction return window, as a control in the model.⁵ The results are robust to the inclusion of additional controls for the impact of differences in information asymmetry. Finally, in addition to industry fixed effects, I include year fixed effects and cluster the standard errors to control for cross-sectional and time-series dependencies in the data (Petersen, 2007).⁶

3.3 Sample Description

The *PricePattern* measure relies on a trade-specific pattern in stock returns to identify potential opportunism, allowing me to focus on a relatively broad sample of insider transactions. Driven by data availability, my sample period extends from January 1, 1996 through December

⁵ The exclusion of *SharesTraded*, *Volatility*, or both variables from the model leads to overstated estimates of the coefficients on the governance variables.

⁶ Using the Newey-West (1987) approach to estimate heteroscedasticity and autocorrelation-consistent standard errors yields lower standard error estimates in my tests.

31, 2006. I obtain insider-trading data from Thomson Financial. The database includes only self-reported transactions of corporate executives as required by law, and it is not unlikely that there are opportunistic transactions executed through trusts, off-shore vehicles, family members, and other means that are hidden and thus excluded from my analysis. To the extent that such hidden opportunistic transactions are more likely to occur at firms with weaker corporate governance, my inability to observe them biases against finding a negative relation between good corporate governance and opportunistic insider trading.

The sample of insider transactions carries several additional restrictions. Building on prior research that documents a higher litigation risk for insider disposal transactions (Cheng and Lo, 2006), I focus on the subset of acquisition transactions because I expect to observe a higher proportion of opportunistic insider trades in this subset of transactions. I also exclude derivative, compensation, and M&A related transactions and instead focus only on discretionary trades because I do not expect to capture opportunistic insider trading with transactions that do not involve trading or involve limited discretion. The sample of insider transactions contains 111,987 observations for the 1996 to 2006 period. I do not exclude firms in the transportation, utilities, or financial industries because, unlike accounting numbers, the dependent and the primary independent variables in my tests are not directly affected by industry-specific differences in regulation. Excluding firms in these industries does not affect my findings.

I obtain data to measure *PricePattern* from the CRSP daily stock file, available for 94,399 of my sample observations. Data to compute the control variables is available from CRSP and COMPUSTAT for 87,095 observations. I use the IRRC database and Thomson Financial to compute *BoardSize*, *BoardIndependence*, and *InstitutionalOwnership*. I obtain data from the Blockholders database (Dlugosz et al., 2006) and from Board Analyst to compute

OwnershipConcentration. Governance data is available for 11,304 observations. The sample selection criteria and the variable definitions are summarized in Table 1 and Appendix A, respectively. The variable descriptive statistics and correlations are presented in Table 2. All variables are winsorized at the extreme percentiles.

4. Construct Validity Tests

In order to gain confidence that insider transactions accompanied by higher values of *PricePattern* are indeed more likely to be based on non-public information and thus to be opportunistic, I conduct several construct validity tests. First, I examine whether six-month abnormal returns are higher for insider trades with higher values of *PricePattern*. Second, I test whether management earnings guidance is more biased in favor of insider trades for transactions with higher values of *PricePattern*. Third, I estimate whether the probability of a securities-fraud class-action lawsuit increases with the value of *PricePattern* following insider transactions.

4.1 Six-Month Abnormal Returns

Insiders are required by law to return to the corporation any profits made or losses avoided on round-trip trades that are executed within a six-month period. For an insider to profit by trading on private information, the insider has to earn an abnormal return on the purchased stock over at least a six-month period following the trade. If insider transactions with higher values of *PricePattern* are indeed more likely to be motivated by private information, then these transactions are expected to earn a higher abnormal return over the six-month period following the transaction date (Lakonishok and Lee, 2001; Huddart and Ke, 2007).

To test this prediction, I assign firms each calendar month to one of five portfolios based on the value of *PricePattern* around insider purchase transactions and measure abnormal

monthly stock returns on each of these portfolios. Firm returns are value-weighted and included in the respective portfolios for six months starting after the month in which the insider trade occurs. Using equal-weighted or daily returns does not change the inferences. Abnormal returns are reflected by the intercept α in equation (2), the Carhart (1997) return model. For these tests, return data is obtained from the CRSP monthly file.

$$Rp_t - Rf_t = \alpha + \beta_M(Rm_t - Rf_t) + \beta_S R_{smb}_t + \beta_V R_{hml}_t + \beta_U R_{umd}_t + \varepsilon_t \quad (2)$$

As reported in Table 3 Panel A, I find that six-month abnormal returns increase monotonically across the *PricePattern* portfolios, with the portfolio of lower *PricePattern* insider transactions earning a statistically insignificant abnormal return of 35 basis points per month, and the highest *PricePattern* portfolio earning a statistically significant monthly return of 2.61 percent. The difference between the abnormal returns of the two extreme portfolios is equal to 2.26 percent and is statistically significant.⁷ Since abnormal returns are expected to be zero in an information-efficient market, these results suggest that insiders whose trades have higher value of *PricePattern* are more likely to base their transactions on non-public information and thereby earn higher abnormal returns.⁸

4.2 Insider-Trade Related Bias in Management Earnings Guidance

An alternative hypothesis to my assumption that high *PricePattern* transactions that are

⁷ The overall magnitude of these returns, reported in Table 3 Panel A, is consistent with the mean (median) six-month cumulative abnormal return of 8.58 (5.85) percent on all insider purchase transactions during the 1994 to 1997 sample period reported by Huddart and Ke (2007). Lakonishok and Lee (2001) document twelve-month abnormal returns of 15.3%, 16.3%, and 16.2% on portfolios of firms that reported insider purchase transactions. Interestingly, there is no significant variation across the three portfolios, which are ranked based on the net purchase ratio from low to high, respectively.

⁸ Table 3 Panel B reports the results for a similar analysis with the single difference that firm returns are measured over five instead of six months by omitting an additional month of returns following the month of the insider transaction. Panel A captures the potential abnormal returns earned by insiders, whereas Panel B reflects potential abnormal returns to outsiders who attempt to replicate the trading behavior of corporate executives, assuming zero transaction costs and valid risk-adjustment. While there is a positive difference between the abnormal returns of the two extreme portfolios for this latter analysis, the difference is not statistically significant at conventional levels.

based on non-public information are opportunistic is that such trades are not opportunistic but rather serve as a credible signal of private information to outside market participants. By betting personal wealth on the value of the corporate stock, insiders communicate to the market their belief that the stock price is undervalued. In an efficient market, the greater the abnormal return following the insider transactions, the more likely it is that the transaction is based on material non-public information. Thus, insiders who engage in such credible signaling increase the risk of violating securities laws and regulations, which makes such actions unlikely without a more direct opportunistic incentive for the insiders, such as personal profit from trade on non-public information. Notwithstanding this concern, I test the alternative hypothesis by examining corporate disclosure choices prior to insider trades.

Early studies indicate that the stock market reacts to management issued guidance (Patell, 1976; Ajinkya and Gift, 1984; Waymire, 1984; Pownall and Waymire, 1989) and that analysts do, too (Hassell et al., 1988; Williams, 1996; Gift and Yohn, 1998). Acting in their self-interest, managers have an incentive to issue biased earning guidance to affect stock prices in favor of their trades. However, doing so exposes managers to the risk of being detected and punished for fraud. Rogers and Stocken (2005) find that in the aggregate, managers do bias earnings guidance in favor of subsequent transactions by corporate insiders.

Although I cannot directly determine whether insider transactions that follow biased disclosures are opportunistic from the perspective of outside shareholders, it seems intuitive and likely that they are. It is difficult to assert that such transactions, if considered jointly with the misleading disclosure, contribute to the efficient pricing of securities. On the other hand, when the market impounds the false information contained in the biased disclosure, outside shareholders who trade with the insiders incur a larger cost or forego a larger profit than they

otherwise would. Hence, to the extent that *PricePattern* is able to identify such transactions, and such transactions are indeed opportunistic, it suggests that in general, *PricePattern* identifies transactions that are more likely to reflect opportunistic insider trading.

Intentional bias is unobservable, so I rely on a systematic relation between insider trading and disclosure error to infer the existence of a bias (Rogers and Stocken, 2005), as captured by equation (3). A negative coefficient β in equation (3) indicates a systematic ex post error, which in turn is a reflection of an intentional ex ante bias, in corporate disclosures in favor of insider transactions.

$$\begin{aligned} \text{GuidanceError}_{i,t} = & \alpha + \beta \text{InsiderTrade}_{i,t} + \delta_1 \text{BidAsk}_{i,t} + \delta_2 \text{Volume}_{i,t} + \delta_3 \text{Horizon}_{i,t} + \\ & \delta_4 \text{CAR}_{i,t} + \delta_5 \text{CAR}_{i,t} \text{BadNews}_{i,t} + \delta_6 \text{Size}_{i,t} + \delta_7 \text{BM}_{i,t} + \sum_Y \delta_Y \text{Year} + \\ & \sum_I \delta_I \text{Industry} + \varepsilon_{i,t} \end{aligned} \quad (3)$$

In equation (3), the dependent variable, *GuidanceError*, is measured as the difference between the company-issued guidance and the reported actual value of annual earnings per share (EPS), scaled by assets per share, and the primary explanatory variable, *InsiderTrade*, is a ranked measure of the total number of shares acquired or disposed by corporate officers within a 10-trading-day window following the guidance issuance.

I identify the incidence of opportunistic insider trading within a sample of transactions by estimating equation (3) in that particular sample; unlike the *PricePattern* approach, there is no transaction-specific indicator of opportunism in this setting.⁹ In order to determine whether *PricePattern* is able to distinguish a sample of opportunistic transactions that exhibit a

⁹ Although prior research suggests that voluntary disclosures affect managers' trading decisions in general (Cheng and Lo, 2006), there is no evidence on whether disclosure bias affects insiders' trading decisions. Hence, I build my analysis on a model that treats insider trading as an independent variable because prior research has shown such a relation to exist (Rogers and Stocken, 2005). Moreover, from a variable measurement perspective, the insider trading occurs first, and any error in the earnings guidance is revealed afterwards. Ultimately, my analysis hinges on a systematic relation between insider trading and the disclosure error, and the model in equation (3) identifies this relation.

systematic, trade-related disclosure bias, I estimate equation (3) using partitions of the data based on *PricePattern* and separately also include *PricePattern* as an interaction term in the model, as depicted in equation (3a). I expect the coefficient β to be significantly negative for the set of transactions with a high value of *PricePattern*.

$$\begin{aligned} \text{GuidanceError}_{i,t} = & \alpha + \beta \text{InsiderTrade}_{i,t} + \gamma \text{InsiderTrade}_{i,t} \text{PricePattern}_{i,t} + \\ & \delta \text{Controls}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (3a)$$

Both equations (3) and (3a) include several control variables, *Controls*, that have been linked to disclosure error in prior research (Rogers and Stocken, 2005). To proxy for information asymmetry, I use the bid-ask spread scaled by the stock price, *BidAsk*, and trading volume scaled by total shares outstanding, *Volume*, both measured on the trading day preceding the earnings guidance. The bid-ask spread also reflects the difficulty of making an accurate forecast, as does *Horizon*, measured as the number of calendar days between the guidance-issuance date and the fiscal-period end date. The cumulative market-adjusted return over a five-day window around the guidance-issuance date, *CAR*, is a proxy for the magnitude and direction of the guidance news. *CAR* is also interacted with *BadNews*, which is assigned a value of 1 if *CAR* is negative, and 0 otherwise, to account for potential asymmetry in the relation between guidance news and guidance error for bad versus good news disclosures. Finally, I also control for the book-to-market ratio, *BM*; the natural logarithm of market capitalization, *Size*; and industry and year fixed effects.

The analysis relies on a sample of firms that issue management earnings guidance, so I obtain guidance data from First Call. Because I am interested in replicating the systematic bias found in Rogers and Stocken (2005), I impose many of the same restrictions on my sample. I focus only on point or range forecasts of annual EPS and match these to the actual values of

EPS, also obtained from First Call. I exclude any pre-announcements, warnings, and updates of previous guidance. Managers are more likely to bias earnings guidance if a significant amount of time is allowed to pass between the forecast and the actual earnings announcement. Likewise, more specific guidance is likely to have a stronger impact on stock prices, and its ex post accuracy is easier to measure.

To verify my sample selection and model, I estimate equation (3) over the period from January 1996 through October 2000 using 744 observations containing data to measure all of the model's parameters, reported in Table 4 Panel A. This timeframe, beginning with the enactment of the PSLR act on December 22, 1995, which reduced litigation risk arising in connection with forward-looking management disclosures, and ending with Regulation Fair Disclosure, passed by the SEC in October of 2000, is the period studied by Rogers and Stocken (2005). Consistent with the predicted trade-related disclosure bias, I find a significant negative coefficient estimate on *InsiderTrade*. I also find a significant negative coefficient estimate for the sample used in the main hypothesis tests that spans from 1996 to 2006 and includes observations with available governance data, also reported in Table 4 Panel A.

For the construct validity test, I explore whether the opportunistic insider trading identified using the relation between insider trading and guidance error in equation (3) varies with *PricePattern* by estimating a modified *PricePattern* around each guidance-sample observation. Because *InsiderTrade* is measured over 10 trading days, I use returns over the 20 trading days prior to this 10-trading-day period to compute the denominator of the ratio in *PricePattern* and returns over the 20 trading days following the 10-trading-day period to compute the numerator. Using shorter return windows does not affect the results. I then sort all observations into five portfolios based on the value of *PricePattern*.

The parameter estimates are reported in Table 4 Panels B and C. I find that the coefficient β estimate is negative and statistically significant for the portfolio of firms with the highest value of *PricePattern*. In untabulated analysis, I use a different number of portfolios and find similar results. Moreover, when I include *PricePattern* as an interaction variable on *InsiderTrade*, as in equation (3a), the coefficient estimate on the interaction term is also negative and significant. Overall, these findings suggest that in the sample, of all insider transactions following management-issued earnings guidance, the insider trades accompanied by larger values of *PricePattern* are more likely to be opportunistic. The bias in management guidance prior to such transactions is inconsistent with the credible signaling hypothesis.

4.3 Litigation Risk

As indicated above, transactions that are based on non-public information expose insiders to the risk of violating securities laws and regulations. Thus, if a high value of *PricePattern* does indeed identify transactions that are more likely to be based on non-public information, then I expect litigation risk to increase for the firm following such transactions. I test this prediction by estimating the likelihood that a federal securities class action is filed against a firm within a six-, twelve-, and twenty-four-month period following an insider trade by corporate executives at the firm, as captured by equation (4). The model, including the control variables, is adopted from prior research (Jones and Weingram, 1996; Johnson et al., 2000; Brown et al., 2005; Rogers and Stocken, 2005).

$$Prob(Litigation_{i,t} = 1) = f(\alpha + \beta PricePattern_{i,t} + \delta Controls_{i,t} + \epsilon_{i,t}) \quad (4)$$

A significant positive estimate of the coefficient β on *PricePattern* in equation (4) indicates that insider purchase transactions with higher values of *PricePattern* are more likely to be followed by securities litigation against the firm of the trading insiders during the designated

period following the insider transaction. If insider transactions with high values of *PricePattern* are not more likely to be based on non-public information and if insiders that engage in such transactions are not acting opportunistically, then I do not expect to observe a relation between *PricePattern* and probability of a lawsuit.

I obtain litigation data from the Stanford Law School Securities Class Action Clearinghouse. In equation (4), for each insider-trade observation, *Litigation* is equal to 1 if a lawsuit is filed during the designated period after a trade and 0 otherwise. *Controls* include *Size*, *Turnover*, *Beta*, *BHReturn*, *Volatility*, *Skewness*, and *MinReturn* as well as industry and year fixed effects. *Size* is measured as the natural logarithm of the total market capitalization of equity. *Turnover* is measured as the ratio of the average daily trading volume to the average shares outstanding over 60 trading days prior to the *PricePattern* measurement window. *Beta* is the estimated CAPM coefficient on the market risk premium over the same 60 trading-day period. *BHReturn*, *Volatility*, *Skewness*, and *MinReturn* are the buy-and-hold return on the stock, the daily return volatility, the skewness of the daily return, and the lowest daily return over the same 60 trading-day period, respectively.

Consistent with the prediction that insider transactions accompanied by a high value of *PricePattern* are more likely to be based on non-public information and thus more likely to increase the risk of violating securities laws and regulations, the coefficient β estimate is positive and statistically significant. As reported in Table 5, the point estimate of the coefficient on *PricePattern* is highest when litigation risk is measured within a six-month period after the transaction and monotonically declines as the period is extended to one and two years. These results provide additional evidence suggesting that the *PricePattern* measure helps to identify transactions that are more likely to be based on non-public information and thus to be

opportunistic.

Overall, the three construct validity tests provide evidence consistent with the argument that *PricePattern* discriminates between insider trades that are more likely and those that are less likely to be based on private information as well as with the argument that insider trading based on private information as identified using *PricePattern* is likely to be opportunistic.

5. Empirical Results

5.1 Corporate Governance and Insider Trading

I estimate equation (1) to test the paper's main hypothesis on the relation between good corporate governance and opportunistic insider trading. The parameter estimates are reported in Table 6.

First, I find that *BoardSize* is positively associated with *PricePattern* when considered separately from or jointly with the other corporate governance characteristics. The result is consistent with the hypothesis that trade in corporate stock by corporate executives at firms that have corporate boards that are either too large or too small relative to other firms of the same size in the same industry is more likely to be based on non-public information. In untabulated analysis, I find no relation between the number of directors serving on the corporate board and *PricePattern*, consistent with the view that boards that are too large or too small can both contribute to agency problems. This result is not surprising in light of the evidence in prior research and suggests that it is appropriate to use an alternative measure of board size, such as *BoardSize*, to capture the relation between the number of directors serving on the corporate board and the effectiveness of the board as a monitor of management.

Second, I find that *BoardIndependence* is negatively associated with *PricePattern* when

considered independently of or together with the other corporate governance characteristics. The result is consistent with the hypothesis that insiders at firms with more independent boards are less likely to engage in information-driven insider trading. This result conforms with prior research arguing that boards with a greater proportion of outside directors reflect stronger corporate governance. The evidence does not support the alternative view that inside directors are more effective monitors of managerial opportunism, at least in the context of corporate insider trading.

Third, I do not find a relation between *PricePattern* and either of the two ownership characteristics when each is considered separately. In the multivariate model, *OwnershipConcentration* is negatively associated with *PricePattern*, but only marginally so. With respect to *InstitutionalOwnership*, at first glance, the results suggest that institutional investors do not help to monitor opportunistic insider trading by corporate executives. The results on *OwnershipConcentration*, although weak, are in line with the argument that diffuse ownership exacerbates agency costs.

In summary, to the extent that more balanced board size, greater board independence, and higher ownership concentration reflect more effective monitoring of potential agency problems, the results suggest that good corporate governance helps to mitigate opportunistic insider trading. Interestingly, I do not find a relation between *InstitutionalOwnership* and *PricePattern*. The lack of a relation suggests that when all institutional investors are considered collectively, institutional ownership does not contribute to the reduction in insider trades based on non-public information. Recognizing that there are different types of institutional investors (Bushee, 1998), I explore this relation further in the supplementary analysis that follows.

In Tables 6, I also report the coefficient estimates on the control variables. The variables

SharesTraded and *Volatility* load positively and significantly across all examined subsets of the data. These results are consistent with the prediction that both the size of the trade as well as the underlying volatility of the stock are mechanically associated with *PricePattern* independently of opportunism and corporate governance. The book-to-market ratio loads negatively, suggesting that insider trades at growth firms are accompanied by higher values of *PricePattern*, while firm size does not load significantly in any of the specifications.

5.2 *Supplementary Analysis*

I perform several supplementary tests to provide greater insight into the relation between good corporate governance and opportunistic insider trading. I examine the relation between corporate governance characteristics and *PricePattern* for small versus large transactions, and I explore the monitoring role of different institutional investor types. I also test for cross-sectional differences in the insider-trading-related bias in management earnings guidance due to differences in the corporate governance characteristics. Finally, I address the impact of endogeneity on the interpretation of my empirical findings.

5.2.1 *Trade Size*

I expect that broad corporate governance, identified by the four characteristics examined in this study, is more likely to have an impact on larger, more material transactions and is less likely to have an impact on smaller, more negligible trades. Thus, I split the sample into two equal-sized groups of relatively large and small trades. The partitioning variable is measured as the dollar value of the insider transaction, which is likely a primary indicator of how visible the transaction is to outside observers such as the SEC. I estimate equation (1) separately in both subsets of the full sample. The coefficient estimates are reported in Table 7.

For the sample containing relatively smaller trades, I do not find a significant relation

between any of the four corporate governance characteristics and the measure of opportunistic insider trading. However, for the sample containing relatively larger trades, consistent with the results for the full sample, I find that *BoardSize* is positively associated with *PricePattern*, while *BoardIndependence* and *OwnershipConcentration* are negatively associated with *PricePattern* in both univariate and multivariate tests. Overall, the results suggest that good corporate governance, as identified using the board and ownership characteristics, is more likely to affect larger insider trades.

The relation between *OwnershipConcentration* and *PricePattern* is statistically significant at the 5 percent level for the larger trades and only marginally statistically significant at the 10 percent level for all trades. I interpret this result as a reflection of more effective monitoring by concentrated investors. Because ownership concentration includes any significant owner, including corporate executives, an alternative, incentive-based explanation for the results is also possible. Insiders who hold significant positions in corporate stock may be less likely to base their trades in that stock on private information. The descriptive validity of this competing hypothesis can be tested, although the data used in this study is insufficient to do so.

5.2.2 Institutional Investor Classification

In the main hypothesis test reported in Table 6, I find no relation between institutional ownership and opportunistic insider trading. The result is consistent with the view that institutional investor vary in their investment objectives and likely have a differential impact on the behavior of corporate executives. Bushee (1998) finds that a high proportion of ownership by transient institutional investors, those with short investment horizons, increases the likelihood of a reduction in R&D to buffer an earnings decline. On the other hand, when institutional ownership is high but consists of other investor types, such as dedicated investors, the likelihood

of an R&D reduction to meet short-term earnings is lower than at firms with lower levels of institutional ownership. Bushee (2001) finds that greater institutional ownership by transient institutional investors is negatively (positively) associated with the amount of firm value in expected long-term (short-term) earnings. The results suggest that transient institutions, optimizing over their own incentive set, drive corporate executives to act myopically, while dedicated institutions typically serve a monitoring role in reducing pressure for myopic behavior.

Based on this evidence, I expect that different institutional investor types are likely to have a different impact on opportunistic trade in corporate stock by corporate executives. I partition *InstitutionalOwnership* into the three institutional investor classifications used in Bushee and Noe (2000) and Bushee (2001), which include dedicated, quasi-indexer, and transient investor types.¹⁰ To explore whether different institutional investor types have a different impact on opportunistic insider trading, I estimate equation (1a).

$$\begin{aligned}
 PricePattern_{i,t} = & \alpha + \beta_1 BoardSize_{i,t} + \beta_2 BoardIndependence_{i,t} + & (1a) \\
 & \beta_{3A} InstitutionalOwnershipDedicated_{i,t} + \\
 & \beta_{3B} InstitutionalOwnershipQuasiIndexer_{i,t} + \\
 & \beta_{3C} InstitutionalOwnershipTransient_{i,t} + \beta_4 OwnershipConcentration_{i,t} + \\
 & \delta_1 Size_{i,t} + \delta_2 BM_{i,t} + \delta_3 SharesTraded_{i,t} + \delta_4 Volatility_{i,t} + \sum_Y \delta_Y Year + \\
 & \sum_I \delta_I Industry + \varepsilon_{i,t}
 \end{aligned}$$

Building on the results in Bushee (1998), Bushee and Noe (2000), and Bushee (2001), I develop differential predictions for the three institutional-investor types. If higher ownership by dedicated investors leads to more effective monitoring of managerial behavior so as to maximize long-term firm value, I expect the coefficient β_{3A} to be negative. Likewise, if higher ownership

¹⁰ I thank Brian Bushee at the Wharton School of the University of Pennsylvania for sharing this data with me.

by transient investors creates an added incentive for greater myopia on the part of corporate executives, which in turn may lead to more opportunistic behavior at the cost of long-term value, I expect the coefficient β_{3C} to be positive. I do not expect quasi-indexers to have any effect on opportunistic insider trading.

As reported in Table 8, I find that greater ownership by dedicated institutional investors is negatively associated with *PricePattern*. The relation is marginally statistically significant when dedicated ownership is considered alone or jointly with ownership by the other two investor types in the model. The relation is statistically insignificant when the other three corporate governance characteristics are controlled for. Overall, these results weakly suggests that corporate executives at firms with a higher proportion of dedicated institutional ownership are less likely to engage in opportunistic insider trading.

I also find that greater ownership by transient institutional investors is positively associated with *PricePattern*. The relation is statistically significant when transient ownership is considered alone, jointly with ownership by the other two investor types, and when the other three corporate governance characteristics are controlled for in the model. This result suggests that corporate executives at firms with a higher proportion of transient institutional ownership are more likely to engage in myopic behavior in the form of opportunistic insider trading.

Collectively, the two findings are consistent with the view that different investor types have a differential impact on the behavior of corporate executives. The results indicate that good corporate governance, either in the form of high ownership by dedicated investors or low ownership by transient investors, is negatively associated with opportunistic insider trading.

5.2.3 Insider-Trade Related Bias in Management Earnings Guidance

In Section 4, I discuss and provide evidence inconsistent with an alternative hypothesis

that the *PricePattern* measure identifies non-opportunistic credible signaling as opposed to opportunistic trade on non-public information. To shed additional light on the descriptive validity of this competing view, I perform a set of basic tests to determine whether opportunistic insider trading identified using the bias in management earnings guidance varies across firms with different governance attributes. It is difficult to argue that managers engage in credible signaling when issuing earnings guidance that is intentionally biased against the direction of the news in their subsequent trades and that such insider trading is not opportunistic. Yet, if corporate governance does not affect opportunistic insider trading, and the association between the corporate governance characteristics and *PricePattern* is driven by an alternative hypothesis, then I am not likely to observe a difference in opportunistic insider trading, identified using the insider-trade related bias in management earnings guidance, across firms with different corporate governance characteristics.

I split the sample four independent times along the four corporate governance characteristics, and I estimate equation (3) in each of the eight resulting sub-samples based on *BoardSize*, *BoardIndependence*, *InstitutionalOwnership*, and *OwnershipConcentration*. I expect to find a significant negative estimate of the coefficient β on *InsiderTrade* for firms with weaker governance and an insignificant estimate for firms with better governance. I test for the statistical difference between the coefficient estimates across the sub-samples by estimating equation (3b), which is a variation on equation (3) with the governance characteristic included as an interaction dummy on all of the model's explanatory variables.

$$\begin{aligned}
 \text{GuidanceError}_{i,t} = & \alpha_1 + \beta \text{InsiderTrade}_{i,t} + \delta \text{Controls}_{i,t} + \alpha_2 \text{GI}_{i,t} + \\
 & \gamma \text{InsiderTrade}_{i,t} \text{GI}_{i,t} + \theta \text{Controls}_{i,t} \text{GI}_{i,t} + \varepsilon_{i,t}
 \end{aligned} \tag{3b}$$

The governance interaction dummy, *GI*, is set equal to 1 for all firms with a value of the

examined governance variable above the sample median and zero otherwise. A positive (negative) coefficient γ estimate suggests that higher levels of the particular governance attribute are associated with a lower (higher) incidence of opportunistic insider trading.

Consistent with my original findings, firms with relatively more extreme board size, relatively lower board independence, and with relatively lower ownership concentration exhibit a systematic, insider-trade-related bias in management earnings guidance, while firms with less extreme board size, higher board independence, and higher ownership concentration do not. The differences between the coefficient β estimates are statistically significant but only marginally so for ownership concentration. I also find that lower institutional ownership is associated with less opportunistic insider trading. The results are reported in Table 9.¹¹

The tabulated results follow Rogers and Stocken (2005), who include industry and year fixed effects but do not outline any further attempts to control for cross-sectional and time-series dependencies in the data. If clustered standard errors are used instead, then the relation between *InsiderTrade* and *GuidanceError* in general and the governance results in particular lose statistical significance. Therefore, although the results suggest that good corporate governance is negatively associated with opportunistic insider trading, I am unable to draw any strong inferences from these additional tests.¹²

5.2.4 Endogeneity and the New CEO Sample

A common concern relating to research on corporate governance is endogeneity. Given

¹¹ In additional untabulated analysis, an F test rejects the null hypothesis that the governance attributes exhibit no significant explanatory power when considered together.

¹² Several other limitations inherent in these tests raise concern about the proper interpretation of these results. First, the analysis relies on all insider transactions, both stock and derivatives. To the extent that a significant fraction of these transactions are compensation related, it is difficult to differentiate between the effect of corporate governance on compensation decisions versus insider trading behavior. Second, corporate governance has been related to disclosure choices (Ajinkya et al., 2005). To the extent that corporate governance affects disclosure bias in the same (opposite) direction as hypothesized for insider trading, there is risk of a Type I (Type II) error.

that the examined governance attributes are choice variables, potential uncertainty regarding the direction of causality hinders a straightforward interpretation of the results and could lead to inconsistent estimates of the coefficients and standard errors. One possible source of endogeneity is reverse causality. If corporate executives, who seek to engage in opportunistic insider trading, are able to affect the structure of the board so as to weaken oversight, then an alternative explanation for the negative association between good corporate governance and opportunistic insider trading is that opportunistic insider trading leads to the weak governance. However, this logic also suggests that corporate executives who seek to engage in opportunistic insider trading believe that stronger boards create an obstacle to such behavior, a notion that is consistent with the hypothesis tested in this paper. Reverse causality also applies to the ownership structure. When making an investment decision, some institutional investors are likely to prefer firms in which the management does not engage in costly opportunistic behavior, such as opportunistic insider trading. Opportunistic insider trading potentially affects ownership concentration in a similar fashion.

In order to shed some light on the direction of the causality, I repeat the analysis by estimating equation (1) on a subset of firms that recently replaced their CEOs. A new CEO is less likely to have had a significant impact on the structure of the board and the composition of the share ownership. Moreover, it is unlikely that insider-trading considerations are a first-order determinant in the CEO selection process. The results for this analysis are reported in Table 10.

As in the full sample, I find that board independence is negatively associated with opportunistic insider trading, although only marginally so. Ownership concentration is significantly negatively associated with opportunistic insider trading, while the coefficient estimates on board size and institutional ownership are insignificant. I also find a negative and

significant relation between both board independence as well as ownership concentration and the measure of opportunistic insider trading for the subset of larger transactions.

In general, these findings provide some reassurance that that the relation between the examined corporate governance characteristics, specifically board independence and ownership concentration, and opportunistic insider trading is not purely driven by endogeneity. The results also suggest that the size of the corporate board does not have any impact on opportunistic insider trading by corporate executives at firms that have replaced their CEO within the preceding fiscal year, and that the effect in other years may be driven by reverse causality. Overall, the analysis suggests that insiders at firms with more independent boards and with greater ownership concentration are less likely to engage in opportunistic insider trading.

Notwithstanding these findings, further analysis is needed to more fully rule out endogeneity. Simultaneity and the potential for an omitted correlated variable, ranging from a quantifiable financial firm attribute to a qualitative construct such as corporate culture, are of particular concern. I follow the standard approach in the governance literature by examining the incremental impact of the examined corporate governance characteristics above and beyond other determinants, which I include as control variables; a sophisticated approach to deal with endogeneity in the context of corporate governance appears to be lacking in the existing literature (Larcker et al., 2007).¹³

In untabulated analysis, I repeat the tests for disposal transactions. Because litigation risk is particularly high for disposal transactions and because many such transactions are motivated

¹³ More broadly, econometricians employ several methods to address endogeneity. One possibility is to use instrumental variables and a multi-staged model in order to predetermine the governance variables. The challenge with this approach is to find suitable instruments or a truly exogenous shock. Existing theory does not identify factors that are expected to affect the governance variables but not the opportunistic insider trading behavior of corporate officers. Another possibility is to test for Granger causality by estimating the association between changes in the lead of the dependent variable and changes in the lag of the independent variables. The high serial correlation usually observed for governance variables is a likely obstacle to such an analysis.

by liquidity or diversification needs, I do not expect to find as significant of a relation between good corporate governance and the value of *PricePattern* for these transactions. On the other hand, if the relation between *PricePattern* and the corporate governance characteristics is spurious or driven by a factor other than the mitigating effect of good governance on opportunistic behavior, then I expect to observe a similar relation between the corporate governance characteristics and *PricePattern* for the sample of disposal transactions as in the sample of purchase transactions.

Consistent with the former hypothesis, I find no relation between any of the corporate governance characteristics and *PricePattern* for insider sell transactions. These results are consistent with the literature that documents higher litigation risk for insider sell transactions and suggest that the observed relation between the corporate governance characteristics and *PricePattern* for insider purchase transactions is a reflection of good corporate governance helping to attenuate opportunistic insider trading.

6. Conclusion

In this study, I develop an empirical measure to identify insider trades that are more likely to be based on non-public information and investigate the role of good corporate governance in mitigating opportunistic insider trading by corporate executives. By examining long-run returns, disclosure bias, and litigation risk, I provide evidence which suggests that the proposed measure does indeed identify opportunistic insider trading. Using this measure, I find that certain firm characteristics, which have been linked to more effective monitoring of corporate management, are negatively associated with opportunistic insider trading. In particular, I find that trades in corporate stock by corporate insiders at firms with boards that are

neither too large nor too small relative to their size- and industry-peers, boards that are more independent, and an ownership structure that is more concentrated are less likely to be based on non-public information.

In supplementary analysis, I find that the relation between the corporate governance characteristics and opportunistic insider trading is more pronounced for more material transactions. I also find evidence which suggests that the effect of institutional ownership on opportunistic insider trading depends on the type of institutional investor, whereby greater ownership by transient (dedicated) investors is related to trading that is more (less) likely to be based on private information. Additionally, I investigate whether the main results are driven by an alternative hypothesis of credible signaling and find evidence inconsistent with this alternative view. Likewise, I provide evidence suggesting that the results are not driven purely by endogeneity. On the basis of these findings, I conclude that good corporate governance helps to attenuate opportunistic insider trading.

On the one hand, the analysis in this paper contributes to the insider trading literature. Insider trading has received considerable attention from academics and practitioners alike. Although the debate regarding the merits of trade on private information is not easily settled, the persistent efforts of capital market regulators and investors to restrict such trading reflect an underlying view that certain forms of insider trading adversely affect outside shareholders. An alternative perspective is that information-based insider trading benefits outside shareholders by increasing the informational efficiency of stock prices and that any costs of such trading are relatively negligible. My findings are consistent with the former view; the empirical evidence suggests that good corporate governance mitigates insider trading that is more likely to be based on non-public information.

On the other hand, the analysis in this paper also relates to the extant literature on the role of corporate governance in mitigating agency costs (Fama and Jensen, 1983; Shleifer and Vishny, 1997; Bebchuk and Fried, 2003; Weisbach, 2007). First, through the construct validity tests, I provide reassurance that the observed insider trading is opportunistic. Second, I find that certain corporate governance characteristics are negatively associated with this opportunistic behavior. Third, supplementary tests suggest that the relation is robust to several alternative hypotheses, although there is always an opportunity to further rule out additional competing explanations. Collectively, this evidence supports the view in the literature that corporate governance is relevant and challenges the argument that good corporate governance does not matter.

The analysis in this paper also presents two potential methodological insights. First, I explore an empirical measure that utilizes stock returns to identify trades that are more likely to be based on private information. Several construct validity tests shed positive light on the efficacy of this measure, for it is positively associated with long-run abnormal returns, disclosure bias, and litigation risk. Moreover, this measure is relatively simple to compute using publicly available information and does not require a significant time series of data. To the extent that the measure successfully identifies transactions that are more likely to be based on non-public information, it could serve as a potentially useful tool for practitioners and researchers alike. Second, I develop a measure of board size that operationalizes the view in prior research that both boards that are too large and those that are too small expose firms to higher agency costs. This measure, too, is relatively simple to compute and captures variation in corporate governance, at least in the context of insider trading by corporate executives.

The study also leaves several questions unanswered, calling for further analysis. A

fundamental question is, what do firms with characteristics that reflect better corporate governance do differently to restrict opportunistic trade in corporate stock by corporate executives? Anecdotal evidence suggests that many firms implement policies on insider trading, impose restrictions on when insiders can trade in corporate stock, and require certain insider transactions to be pre-cleared. A deeper understanding of how such specific control mechanisms vary with broad corporate governance characteristics and which of the mechanisms are most effective at curtailing trade on private information is critical if one is to draw implications for public policy and corporate best practices.

Additionally, the research design offers a means to investigate several related research questions. The empirical tests could be adapted to explore variation in insider trading by institutional investors and non-executive corporate insiders. Likewise, the research design could be extended by considering the effect of non-monitoring dimensions of corporate governance, such as differences in incentive structures, on opportunistic insider trading and by exploring whether corporate executives rely on public releases of information other than management earnings guidance, such as press releases or analyst recommendations, to profit from trade in corporate stock.

Finally, although the evidence in the paper suggests that the studied insider trading is not a form of credible signaling, it does not rule out the possibility that insiders do attempt to signal private information to the market through trade in corporate stock. The role of capital structure and financing transactions, such as dividend policy, in communicating information to capital market participants is well-established in corporate finance. Given that the costs and benefits of financing choices likely differ from the costs and benefits of signaling through insider trading depending on the circumstances, I expect that firms will rely on both mechanisms to

communicate information to the market. Under what circumstances corporate executives actually trade in corporate stock to grant added credibility to other corporate disclosures is an unanswered question.

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Appendix A Variable Definitions

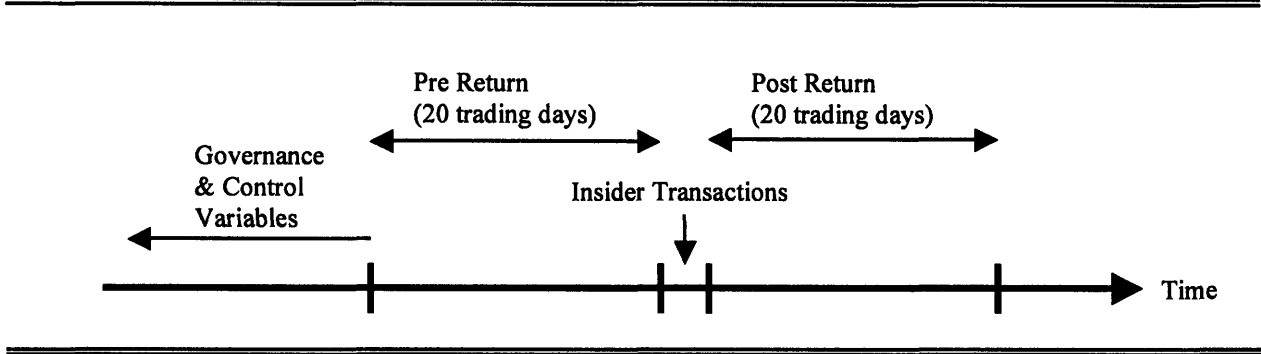
Appendix A provides the definitions of the variables used in the empirical tests. I obtain insider trading data from Thomson Financial, board data and institutional ownership data from IRRC and Thomson Financial, ownership concentration data from Blockholders and Board Analyst, financial statement data from COMPUSTAT, and stock data from CRSP. For the supplementary analysis, I obtain management earnings guidance data from First Call and litigation data from the Stanford Law School Securities Class Action Clearinghouse. Data on institutional investor types is obtained from Brian Bushee.

Variable	Definition
<i>PricePattern</i>	Natural logarithm of the ratio of the 20 trading day cumulative market-adjusted gross return following an insider transaction to the 20 trading day cumulative market-adjusted gross return preceding an insider transaction (multiplied by 100)
<i>BoardSize</i>	Absolute deviation from the industry- and size-adjusted median number of directors serving on the corporate board
<i>BoardIndependence</i>	Ratio of outside directors to total directors serving on the corporate board
<i>InstitutionalOwnership</i>	Percentage of common stock held by institutional investors
<i>OwnershipConcentration</i>	Percentage of stock held by owners of more than 5 percent of common stock
<i>Size</i>	Natural logarithm of the total market capitalization of common equity
<i>BM</i>	Ratio of the book value to the market value of common equity
<i>SharesTraded</i>	Ranked ratio of the number of shares traded scaled by the total number of shares outstanding
<i>Volatility</i>	Standard deviation of returns over the 60 trading days prior to the <i>PricePattern</i> measurement window (multiplied by 100)
<i>Rp</i>	Monthly value-weighted portfolio return
<i>Rf</i>	Monthly risk-free rate of return (one-month Treasury bill rate)
<i>Rm</i>	Monthly value-weighted return on the market (NYSE, AMEX, and NASDAQ)
<i>R SMB</i>	Monthly return on the Fama-French (1993) SMB size portfolio
<i>R HML</i>	Monthly return on the Fama-French (1993) HML book-to-market portfolio
<i>R UMD</i>	Monthly return on the Carhart (1997) UMD momentum portfolio
<i>GuidanceError</i>	Management guidance of annual earnings per share less actual earnings scaled by total assets of the firm
<i>InsiderTrade</i>	Ranked net volume of insider transactions during the 10 trading-day period following the guidance
<i>BidAsk</i>	Bid-ask spread scaled by the stock price
<i>Volume</i>	Total volume of trade in the corporate stock
<i>Horizon</i>	Number of calendar days between the the guidance and the earnings announcement
<i>CAR</i>	Cumulative market-adjusted return over a five-day window around the guidance
<i>BadNews</i>	Indicator variable equal to 1 for all positive values of <i>CAR</i> and 0 otherwise
<i>Litigation</i>	Indicator variable equal to 1 for a lawsuit is filed against the firm within a specified period following the insider transaction and 0 otherwise
<i>Turnover</i>	Ratio of the average daily volume to the average shares outstanding over 60 trading days
<i>Beta</i>	Estimated CAPM coefficient on the market risk premium over 60 trading days
<i>BHReturn</i>	Buy and hold return on the stock over 60 trading days
<i>Skewness</i>	Skewness of the daily returns over 60 trading days
<i>MinReturn</i>	Lowest of the daily returns during 60 trading days

Table 1
Variable Measurement Timeline and Sample Selection

Table 1 Panel A provides an illustration of the variable measurement timeline, and Panel B summarizes the sample selection procedure for the variables used in the empirical hypothesis tests. I obtain insider trading data from Thomson Financial, board-related and institutional ownership data from IRRC and Thomson Financial, ownership concentration data from Blockholders and Board Analyst, financial statement data from COMPUSTAT, and stock data from CRSP.

Panel A: Variable Measurement Timeline



Panel B: Sample Selection

	<u>Dropped Observations</u>	<u>Sample Observations</u>
All Open Market, Private, and Discretionary Purchase Transactions of Corporate Stock by Corporate Officers during the 1996 through 2006 Sample Period Available from Thomson Financial		111,987
Stock Price Data Available from CRSP	17,588	94,399
Controls Data Available from COMPUSTAT and CRSP	7,304	87,095
Governance Data Available from IRRC, Thomson Financial, Blockholders, and Board Analyst	75,786	11,309

Table 2
Sample Descriptive Statistics and Variable Correlations

Table 2 Panel A provides the summary statistics for the variables used in the empirical hypothesis tests, and Panel B reports the Pearson and Spearman correlations between the variables. All variables are winsorized at the extreme percentiles. Refer to Appendix A for an overview of the variable definitions.

Panel A: Descriptive Statistics

Variable	Mean	25%	Median	75%	Std Dev
<i>PricePattern</i>	7.97	-4.73	4.98	17.73	23.13
<i>BoardSize</i>	2.53	1.00	2.00	3.00	1.70
<i>BoardIndependence (%)</i>	64.23	54.54	66.67	77.78	18.02
<i>InstitutionalOwnership (%)</i>	58.42	44.55	59.96	72.83	19.35
<i>OwnershipConcentration (%)</i>	23.78	10.90	21.27	34.90	16.90
<i>Size (USD Millions)</i>	4,067	393	1,098	3,080	10,320
<i>BM</i>	0.57	0.30	0.48	0.71	0.45
<i>SharesTraded¹</i>	47.20	0.62	3.20	13.01	1954.78
<i>Volatility</i>	2.74	1.72	2.36	3.31	1.48

¹Values have been multiplied by 10⁵ for expositional purposes; unranked measure of this variable used in the panel.

Panel B: Correlation Matrix

	<i>PP</i>	<i>BS</i>	<i>BI</i>	<i>IO</i>	<i>OC</i>	<i>Size</i>	<i>BM</i>	<i>ST</i>	<i>V</i>
<i>PricePattern</i>		0.02	-0.08*	0.02*	0.03*	-0.08*	-0.01	0.17*	0.17*
<i>BoardSize</i>	0.02		-0.07*	-0.10*	-0.07*	0.13*	-0.02*	-0.06*	-0.06*
<i>BoardIndependence</i>	-0.05*	-0.06*		0.19*	-0.30*	0.13*	-0.05*	-0.13*	-0.14*
<i>InstitutionalOwnership</i>	0.03	-0.08*	0.18*		0.12*	0.19*	-0.06*	0.01	-0.00
<i>OwnershipConcentration</i>	0.03*	-0.07*	-0.26*	0.15*		-0.29*	0.14*	-0.22*	0.13*
<i>Size</i>	-0.06*	0.09*	0.12*	0.21*	-0.28*		-0.43*	-0.45*	-0.40*
<i>BM</i>	-0.03*	0.01	-0.04*	0.05*	0.17*	-0.44*		0.18*	0.19*
<i>SharesTraded</i>	0.17*	-0.03*	-0.13*	0.00	0.22*	-0.44*	0.18*		0.26*
<i>Volatility</i>	0.15*	-0.08*	-0.15*	0.05*	0.17*	-0.39*	0.08*	0.26*	

*Indicates significance at the 5 percent level.

Table 3
Construct Validity: Six-Month Abnormal Returns

Table 3 Panel A and Panel B report OLS estimates of the parameters in equation (2), which is estimated using monthly value-weighted returns on each of the five *PricePattern* quintile portfolios. In Panel A, a firm is assigned to the portfolios for 6 months following the month of the insider trade. In Panel B, the first month following the month of the insider trade is excluded to avoid overlap with the *PricePattern* measurement window. A significant positive estimate of the intercept α indicates an abnormal return on insider trades during the 6-month period following insider transactions. Refer to Appendix A for an overview of the variable definitions. T-statistics are reported in parentheses. *, **, and *** indicate significance at the 10, 5, and 1 percent levels (two-tailed).

$$Rp_t - Rf_t = \alpha + \beta_M(Rm_t - Rf_t) + \beta_S Rsbm_t + \beta_V Rhml_t + \beta_U Rumd_t + \varepsilon_t \quad (2)$$

Panel A: Monthly Abnormal Returns on PricePattern Portfolios

Variable	PricePattern Quintile					Difference
	Low		Medium		High	High - Low
<i>Abnormal Return (%)</i>	0.35 (1.22)	0.61** (2.37)	0.80*** (2.99)	1.41*** (5.02)	2.61*** (5.30)	2.26*** (3.97)
<i>Observations</i>	128	127	128	128	126	
<i>Adjusted R²</i>	62.88%	65.14%	65.40%	69.96%	56.14%	

Panel B: Monthly Abnormal Returns on PricePattern Portfolios (Excluding First Month)

Variable	PricePattern Quintile					Difference
	Low		Medium		High	High - Low
<i>Abnormal Return (%)</i>	0.85*** (2.77)	0.79*** (2.84)	0.75*** (2.74)	1.12*** (3.91)	1.35*** (2.84)	0.50 (0.88)
<i>Observations</i>	127	126	127	127	125	
<i>Adjusted R²</i>	61.19%	60.67%	64.08%	69.04%	57.20%	

Table 4
Construct Validity: Insider-Trade Related Bias in Management Earnings Guidance

Table 4 Panel A reports OLS estimates of the parameters in equation (3), which is estimated in two samples of the data. The first sample, “Pre-Reg FD Sample” is a replication of the sample studied in Rogers and Stocken (2005). The second sample, “Governance Sample”, spans from 1996 through 2006 and includes all observations with available data to measure the corporate governance variables. A significant negative estimate of the coefficient β on *InsiderTrade* indicates a systematic relation between insider trading by corporate officers and the error in management guidance of annual earnings per share. Refer to Appendix A for an overview of the variable definitions. T-statistics are reported in parentheses. *, **, and *** indicate significance at the 10, 5, and 1 percent levels (two-tailed).

$$GuidanceError_{i,t} = \alpha + \beta InsiderTrade_{i,t} + \delta_1 BidAsk_{i,t} + \delta_2 Volume_{i,t} + \delta_3 Horizon_{i,t} + \delta_4 CAR_{i,t} + \delta_5 CAR_{i,t} \cdot BadNews_{i,t} + \delta_6 Size_{i,t} + \delta_7 BM_{i,t} + \sum_Y \delta_Y Year + \sum_I \delta_I Industry + \varepsilon_{i,t} \quad (3)$$

Panel A: Insider Trading and the Bias in Management Earnings Guidance

Variable	Pred. Sign	Pre-Reg FD Sample 1996 – 2000		Governance Sample 1996 – 2006	
		Estimate	T-stat	Estimate	T-stat
<i>Intercept</i>	?	0.194	(0.82)	0.094	(0.79)
<i>InsiderTrade</i>	–	–0.194***	(–2.89)	–0.081***	(–2.69)
<i>BidAsk</i>	?	–0.216	(–0.14)	–0.541	(–0.47)
<i>Volume¹</i>	?	1.010	(0.68)	0.213	(0.21)
<i>Horizon¹</i>	?	0.285**	(2.35)	0.085	(1.09)
<i>CAR</i>	?	0.246	(0.76)	0.049	(0.28)
<i>CAR x BadNews</i>	?	0.052	(0.98)	0.012	(0.50)
<i>Size</i>	?	–0.013	(–1.04)	–0.007	(–1.04)
<i>BM</i>	?	0.070	(1.20)	0.024	(0.71)
<i>Year Fixed Effects</i>		Yes		Yes	
<i>Industry Fixed Effects</i>		Yes		Yes	
<i>Observations</i>		744		1,395	
<i>Adjusted R²</i>		6.22%		9.47%	

¹Parameter estimate has been multiplied by 10³ for expositional purposes.

Table 4 (Continued)**Construct Validity: Insider-Trade Related Bias in Management Earnings Guidance**

Table 4 Panel B reports OLS estimates of the coefficient β in equation (3), which is estimated in each of the five sub-samples of the data partitioned by the value of *PricePattern*. For this set of tests, *PricePattern* is measured as the natural logarithm of the ratio of the 20 trading day cumulative market-adjusted gross return following the 10 trading days of insider transactions that follow earnings guidance to the 20 trading day cumulative market-adjusted gross return preceding an insider transaction. A significant negative estimate of the coefficient β on *InsiderTrade* in equation (3) indicates a systematic relation between insider trading by corporate officers and the error in management guidance of annual earnings per share. Panel B reports OLS estimates of the coefficients β and γ in equation (3a), which is estimated on the full sample. A significant negative estimate of the coefficient γ is consistent with a positive association between *PricePattern* and the systematic insider trade-related bias in earnings guidance. In both equations, *Controls* include *BidAsk*, *Volume*, *Horizon*, *CAR*, *CAR·BadNews*, *Size*, and *BM* as well as industry and year fixed effects. Refer to Appendix A for an overview of the variable definitions. T-statistics are reported in parentheses. *, **, and *** indicate significance at the 10, 5, and 1 percent levels (two-tailed).

$$GuidanceError_{i,t} = \alpha + \beta InsiderTrade_{i,t} + \delta Controls_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$GuidanceError_{i,t} = \alpha + \beta InsiderTrade_{i,t} + \gamma InsiderTrade_{i,t} \cdot PricePattern_{i,t} + \delta Controls_{i,t} + \varepsilon_{i,t} \quad (3a)$$

Panel B: Earnings Guidance Bias in PricePattern-Based Sub-Samples of the Data

Variable	PricePattern Quintile				
	Low		Medium		High
<i>InsiderTrade</i>	0.044 (0.28)	-0.008 (-0.33)	-0.001 (-0.05)	-0.261* (-1.72)	-2.338*** (-3.18)
<i>Observations</i>	291	296	294	296	290
<i>Adjusted R²</i>	4.90%	4.62%	9.35%	5.20%	9.81%

Panel C: Interaction between PricePattern and the Earnings Guidance Bias

Variable	Pred. Sign	I
<i>InsiderTrade</i>	?	0.622*** (3.86)
<i>IT x PricePattern</i>	-	-0.894*** (-11.33)
<i>Observations</i>		1,467
<i>Adjusted R²</i>		10.54%

Table 5
Construct Validity: Litigation Risk

Table 5 reports maximum likelihood estimates of the coefficient β in Probit model summarized by equation (4), which is estimated on the full sample of the data. For each insider transaction observation, *Litigation* is assigned a value of 1 if a Federal Securities Fraud Class Action is filed within a 6-, 12-, and 24-month period following the insider transaction. A significant positive estimate of the coefficient β on *PricePattern* in equation (4) indicates a systematic relation between the value of *PricePattern* of an insider transaction and the likelihood that the insider's firm will face securities litigation during the designated period following the insider transaction. In equation (4), *Controls* include *Size*, *Turnover*, *Beta*, *BHReturn*, *Volatility*, *Skewness*, and *MinReturn* as well as industry and year fixed effects. Refer to Appendix A for an overview of the variable definitions. χ^2 -statistics are reported in parentheses. *, **, and *** indicate significance at the 10, 5, and 1 percent levels.

$$Prob(Litigation_{i,t} = 1) = f(\alpha + \beta PricePattern_{i,t} + \delta Controls_{i,t} + \varepsilon_{i,t}) \quad (4)$$

<u>Variable</u>	<u>Pred. Sign</u>	<u>6 Months</u>	<u>1 Year</u>	<u>2 Years</u>
<i>Intercept</i>	?	-5.178*** (67.24)	-4.605*** (102.02)	-5.163*** (177.30)
<i>PricePattern</i>	+	0.728*** (22.53)	0.558*** (21.79)	0.319*** (9.87)
<i>Size</i>	?	0.185*** (37.74)	0.184*** (69.22)	0.219*** (150.51)
<i>Turnover</i>	?	0.027*** (19.07)	0.026*** (24.57)	0.029*** (42.60)
<i>Beta</i>	?	-0.272*** (12.46)	-0.284*** (21.85)	-0.208*** (17.04)
<i>BHReturn</i>	?	-0.221 (1.15)	-0.059 (0.14)	-0.347*** (6.68)
<i>Volatility</i>	?	16.950** (5.10)	-3.987 (0.47)	-10.160** (4.22)
<i>Skewness</i>	?	-0.152** (6.06)	0.033 (0.58)	-0.026 (0.50)
<i>MinReturn</i>	?	4.011** (4.26)	-1.919 (2.23)	-1.260 (1.34)
<i>Industry Fixed Effects</i>		Yes	Yes	Yes
<i>Year Fixed Effects</i>		Yes	Yes	Yes
<i>Observations</i>		11,299	11,299	11,299

Table 6
Corporate Governance and Insider Trading

Table 6 reports the OLS estimates of the parameters in equation (1) for insider transactions during the 1996 to 2006 sample period. A significant negative coefficient β on a corporate governance characteristic indicates that the characteristic is systematically associated with insider transactions that are less likely to be motivated by non-public information. Refer to Appendix A for an overview of the variable definitions. Clustered t-statistics are reported in parentheses. *, **, and *** indicate significance at the 10, 5, and 1 percent levels (two-tailed).

$$PricePattern_{i,t} = \alpha + \beta_1 BoardSize_{i,t} + \beta_2 BoardIndependence_{i,t} + \beta_3 InstitutionalOwnership_{i,t} + \beta_4 OwnershipConcentration_{i,t} + \delta_1 Size_{i,t} + \delta_2 BM_{i,t} + \delta_3 SharesTraded_{i,t} + \delta_4 Volatility_{i,t} + \sum_Y \delta_Y Year + \sum_I \delta_I Industry + \varepsilon_{i,t} \quad (1)$$

Variable	Pred. Sign	I	II	III	IV	V
<i>Intercept</i>	?	-14.998** (-2.21)	-12.499* (-1.81)	-14.815** (-2.17)	-12.957* (-1.78)	-8.251 (-1.12)
<i>BoardSize</i>	+	0.520*** (2.77)				0.463** (2.52)
<i>BoardIndependence</i>	-		-6.242*** (-3.10)			-7.053*** (-3.17)
<i>InstitutionalOwnership</i>	?			-0.137 (-0.06)		1.845 (0.83)
<i>OwnershipConcentration</i>	-				-1.930 (-0.86)	-4.108* (-1.72)
<i>Size</i>	?	0.334 (1.18)	0.450 (1.58)	0.393 (1.35)	0.330 (1.11)	0.219 (0.73)
<i>BM</i>	?	-2.781*** (-2.60)	-2.727** (-2.56)	-2.738** (-2.56)	-2.721** (-2.54)	-2.752** (-2.57)
<i>SharesTraded</i>	+	0.126*** (9.83)	0.125*** (9.73)	0.126*** (9.78)	0.127*** (9.74)	0.125*** (9.83)
<i>Volatility</i>	+	2.021*** (4.76)	2.004*** (4.75)	2.054*** (4.84)	2.038*** (4.77)	1.931*** (4.56)
<i>Industry Fixed Effects</i>		Yes	Yes	Yes	Yes	Yes
<i>Year Fixed Effects</i>		Yes	Yes	Yes	Yes	Yes
<i>Observations</i>		11,309	11,309	11,309	11,309	11,309
<i>Adjusted R²</i>		6.12%	6.19%	6.00%	6.01%	6.33%

Table 7
Supplementary Analysis: Corporate Governance and Insider Trading by Trade Size

Table 7 reports the OLS estimates of the parameters in equation (1) for insider transactions during the 1996 to 2006 sample period for two sub-samples of the data. All observations are ranked within calendar years by trade size, measured as the dollar value of the insider transaction, and assigned to the “Small Trades” and the “Large Trades” sub-samples based on this ranking. A significant negative coefficient β on a corporate governance characteristic indicates that the characteristic is systematically associated with insider transactions that are less likely to be motivated by non-public information. Refer to Appendix A for an overview of the variable definitions. Clustered t-statistics are reported in parentheses. *, **, and *** indicate significance at the 10, 5, and 1 percent levels (two-tailed).

$$PricePattern_{i,t} = \alpha + \beta_1 BoardSize_{i,t} + \beta_2 BoardIndependence_{i,t} + \beta_3 InstitutionalOwnership_{i,t} + \beta_4 OwnershipConcentration_{i,t} + \delta_1 Size_{i,t} + \delta_2 BM_{i,t} + \delta_3 SharesTraded_{i,t} + \delta_4 Volatility_{i,t} + \sum_Y \delta_Y Year + \sum_I \delta_I Industry + \varepsilon_{i,t} \quad (1)$$

<u>Variable</u>	<u>Pred. Sign</u>	<u>Smaller Trades</u>	<u>Larger Trades</u>
<i>Intercept</i>	?	-53.274*** (-5.47)	-15.928 (-1.12)
<i>BoardSize</i>	+	0.252 (1.03)	0.527** (2.45)
<i>BoardIndependence</i>	-	-4.316 (-1.61)	-10.452*** (-3.55)
<i>InstitutionalOwnership</i>	?	2.868 (1.13)	1.819 (0.55)
<i>OwnershipConcentration</i>	-	-1.159 (-0.40)	-6.734** (-2.22)
<i>Size</i>	?	2.118*** (5.17)	0.482 (0.85)
<i>BM</i>	?	-2.970** (-2.44)	-2.509 (-1.48)
<i>SharesTraded</i>	+	0.291*** (11.72)	0.130*** (5.12)
<i>Volatility</i>	+	1.575*** (3.37)	2.126*** (3.46)
<i>Industry Fixed Effects</i>		Yes	Yes
<i>Year Fixed Effects</i>		Yes	Yes
<i>Observations</i>		5,654	5,655
<i>Adjusted R²</i>		9.01%	5.51%

Table 8
Supplementary Analysis: Institutional Investor Classification and Insider Trading

Table 8 reports the OLS estimates of the parameters in equation (1a) for insider transactions during the 1996 to 2006 sample period. *InstitutionalOwnership* is split into *Dedicated*, *Quasi-Indexer*, and *Transient* investor types based on the Bushee and Noe (2000) and Bushee (2001). A significant negative coefficient β on a corporate governance characteristic indicates that the characteristic is systematically associated with insider transactions that are less likely to be motivated by non-public information. Refer to Appendix A for an overview of the variable definitions. Clustered t-statistics are reported in parentheses. *, **, and *** indicate significance at the 10, 5, and 1 percent levels (two-tailed).

$$PricePattern_{i,t} = \alpha + \beta_1 BoardSize_{i,t} + \beta_2 BoardIndependence_{i,t} + \beta_{3A} InstitutionalOwnershipDedicated_{i,t} + \beta_{3B} InstitutionalOwnershipQuasiIndexer_{i,t} + \beta_{3C} InstitutionalOwnershipTransient_{i,t} + \beta_4 OwnershipConcentration_{i,t} + \delta_1 Size_{i,t} + \delta_2 BM_{i,t} + \delta_3 SharesTraded_{i,t} + \delta_4 Volatility_{i,t} + \sum_Y \delta_Y Year + \sum_I \delta_I Industry + \epsilon_{i,t} \quad (1a)$$

Variable	Pred. Sign	I	II	III	IV	V
<i>Intercept</i>	?	-14.743** (-2.15)	-14.909** (-2.16)	-12.906* (-1.86)	-12.685* (-1.83)	-7.070 (-0.95)
<i>BoardSize</i>	+					0.507*** (2.74)
<i>BoardIndependence</i>	-					-7.022*** (-3.20)
<i>InstitutionalOwnership Dedicated</i>	-	-7.712* (-1.86)			-7.960* (-1.85)	-5.253 (-1.22)
<i>InstitutionalOwnership Quasi-Indexer</i>	?		1.159 (0.44)		-1.282 (-0.45)	1.119 (0.38)
<i>InstitutionalOwnership Transient</i>	+			11.747** (2.38)	12.005** (2.35)	12.980*** (2.58)
<i>OwnershipConcentration</i>	-					-3.465 (-1.47)
<i>Size</i>	?	0.410 (1.44)	0.366 (1.29)	0.293 (1.02)	0.338 (1.18)	0.190 (0.64)
<i>BM</i>	?	-2.756** (-2.56)	-2.756** (-2.58)	-2.570** (-2.41)	-2.539** (-2.38)	-2.550** (-2.39)
<i>SharesTraded</i>	+	0.126*** (9.69)	0.126*** (9.77)	0.123*** (9.66)	0.123*** (9.66)	0.122*** (9.73)
<i>Volatility</i>	+	2.012*** (4.71)	2.059*** (4.83)	1.982*** (4.64)	1.932*** (4.49)	1.837*** (4.26)
<i>Industry & Year FE</i>		Yes	Yes	Yes	Yes	Yes
<i>Observations</i>		11,309	11,309	11,309	11,309	11,309
<i>Adjusted R²</i>		6.07%	6.00%	6.22%	6.27%	6.61%

Table 9
Supplementary Analysis: Insider-Trade Related Bias in Management Earnings Guidance

Table 9 Panel A reports in the first two columns OLS estimates of the coefficient β in equation (3), which is estimated on partitions of the data based on board-related governance characteristics. A significant negative estimate of the coefficient β on *InsiderTrade* in equation (3) indicates a systematic relation between insider trading by corporate officers and the error in management guidance of annual earnings per share. The coefficient β is estimated separately within each *BoardSize* and *BoardIndependence* based sub-sample. The difference between the estimates of the coefficient β across the governance sub-samples is captured by the coefficient γ in equation (3b), which is estimated on the full sample and reported in the third column of Panel A, labeled “Difference”. *GI* is an indicator variable that is equal to one if the firm falls into the higher *BoardSize* or the higher *BoardIndependence* partition of the sample for the *BoardSize* and *BoardIndependence* analysis, respectively. In both equations, *Controls* include *BidAsk*, *Volume*, *Horizon*, *CAR*, *CAR·BadNews*, *Size*, and *BM* as well as industry and year fixed effects. Refer to Appendix A for an overview of the variable definitions. T-statistics are reported in parentheses. *, **, and *** indicate significance at the 10, 5, and 1 percent levels (two-tailed).

$$GuidanceError_{i,t} = \alpha + \beta InsiderTrade_{i,t} + \delta Controls_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$GuidanceError_{i,t} = \alpha_1 + \beta InsiderTrade_{i,t} + \delta Controls_{i,t} + \alpha_2 GI_{i,t} + \gamma InsiderTrade_{i,t} \cdot GI_{i,t} + \theta Controls_{i,t} \cdot GI_{i,t} + \varepsilon_{i,t} \quad (3b)$$

Panel A: The Board of Directors

Variable	Board Size				Difference	
	Pred. Sign	Standard	Pred. Sign	Extreme	Pred. Sign	Difference
<i>InsiderTrade</i>	?	-0.009 (-1.07)	-	-0.131** (-2.15)	?	-0.008 (-0.20)
<i>InsiderTrade x GI</i>					-	-0.123** (-2.07)
<i>Observations</i>		745		650		1,395
<i>Adjusted R²</i>		2.56%		15.62%		15.62%

Variable	Board Independence				Difference	
	Pred. Sign	Low	Pred. Sign	High	Pred. Sign	Difference
<i>InsiderTrade</i>	-	-0.175*** (-3.00)	?	0.006 (1.51)	?	-0.175*** (-4.21)
<i>InsiderTrade x GI</i>					+	0.181*** (2.93)
<i>Observations</i>		706		689		1,395
<i>Adjusted R²</i>		10.28%		5.22%		10.05%

Table 9 (Continued)**Supplementary Analysis: Insider-Trade Related Bias in Management Earnings Guidance**

Table 9 Panel B reports in the first two columns OLS estimates of the coefficient β in equation (3), which is estimated on partitions of the data based on ownership-related governance characteristics. The coefficient β is estimated separately within each *InstitutionalOwnership* and *OwnershipConcentration* based sub-sample. *GI* is an indicator variable that is equal to one if the firm falls into the higher *InstitutionalOwnership* or the higher *OwnershipConcentration* partition of the sample for the *InstitutionalOwnership* and *OwnershipConcentration* analysis, respectively. In both equations, *Controls* include *BidAsk*, *Volume*, *Horizon*, *CAR*, *CAR·BadNews*, *Size*, and *BM* as well as industry and year fixed effects. Refer to Appendix A for an overview of the variable definitions. T-statistics are reported in parentheses. *, **, and *** indicate significance at the 10, 5, and 1 percent levels (two-tailed).

$$GuidanceError_{i,t} = \alpha + \beta InsiderTrade_{i,t} + \delta Controls_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$GuidanceError_{i,t} = \alpha_1 + \beta InsiderTrade_{i,t} + \delta Controls_{i,t} + \alpha_2 GI_{i,t} + \gamma InsiderTrade_{i,t} \cdot GI_{i,t} + \theta Controls_{i,t} \cdot GI_{i,t} + \varepsilon_{i,t} \quad (3b)$$

Panel B: The Ownership Structure

	Institutional Ownership				Difference	
	Pred. Sign	Low	Pred. Sign	High	Pred. Sign	Difference
<i>InsiderTrade</i>	?	-0.004 (-0.37)	?	-0.137** (-2.35)	?	-0.004 (-0.08)
<i>InsiderTrade x GI</i>					?	-0.133** (-2.23)
<i>Observations</i>		694		701		1,395
<i>Adjusted R²</i>		8.26%		15.36%		14.87%
	Ownership Concentration				Difference	
	Pred. Sign	Low	Pred. Sign	High	Pred. Sign	Difference
<i>InsiderTrade</i>	-	-0.097** (-2.12)	?	-0.015 (-1.28)	?	-0.097*** (-2.91)
<i>InsiderTrade x GI</i>					+	0.082* (1.73)
<i>Observations</i>		695		700		1,395
<i>Adjusted R²</i>		47.84%		9.27%		46.38%

Table 10
Supplementary Analysis: The New CEO Sample

Table 10 reports the OLS estimates of the parameters in equation (1) for insider transactions during the 1996 to 2006 sample period for the full data sample and for two sub-samples of the data based on trade size. All samples are restricted to firms that have replaced their CEO during the previous fiscal year. All observations are ranked within calendar years by trade size, measured as the dollar value of the insider transaction, and assigned to the “Small Trades” and the “Large Trades” sub-samples based on this ranking. A significant negative coefficient β on a corporate governance characteristic indicates that the characteristic is systematically associated with insider transactions that are less likely to be motivated by non-public information. Refer to Appendix A for an overview of the variable definitions. Clustered t-statistics are reported in parentheses. *, **, and *** indicate significance at the 10, 5, and 1 percent levels (two-tailed).

$$PricePattern_{i,t} = \alpha + \beta_1 BoardSize_{i,t} + \beta_2 BoardIndependence_{i,t} + \beta_3 InstitutionalOwnership_{i,t} + \beta_4 OwnershipConcentration_{i,t} + \delta_1 Size_{i,t} + \delta_2 BM_{i,t} + \delta_3 SharesTraded_{i,t} + \delta_4 Volatility_{i,t} + \sum_Y \delta_Y Year + \sum_I \delta_I Industry + \epsilon_{i,t} \quad (1)$$

<u>Variable</u>	<u>Pred. Sign</u>	<u>All Trades</u>	<u>Small Trades</u>	<u>Large Trades</u>
<i>Intercept</i>	?	-21.211 (-1.38)	-49.009* (-1.87)	-17.293 (-0.69)
<i>BoardSize</i>	+	0.254 (0.59)	0.397 (0.73)	0.390 (0.70)
<i>BoardIndependence</i>	-	-9.737* (-1.73)	0.337 (0.05)	-17.761** (-2.33)
<i>InstitutionalOwnership</i>	?	2.461 (0.48)	-5.701 (-0.85)	8.116 (1.34)
<i>OwnershipConcentration</i>	-	-9.573** (-2.05)	-3.657 (-0.53)	-12.723** (-2.00)
<i>Size</i>	?	0.740 (1.20)	2.180** (2.04)	0.538 (0.57)
<i>BM</i>	?	-0.842 (-0.39)	0.342 (0.15)	-3.027 (-0.94)
<i>SharesTraded</i>	+	0.162*** (5.65)	0.268*** (5.50)	0.162*** (3.11)
<i>Volatility</i>	+	2.205*** (2.75)	1.879* (1.83)	2.295** (1.99)
<i>Industry Fixed Effects</i>		Yes	Yes	Yes
<i>Year Fixed Effects</i>		Yes	Yes	Yes
<i>Observations</i>		2,277	1,138	1,139
<i>Adjusted R²</i>		8.07%	7.83%	14.01%