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To the Graduate Council:

I am submitting herewith a dissertation written by Alireza Ebrahim entitled "Board of Directors Monitoring of CEO Insider Trading: Before and After the Sarbanes-Oxley Act." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Business Administration.

Harold A. Black, Major Professor

We have read this dissertation and recommend its acceptance:

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(Original signatures are on file with official student records.)

Board of Directors Monitoring of CEO Insider Trading: Before and After the Sarbanes-Oxley Act

A Dissertation Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

Alireza Ebrahim

May 2012

Dedication

To my wife for her unconditional love and support

Acknowledgement

It would not have been possible to write this doctoral thesis without the help and support of the kind people around me, to only some of whom it is possible to give particular mention here.

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For any errors or inadequacies that may remain in this work, the responsibility is my own.

ABSTRACT

This study investigates the impact monitoring by the board of directors had on the incidence of insider trading by firm chief executive officers (CEO) and on the abnormal returns they realized from 1996 to 2008. The study also analyzes the impact the Sarbanes-Oxley Act of 2002 (SOX) had on this relationship. The results show that CEOs earned significant abnormal returns on their buy and sell trades during this period. Furthermore, the results show that internal governance mechanisms such as board independence and CEO/Chairman duality reduce abnormal return and the intensity of CEOs' insider trades. The results are particularly significant for trades with more significant underlying nonpublic information. The results also show that SOX significantly reduced the abnormal returns and the intensity of CEOs' insider trades. The results show that SOX weakened the impact of board independence in mitigating CEOs' insider trades, while it increased the impact of the CEO/chairman duality. The results indicate that internal governance mechanisms generally have more pronounced impact on sell trades than on buy trades.

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1. Introduction

> " … among the central causes of the financial and economic crises that the United States faces today has been a widespread failure of corporate governance."
> — Shareholder Bill of Rights Act, introduced in the U.S. Senate in May 2009

Trading a firm's securities by the firm's insiders, who have access to nonpublic information about the firm, has been an issue of interest to several groups. Financial economists are interested in the topic because of the potential impact such trades can have on shareholders' wealth as well as on financial markets' performance. Striving to introduce effective regulation, policy makers are interested in the topic because of the implications for both fairness and performance of the markets. The public is interested in the topic because of the impact insider trading can have on shareholders' wealth and investment decisions.

The recent economic recession, which started with problems in the financial sector, has raised the sensitivity of the public and academia about the regulatory environment in the financial markets, as well as various aspects of managerial behavior. One of the most important concerns about managerial behavior is the potential abuse of nonpublic information by managers in their personal trades. The popular news media widely covers news about cases of insider trading based on nonpublic information and warns about investors' declining confidence in financial markets. While it has been widely suggested that insider trading based on nonpublic information is detrimental to investors' wealth and the integrity of markets—and despite an extensive set of laws and regulations—there are indications in the financial literature that the regulation has not been fully effective in preventing the abuse of nonpublic information by firms' insiders. As phrased by Jeng et al. (2003), only a "draconian regulatory system" could prevent insiders from profiting on their valuable insider information.

The main motivation for this study is the importance of protecting the integrity of markets. Fairness and integrity of stock markets are the basis for investors' trust and confidence in the financial institutions. Arthur Levitt, former chairman of the Securities and Exchange Commission (SEC) once stated, "Our markets are a success precisely because they enjoy the world's highest level of confidence. Investors put their capital to work—and put their fortunes at risk—because they trust that the marketplace is honest. They know that our securities laws require free, fair, and open transactions."[1] Certain behaviors by market participants, however, such as corporate insiders, can hurt investors' confidence in the markets. The use of nonpublic information by insiders for profit-seeking purposes is one such behavior. Nonetheless, financial literature indicates that nonpublic information is abused by some firm insiders (Lakonishok and Lee, 2001; Garfinkel et al. 2007; Huddart et al., 2007; Jagolinzer, 2009 among others).

Although the abuse of nonpublic information for personal benefit by a firm's insiders is an agency problem, the potential role of internal corporate governance mechanisms in mitigating such abuse of nonpublic information has not been fully explored in theory or practice. So far, external governance mechanisms, such as laws and regulations, have been relied upon to mitigate the abuse of nonpublic information. There is theoretical and empirical evidence, however, that external governance mechanisms can be substituted or complemented by various internal corporate governance mechanisms (Brickley and James, 1987; Hirshleifer and Thakor, 1994; Acharya et al., 2011). Importantly, the shortage of studies about the role of internal governance mechanisms comes at a time when recent scandals and ongoing corporate governance concerns have made internal governance mechanisms, such as the board of directors, the center of policy debate and academic research (Adams et al., 2010).

[1] Arthur Levitt, "A Question of Integrity: Promoting Investor Confidence by Fighting Insider Trading," address before the SEC Speaks conference, February 27, 1998.

This study investigates the impact some internal corporate governance mechanisms have on controlling the abuse of nonpublic information by firm insiders. Specifically, this study investigates whether monitoring firm management by the board of directors can augment regulation in mitigating informed insider trading by firms' CEOs, the highest-level executives. Following the models, which link board characteristics to monitoring functions (Adams et al. 2010), I study the impact of some board characteristics such as board independence, CEO/Chairman duality, multiple directorship by independent directors and stock ownership by independent directors. Furthermore, I investigate the impact of SOX on CEOs' trading, as well as on the role of the internal governance mechanisms in reduction of informed insider trading. SOX acts as an exogenous regulatory shock that contributes to the analysis of the interaction between internal governance mechanisms and external regulation of insider trading.

Compared with the impact of the impact of external regulations, the impact of board monitoring as an internal governance mechanism on mitigating informed insider trading is expected to be significant for several reasons. First, monitoring by board members is exerted by parties who are well informed, have expertise, and are actively engaged in firm activities. Second, monitoring by the board of directors could be proactive rather than reactive. Unlike enforcement agencies, directors have vested interests in preventing the use of nonpublic information in insider trades. Third, the monitoring enforced by the board of directors is less constrained by regulatory obstacles and defensive mechanisms, when compared with monitoring by agencies such as the SEC.

This study shows that CEOs earn significant abnormal returns on both buy and sell trades. Furthermore, the study suggests that board monitoring, as an internal governance mechanism, can reduce both the abnormal returns and the incidence of informed trading by firms' CEOs. The results indicate that significance of the impact increases with the significance of the underlying nonpublic

information. The results also indicate that the impact of board monitoring is more significant and consistent for sell trades than it is for buy trades.

The results also suggest that SOX reduces the abnormal return of buy and sell insider trades. In addition, the results show that SOX reduces the proportion of significantly informed trades in CEOs' trades. The results also suggest that some internal governance mechanisms became less effective after SOX (substitution effect), while others became more effective (complement effect). Overall, the results suggest that various internal governance mechanisms can be substituted for or be used to complement the regulations that aim to mitigate the use of nonpublic information in insider trades. Due to the different characteristics of buy and sell trades, however, the results for buy and sell trades are different for some mechanisms. Specifically, the results suggest that the impact of internal governance mechanisms is more pronounced for sell trades that are exposed to higher information asymmetry between insiders and outsiders than buy trades. The findings are significant both statistically and economically.

There are few studies in the literature that are similar in scope to this study. Bettis et al. (2000) investigate the effectiveness of corporate compliance policies against informed insider trading and compare the effectiveness of such internal policies with that of external regulation. They find that corporate self-regulation is associated with a statistically and economically significant reduction in insider trading, but such internal regulations are not 100 percent effective. Furthermore, in a cross-country study, Durnev and Nain (2007) examine the effectiveness of insider trading restrictions in reducing private information trading and find that the effectiveness of the insider trading regulation depends on the severity of agency problem in the firm[2]. Another study that focuses on the monitoring role of the board of directors is Ravina and Sapienza (2010). Using

[2] They measure agency cost as the difference between control rights and cash flow rights of the largest shareholder.

insider trading data from 1986 to 2003, Ravina and Sapienza (2010) study the trading performance of independent directors and other firm executives and suggest that independent directors also earn significant abnormal returns on their purchase trades, with the return comparable to those earned by the firm's executives. Ravina and Sapienza (2010) conclude that independent directors have adequate information to be able to monitor firm's executives effectively. They suggest, however, that in firms with weak corporate governance, the gap between the information set available to a firm's executives and that of independent directors widens, and the executives earn substantially higher abnormal returns on their insider trades than do independent directors. The results of Ravina and Sapienza (2010) support the potential role of independent directors on mitigating informed trading by firm insiders.

This study is different from other studies on the topic in several ways. First, among all internal governance mechanisms, the focus of this investigation is on the board of directors and the impact of several board characteristics in reducing informed insider trading. Furthermore, to get a clear view of the impact of the board monitoring, only trades by CEOs are studied, because CEOs are directly monitored by the board of directors. CEOs are among the most informed insiders and they earn higher abnormal returns on their trades than other insiders (Seyhun, 1986). Second, unlike most previous studies that ignore sell trades[3] (Garfinkel et al. 2007), this study considers both buy and sell trades and finds that in most cases, the impact of internal governance mechanisms is more pronounced on sell trades[4]. Third, while other studies have not paid adequate attention to the potential impact of SOX on insider trades, this study investigates the impact of SOX on the use of

[3] It is argued that there are several motivations for insider trades, such as need for liquidity, wealth diversification, and signaling. The need for liquidity and wealth diversification applies mostly to sell trades, since the granted stock options form a nontrivial portion of insiders' wealth. However, insider buy trades occur mainly for investment and signaling purposes.

[4] For suggested differences in the characteristics of buy and sell trades, see studies such as Kim and Verrecchia (1994), Baiman and Verrecchia (1996), and Cheng and Lo (2006).

nonpublic information in insider trades as well as on the role of internal governance mechanisms in mitigating informed trades. SOX is also used as an exogenous regulatory shock to test the hypothesis of substitution of internal and external governance mechanisms on insider trading issues. The findings of this study suggest that SOX has significantly reduced the abnormal returns and rate of CEOs' informed insider trades.

This study reviews the different views about insider trading, the development of insider trading regulation in the United States, and literature about the effectiveness of regulation in mitigating informed insider trading. Moreover, the potential role of internal governance mechanisms in insider trading is investigated. Specifically, under a general framework for corporate governance, the law and regulations are considered as part of external governance mechanisms in reducing the conflict of interests between managers and shareholders, while the conduct of informed insider trading is considered as an agency problem, which originates from the conflict of interests between a firm's insiders and outsiders. Since internal governance mechanisms pursue the narrowing of gap between interests of various stakeholders in a firm, the study investigates their impact on informed insider trading. This study limits itself to examining the impact of the board of directors among other internal governance mechanisms. Indeed, supervision by the board of directors not only can limit the opportunities that insiders have to profit by abusing nonpublic information (for example through lower information asymmetry), it also increases the probability that the abuse of nonpublic information is detected and punished. The study focuses on some characteristics of board of boards of directors, such as board independence and the duality of the CEO and the chairman of the board (hereafter, COB). In addition, the impact of some director characteristics, such as multiple directorships and stock ownership, on the effectiveness of independent directors is examined.

To measure the significance of nonpublic information incorporated in insider trades, this study measures the abnormal returns earned by the CEOs' trades through various proxies. For instance, the abnormal return of an insider trade is considered as a proxy for the materiality of nonpublic information incorporated in the insider trade (Rogoff, 1964; Ravina and Sapienza, 2010). Furthermore, the significance of the underlying nonpublic information in each trade is estimated from the significance of the measured abnormal returns.

The results are tested with a battery of robustness tests. The tests include using other methods to calculate abnormal returns, excluding records with unknown sector code, clustering for the sectors, excluding the data for 2002 (the year that SOX was implemented), controlling for the firms' fixed effects, and testing for alternative explanations.

The results of this study help to fill the void between studies on insider trading and those on internal governance mechanisms, and contribute to the literature in several ways. First, the study suggests that monitoring by the board can assist existing regulations in mitigating the abuse of nonpublic information trades by insiders. Second, it highlights the role of various aspects of board characteristics in the reduction of the abuse of nonpublic information. Third, it establishes the oversight of insider trading as part of the board's monitoring role. Fourth, it sheds light on the interaction between external and internal governance mechanisms when it comes to controlling insider trading. Fifth, it adds to the literature about SOX and complements SOX-related research on its impact on corporate governance and insider trading. Finally, the study sheds light on managerial behavior in terms of handling nonpublic information under various regulatory and internal corporate governance settings.

This study can be extended in several ways. For example, other internal or even external corporate governance mechanisms can be investigated for their potential role in reducing the abuse of nonpublic information by insiders. In addition, trades by insiders other than CEOs can be studied. Comparing the results for various insiders with different levels of access to nonpublic information could be of interest. Furthermore, by focusing on firms' characteristics, the impact of external and internal governance mechanisms can be compared for such characteristics as the size, industry and regulatory environment of the firm. Also, the relationship between insiders' (for example, CEOs') invested wealth in the firm and the effectiveness of internal governance mechanisms in reducing the abuse of nonpublic information can be investigated.

This paper is organized as follows. Chapter 2 reviews the relevant literature and develops the hypotheses. Chapter 3 discusses the data and provides summary statistics. Chapter 4 lays out the applied methodology, presents the results, and tests their robustness. Chapter 5 concludes the study.

2. Literature

2.1. Insider Trading

The SEC defines insider trading as follows:

> "Insider trading" is a term that most investors have heard and usually associate with illegal conduct. But the term actually includes both legal and illegal conduct. The legal version is when corporate insiders—officers, directors, and employees—buy and sell stock in their own companies. When corporate insiders trade in their own securities, they must report their trades to the SEC. Illegal insider trading refers generally to buying or selling a security, in breach of a fiduciary duty or other relationship of trust and confidence, while in possession of material, nonpublic information about the security.[5]

[5] http://www.sec.gov/answers/insider.htm.

Not all insider trades are based on nonpublic information. The insider trades, which are based on nonpublic information, are commonly called “informed,” “information-driven,” or “opportunistic” insider trading in the literature. Nonetheless, the incorporation of nonpublic information into trades by insiders is not observable to outside observers. Only cases that are detected, brought before a court or administrative tribunal, and proved to be based on nonpublic information are observable by the public. Such lack of observation has been an obstacle to studying illegal insider trading. The recognition of some trades as “informed insider trading” in the literature has been mainly based on estimations and do not have implications about legal status of individual trades.

In this study, the terms “informed insider trading” and “information-driven insider trading” are used interchangeably to refer to trades that are likely to be based on nonpublic information, regardless of the significance of the nonpublic information or the breach of a duty by an insider. Moreover, the terms "more significantly informed insider trades" or " more significantly information-driven insider trades" are used to refer to trades, which are estimated to be based on more significant (or material) nonpublic information.

In general, informed insider trades can take place in various ways. For example, insiders can use their nonpublic information to recognize mispricing and profit by trading the firm’s securities. Also, insiders can induce mispricing through incomplete or inaccurate information disclosures and take advantage of the created mispricing. Insiders can also sell or otherwise selectively disseminate their nonpublic information to others for personal benefit.

The abnormal returns on insider trading that is done for personal benefit start with the information asymmetry between a firm’s insiders and outsiders. Such information asymmetry is an

inherent characteristic of a firm and is a result of the separation of ownership and control, and opacity of firms to their rival firms. In the absence of direct evidence of the use of nonpublic information, which is usually available only for cases that go for trial, researchers estimate the materiality of incorporated nonpublic information from ex-post abnormal returns. As Rogoff (1964) suggests, the abnormal return of an insider trade is associated with the significance (or materiality) of its underlying nonpublic information.

The following section introduces the opposing academic views on insider trading and sets the stage for developing the hypotheses tested in this study.

2.2. Views on Insider Trading

Academicians have opposing views about the vices and virtues of insider trading and the appropriateness of associated regulations and penalties. Some economists and legal scholars argue that insiders should be allowed to trade the securities of their affiliated firms without constraints, and that the laws prohibiting informed insider trading should be revoked. These scholars argue that insider trading can transfer information to the markets more promptly and thereby benefit the general investor (Easterbrook, 1981). They also suggest that such insider trading not only increases the efficiency of capital markets by fostering the accuracy of stock prices, but also eliminates the need for many individuals to collect the same information through accelerated price discovery (Manne, 1966; Carlton and Fischel, 1983; Dye, 1984). They emphasize that adequate information may not be produced or disseminated in the absence of allowed informed insider trading (Demsetz, 1969 and Hirshleifer, 1971). Furthermore, they argue that the new information brought by insider trades can reduce the risk and consequently, would increase asset prices and elevate real investments due to that reduced risk. It is also suggested that outsiders' welfare may be higher at the

presence of free insider trading (Bhattacharya and Nicodano, 2001 and Medrano and Vives 2003). Fein (1992) suggests that insider trading is a victimless crime and hence enforcing insider trading restrictions is not cost effective. Manne (1966b) even proposes the use of unconstrained insider trading as a compensation mechanism and suggests that this method would not only reduce managerial salaries, but it would also make up for the shortcomings of conventional compensation methods.

Conversely, the advocates for the prohibition of informed insider trading point to various harms to shareholders and other market participants by such trades. They argue that such trades are unfair to outsiders (Leland, 1992) and impose losses on opposing traders (Seyhun, 1986). It is also suggested that insider trades subject outside investors to moral hazard (Hirshleifer, 1971; Ross, 1978) and adverse selection problems that eventually discourage investment in the firm and lower the firm's value and its stock price (Manove, 1989; Ausubel, 1990; Fischer, 1992; Meulbroek, 1992; Fishman and Hagerty, 1992; Chung and Li, 2003; Gunny et al., 2008). Furthermore, it is suggested that informed insider trading reduces market liquidity (Meulbroek, 1992) and decreases efficiency due to lower trading amounts and consequent sub-optimal risk sharing (Glosten, 1989; Maug, 1995, and 2002).

There are studies that mention simultaneous benefits and harm to the markets by informed insider trading. For example, in a theoretical study, Leland (1992) suggests several outcomes for allowed informed insider trading. He shows that when informed insider trading is allowed, stock prices are higher and the trades reflect information more efficiently. Leland (1992) also shows that as a consequence of allowed informed insider trading, expected real investment would rise, and both owners and insiders of investment projects would benefit, but markets would be less liquid and

outside investors would be hurt. Overall, Leland (1992) suggests that total welfare may change in either direction depending on the economic environment.

From a public perspective, informed insider trading is regarded harmful for the shareholders. The continual evolution of insider trading regulation in many countries is due to this perception. The United States pioneered insider trading regulation, but the evolution of insider trading regulation is not limited to the U.S. Many other countries have moved in the same direction and have passed and enforced laws to prevent informed insider trading in their markets (Batacharya and Daouk, 2008).

The following section is an overview of insider trading regulation in the United States. Evidence that indicates that regulation has not stopped the abuse of nonpublic information by insiders is reviewed. The section paves the way for the introduction of internal corporate governance mechanisms as factors that can mitigate the abuse of nonpublic information by insiders.

2.3. Insider Trading Regulation

In the aftermath of the stock market crash of 1929, federal legislation was introduced to regulate securities trading in the United States and, as a result of subsequent judicial decisions, served as the main basis for insider trading regulation. The Securities Act of 1933 (1933 Act), requires that any offer or sale of securities be registered, unless the offeror or seller (as applicable) can comply with an applicable exemption from registration. Through the registration process, the 1933 Act requires that issuers publicly disclose information about themselves and the securities they issue. The Securities Exchange Act of 1934 (1934 Act) was passed to regulate secondary trading. Section 10(b) of the 1934 Act outlaws manipulation and deception in connection with the purchase

or sale of a security. In addition, under Section 4 of the 1934 Act, the Securities and Exchange Commission (SEC) was created to regulate securities trading and the securities industry and to enforce federal securities law. Furthermore, Section 16(a) of the 1934 Act requires directors, officers, and stockholders of an issuer who directly or indirectly beneficially own more than 10 percent of any registered security of the issuer to file statements with the SEC to report initial ownership and any further changes in ownership of those securities. According to Section 16(a), any change in ownership by an insider is required to be reported to the SEC. To prevent unfair use of nonpublic information by targeted officers, directors, and beneficial owners, Section 16(b) allows firms to recover any "short-swing profits" resulting from any matched purchase and sell trades occurring within a six-month period.

Under and in accordance with Section 10(b) of the 1934 Act, the SEC adopted Rule 10b-5 in 1942. Although, Rule 10b-5 was not initially used to regulate insider trading, it later became the primary enforcement tool for insider trading enforcement. The rule says:

> It shall be unlawful for any person, directly or indirectly, by the use of any means or instrumentality of interstate commerce, or of the mails or of any facility of any national securities exchange,
>
> (a) To employ any device, scheme, or artifice to defraud,
>
> (b) To make any untrue statement of a material fact or to omit to state a material fact necessary in order to make the statements made, in the light of the circumstances under which they were made, not misleading, or
>
> (c) To engage in any act, practice, or course of business that operates or would operate as a fraud or deceit upon any person, in connection with the purchase or sale of any security.

The direct regulation of "insider trading" under Rule 10b-5, however, is traceable to an opinion in an SEC administrative enforcement action from 1961, *In re Cady, Roberts and Co*., in which the SEC adopted the "disclose or abstain" principle. Under this rule, any insider who has material nonpublic information must either disclose the information before he trades or abstain from

trading. Based on this principle, the possession of material nonpublic information by an insider while trading is prohibited.

The regulation of insider trading in the U.S. has been largely constructed through court decisions and SEC rule making. For instance, three key Supreme Court cases together establish the central principle of insider trading regulation under Section 10(b) and Rule 10b-5. In the first case, *Chiarella v. United States* (1980), the Supreme Court clarified the importance of the concept of "duty" to the definition of an "insider" under Section 10(b) and Rule 10b-5. In the second key case, *Dirks v. Securities and Exchange Commission* (1983), the Court found that a person who trades on material nonpublic information received from an insider does not himself violate insider trading restrictions unless the information was conveyed improperly, for example, in violation of the insider's known duty of trust and confidence. The third key Supreme Court ruling was *United States v. O'Hagan* (1997). This ruling endorsed a "misappropriation" theory of insider trading, under which any deceptive use of material nonpublic information to trade securities in breach of a duty of trust and confidence owed to the source of the information is considered a fraud.

In more recent years, there has been more regulation. The Insider Trading Sanctions Act of 1984 and the Insider Trading and Securities Fraud Enforcement Act of 1988 set penalties for illegal insider trading up to three times the profit gained or the loss avoided from the illegal trading. The penalties are intended to increase the expected cost of conducting illegal insider trading.

As an adjunct to insider trading regulation, the SEC adopted Regulation FD (Fair Disclosure) in 2000 to increase transparency and to address the problem of selective disclosure of information by publicly traded companies and other issuers. The SEC was concerned about the selective disclosure of material nonpublic information to market professionals (such as advance

warnings of earning results by issuers), as well as the potential resulting threats to market integrity arising from potential abuse of managerial information in favor of or against some analysts or investors. This piece of regulation, which was intended to foster the full and fair disclosure of information, mandated that when an issuer discloses material nonpublic information to certain individuals or entities (for example security analysts or institutional shareholders), the issuer must disclose the same information to the public promptly.

In 2000, the SEC adopted Rules 10b5-1 and 10b5-2 to provide a clearer definition of insider trading and some of its elements. Rule 10b5-1 indicates that any purchase or sale of a security on the basis of "material nonpublic information" about the security or its issuer is forbidden if the trader is "aware" of such information at the time of a trade. Rule10b5-1 also provides several affirmative defenses against charges of (or exceptions to liability for) insider trading when an insider can demonstrate certain affirmative defenses. These affirmative defenses include trades under pre-existing plans, contracts, or instructions that were made in good faith. Furthermore, Rule 10b5-2 clarifies the circumstances under which a duty of trust or confidence to another party may result in misappropriation liability.

Another piece of legislation that has implications for insider trading, is the Sarbanes-Oxley Act of 2002 (SOX). In compliance with the requirements of Section 403 of SOX, the SEC amended Rule 16a-3(g). The rule shortened the required insider trading reporting time window from ten business days after the end of the month in which the trade occurs to two business days after the trade. In addition, the SEC required corporate insiders to file their reports electronically with the SEC and also required issuers to publish the information on their websites within one business day following the filing with the SEC as of June 30, 2003. These changes were made to reduce the degree of information asymmetry between insiders and outsiders. Furthermore, penalties for illegal

insider trading significantly increased after the passage of SOX, doubling the maximum term of imprisonment for insider trading convictions from 10 to 20 years and increasing fines from $1 million to $5 million. In addition, Section 306(a) of SOX, entitled "Prohibition of Insider Trading During Pension Fund Blackout Periods" makes it illegal for any director or officer "to [directly or indirectly] purchase, sell or otherwise acquire or transfer any equity security of the issuer during any pension plan blackout period with respect to such equity security, if the director or executive officer acquired the equity security in connection with his or her service or employment as a director or executive officer."[6] Section 306(a) also requires issuers to notify their directors and officers about pension fund blackout periods that may affect them.

Under and in connection with SOX, new listing requirements were adopted by the NYSE and NASDAQ that require firms to have boards with a majority of independent directors as well as entirely independent compensation, nomination, and governance committees. In addition, they required that the audit committee have a minimum of three members and consist entirely of independent directors. Also, each member of the audit committee must be financially literate and at least one member of the audit committee must be a financial expert or the company must disclose that it does not have such an expert and why.

2.4. Effectiveness of Regulation as an External Corporate Governance Mechanism

Although the law and regulations have been relied upon as the main mechanisms for limiting informed insider trades, their effectiveness in preventing the use of nonpublic information by insiders is an open question. Previous academic research found evidence that can be interpreted

[6] Section 306(a)(1) of SOX.

as the relative ineffectiveness of the regulation in mitigating the use of nonpublic information by insiders. It may be argued that regulations are not intended to prevent entire informed insider trades; rather, the regulation only targets trades that are based on "material" nonpublic information used in violation of an identified duty of trust and confidence. Such an argument implies the limitations of regulation in detecting and preventing informed insider trades. These limitations of the regulations would encourage us to look for other mechanisms that can compensate for the shortcomings of the law and regulation. If we assume that informed insider trades are undesirable, mechanisms that can prevent informed insider trades with more precision and at a lower cost than insider trading regulation would be highly desirable.

Previous studies have documented that corporate insiders earn significant abnormal returns on their trades (Jaffe, 1974; Finnerty, 1976a, 1976b; Penman, 1982; Seyhun, 1986, and 1998; Rozeff and Zaman, 1988; Lin and Howe, 1990; Damodaran and Liu, 1993; Jeng et al., 1999; Jeng et al., 2003; Garfinkel et al., 2007; Huddart et al., 2007; Jagolinzer, 2009, Ravina and Sapienza, 2010, Anderson et al., 2011)[7]. Seyhun (1986) finds that even uninformed outsiders were able to earn abnormal returns by imitating trades conducted by insiders. According to the semi-strong form of the efficient market hypothesis, these results imply that nonpublic information is incorporated into some insider trades, since the efficient market theories indicate that trades conducted by insiders should, on average, yield zero abnormal return if they are not based on nonpublic information.

The evidence about the incorporation of nonpublic information in insider trades is not limited to the abnormal returns earned by insiders. Several studies suggest that trades by insiders have significant predicting power for various corporate events such as merger and acquisition

[7] Estimates of insider's abnormal returns in these studies range from 3 percent to 30 percent for holding periods from eight months to three years.

activity (Meulbroek, 1992; Seyhun, 1990), bankruptcy (Seyhun and Bradley, 1997), accounting frauds (Summers and Sweeney, 1998), accounting standard changes (Larcker et al., 1983; Odaiyappa and Nainar, 1992), dividend initiations (John and Lang, 1991), seasoned equity offerings (Karpoff and Lee, 1991), share repurchase activities (Lee et al., 1992) and future stock returns (Meulbroek, 1992; Lakonishok and Lee, 2001).

Other studies document evidence on insiders' market timing, strategic trading, and information manipulation (Penman 1982; Elliot et al., 1984; Seyhun, 1988; Noe, 1999; Lakonishok and Lee, 2001; Jenter, 2005; Cheng and Lo, 2006; Geczy and Yan, 2006; Billings, 2007; and Jagolinzer, 2009). In general, these studies show that corporate insiders not only time their trades around an important corporate event, but also manipulate corporate events in order to make a profit on their trading. For instance, Elliot et al. (1984) find that insiders increase purchases and decrease sales in the 12-month period before an extreme earnings hike.[8] Seyhun (1986) shows that insiders purchase stock of their own firm before abnormal stock price increases and sell before abnormal stock price declines. Seyhun (1986) also finds that not only are insiders well informed about the value of their information, but their trade volume is proportional to the perceived value of their information. For instance, CEOs earn higher abnormal returns than other insider traders in a firm. Similarly, Noe (1999) shows that managers sell more shares after good news is released than they do after bad news is released, while they buy more shares after bad news than they do after good news. Huddart et al. (2003) find that insiders sell more stock in the year before a firm experiences a shock in consecutive quarterly earnings increase. Cheng and Lo (2006) find that managers increase the number of bad news forecasts in advance of their purchase activities and that such an increase is more pronounced when CEOs trade. Cheng and Lo (2006) also suggest that managers' market

[8] They find little evidence, however, about increased sales in advance of extreme earnings decrease.

timing is more successful for buy trades than for sell trades and attribute that to a higher probability of litigation risk for sell trades. Geczy and Yan (2006) find that market makers affiliated with the brokers who are used by insiders post more aggressive ask quotes compared with their peers when insiders trade. Billings (2007) finds that insiders selling shares in advance of significant price declines delays the release of poor earning news. Marin and Oliver (2008) show that insiders' stock sales peak several months before a large drop in stock price and insiders' purchases peak in the month before a large jump in stock price. Also, Ravina and Sapienza (2010) find that independent directors and executives exhibit excellent timing skills which are not arbitrary.

Another factor that decreases the effectiveness of regulation against informed insider trading is the existence of regulatory exceptions. These exceptions allow insiders to profit from their nonpublic information without violating the law. As a good example, Rule 10b5-1, which protects insiders' pre-planned trades from litigation, seems to enable insiders to do strategic trading (Jagolinzer, 2009). Jagolinzer (2009) finds that participating insiders' sales systematically follow positive and precede negative firm performance. He also finds that such trades generate abnormal forward-looking returns larger than those earned by nonparticipating insiders. Rule 10b5-1 created a possible loophole for insiders by letting them cancel planned trades so they could avoid loss based on their nonpublic information without violating insider trading regulations (Fried, 2003; Jagolinzer, 2009). Likewise, Yermack (2009) studies large charitable stock gifts by chairmen and CEOs of public companies and finds that these gifts, which are not subject to insider trading regulation (because they do not constitute sales of securities), often occur before sharp declines in their firms' stock prices. Yermack (2009) finds that such timing effect is more significant when executives donate shares to their own family foundations. He also suggests that some CEOs fraudulently backdate stock gifts to increase their personal income benefits and that CEOs' family

foundations hold donated stocks for long periods instead of diversifying their portfolio so that CEOs can continue to enjoy their voting power.

Inefficient enforcement is another reason for the ongoing abuse of nonpublic information in insider trades (Fernandes and Ferreira, 2009). Durnev and Nain (2007) show the importance of enforcement efficiency by finding that the amount of private information trading decreases after the first enforcement of insider trading laws, rather than after the introduction of the law. Likewise, in a cross-country study, Bhattacharya and Daouk (2009) suggest that it is not the introduction of insider trading laws that changes the cost of equity in a country, but the first prosecution that significantly reduces the cost of equity. They suggest that the regulation is especially ineffective in mitigating gray trades, which are difficult to be judged legal or illegal.

Given the shortcomings of the existing regulation and enforcement mechanisms in preventing informed insider trading, many companies have increasingly adopted internal insider trading policies, known as compliance policies. Seyhun (1992) documents that as of November 1990, about 25 percent of companies explicitly had cautioned their employees against insider trading. Bettis et al. (2000) documented that by late 1996, 92 percent of firms they studied had adopted some type of insider trading policy. Such policies, which are mainly intended to protect a company against liabilities posed by its employees' insider trading, can be in the form of a general ban on trading or tipping on material nonpublic information, allowed trading windows, blackout periods,[9] or pre-clearance requirements. Also, in some firms, compliance policies prohibit their

[9] Indeed, blackout periods ban trading by a group of insiders during a window that is otherwise open. A compliance officer, who supervises the compliance with internal insider trading rules, may announce a blackout period if there is nonpublic information about the firm that might affect share price. In addition, the blackout period may be announced before filing forms such as an 8-K, an amended annual report 10-K, or an amended 10-Q. Also, in some firms, insiders go through a pre-clearance procedure by the compliance department before they conduct a trade. Thus, the compliance officer determines whether the employee who plans to trade is aware of any material nonpublic information.

insiders from engaging in some activities such as short sales[10], trading derivatives, purchasing covered securities on margin,[11] engaging in zero-cost collars or forward sale contracts, which allow the employee to continue to own the covered security without the full risk and reward of ownership. Some companies also require that any equity security purchased in the open market must be held for a minimum amount of time (for example six months).

But, the effectiveness of compliance policies in deterring informed insider trading is not clear. Although Bettis et al. (2000) find that internal compliance policies reduce the rate and abnormal return of insider trades, they suggest that insider trading still occurs during blackout periods and the trades still earn abnormal returns, although they are lower than the abnormal return earned by trades made during allowed trading windows. Bettis et al. (2000) attribute the occurrence of trades in blackout periods to partial ineffectiveness of internal regulation at the company level or considerable permissions granted to insiders to trade during blackout periods. Overall, they suggest that internal corporate policies provide benefits to shareholders beyond what is provided by the external regulation[12]. This observation supports the role of internal governance mechanisms in reducing the use of nonpublic information in insider trades and supports the hypothesis laid out in this study as well as the obtained results.

Despite the potential for compliance policies to limit the abuse of nonpublic information, another view argues that compliance policies merely provide legal protection for the firm and the firm's insiders without having any significant effect on insider trading. Under this view, these internal regulations make it more difficult for the SEC to prove insiders' reckless activities (Steinberg and Fletcher, 1994; Horowitz and Bitar, 1998). The view indicates that the trading

[10] Section 16(c) of the Exchange Act also prohibits directors and officers from engaging in short sales.
[11] This refers to purchasing a company's securities by borrowing money from stockbrokers to fund the purchase.
[12] They also indicate that the reduction of incidence and abnormal return are more pronounced for insider sales than purchases.

policies appear to be a public relations contrivance, rather than an effective tool in reducing informed trading by corporate insiders.

The high cost of informed insider trading, along with the indication that current regulation is not fully effective suggests a need for other solutions to the problem of informed insider trading. The literature indicates, implicitly and explicitly, that internal corporate governance mechanisms can affect the abuse of nonpublic information in insider trades. Mainly, internal corporate governance mechanisms can reduce the opportunities for abuse of nonpublic information by reducing the information asymmetry between insiders and the markets, by empowering regulation and enforcement in detecting information-driven trades, and by punishing insiders. Internal corporate governance mechanisms can operate in parallel with external governance mechanisms in reducing the interest gap between insiders and outsiders.

To investigate the role of internal governance mechanisms in reducing the abuse of nonpublic information by insiders, this study analyzes the role of the board of directors in monitoring firms' highest-ranking executives, CEOs. Studying the impact of board monitoring on the trading behavior of firms' CEOs provides a clearer picture of the role boards play as the firm's most important internal governance mechanism. The focus on CEOs is important since the CEO is the most informed individual in a firm who is not normally monitored by other managers. Furthermore, due to CEOs' power inside the firm, it is not generally expected that compliance policies have a significant impact on their trading behavior. For lower managerial levels, insider trades are monitored and checked by compliance officers and possibly by senior managers.

It is worth noting that the focus on the board of directors does not negate the possibility that other internal governance mechanisms can be effective in reducing the abuse of nonpublic

information by corporate insiders. A potential extension to this study would be to look at the role of other internal governance mechanisms in preventing informed insider trading.

2.5. Corporate Governance: Internal and External Mechanisms

Corporate governance has been defined in various ways. For example, Shleifer and Vishny (1997) suggest that corporate governance is a framework in which suppliers of capital to corporations are assured about their investments. Gillan and Starks (1998) suggest that corporate governance is a system of laws, rules and factors that control a company's operation. Zingales (1998) defines corporate governance as a complex set of constraints that shape the ex-post bargaining over the quasi-rents generated by a firm.

In general, the mechanisms that are in place to reduce the gap between the interests of a firm's principals and those of the firm's agents are called corporate governance mechanisms. Corporate governance mechanisms are usually categorized into two main groups: internal and external. Internal corporate governance mechanisms include, but are not limited to, the board of directors (including its role, structure, and incentives), managerial incentives, capital structure, bylaw/charter provisions, and internal control systems. External governance mechanisms include, but are not limited to, laws and regulations, capital markets, markets for corporate control, labor markets, product markets, capital market analysts, markets for accounting, financial and legal services, and private sources of external oversight.

It is conceivable that internal and external governance mechanisms can substitute for or complement each other, since both have the same goal: to reduce the gap between the interests of insiders and outsiders. The literature has documented the general relationship between internal and

external governance mechanisms. For example, Brickley and James (1987) suggest that the market for takeovers and boards of directors are substitute mechanisms in controlling managerial behavior. Hirshleifer and Thakor (1994) refer to the interplay between the internal mechanisms for corporate control (such as board actions) and the external mechanisms for corporate control (such as acquirers' actions) and suggest that internal and external monitoring can be either substitutes or complements.

As an agency problem, insider trading is also affected by internal and external corporate governance mechanisms. Both internal and external governance mechanisms affect factors that influence insiders' decisions in conducting trades. Information asymmetry between a firm's insiders and outsiders is one of these factors[13]. The literature suggests that stronger internal corporate governance decreases the information asymmetry between principals and agents (Wruck, 1989; Hertzel and Smith, 1993; Hertzel et al., 2002). It is also documented that higher financial statement quality, in terms of communicating information with outsiders and more precise analyst investigations reduces the association between insider trades and their subsequent stock returns (Frankel and Li, 2004). It is also suggested that annual earnings announcements convey more information in countries with better enforced insider trading laws and those countries with strong investor protection institutions (DeFond et al., 2007).

[13] Previous studies show that information asymmetry is the leading factor in abnormal return on informed insider trades (Rogers and Stocken 2005; Huddart et al. 2007) and is the main driver for insiders to take advantage of their nonpublic information. Information asymmetry peaks around corporate events and earning announcements, mergers, and acquisitions (Kim and Verrecchia 1994; Skinner 1991; and Lee et al. 1992). The price-taking model of Grossman and Stiglitz (1976) and the imperfect competition model of Kyle (1985) also predict a positive association between information asymmetry and abnormal returns of insider trades. These models also indicate that in firms with weak corporate governance, which generally show significant information asymmetry between insiders and outsiders, trades conducted by insiders are linked to abnormal returns.

Stronger corporate governance also boosts the effectiveness of existing insider trading regulation through more effective monitoring and enforcement. Durnev and Nain (2007) suggest that insider trading regulation is less effective in reducing private information trading when corporate governance is weaker.

In addition to adjusting the level of information asymmetry, internal corporate governance mechanisms influence insiders' decisions on using nonpublic information by increasing the probability they will be detected and punished. Indeed, stronger governance reduces the expected payoff of informed insider trading. As the costs of insider trading become sufficiently high and exceed the expected payoff from trading, insiders abstain from trading (Piotroski and Roulstone 2007).

The following section reviews the impact of the board of directors has as an internal governance mechanism. The impact is traced to various board characteristics that affect board supervisory role and an insider's decision to trade on insider information.

2.6. Board of Directors

The board of directors is arguably the most important internal governance mechanism. It has also become the center of debate concerning governance and the focus of academic research as a result of corporate scandals in the past two decades. In his presidential address to the American Finance Association in 1993, financial economist Michael Jensen stated "The board of directors, at the apex of internal control systems, is charged with advising and monitoring management and has the responsibility to hire, fire, and compensate the senior management team". Similarly, in a comprehensive survey study on corporate governance, Gillan (2006) states that "…many view the

board of directors as the lynchpin of corporate governance". Boone et al. (2007) state that the board of directors is at the center of attempts to improve corporate governance by firms' shareholder advocates.

From a legal point of view, the board of directors has two key fiduciary duties. The first, which is known as the "duty of care," typically requires that directors act with the same care as a "reasonably prudent man" would exercise under similar circumstances (although the standard of conduct and liability vary somewhat from state to state). The second, known as the "duty of loyalty," requires that directors not engage in activities contrary to the best interests of the corporation. Among other things, the duty of loyalty requires procedural safeguards and standards of fairness in cases of a conflict of interest between the director and the organization.

This study focuses on the boards' duties of care and loyalty in overseeing the business and affairs of the corporation-specially, by limiting the abuse of nonpublic information by CEOs. Moreover, the effectiveness of the board of directors is examined as an alternative to regulations. As mentioned before, there are several important reasons to focus on the board of directors among other internal corporate governance mechanisms. First, the board of directors is frequently referred to as the most important internal corporate governance mechanism. Because of its high position in a firm, the board is less likely than other internal governance mechanisms to be manipulated by insiders. The effectiveness of a board in limiting the abuse of nonpublic information, however, depends on several characteristics of the board as well as the balance of power between the board and the firm's management, particularly the CEO. There are models that link board characteristics to boards' monitoring functions. Such models have proved to be robust and widely consistent with subsequent empirical results (Adams et al., 2010). Moreover, the board's impact on insider trading runs through the same channels, which carry the impact of regulation. This parallel functioning

allows a comparison between the effectiveness of the regulation and that of internal governance mechanisms. For example, both the regulation and the board of directors are supposed to decrease information asymmetry between a firm's insiders and outsiders and consequently reduce the expected benefits of informed insider trading for insiders. It is suggested in the literature that the board of directors reduces information asymmetry between a firm's managers and owners (or between insiders and outsiders) and this effect is more pronounced at the presence of independent directors (Wruck, 1989, Hertzel and Smith, 1993, Hertzel et al, 2002). The monitoring capabilities of board of directors have been theoretically shown in several studies (e.g. Williamson, 1975; Calvo and Wellisz, 1979; Holmstrom, 1982; Kofman and Lawarree, 1993; and Tirole, 1986, 1992). In addition, there are many empirical studies that document the monitoring role of board of directors (Fama, 1980; Fama and Jensen, 1983; Gilson, 1989; Srinivasan, 2005; Shivdasani and Yermack, 1999).

Compared with external (that is, laws and regulations) and internal governance mechanisms, the board's impact on limiting informed insider trading is expected to be significant for several reasons. First, board monitoring is conducted and enforced by directors who are well informed about their firm and information flow inside the firm (Ravina and Sapienza, 2010). Board members are in a position to obtain information about almost any issue much more easily than anybody else could. Second, directors could gain personal benefits from preventing information-driven trades and consequently are expected to be proactive in preventing or detecting informed insider trading. The directors' payoff from outside the firm shapes their motivations as well. In particular, independent directors' external payoffs outweigh their payoff from inside the firm and hence provide a motivation for them to prevent wrongdoings by managers (Fama, 1980; Fama and Jensen, 1983; Gilson, 1989; Srinivasan, 2005; Shivdasani and Yermack, 1999). Fich and Shivdasani

(2007) show that directors who serve in firms that are subject to class-action lawsuits experience a drop in other seats they hold. They also find that the drop in gaining extra board seats grows with the severity of fraud allegations and with the responsibility of a director in monitoring fraud (for example directors who serve on audit committees). Directors have been also held liable for fraud occurred in their firms (Adams et al., 2010). Conversely, supervisory agencies, such as the SEC, may be reactive, rather than proactive, in their monitoring activities so that their staff may conduct in-depth oversight only when triggered by a suspected violation. Third, while the effectiveness of the regulation is greatly dependent upon its enforcement, internal corporate governance mechanisms are not dependent on other enforcement mechanisms. Also, boards are not constrained by legal procedures and red tape to the extent that regulatory agencies, such as the SEC, are in their monitoring activities (Steinberg and Fletcher, 1996; Horowitz and Bitar, 1998). Boards have such levers as compensation and hire/fire decisions to discipline CEOs. Such disciplining power spills over from top to bottom of the managerial hierarchy. Fourth, boards can eliminate opportunities for informed insider trading by reducing the information asymmetry between insiders and the market. The reduction of information asymmetry is usually achieved through prompt and accurate information releases to the markets.

The following section discusses some of the board characteristics that have been linked to board monitoring abilities.

2.6.1. Board Independence

Generally, directors are categorized into two groups: inside and outside directors (Adams et al., 2010). Inside directors are directors who are full-time employees of the firm, while outside

directors are those whose primary employment is not with the firm. Among outside directors, those with some business relationship with the firm are known as affiliated or gray directors, while those with no material connection to the firm (other than a board seat) are known as independent directors (See Appendix G for details provided by Thomson Reuters).

Another categorization divides the directors into two groups: dependent and independent. Although there is no consensus among scholars about the definition of director independence, an independent director is generally defined as someone who has never worked at the company or any of its subsidiaries or consultants, is not related to any of the key employees, and has not worked for a major supplier or customer of the firm. Independent directors are the focus of this study as they are postulated in the literature to be the group that is most highly motivated to monitor the CEO.

The presence of independent directors is commonly associated with higher efficiency of the board in fulfilling its monitoring function[14] (Dunn, 1987; Rosenstein and Wyatt, 1990), even though the impact of independence on firm performance is mixed. Not only do independent directors bring diversified sets of experience and expertise to a firm, they are more highly motivated than inside directors in monitoring the management. That motivation is thought to stem from the independent directors' balance of internal and external payoffs. The literature suggests that the weight of directors' external benefits, such as reputation, is much higher than their benefits from inside the firm (Fama, 1980; Fama and Jensen, 1983; Gilson, 1989; and Srinivasan, 2005)[15]. Fama (1980) suggests that reputation, as an external payoff for independent directors, is an important incentive for directors to act in their principal's interests. Hermalin and Weisbach (1998), suggest that more

[14] Another main function of directors is advising the management, particularly the CEO.

[15] For instance, Srinivasan (2005) suggests that the occurrence of accounting restatements increases the likelihood of losing seat by independent board members both in restating firm and other firms they may serve as a director.

independent boards provide higher levels of monitoring and that they can afford to be tougher with marginally performing incumbent CEOs. Shivdasani and Yermack (1999) suggest that more independent boards are more likely to monitor management aggressively and remove poorly performing CEOs. In the same vein, Weisbach (1988) suggests that CEO turnover is more sensitive to firm performance in firms whose boards are dominated by outside directors than other firms. Also, Raheja (2005) and Harris and Raviv (2008) developed theoretical models that suggest that optimal boards employ larger numbers of outside directors. Boone et al. (2007) find that the proportion of outsiders on the board will be negatively related to the CEO's influence and positively related to constraints on the CEO's influence. Other studies find that independent boards are instrumental in reducing information asymmetry by having management comply with accounting rules and produce more accurate financial statements (Dechow et al., 1996; Anderson et al., 2003, Farber, 2004; and Sengupta, 2004).

One question that may arise about the effectiveness of independent directors in mitigating informed insider trading is whether independent directors have access to sufficient information about the firm to monitor insider trading behavior. Ravina and Sapienza (2010) find that independent directors are well informed about their associated firms and are thus able to monitor insiders effectively. As an indication of the adequacy of information independent directors have, Ravina and Sapienza (2010) show that independent directors earn substantial abnormal returns when they trade their own company's stock, an indicator of access to nonpublic information. The abnormal returns earned by independent directors are comparable to those earned by the firm's executives. This suggests that the gap between the information set of independent directors and that of managers narrows as corporate governance quality improves within a firm.

The importance of board independence has resulted in regulatory pressure to have more independent directors on boards. The NYSE and the NASDAQ require a majority of independent directors on the boards of listed firms. Furthermore, they require that the audit, compensation, and nominating committees be comprised only of independent directors. SOX also contains several requirements that have increased the demand and workload for independent directors.

Given the above, it is expected that there is a negative association between board independence, as measured by the proportion of independent directors to board size, and the abuse of nonpublic information by insiders, specifically CEOs, who are directly monitored by boards of directors. The association is caused by the impact independent directors have on information asymmetry between a firm's insiders and outsiders, and more effective monitoring of insider trades, which leads to higher expected cost of the abuse of nonpublic information by a firm's insiders. The spread of the abuse of nonpublic information can be measured by the abnormal return earned on insider trades and the frequency (or intensity) of such trades.

2.6.2. CEO/Chairman Duality

The separation of the CEO and chairman of the board positions (duality) is another factor that can impact the monitoring ability of a board. It has been suggested that the separation of these positions provides a checking mechanism on CEOs' activities[16]. Fama and Jensen (1983) suggest that agency cost is reduced by the separation of decision management from decision control. In his presidential address to American Finance Association, financial economist Michael Jensen encouraged separating the two titles to strengthen the board's monitoring role. In a theoretical

[16] The results on the impact of duality on firm performance are mixed (Brickley et. al, 1997)

setting, Adams et al. (2010) show that CEOs who also hold board chairmanships have more influence over corporate decision making and may reduce the board's monitoring power.

The empirical evidence also confirms the perceived impact of the duality of the CEO and the chairman of the board (COB). Hermalin and Weisbach (1991, 1998) suggest that the duality may be a sign of entrenchment against mechanisms that hinder the CEO from forbidden private benefits. Goyal and Park (2002) suggest that the sensitivity of CEO turnover to performance is lower when titles are combined. Anderson et al. (2003) find that earning announcements are more informative in firms where the board is more independent and in firms where the CEO and chairman positions are not held by the same person.

Given the impact of duality on the effectiveness of the board's monitoring role, this study hypothesizes that separating the CEO and COB positions will reduce the incidence of insider trading and abnormal returns by firms' CEOs.

2.6.3. Multiple Directorships

Although independent directors are suggested to be more effective monitors of firms' CEOs, not all independent directors have the same effectiveness. One factor that affects independent directors' monitoring ability is the amount of time and energy a director allocates to the monitoring functions. The issue is particularly critical in the case of independent directors, since they shoulder a bigger portion of the board's monitoring function. Multiple directorships, measured as the number of directorships held by a single director, is a control variable for independent directors in this study.

The number of directorships held by a single director can be considered as a proxy for the amount of time and energy a director allocates to the firm. There are conflicting views about the

impact a director holding multiple directorships has on the monitoring efficiency of the board directors. The "busy director hypothesis" suggests that directors with too many directorships are associated with weaker corporate governance. The theory also suggests that too many directorships could lower the monitoring effectiveness of outside directors (Core et al., 1999; Shivdasani and Yermack, 1999). These studies do not, however, define how many directorships is too many. Beasley (1996) suggests that the probability of accounting fraud in a firm is positively associated with the average number of directorships held by outside directors. Shivdasani and Yermack (1999) suggest that busy directors are more likely to be appointed to the board when the CEO has more influence on the nominating process. Fich and Shivdasani (2006) find that CEO turnover is less sensitive to firm performance in firms with busy directors. Adams and Ferreira (2008) find that busier directors are more likely to have attendance problems at board meetings. In the same vein, Adams et al. (2010) theoretically show that less busy directors devote more time to a board than their busier counterparts. Overall, the preponderance of evidence indicates that busy directors weaken corporate governance.

Nevertheless, one study finds the converse. Ferris et al. (2003) suggest that busy directors are as effective as less busy directors at their monitoring functions. They find no evidence that directors with multiple directorships shirk their responsibilities or that their presence on a board is associated with a greater likelihood of securities fraud litigation. Ferris et al. (2003) find that directors on multiple boards serve on more committees and attend more committee meetings. They suggests that the number of directorships is associated with the quality of previous board service, as measured by a firm's financial performance (this view is called "reputation hypothesis") and therefore directors with multiple directorships are not necessarily less effective than their peers with fewer number of directorships.

Based on the "busy director hypothesis," it is expected that independent directors with multiple directorships are associated with higher abnormal return and higher rates of CEOs' informed trades. In contrast, based on the "reputation hypothesis," it is expected that multiple directorship is associated with lower levels of abnormal return and lower rates of CEO trades.

2.6.4. Director Ownership

Equity ownership is another factor that can influence the effectiveness of directors in achieving their duties. As suggested by Ravina and Sapienza (2010) independent directors also earn abnormal returns on their trades. Therefore, this study investigates equity ownership by independent directors to see if such ownership has an impact on the effectiveness of CEO monitoring by independent directors.

Higher equity ownership by independent directors can align their interests with those of shareholders and empower them toward more effective monitoring of CEOs. As such, it is expected that higher ownership level by independent directors is associated with lower levels of the abuse of nonpublic information by CEOs in the form of informed insider trading. On the other hand, higher ownership by independent directors could encourage them to pursue profit-seeking trading based on their nonpublic information (Ravina and Sapienza, 2010). If independent directors conduct insider trading based on nonpublic information, they may not be effective monitors of CEOs. Therefore, this study investigates stock ownership by independent directors as an influential factor on the monitoring effectiveness of independent directors.

Given the results of previous studies that confirm the role of boards in reducing agency costs through lower information asymmetry and higher monitoring and enforcement abilities, it is expected that abnormal return and rate of informed insider trades by CEOs decrease with stronger

internal corporate governance. Stronger corporate governance is defined here as higher proportions of independent directors and the separation of the CEO and the COB positions. The first hypothesis is:

H1: Stronger board monitoring, measured by higher board independence and the separation of the CEO and the COB positions, is associated with lower abnormal return and incidence (rate) of insider trades.

Also, the impact of multiple directorship, measured as the average number of directorships held by independent directors, and stock ownership, measured as the total stock ownership by independent directors on a board, is investigated.

2.7. The Impact of SOX

Another contribution of this study is investigating the impact of SOX on informed insider trading as well as the potential role of the internal corporate governance mechanisms, which are studied here. SOX is part of regulations, which are commonly categorized as external governance mechanisms (Gillan, 2006). In general, SOX has several objectives. These objectives include (1) strengthening the independence of auditing firms, (2) improving the quality and transparency of financial statements and corporate disclosure, (3) enhancing corporate governance, (4) improving the objectivity of research, and (5) strengthening the enforcement of the federal securities laws[17]. These objectives affect the expected costs and benefits of conducting informed insider trading by firms' insiders directly or indirectly.

[17] The Practitioner's Guide to the Sarbanes-Oxley Act, Volume1, American Bar Association, 2004.

As mentioned before, SOX triggered some requirements by the SEC regarding insider trades. Since SOX, insiders are required to report their trades within two business days of the trading day rather than by the 10th day of the month following the trading month. SOX reduced the information asymmetry between insiders and outsiders of firms by reducing the reporting time. Consequently, profitable opportunities that would arise due to information asymmetry are reduced due to the new reporting requirements. Moreover, SOX increased the penalties for the violators of the insider trading regulations. The increased penalties give rise to higher expected costs of abuse of nonpublic information by firm insiders. The higher expected costs of informed insider trades are expected to result in lower expected profit of such trades and consequently, lower incidences (rates) of informed trades.

Moreover, considering the impact of SOX on information asymmetry and expected costs of violation of insider trading laws, it is expected that the impact of internal governance mechanisms in reducing information asymmetry and increasing the expected cost of informed insider trades for insiders is less pronounced after SOX than it is before SOX. Some of the deficiencies of laws and regulations that would be compensated by stronger internal governance mechanisms (substitute effect), are eliminated by SOX. The potential complementary impact of SOX remains. In terms of the interaction of SOX with previous regulation, it can be said that weaker boards with less monitoring could find that SOX is a substitute while stronger boards will find SOX a complement to their efforts. The second hypothesis is as follows:

H2: SOX reduced the abnormal return and rate of insider trades. Also, the impact of stronger board monitoring on insider trades is less pronounced in the post-SOX era than in the pre-SOX era.

3. Data

3.1. Insider Trading Report System

Currently, ownership and trades by directors, officers and beneficiary owners with at least 10 percent ownership are required to be reported to the SEC through Forms 3, 4, 5, or 144. Form 3 is an initial statement of beneficial ownership for all officers, directors, and holders of 10 percent or more of an issuer's public equity and is filed when the issuer is registering its equity securities for the first time or, if later, when the person first becomes a officer, director, or holder of 10 percent or more of an issuer's public equity. Form 4, which typically is the most important form to report insider trading, reports changes in an insider's ownership position, whether such change is a purchase, sale, option grant, option exercise, gift, or any other transaction. Form 4 is comprised of two tables: the first is for reporting conventional stock or non-derivative transaction information and the second is for reporting transactions such as options, warrants, and convertible securities. Form 5 documents exempt transactions, which include, among other things, small transactions or small transfers within company plans that are not required to be reported on Form 4. Finally, Form 144 is reserved for declarations of intention to sell restricted[18] and control[19] securities. Report of the sale of restricted or controlled shares by insiders, however, is required only when the sale involves more than 5,000 shares or aggregate dollar value of $50,000 in any three-month period. Also, the proposed sale should take place within three months after filing Form144 or another notice must be filed.

This study uses the data from Form 4. Data from other forms are excluded from the sample. Specifically, Form 3 only reports the initial ownership of an insider and does not include any

[18] Restricted securities are those shares that are acquired through an unregistered private sale from an issuer or its affiliates.
[19] Control securities are securities that are held by firm affiliates who have the power to direct the management and influence company policies. See Securities and Exchange Commission at www.sec.gov/investor/pubs/rule144.htm.

information about the use of nonpublic information by firm insiders. Likewise, Form 5 only includes trades that are exempt from reporting on Form 4. Form 144 does not report any actual transactions by firms' CEOs, rather it declares an intention to conduct transactions by an insider. The announced transaction may not take place. If any share is traded following the filing of Form144, however, the trade must be reported through Form 4. Therefore, Form 4 provides sufficient data for this study.

3.2. Sample Data

Data for CEO insider trades are from Thomson Reuters Insider Trading database. In addition to direct trades by CEOs, trades conducted by the CEOs' relatives as well as transactions originating from indirect ownership by CEOs are also included in the sample. The time period for the study is 1996 to 2008. This period is selected due to the availability of data and because it allows the investigation of the impact of SOX.

The sample excludes the records that are not reliable. Since records reported to the SEC by firm insiders may contain errors, Thomson Reuters validates all reported data by cross-checking them with other data sources and eventually assigns each record a cleansing indicator (see Appendix A). The cleansing record indicates the level of reliability of each record. Using the cleansing record, transactions with low levels of reliability (that is cleansing records S and A in Appendix A), are excluded from the sample.

As presented in Appendix B, there are initially 1,138,387 individual reported trades by firm CEOs in the Thomson Reuters Insiders database for the time period. In the first step, 27,759 records, whose validity could not be verified by Thomson Reuters, are excluded. Appendix C shows an annual breakdown of records with various cleansing codes to show how the accuracy of data

increased throughout the sample time period. In the second step, 73,425 records that are reported on forms other than Form 4, are excluded. Furthermore, 455,876 records of non-open-market trades are excluded since the focus of this study is on open-market trades. The final sample contains 581,327 records.

Unlike several previous studies that focused on purchase trades (for example Garfinkel et al., 2007), both purchase and sell trades are retained in the sample. Studies that ignore sell trades argue that sell trades are less likely to be based on nonpublic information since they take place for such reasons as liquidity and wealth diversification (Kim and Verrecchia, 1994, Baiman and Verrecchia, 1996) and are exposed to higher litigation risk levels (Cheng and, Lo, 2006). Although sell trades are more likely than buy trades to happen for other reasons, such as need for liquidity or wealth diversification (Lakonishok and Lee, 2001, Huddart and Ke, 2007), sell trades can still be based on nonpublic information. The fact that insider sell trades often take place for purposes such as providing liquidity or wealth diversification makes sell trades desired vehicles to hide the abuse of nonpublic information. Moreover, even sell trades, which occur for liquidity or diversification purposes, may benefit from some nonpublic information to earn higher returns for trading insider.

As presented in Table 1 (tables and figures are presented in Appendix H), among the final sample of 581,327 open-market transactions conducted by firm CEOs and reported on Form4 form the beginning of 1996 to the end of 2008, 482,433 records are sell transactions (82.99 percent of all open-market trades) and 98,894 records are buy transactions (17.01 percent of all open-market trades). The transactions are filed from 11,183 distinct firms during the sample period. Buy transactions are from 8,219 distinct firms and sell transactions are from 7,063 distinct firms.

Figure 1 shows the trend of annual trade frequency from 1996 to 2008 for buy (acquisition) and sell (disposition) trades[20]. The figure indicates that although the number of trades has been rising during all years except 2008, most of the growth can be attributed to sell transactions. The larger number of sell trades compared with that of buys reflects the increasing portion of equity and derivative awards in CEOs' compensation packages.

Table 2 presents the distribution of the number of transacted shares and transaction value of the trades (value is defined as the number of traded shares multiplied by their price). As can be observed in this table, the buy transactions volumes are generally larger than those of sell transactions. The figures also indicate that the number of shares in a typical sell trade is fewer than that of a buy trade. Also, the figures indicate that sell transactions are conducted more frequently, yet in smaller volumes, than buy transactions.

The breakdown of trades by year and industry is provided to check whether the insider trades are time or industry specific. Table 3 does not indicate that any year or industry dominates the data. Furthermore, in order to obtain more assurance that the results are not driven by observations from any specific year or industry, clustering in year and industry dimensions is performed in the models as a robustness test. As an extra robustness measure, the records with unclassified industry are excluded from the sample data where clustering is performed on industry variables.

Data on board characteristics are from the RiskMetrics Directors database. The RiskMetrics Directors dataset covers a range of board characteristics and has been updated annually from

[20] Acquisition (A) code represents buy trades and Disposition (D) code represents sell trades.

1996[21]. Table 4 presents the summary statistics for the internal governance mechanisms, which are used in this study. The figures indicate that independent directors have a significant presence on the board of the firms in the sample. Also, the figures show that the directors in the sample typically have external directorships as well. Moreover, the figures on independent directors ownership indicates that stock ownership by independent directors is typically low.

It is necessary to have a clear vision of directors' affiliation with a firm as the emphasis of this study is on the role of independent directors. Based on their affiliation with their associated firm, directors are categorized into three groups in the RiskMetrics database: independent, linked, and employee. Independent members are defined as those who have no significant connection with the firm. Linked or affiliated directors are those who provide professional services to the company or its major customers and include former employees, recipients of charitable funds, interlocks, and family members of a director or executive[22]. Finally, employee directors are those who are currently employed by the company. Appendix E provides the detailed definition for each class of directors.. Appendix F provides the breakdown of the number of directors in each category in each year. The figure shows that the proportion of independent directors has significantly increased during recent years.

As suggested by asset pricing models, some of firm characteristics such as size and book-to-market ratio affect stock returns as well (e.g. Chan, Hamao, and Lakonishok, 1991 and Fama and French, 1992). The same characteristics are also suggested to be influential on trading behavior of firms' insiders. For instance, it is suggested that larger and faster growing firms (lower Book/Market

[21] The current universe of data is S&P 1500 companies. In earlier years, however, data were also collected for a few hundred additional large-cap companies. Reported fields included name, age, tenure, gender, committee membership, independence classification, primary employer and title, number of other public company boards serving on, shares owned, former employer, charity affiliation, designated director status, business transaction status, relative of an executive office status, and interlocking directorship.

[22] From RiskMetrics Directors database in Wharton Research Data Services.

ratios) tend to have more equity-based compensation (Demsetz and Lehn, 1985; Rozeff and Zaman, 1988) and consequently, the insiders in those types of firms trade more frequently. Another factor that can impact both abnormal return and the intensity of trading by insiders is the liquidity of a firm's stocks. More liquid stocks are usually associated with lower levels of information asymmetry between a firm's insiders and outsiders. Liquidity of stocks has frequently been used as a measure for existing information asymmetry between owners and managers, or outsiders and insiders in case of this study. The data for firm financial characteristics are from Compustat and their summary statistics are presented in Table 5[23].

4. Methodology and Results

4.1. Abnormal Return of Insider Trades

Since abnormal return following each trade is suggested to be a proxy for the magnitude of the incorporated nonpublic information in the trade (Rogoff, 1964, Jaffe, 1974 and Jagolinzer, 2009), the abnormal returns are calculated for each of the CEOs' insider trades in the sample to estimate the level of incorporated nonpublic information in each trade.

The abnormal return calculation is done separately for buy and sell portfolios due to opposite signs[24] of abnormal return in each group and different characteristics of buy and sell trades (Kim and Verrecchia, 1994; Baiman and Verecchia, 1996; Cheng and, Lo, 2006) and the sign of abnormal return in each category. Previous studies suggest that sell trades are less likely to be based on nonpublic information and that such trades are usually conducted for other motivations such as

[23] The definitions of all the variables used throughout this study are in Appendix D.

[24] The abnormal return for sell trades is the negative abnormal return following an insider trade and represents the abnormal avoided loss by the insider trader.

need for liquidity and wealth diversification. It was shown that the abnormal returns are generally higher for buy insider trades than they are for sell insider trades (Garfinkel et al, 2007). Similarly, it has been documented that, that purchase trades are more informative than sell trades (Seyhun, 1988) and that the predicting power of purchase trades is higher than that of sell trades in forecasting market movements (Lakonishok and Lee, 2001).

To calculate the abnormal returns, an event study technique is used. The abnormal return is calculated by means of a Fama-French Four-Factor model[25] (Bharath et al., 2009). The event period is 90 days following a trade (Jagolinzer, 2009) and the estimation period is a window from 250 to 10 days before each trade. The 250-day estimation method is commonly used in similar event studies the literature[26]. The data for 10 days immediately preceding the transaction date are excluded to avoid the potential influence of information leak prior to each trade. The Fama-French Four-Factor model is as follows:

$$\widehat{\boldsymbol{R}}_{\boldsymbol{it}} = \boldsymbol{R}_{\boldsymbol{ft}} + \boldsymbol{\beta}_{\boldsymbol{1}}(\boldsymbol{R}_{\boldsymbol{mt}} - \boldsymbol{R}_{\boldsymbol{ft}}) + \boldsymbol{\beta}_{\boldsymbol{2}}.\boldsymbol{SMB} + \boldsymbol{\beta}_{\boldsymbol{3}}.\boldsymbol{HML} + \boldsymbol{\beta}_{\boldsymbol{4}}.\boldsymbol{UMD} + \boldsymbol{\alpha} \qquad \textbf{(3)}$$

Therefore, abnormal return is:

$$\boldsymbol{Abnormal\ Return}_{\boldsymbol{it}} = \boldsymbol{R}_{\boldsymbol{it}} - [\boldsymbol{R}_{\boldsymbol{ft}} + \widehat{\boldsymbol{\beta}}_{\boldsymbol{1}}(\boldsymbol{R}_{\boldsymbol{mt}} - \boldsymbol{R}_{\boldsymbol{ft}}) + \widehat{\boldsymbol{\beta}}_{\boldsymbol{2}}.\boldsymbol{SMB} + \widehat{\boldsymbol{\beta}}_{\boldsymbol{3}}.\boldsymbol{HML} + \boldsymbol{\beta}_{\boldsymbol{4}}.\boldsymbol{UMD}] \qquad \textbf{(4)}$$

Where R_{it} is the return of a trade on a day t, R_{ft} is the risk-free rate of return on a day t, and R_{mt} is the return of the whole stock market on a day t. In the model, SMB[27] (Small Minus Big) measures the historic excess returns of smaller companies over larger companies, HML (High Minus Low), measures the historic excess returns of value stocks over growth stocks and UMD

[25] The model is also known as Carhart's four-factor model.
[26] Other event period lengths are used for robustness test analyses.
[27] The factors data are from French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html).

(momentum factor) specifies the abnormal return, which can be explained by prior returns[28]. The daily abnormal returns are cumulated to obtain the 90-day Cumulative Abnormal Return (CAR).

A 90-day window (as in Jagolinzer, 2009) is regarded as a reasonable time window for the diffuse of nonpublic information into the market. It does not seem very likely that CEOs can delay or accelerate firm decisions for more than three months around a trade without the information leaking out. The selection of longer windows could increase the noise from other sources, such as other corporate events. In addition, only distinct trades per day are considered in the calculation of abnormal returns due to the possibility that trades executed in one day may had beeen reported individually or aggregately.

The Fama-French Four-Factor model is preferred to other methods, such as CAPM, net of market and market models, due to its higher ability in explaining returns. In contrast to other models, the Fama-French Four-Factor model controls for differences in size and book-to-market ratio among firms. As previous studies have suggested, a significant portion of abnormal returns calculated by other methods are driven by insiders' propensity to buy small and value stocks (Jeng et al., 2003).

Table 6 presents the summary statistics for cumulative abnormal returns on CEOs' buy and sell trades in the sample. The number and proportion of trades with favorable returns for trading insiders is also reported for each group of trades. Positive return is considered as the favorable return for the buy trades and negative return is considered as the favorable return for the sell trades. The results show that the CEOs' average abnormal return is 14.66 percent for buy trades 6.05 percent for sell trades in a 90-day post-trade window. The abnormal returns are statistically and

[28] UMD is calculated by six monthly portfolios which are formed by intersecting portfolios on size (two portfolios on market equity) and prior returns (three portfolios on prior returns). The monthly size breakpoints used are the median NYSE market equity figures and monthly prior return breakpoints are the monthly 30th and 70th NYSE percentiles.

economically significant. The results are consistent with the results of previous studies, which suggested that open-market buy trades are on average more profitable than open-market sell trades. The results also show that 61.57 percent of CEOs' buy trades are followed by positive abnormal returns and 59.18 percent of CEOs' sell trades are followed by negative abnormal returns during the event window. The results from other abnormal return calculation methods, such as market model and net-of-market model confirm that CEOs earn positive abnormal returns on their buy trades and avoid negative abnormal losses on their sell trades.

The results on sell trades are particularly interesting since many previous studies ignore sell trades under the impression that such trades are less likely to be information-driven. The results indicate, however, that nonpublic information is used by CEOs in sell trades, as well as in buy trades, despite the suggested higher likelihood of litigation for sell trades and other potential reasons for sell trades including need for liquidity and wealth diversification. In a recent study, Cohen et al. (2011) document significant abnormal returns for insider sell trades.

Table 7 shows the potential impact of firm size and the B/M ratio on the measured abnormal returns in a univariate setting, as it is suggested that the abnormal returns resulting from insider trades are associated with some firm characteristics (Seyhun, 1986, 1988; Lin and Howe, 1990). *Firm Size* is measured as the natural logarithm of a firm's total assets. *B/M ratio* is measured as the book value of equity to the market value of equity in a firm. The results, as presented in Table 7, suggest that CEOs in smaller firms earn higher abnormal returns on their trades than do their peers in larger firms. The results for the B/M ratio, however, is mixed: Buy trades yield higher abnormal returns in value firms (higher B/M ratios), while sell trades earn higher abnormal returns (avoid higher abnormal losses) in growth firms (lower B/M ratios).

4.1.1. Internal Corporate Governance and Abnormal Return of Insider Trades

This section investigates the impact internal governance mechanisms have on mitigating the use of nonpublic information in CEOs' trades. Following the literature, the abnormal return is considered as a proxy of the incorporated nonpublic information. Consequently, the impact of internal governance on the abnormal returns of CEOs' trades is considered as a proxy for the impact of internal governance mechanisms on the spread of the incorporation of nonpublic information in CEOs' trades. Internal governance mechanisms affect the potential abnormal return of insider trading, mainly by affecting the information asymmetry between a firm's insiders and outsiders, which is the source of abnormal profitability of informed trades. The stronger governance mechanisms also increase the probability that those who perform informed insider trades will be detected and punished. The following model is used to estimate the impact of internal governance mechanisms on the abnormal return of the CEOs' insider trades.

$$\boldsymbol{CAR_{i,t}} = \boldsymbol{\beta_0 + \beta_1\ Board\ Independence_{i,t} + \beta_2 Duality + \beta_3\ Multiple\ Directorship + \beta_4\ Directors\ Ownership + \beta_5 Firm\ Size_{i,t} + \beta_6 \frac{B}{M}\ Ratio_{i,t} + \beta_7 Liquidity_{i,} + \beta_8 SOX + \sum_{00}^{12} \beta_i\ Sector_i + \sum_{1997}^{2008} \beta_j Year_j + \varepsilon_{i,t}} \quad \textbf{(5)}$$

The dependent variable is the 90-days cumulative abnormal return (CAR) for each trade in a firm *i* at a date *t*. The independent variables are *Board Independence*, measured as the proportion of independent directors to the board size, *Duality*, a binary variable that is equal to one when the CEO is also COB. In addition, *Multiple Directorship*, which is the average number of outside board seats held by the independent directors, and *Directors Ownership*, which is the total percentage of shares owned by independent directors, are included to control for differences among independent directors.

The control variables are *Firm Size, B/M ratio* and *Liquidity*[29]. *Firm Size* is measured as the natural logarithm of a firm's total assets. *B/M ratio* is measured as the book value of equity to the market value of equity in a firm. *Liquidity* is measured as the proportion of the total annual number of shares traded to the number of outstanding shares in a firm at the end of its fiscal year (Ravina and Sapienza, 2010). The correlation tables for the variables (explanatory and control) are in Appendix G.

A binary variable for SOX measures the impact of the implementation of SOX on the abnormal return of the CEOs' insider trades. The SOX binary variable is equal to zero for trades that took place before the SOX and is equal to one for other trades after SOX[30]. In addition, binary variables for each year and each sector (12 sectors as reported on Thomson Reuters database) are included in the model to control for year and sector fixed effects[31].

The results of the Ordinary Least Squares (OLS) regressions of the equation (5) on the entire sample are shown in Table 8. When the entire sample is considered, no judgment is made about the significance of the underlying nonpublic information. Indeed, the insider trades may not be based on any insider information or they may have benefited from various levels of nonpublic information. In the next sections, the trades are distinguished based on their underlying nonpublic information and the impact of internal governance mechanisms is investigated for the trades which are estimated to be based on more significant nonpublic information.

[29] Volatility of stock prices was initially considered as one of control variables, but it was dropped from the model due to its significant correlation with *Liquidity*. Liquidity proved to be more explanatory than Volatility for abnormal returns.
[30] August 1, 2002 is considered the cutoff date for SOX.
[31] As a robustness test, the model is also regressed by clustering at the sector level. In addition, the results are checked with a firm-level fixed effects model.

Table 8 shows that there is not a statistically significant association between board independence and abnormal returns of the buy trades. However, the corresponding result for sell trade is statistically significant and indicates that higher board independence is associated with lower abnormal returns. The result for sell trades is consistent with the first hypothesis of this study.[32] The results indicate that higher board independence has a more significant impact on abnormal returns of the sell trades than those of buy trades. The results imply higher levels of information asymmetry between insiders and outsiders in insider sell trades. The elevated information asymmetry partially stems from the fact that insider sell trades takes place for a range of reasons from wealth diversification and need for liquidity to profit on nonpublic information. Also, sell trades are conducted more frequently and in smaller volumes than buy trades. That makes the external monitoring more costly and potentially less effective. The results indicate that independent directors are more instrumental in preventing the abuse of nonpublic information where information asymmetry is higher. The role of SOX on information asymmetry and consequently, on the potential role of internal governance mechanisms will be discussed in coming sections.

The results on duality show that the association between CEO/COB duality status and the abnormal return of buy trades is not statistically significant for buy trades. The results for sell trades, however, are statistically significant and indicate that CEOs earn significantly higher abnormal returns when they preside over the board. Similar to the results for board independence, the results on duality suggest that the impact of separation of the CEO and COB positions on lowering the abnormal returns of CEOs' insider trades is more significant on sell trades than on buy trades. The results stress the effectiveness of board of directors' monitoring on sell trades.

[32] The regressions results are checked by using firm fixed effects for robustness analysis purposes.

In Table 8, the findings on multiple directorships suggest an association between independent directors who hold a large number of directorships and a lower abnormal return earned on CEOs' buy trades. This observation is consistent with "reputation hypothesis," which argues that multiple directorships held by a director are a signal of his/her quality in performing his/her duties. The results imply that independent directors with higher number of outside directorships are more effective in reducing information asymmetry between firms' insiders and outsiders, despite the time and energy burden of handling extra directorships. The results can also imply that independent directors with multiple directorships can afford to be tougher in their monitoring duties, due to the extra power and influence stemming from their reputation and network. Nonetheless, the corresponding results for sell trades are consistent with "busy director hypothesis". The impact of independent directors' multiple directorships on sell trades indicate that independent directors with more directorships are less effective in reducing CEOs' trades abnormal returns than their peers with lower number of directorships. The results underline the higher asymmetry information about sell trades that demands more time and energy of independent directors.

Table 8 also shows that the level of stock ownership by independent directors has a positive correlation with the abnormal returns of the CEOs' trades in both buy and sell categories. The results imply that when independent directors have higher equity ownership in a firm, their effectiveness in reducing information asymmetry or in monitoring CEOs' insider trades subside. All other things being the same, independent directors who have lower equity ownership are more effective in reducing the abnormal returns earned on CEOs' trades. The results can be explained by the fact that independent directors are also able to benefit from nonpublic information by trading the securities of the firm. Ravina and Sapienza (2010) document that independent directors earn abnormal returns that are close to the returns earned by the firm's management. The higher levels of

equity ownership by independent directors make their interests more aligned with those of the CEOs, rather than with those of the shareholders.[33] Nonetheless, more analysis is required for a conclusion about this variable. More analyses will be performed in coming sections.

Table 8 also shows that SOX has significantly reduced the abnormal returns of buy and sell trades. The results underline the impact SOX had in reducing the information asymmetry between firms' insiders and outsiders, as well as in increasing the expected costs of conducting informed insider trading through tougher penalties for those who violate insider trading law.

The results in this section particularly showed that the board monitoring is more effective on CEOs' sell trades than on CEOs' buy trades, when all trades are investigated, regardless of their level of underlying nonpublic information. As mentioned, the results indicate that the degree of information asymmetry is higher for sell trades and it makes monitoring by the markets and the SEC less effective.

4.1.2. Impact of SOX on the Effectiveness of Internal Corporate Governance Mechanisms

Considering the significant impact of SOX and the regulatory environment on the level of information asymmetry and expected costs of the violation of insider trading regulations, it is expected that the role of the internal governance mechanisms is partially substituted by SOX. Studying the impact of SOX on the potential role of internal governance mechanisms also sheds light on the interaction between internal and external (such as law/regulation) governance

[33] Including the quadratic form of independent directors' ownership in the model does not change the results.

mechanisms. This section distinguishes between before and after SOX eras and compares the effectiveness of internal governance mechanisms on insider trades within these two periods.

Two approaches are taken to estimate the impact of SOX on the effectiveness of internal governance mechanisms. In the first approach, interactive variables between SOX binary variable and individual internal governance variables are used. The interactive variables capture the change in the impact of internal governance mechanisms caused by SOX. In the second approach, separate regressions are run for before and after SOX took effect.

The following model is used in the first approach.

$$\boldsymbol{CAR_{i,t} = \beta_0 + \beta_1\, Board\ Independence_{i,t} + \beta_2 Duality + \beta_3 Multiple\ Directorship + \beta_4\, Directors\ Ownership + \beta_5 Firm\ Size_{i,t} + \beta_6 \frac{B}{M}\, Ratio_{i,t} + \beta_7 Liquidity_{i,} + \beta_8 SOX + \beta_9\, SOX * Board\ Independence + \beta_{10} SOX * Duality + \beta_{11} SOX * Multiple\ Directorship + \beta_{12}\, SOX * Directors\ Ownership + \sum_{00}^{12} \beta_i\, Sector_i + \sum_{1997}^{2008} \beta_j Year_j + \varepsilon_{i,t}} \quad \textbf{(6)}$$

Table 9 reports the results of the regression of the equation (6).

The results of Table 9 also show that the association between board independence and abnormal return for buy trades was not statistically significant before SOX. The result for the board independence indicative variable does not indicate any significant change in the impact of board independence on abnormal returns after SOX took effect. The results for the sell trades, however, indicate that board independence was negatively associated with the abnormal returns of CEOs' trades before SOX (positively related with avoided losses). The results also indicate that the negative association weakened after SOX, as hypothesized.

On the issue of duality, Table 9 shows that the combination of CEO and COB positions is associated with higher abnormal returns for both buy and sell trades after SOX, but not before it

took effect. The result speaks to the importance of the separation of the CEO and COB positions in limiting the abuse of nonpublic information by CEOs and provides an example for the complement effect of an internal governance mechanism with an external one. The result is significant, both statistically and economically.

The results on multiple directorships shown in Table 9 suggest that before SOX, multiple directorships were associated with higher abnormal returns for buy and sell trades. The observation is consistent with the "busy director hypothesis," which predicts that monitoring by independent directors weakens as the number of directorships increases. The results for the indicative variable between the multiple directorship variable and the SOX binary variable indicate that the implementation of SOX did not significantly change the effect of multiple directorship on buy trades, while it weakened the effect for sell trades, as hypothesized. The post-SOX result for sell trades indicates that the impact of multiple directorships became consistent with "reputation hypothesis." This result indicates that SOX reduced the impact of time and effort spent by independent directors to prevent the abuse of nonpublic information, while it increased the importance of the presence of independent directors of higher quality, who are awarded higher numbers of director seats.

The results for independent directors' ownership in Table 9 show that higher ownership levels by independent directors are associated with higher abnormal returns on CEOs' trades in the pre-SOX era. Furthermore, the impact of directors' ownership weakened after SOX for both buy and sell categories, as hypothesized in this study. The results on directors' ownership indicate that SOX reduced the misalignment between independent directors' interests and those of the shareholders, which stemmed from the potential ability of independent directors to profit on their nonpublic information, particularly when they have larger ownership in the firm.

Similar to the results in Table 8, the results in Table 9 on the direct impact of SOX on the abnormal return of CEOs' trades suggest that the abnormal return of buy and sell trades reduced significantly after SOX.

In the second approach, equation (6) is regressed separately for the pre- and post-SOX eras. Accordingly, the binary variable SOX and indicative variable are dropped from the regression in this regression. The results are reported in Table 10.

The results in Table 10 indicate that board independence had no significant effect on the abnormal returns of buy trades either before or after SOX. The results for sell trades, however, indicate that abnormal returns on CEOs sell trades are lower when a higher proportion of board is comprised of independent directors. In addition, it is observed that the association between board independence and abnormal returns of CEOs' sell trades weakened after SOX, as hypothesized[34].

On the issue of duality, the results in Table 10 show indicate that the impact of CEO/COB duality status on buy trades is not statistically significant before SOX. After the SOX, however, a positive association between the combination of CEO and COB positions and abnormal returns are observed for buy and sell trades. CEOs earn higher abnormal returns or avoid higher abnormal losses when they also chair the board. This observation highlights the complement impact of duality status on SOX in preventing the abuse of non-public information by firms' insiders. The results imply that SOX is more effective when CEO is less entrenched through the lack of board chairmanship. Similarly, the association between duality and abnormal returns was not significant for sell trades before SOX, but became significant afterwards. Again, the results speak to the more pronounced impact of the separation of the CEO and the COB positions after SOX.

[34] Nonetheless, the performed t-test does indicate that the observed reduction in the impact of board independence in sell trades is not statistically significant.

The results in Table 10 on multiple directorships indicate that independent directors' multiple directorships were associated with higher abnormal returns earned by CEOs on buy and sell trades before SOX (that is higher avoided loss in case of sell trades). This observation is consistent with the "busy director hypothesis" and suggests that independent directors with lower numbers of outside directorships were associated with lower abnormal returns earned by affiliated CEOs. Nonetheless, the results for the post-SOX period indicate that the impact of multiple directorships is not significance in either trade categories[35]. The results imply that after SOX the association between spendable time and energy by independent directors and the directors' effectiveness in preventing the abuse of nonpublic information by firms' CEOs weakened, while the importance of a director's reputation, which is considered a signal of quality, increased.

The results in Table 10 on independent directors' stock ownership suggest that the higher stock ownership by independent directors is associated with higher abnormal returns on the buy and sell trades before SOX. The association, however, weakened after SOX. As explained before, this result is consistent with the observation by Ravina and Sapienza (2010) that independent directors are also able to profit on their nonpublic information. Therefore, larger ownership by independent directors may align their interests toward those of CEOs and reduce independent directors' efficiency in their monitoring role. The results in Table 10 imply that after SOX, stock ownership by independent directors is not associated with higher abnormal returns for CEOs anymore. Even, the results for sell trades indicate that higher stock ownership by independent directors is associated with lower abnormal returns by the CEOs (that is lower abnormal losses). The results suggest that SOX aligned the interests of independent directors with those of shareholders.

[35] The results of the t-test for buy trades suggest that the impact of multiple directorship for buy trades is not significantly different before and after SOX, while the result of the t-test for sell trades indicates that that the impact of multiple directorship is significantly different before and after SOX.

In summary, the results of this section, which investigates CEOs' insider regardless the significance of their underlying nonpublic information, indicate that SOX significantly lowered the abnormal returns of buy and sell trades. Also, the results indicate that board independence impact on sell trades is more significant than its impact on buy trades. Additionally, the results indicate that the impact of duality status became more significant (both statistically and economically) after SOX for buy and sell trades.

Thus far, all the analyses in this study are performed on the entire sample of buy and sell trades. As mentioned in previous sections, not all insider trades are purely based on non-public information. More precisely, not all insider trades are based on equally significant (material) non-public information. While some insider trades do not take advantage of any insider trades, other trades may be based on various levels of nonpublic information. To test the effectiveness of the internal governance mechanisms in reducing the abuse of nonpublic information, the following section estimates the trades that are based on more significant non-public information and subsequently investigates the role of internal governance mechanisms in preventing such trades.

4.1.3. The Role of Governance Mechanisms and Significance of the Incorporated Nonpublic Information

The access to nonpublic information gives an advantage to firms' insiders over other market participants and such an advantage should yield abnormal returns in form of overperformance for buy trades and underperformance for sell trades (Jeng et al., 2003). Hence, the abnormal return of an insider trade is used as a measure for the significance of the nonpublic information underlying a trade. The application of abnormal returns in estimating underlying nonpublic information is supported by major asymmetric information models (the price-taking model of Grossman and

Stiglitz, 1976 and the imperfect competition model of Kyle, 1985), too. From a technical point of view, Piotroski and Roulstone (2007) suggest that an insider's transaction has a greater probability of being scrutinized and "red flagged" as having been motivated by private information if the trade is followed by a material stock price change or a large earnings surprise.

This section focuses on trades that are more likely to be driven by nonpublic information and tests the hypotheses by using those data. The observed abnormal returns following the trades are used to estimate the significance of nonpublic information. Then, insider trades are ranked based on the magnitude of their earned abnormal return. As such, trades, which are followed by higher abnormal returns, are interpreted to be based on more significant nonpublic information than those trades that are followed by less significant abnormal returns.[36] By applying a cutoff value for abnormal returns, a subset of trades, which are more likely to be based on more significant non-public information is selected and the impact of internal corporate governance mechanisms is analyzed within this subsample. In this study, a 0 percent cutoff value is considered to form the subsample of trades, which are more significantly information-driven than others. The buy trades with positive abnormal returns and the sell trades with negative abnormal returns are selected as trades with higher likelihood of being information-driven.

Equation (6) is regressed on the subsample of more significantly informed trades through two approaches: interaction variables and separate regressions. Table 11 reports the results for the approach that considers SOX as a structural change and applies interactive variables, while Table 12 reports the results on separate regressions for pre- and post-SOX eras.

[36] The trades are not claimed to be free of nonpublic information since the materiality of information is only estimated. By ranking the trades based on their abnormal returns, they are claimed to be based on more or less nonpublic information, rather a definite judgment. In addition, it can be argued that insider trades are generally based on some nonpublic information, more or less, due to information superiority of the insiders.

In Table 11, the results on board independence confirm prior results on sell trades, which indicated that board independence is associated with lower abnormal returns for sell trades. The results also show that the impact is stronger for more significantly informed trades. Furthermore, the results show a negative association between board independence and abnormal returns of buy trades. Recall that the corresponding results were not statistically significant when the full sample was used. Indeed, comparing the results of Table 11 with those of Table 9, which is reported on the full sample, reveals that the impact of board independence is stronger on trades (buy and sell) that are based on more significant nonpublic information. In addition, the results show that the impact of board independence weakened after SOX for both trade categories, consistent with the second hypothesis of this study. Indeed, the observed effects of board independence confirm the predictions of the hypotheses, when the investigation focused on trades with more significant incorporated nonpublic information.

The results on duality in Table 11 also confirm previous results that duality status did not have a significant impact on the abnormal return of CEOs' trades before SOX. Furthermore, consistent with previous results, the results suggest that the combination of the CEO and the COB positions is associated with higher abnormal returns in buy and sell categories post-SOX.

The results on the impact of multiple directorships in Table 11 indicate that, unlike the previous results obtained on the full sample, the association of multiple directorship and abnormal returns is not significant before SOX. It can be inferred that the observed positive association in the full sample, which is consistent with the "busy director hypothesis," is mainly driven by trades that are based on less significant nonpublic information. The result can imply that preventing insider trades with less significant nonpublic information depends on the time and effort independent directors can allocate to their duties and preventing CEOs from abusing more significant nonpublic

information is not dependent on time and effort spent by independent directors. Nonetheless, the result for the interactive variable between SOX and multiple directorship variables is similar to the results on the full sample. It suggests that independent directors with higher numbers of outside directorships are more effective in reducing the abnormal returns on buy and sell trades after SOX. The observation is consistent with the "reputation hypothesis" and underlines the importance of the quality of independent directors in achieving their monitoring duties after SOX.

The results on the impact of independent directors' ownership on the abnormal return of more significantly informed trades also confirm previous results. They suggest that higher levels of ownership by independent directors are associated with higher abnormal returns by CEOs before SOX. As ownership of independent directors increases, their effectiveness in reducing information asymmetry and monitoring CEOs decreases. As before, the results suggest that higher levels of equity ownership by independent directors make their interests more aligned with those of the CEOs before SOX. The results in Table 11 on the subsample of trades that are based on more significantly informed trades indicate that the association between ownership and CEOs' abnormal returns did not change significantly for buy trades following SOX, while it significantly decreased for sell trades.

The results in Table 11 also confirm previous results that SOX is associated with significantly lower abnormal returns of buy and sell trades. As before, the impact of SOX is more economically significant in buy trades, possibly due to the higher proportion of buy trades that are based on nonpublic information (Kim and Verrecchia, 1994, Baiman and Verecchia, 1996, Cheng and, Lo, 2006).

In a second approach, the regression to investigate the impact of internal governance mechanisms on the abnormal return of more significantly informed trades is done separately for pre- and post-SOX periods and the results are presented in Table 12. The results in Table 12 also confirm that board independence is negatively associated with abnormal returns in the information-driven subsample for buy and sell trades before SOX. The results for the post-SOX era also confirm that the association between board independence and abnormal returns weakened after SOX, as hypothesized. The post-SOX results for buy trades, however, are significantly positive. Nonetheless, as firm fixed effects are controlled for in the model as a robustness test, the association is negative and weaker than that of the pre-SOX period,[37] supporting the hypotheses of this study.

The results on duality in Table 12 also indicate that there is no significant association between duality and abnormal returns of buy trades before SOX. This result is similar to the one obtained on the full sample of CEOs' insider trades. Also confirming prior results, the results for buy trades after SOX show that the combination of CEO and COB positions is associated with significantly higher abnormal returns on CEOs' trades. For sell trades, the results indicate the combination of CEO and COB positions is associated with higher abnormal returns (that is avoided losses) both before and after SOX.

Confirming prior results, the results on multiple directorship in Table 12 show no association between multiple directorship of independent directors and abnormal returns of materially informed trades before SOX. After SOX, however, independent directors' multiple directorship is associated with lower abnormal returns of CEOs' trades in buy and sell categories, supporting the "reputation hypothesis". This result indicates that independent directors with more outside directorships are more effective in reducing the abnormal returns of CEOs' trades that are

[37] The results for firm fixed effects are not tabulated.

perceived to be based on more significantly informed trades. The results speak to the importance of independent directors quality in preventing the abuse of nonpublic information by CEOs.

The results in Table 12 on independent directors' ownership confirm results found through previous approach. The results indicate that independent directors with higher ownership are associated with higher CEOs' abnormal returns before SOX for both buy and sell trades. Furthermore, the impact is not significant after SOX. It implies that the interests of independent directors became more aligned with those of shareholders after SOX.

Thus far, as part of the investigation of the impact of internal governance mechanisms on CEOs' insider trading, the abnormal return of such trades is examined. Another important aim of this study is to investigate whether stronger board monitoring would reduce the incidents of the abuse of nonpublic information by firms' CEOs. The following section, investigates the relation between board monitoring strength and incidence (also called rate) of insider trading by CEOs.

4.2. Incidence of CEOs' Insider Trading

4.2.1. Internal Governance Mechanisms and the Intensity of Insider Trades

This section investigates the relationship between internal governance mechanisms and the incidence of CEOs' insider trading. As in previous sections, first the full sample of trades is investigated. Then, a subsample of trades that are based on more significant nonpublic information is used in the models. As mentioned in the hypothesis development section, it is expected that stronger board monitoring reduces the incidence of informed trading by CEOs.

To investigate the impact of internal corporate governance mechanisms on the incidence of CEOs' insider trades, a measure is needed for the latter variable. The total number[38] of shares traded by a CEO within a year divided by the number of shares outstanding in the firm in that year is used (Bettis et al., 2000)[39]. The measure is called intensity hereafter.

The following model is used to investigate the impact of board monitoring on the CEOs' trade intensity. The estimation is performed through two approaches. The first approach includes a binary variable for SOX and interactive variables between the SOX binary variable and each of the internal governance variables. The second approach performs separate regressions for pre- and post-SOX periods.

$$\boldsymbol{Intensity_{i,t} = \beta_0 + \beta_1\, Board\ Independence_{i,t} + \beta_2 Duality + \beta_3 Multiple\ Directorship + \beta 4\ Directors\ Ownership + \beta 5 Firm\ Sizei,t + \beta 6 BM\ Ratioi,t + \beta 7 Liquidityi, + \beta 8 SOX + \beta 9\ SOX * Board\ Independence + \beta 10 SOX * Duality + \beta 11 SOX * Director\ Busyness + \beta 12\ SOX * Ownership + 0012 \beta i Sectori + 19972008 \beta j Yearj + \varepsilon it} \qquad (7)$$

The dependent variable is the natural logarithm of the proportion of annualized number of traded shares by a CEO to the number of outstanding shares in a firm. The explanatory variables are similar to those in previous models[40]. The results of the OLS regressions of equation (7) on the full sample are presented in Table 13.

The results in Table 13 show that higher levels of board independence are associated with lower intensities of insider trading by CEOs in both buy and sell trades. Importantly, the negative

[38] The volume of annualized insider trades by CEOs can also be used, but using volume may cause the volatile prices to affect the results.
[39] Some studies such as Jeng et al. (2003) use other measures for intensity of insider trading such as dividing firms into buy and sell trades based of comparison on the number of bought and sold shares by firm insiders. The buy and sell portfolios are adjusted periodically in such trades for time series analyses.
[40] Lakonishok and Lee (2001) suggest that insiders in large firms sell more shares and Rozeff and Zaman (1998) suggest that insiders sell more shares in growth firms.

associations are statistically significant for both categories. The results for the interactive variable between the SOX binary variable and board independence indicate that SOX's impact on the role of board independence was not significant in buy trades, while the influence of board independence on the intensity of sell trades decreased after SOX, as hypothesized. The observed negative association indicates that CEOs trade less intensively in the presence of more independent boards. The reduced trading levels can be attributed to lower information asymmetry, which removes some abnormally profitable trading opportunities, and higher expected cost of informed trades for the CEOs due to higher probabilities of detection by the board. The observed weakening impact of SOX on the role of board independence also indicates that SOX has played a substitute role for board independence through reducing information asymmetry and by increasing expected costs of trades by the tougher penalties. The more pronounced weakening impact of SOX on the role of board independence for sell trades implies higher information asymmetry around sell trades.

The results in Table 13 on duality show that the separation of CEO and COB positions is associated with lower trading intensities. The results indicate that CEOs trade more intensively when they are also COB. The results also show that the implementation of SOX did not significantly affect the impact of duality status on the intensity of insider trades in either buy or sell trades. The results also indicate that SOX did not significantly reduce the impact of duality status on trade intensity. It is worth noting that although duality status did not have a significant impact on abnormal return of CEOs' trades, it did have a significant impact on the intensity of the insider trades. The result implies that the separation of CEO and COB positions does not have much impact on information asymmetry, but it significantly boosts the monitoring capabilities of a board. The separation of CEO and COB positions shifts the power from a CEO to the directors in a board. Such

elevated monitoring and enforcement ability of board would significantly reduce the expected benefits of informed trades for CEOs and consequently, cause them to trade less intensively.

The results in Table 13 on multiple directorships show no significant association between the number of directorships held by independent directors and the intensity of CEOs' buy trades. Also, the results do not show any statistically significant change in the impact of multiple directorships due to SOX. The results for sell trades show a statistically significant association between multiple directorships and trade intensities. It has been observed that CEOs trade less intensively when independent directors hold a higher number of external directorships. The observation, which is consistent with "reputation hypothesis," indicates that the presence of more highly qualified directors, as signaled by the number of directorships they hold, is associated with lower intensities of sell trades before SOX. The coefficient for the indicative variable on multiple directorships shows that the association weakened after SOX, as hypothesized.

The results in Table 13 on independent directors' ownership are consistent with the results on the impact of the variable on abnormal returns. The results show that higher levels of ownership by independent directors are associated with higher trade intensity by the CEOs for buy and sell trades. As noted before, the result implies that independent directors are less effective in monitoring the CEOs when they hold larger numbers of stocks. Nonetheless, the results for the interactive variable between SOX and independent director ownership suggest that the positive association vanishes after SOX, while no statistically significant change is observed for buy trades.

As for the direct impact of SOX on the intensity of insider trades, Table 13 shows no indication that SOX had a consistent direct impact on CEOs' insider trades either in buy or sell trades.

In a second approach, the equation (7) is regressed separately for pre- and post-SOX periods and the results are shown in Table 14. Accordingly, the binary variable SOX and interactive variables between SOX and internal governance mechanisms are dropped from the equation.

The results of Table 14 on board independence show that board independence is associated with lower intensities of insider trading for buy and sell trades before SOX, as hypothesized. Moreover, the results show that the association remains after SOX, but its magnitude and significance are reduced in both trade categories[41]. The results of Table 14 on duality indicate that the combination of CEO and COB positions is associated with higher intensities of CEOs' insider trading for buy and sell trades. The results also confirm that the impact of duality weakened after SOX for buy and sell trades.

The results in Table 14 on multiple directorships show independent directors' multiple directorships had no statistically significant impact on buy trade intensities either before or after SOX. The corresponding results for sell trades suggest, however, that independent directors with a higher number of outside directorships are associated with lower intensities of insider trades by firms' CEOs. That observation is consistent with "reputation hypothesis." The results also indicate that the implementation of SOX weakened the impact.

The results in Table 14 on independent directors' ownership do not show a statistically significant relationship between independent directors' stock ownership and CEOs' insider trading intensity for buy and sell trades, either before or after SOX.

[41] Still, the result of the performed t-test indicates that the estimated impact of board independence on sell trades is not significantly different before and after SOX.

In summary, the results of this section suggest that high board independence and the separation of CEO and COB positions significantly reduce the intensity of CEOs' insider trading.

The analyses of this section are conducted on the full sample, without taking into account the significance of the nonpublic information underlying each trade. The next section investigates the differences in impact internal governance mechanisms have on trades with different levels of incorporated nonpublic information.

4.2.2. Intensity of Insider Trades and Significance of Trades Underlying Nonpublic Information

This section examines the impact of the internal governance mechanisms on trades that are estimated to be more significantly information-driven. As in section 4.1.3., the insider trades are ranked based on their abnormal returns. Then, trades with favorable abnormal returns (that is positive returns for buy trades and negative returns for sell trades) are considered to be trades that are based on more significant nonpublic information. Other trades that are not followed by favorable abnormal returns are categorized as trades that are based on less significant nonpublic information.

To compare the impact of internal governance mechanisms on trades based on different underlying nonpublic information, and instead of performing separate regressions for more informed versus less informed trades, the proportion of the number of more informed trades to the total number of trades is used as the measure of intensity of informed trades in the following model. The analysis results indicate whether stronger internal governance mechanisms reduced bigger proportions of more significantly informed trades than less significantly informed trades or vice

versa. The model will be also regressed for pre- and post-SOX eras separately, as a second approach.

$$\boldsymbol{Proportion_{i,t} = \beta_0 + \beta_1\, Board\ Independence_{i,t} + \beta_2 Duality + \beta_3 Director\ Busyness + \beta_4\, Directors\ Ownership + \beta_5 Firm\ Size_{i,t} + \beta_6 \frac{B}{M}\, Ratio_{i,t} + \beta_7 Liquidity_{i,} + \beta_8 SOX + \beta_9\, SOX * Board\ Independence + \beta_{10} SOX * Duality + \beta_{11} SOX * Director\ Busyness + \beta_{12}\, SOX * Ownership + \sum_{00}^{12} \beta_i\, Sector_i + \sum_{1997}^{2008} \beta_j Year_j + \varepsilon_{i,t}} \qquad \textbf{(8)}$$

The dependent variable is the proportion of the total number of more significantly traded shares by a CEO within a year to the total number of shares traded by the CEO in the same year. The explanatory and control variables are similar to those in equation (7). The results for the regressions on equation (8) are in Table 15.

The results in Table 15 on board independence indicate that the limiting impact of board independence on the intensity of CEOs' buy trades has not been significantly different on trades with different levels of incorporated nonpublic information. Board independence did not have a significantly different impact on the intensity of more significantly informed trades when buy trades were examined. Furthermore, the results show that SOX also did not cause board dependence to have a significantly different impact on trades with different levels of non-public information. The result implies that independent directors mainly affect buy trades by lowering information asymmetry. The lower information asymmetry has a uniform impact on trades with various levels of incorporated nonpublic information. Nonetheless, the results for sell trades indicate that board independence is more effective in mitigating the trades that are based on more significant nonpublic information. Moreover, as hypothesized, the result for sell trades indicates that the impact of board independence in lowering the incidence of more significantly informed trades weakened after SOX. The results for buy and sell trades support the idea that stronger board monitoring matters more

when information asymmetry is more severe, as in sell trades where trades take place because of various reasons. The significant impact of board monitoring on sell trades also shed light on weak points of external supervision.

The results in Table 15 on duality indicate that the impact of CEO/COB duality status on the incidence of more significantly informed trades is not statistically different from corresponding impact on less significantly informed trades for either buy or sell trades before SOX. Furthermore, the results suggest that SOX did not significantly affect that relationship.

The results in Table 15 indicate that the impact of multiple directorships on the intensity of insider trading by firms' CEOs was not significantly different between the trades with different levels of underlying nonpublic information in either buy or sell trades.

The results in Table 15 on independent directors' ownership indicate that higher stock ownership by independent directors is associated with higher proportions of significantly informed buy trades, but not sell trades, before SOX. Furthermore, the results for the interactive variable between SOX and independent directors' stock ownership variable do not indicate any significant change on the impact of independent directors' ownership on buy and sell trades after SOX.

The results on the direct impact of SOX indicate that SOX significantly reduced the proportion of significantly informed trades from all trades by CEOs in buy and sell trades.

In a second approach, equation (8) is regressed separately for pre- and post-SOX eras and the results are shown in Table 16.

The results of Table 16 indicate that board independence does not have a significantly different impact on the intensity of buy trades with more significantly informed trades either before

or after SOX. The results in Table 16 on sell trades, however, indicate that the limiting effect of board independence on the intensity of CEOs' sell insider trades is more pronounced for trades that are estimated to be based on more significant nonpublic information. The results for sell trades also confirm prior results that the impact of board independence in reducing informed trades weakened after SOX.

The results on duality do not show any special impact on the intensity of trades with more significant underlying information. Table 16 shows, however, the impact of duality on sell trades was weakly significant before SOX. The slight difference between the results of tables 15 and 16 on sell trades after SOX can be attributed to the difference in capturing the impact of a structural change by using a binary variable versus separate regressions.

Similar to the results presented in Table15, those in Table 16 do not show any specific impact of multiple directorship on more significantly informed buy and sell trades either before or after SOX. The results in Table 16 on directors' ownership do not show any different impact on the intensity of trades with more significantly informed trades.

The results in this section confirm that the impact of internal governance mechanisms on the intensity of insider trades is almost uniform on buy trades with different levels of underlying nonpublic information, while their impact on sell trades is more pronounced on trades with more significant underlying nonpublic information. The results emphasize the role of internal governance mechanisms when information asymmetry between an insider and a potential monitor is high such as for sell trades where information-driven insider trades can be hidden under other justifications such as need for liquidity or wealth diversification.

4.3. Robustness Tests

To investigate the robustness of the results, several tests are carried out. Specifically, the results proved robust against other abnormal return calculation methods (market model, market-adjusted model, and Fama-French Three-Factor model). Furthermore, excluding the data for year 2002, when SOX was implemented, did not change the results. The exclusion of 2002 data was done to address a concern about a possibility that insiders started to adapt their behavior toward post-SOX conditions before the implementation date of SOX. The results did not change after excluding records with unclassified or missing industry code. In addition, the regression results are tested by controlling for firm fixed effects and sector clustering. While most results are consistent among various approached, few inconsistent results are reported in their affiliated sections.

Supported by robustness tests, the results indicate that stronger internal corporate governance mechanisms, particularly board independence and the separation of CEO and COB positions, are associated with lower abnormal returns and incidence of CEOs' insider trading. Furthermore, the results indicate that this association is usually more pronounced for sell trades.

Nonetheless, endogeneity is a general concern for the research on corporate governance and this study is not an exception. The potential endogeneity could enter a bias into regression results and cause confusions about the direction of causality between dependent and independent variables. In this study, reverse causality between dependent and independent variables is plausible and it could serve as a source of endogeneity. Although, theoretical and empirical results of previous studies, which were mentioned in this study, support the direction of causality form stronger governance mechanisms to lower intensity of CEOs' informed insider trading, an alternative explanation for reverse causality could be perceived.

The alternative explanation for the observed association between the strength of internal corporate governance measures and CEOs' insider trading attributes could argue that the relationship is due to CEOs' influence on the corporate governance structure in general and the board structure in particular, rather than due to the hypothesized impact of board monitoring on CEOs' trading behavior. For instance, if a powerful CEO, who exploits (or intends to exploit) nonpublic information for personal benefits, weakens effective board monitoring (as an internal governance mechanism), a reverse causality direction can be suggested between board monitoring and CEOs' insider trading behavior. CEOs' influence on board structure could be in forms of, for example, nominating directors who are less likely to be effective monitors or taking over the COB position by the CEO.

Indeed, there are studies that propose CEOs' influence on board structure. Boone et al. (2007) suggest that managers affect board size and board independence. Adams et al. (2010) suggest that board structure is a function of a CEOs' power. Baker and Gompers (2003), Boone et al. (2007) and Ryan and Wiggins (2004) suggest that CEOs are able to push for boards with lower proportions of independent directors. Shivdasani and Yermack (1990) suggest that when CEOs are involved in the selection of new directors, the new directors are less likely to be aggressive monitors. Therefore, the alternative explanation could argue that the higher (lower) intensities of information-driven trades are not the result, but rather the cause of weaker (stronger) internal governance mechanisms. Although, a potential reverse causality in forms of influencing the board structure by a CEO who exploits nonpublic information, itself supports the role of board monitoring in mitigating informed trading by CEOs, a robustness analysis is conducted to rule out the potential reverse causality on the observed relationship in this study.

To test the reverse causality possibility, the impact of board monitoring on the level of CEOs' informed insider trading is examined on a subsample of insider trades by CEOs are less likely to be powerful enough to influence the board monitoring functions. More specifically, the subsample includes the trades conducted by CEOs with tenures shorter than two years at the time of the trade as CEO's influence on internal governance mechanism grows with tenure. The selection of such a subsample alleviates the concern for the influence of CEOs on internal corporate governance structure since it is less likely for a recently appointed CEO to be powerful enough to influence internal governance structure.

Equation (8), which examines the impact of board monitoring on the incidence of more significantly informed trades, is used for the test. In this model, the dependent variable is the proportion of the number of shares traded by a CEO in significantly informed trades to the total number of shares traded by the CEO within a year. Dependent variables are the same as those in the previous models. The results are in Table 17.

The results in Table 17 confirm the results obtained on the full sample presented in 15. Specifically, the results indicate that board independence reduces the proportion of sell trades that are estimated to be based on more significantly informed insider trades. Moreover, the result for indicative variable between board independence and SOX confirms that the impact of board independence on reduction of more significantly informed sell trades decreased after SOX. The results for buy trades also confirm previous results. The results show a negative association between board independence and the proportion of more significantly informed trades; however the observed association is not statistically significant. Also the indicator variables between SOX and board independence show that the impact of board independence decreases for sell trades after SOX. The change for buy trades, however, is not statistically significant.

The results in Table 17 on duality indicate that the separation of the CEO and the COB positions is associated with lower proportions of significantly informed trades for the buy and sell trades. The results confirm previous results that the combination of CEO and COB positions is associated with higher proportions of more significantly informed trades. The results also indicate that the impact of being chairman of the board is more pronounced for new CEOs. The higher impact of duality status in the subsample of new CEOs can be attributed to their lack of influence on the board in comparison to older CEOs and the marginal power they get by presiding over the board. Furthermore, the indicator variables between duality and SOX show that SOX did not change the association between duality and intensity of insider trades, consistent with the result from the full sample of CEOs.

Overall, the results of the robustness analyses support the hypothesis that higher levels of board independence and the separation of CEO and COB positions would result in lower levels of CEOs' more significantly informed insider trades. Therefore, a potential reverse causality is rejected.

5. Summary and Conclusion

This study investigates the impact of several board characteristics on abnormal return and the incidence of insider trading by CEOs. The board characteristics are board independence, duality of the CEO and the chairman of the board, independent director's multiple directorship and independent director stock ownership. This study also investigates the impact of SOX on abnormal return and on the incidence of insider trading by the CEOs, as well as its impact on the role of board characteristics in limiting the abuse of nonpublic information by the CEOs.

The board characteristics are postulated to influence the abnormal returns earned by CEOs on their insider trading as well as intensity of their trades. It is also postulated that SOX also influenced both the abnormal returns and the intensity of CEOs' insider trades. Moreover, it is hypothesized that the role of internal governance mechanisms in reducing the abuse of nonpublic information by firms' CEOs was partially replaced by SOX.

This study analyzes open-market buy and sell trades by the CEOs. The abnormal returns earned by the CEOs are measured and treated as a proxy for underlying nonpublic information. The relationship between the measures of board monitoring and abnormal return of insider trades is estimated. Furthermore, using interactive variables between SOX and board monitoring measures, the interaction between SOX and internal governance mechanisms is investigated for buy and sell trades separately. In addition, the analyses are performed separately for pre- and post-SOX eras. Also, to investigate the differences in the impact of the board monitoring on insider trades with different levels of underlying nonpublic information, the trades, which are estimated to be more significantly informed based on their following abnormal returns are grouped and the results are compared with trades that are estimated to be based on less significant nonpublic information.

Several robustness checks are conducted to support the validity of the results. The tests include alternative methods for the calculation of the abnormal returns, alternative regression approaches, various data subsamples and alternative explanations for the observed effects. The results proved to be robust.

The results suggest that CEOs earn statistically and economically significant abnormal returns on both buy and sell trades. The results on sell trades are particularly interesting, since it was perceived that the level of abuse of nonpublic information is not significant for insider sell trades.

Many previous studies ignore insider sell trades and only focus on buy trades. Nonetheless, the results of this study confirm that the average abnormal return earned by CEOs on buy trades is significantly higher than that earned on sell trades. This result is consistent with the notion that sell trades also occur for purposes such as need for liquidity and wealth diversification, which may be less information-driven.

The results of this study indicate that higher board independence reduces the abnormal returns of buy and sell trades. Furthermore, the results are stronger for trades with more significant underlying nonpublic information. The results also indicate that the limiting impact of board independence on abnormal returns decreased after SOX and that the impact of board independence is more robust on sell trades than on buy trades.

The results for independent directors having multiple directorships are mixed. The results suggest that before SOX, multiple directorships are associated with higher abnormal returns for buy and sell trades. The observation is consistent with the "busy director hypothesis." The results for the indicative variable between multiple directorship variable and SOX binary variable indicates that the implementation of SOX did not significantly change the effect of multiple directorship for buy trades, while it weakened the effect for sell trades, as hypothesized. The post-SOX result for sell trades indicates that the impact of multiple directorships became consistent with "reputation hypothesis."

The results for independent directors' ownership show that higher ownership levels by independent directors is associated with higher abnormal returns on CEOs' trades in the pre-SOX era. The results also indicate that the impact of directors' ownership weakened after SOX for both

buy and sell categories. The results suggest that higher levels of equity ownership by independent directors made their interests more aligned with those of the CEOs before SOX.

The results on duality indicate that the combination of CEO and COB positions is associated with higher abnormal returns for both buy and sell trades after SOX, but not before it. The results imply that the separation of CEO and COB is a complement mechanism, rather than a substitute one, for SOX. The results also show that SOX reduced the abnormal profits of both buy and sell trades significantly.

The results for intensity of CEOs' trades indicate that higher board independence results in lower intensities of trades. Nonetheless, the results on intensity show different patterns on buy and sell trades. The weakening impact of SOX is only observed for sell trades. Furthermore, the results indicate that the impact of board independence is more significant on more significantly informed trades for sell trades, but not for buy trades.

The results show no significant association between the number of directorships held by independent directors and the intensity of CEOs' buy trades. Also, the results do not show any statistically significant change in the impact of multiple directorships due to SOX. The results for sell trades, however, show a statistically significant association between multiple directorships and trade intensities such that it is observed that CEOs trade less intensively when independent directors on the board hold larger numbers of major external directorships. The observation, which is consistent with "reputation hypothesis," indicates that the presence of more highly qualified directors, as signaled by the number of held directorships, are associated with lower intensities of sell trades before SOX. As hypothesized the association weakened after SOX.

The results also show that higher levels of ownership by independent directors are associated with higher trade intensity by the CEOs for buy and sell trades. Nonetheless, the results weakened significantly after SOX.

The results on duality show that the separation of CEO and COB positions is associated with lower trading intensities. The results also show that the implementation of SOX did not significantly affect the impact of duality status on the intensity of insider trades in either buy or sell trades. The results on the direct impact of SOX on the intensity of trades suggest that SOX significantly reduced buy and sell trades.

The results also indicate that independent directors are particularly effective in mitigating more materially informed sell trades than buy trades. The observation can imply the relative ineffectiveness of the regulation in mitigating the abuse of nonpublic information in sell trades.

Thus, the findings indicate that internal governance mechanisms are effective tools in reducing information asymmetry between insiders and outsiders. Furthermore, internal governance mechanisms are effective in reducing the use of nonpublic information in insider trades. Indeed, internal governance mechanisms can play substitute and complementary roles to regulation, depending on the type of trade, materiality of the underlying information, and the interaction of internal governance mechanisms with other sets of regulations.

Although determining economic significance is subjective, the results of this study are economically significant. Board independence and the separation of the CEO and COB positions can each reduce the abnormal returns of firms' CEOs by up to 5 percent. Furthermore, board independence can reduce the incidence of more materially informed trades by up to 10 percent.

The findings of this paper suggest that board monitoring can complement the existing regulation in mitigating the use of nonpublic information. The implication is that the board of directors can reduce information asymmetry between insiders and outsiders, reduce the abnormal return of insider trades, and reduce the opportunities a firm's insiders have to abuse nonpublic information. This study establishes the oversight of insider trading as part of the board's monitoring role. This study highlights the interaction between external and internal governance mechanisms on insider trading and contributes to the literature about the impact of SOX on corporate governance and insider trading.

This study can be extended by investigating the impact of other governance mechanisms on insider trading by CEOs or other corporate insiders. Furthermore, additional research can investigate why some governance mechanisms are more influential on more materially informed trades while others may be more influential on less materially informed insider trades. Another extension to this study is to investigate the impact internal governance mechanisms have on non-open-market transactions, such as options, gifts, and other grants. Also, the difference in the regulatory environment of industries such as financials and utilities can be explored to study the impact regulation can have on the role of internal governance mechanisms in the trading behavior of insiders. Finally, the suggested extensions can also be applied to insider trades by other types of firms.

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Appendix A
Insider Data Accuracy Levels

This appendix reports Thomson Reuters cleansing criteria. Records with cleansing records equal to "S" and "A" are excluded in the sample.

Cleanse Indicator	Meaning
R	Data verified through the cleansing process.
H	Cleansed with a very high level of confidence.
L	One or more data cleansing actions were undertaken but secondary sources were unavailable for complete verification.
I	Some data elements were improved (inserted or replaced) to make the data usable. In some cases, records with a cleanse indicator of "I" may contain data that could not be verified or were determined to be outside of a reasonable range.
C	A record added to a non-derivative table or a derivative table to correspond with a record on the opposing table.
W	Indicates an improperly reported holdings record on the derivative table. This occurs when the insider reports a holding value in the number of derivatives or number of underlying shares field (and no value was reported for resulting derivatives held).
Y	An as-reported holdings value identified by data cleansing.
S	No cleansing attempted; security does not meet our collection requirements.
A	Numerous data elements were missing or invalid; reasonable assumptions could not be made.

Appendix B
Insider Trading Sample Selection

This table presents the details of data verification and sample selection steps for the sample. Data are for trades by firms' CEOs from January1996 to December 2008. The data are from Thomson Reuters Insider Data database.

Step	Data	Number of excluded records	Number of remained data records	Notes
1	All insider trading by CEOs from 1996 to 2008 from Thomson Reuters Insiders Data database	0	1,138,387	Cleansing codes include R, H, L, I, C, W, Y, S, A (all indicators are included)
2	Exclude records with 'A' and 'S' indicators	27,759	1,110,628	Records with indicators 'A' and 'S' are those records whose validity could not be verified by Thomson Reuters
3	Exclude trades reported on forms 3, 5, and 144	73,425	1,037,203	**Form3** reports initial statement of beneficial ownership for all officers. **Form4** reports changes in an insider's ownership position including any purchase, sale, option grant, option exercise, gift, or any other transaction that causes a change in ownership position. **Form5** reports activities for exempt transactions not required on a Form4 that include small transactions or small transfers within company plans. **Form144** reports an insider's declaration of intention to sell restricted stock and is only required for sellers of restricted stocks. The declared trade may not be executed, however.
4	Exclude records with transaction codes other than P and S	455,876	581,327	P: Open market purchase of non-derivative or derivative security S: Open market sale of non-derivative or derivative security

Appendix C
Breakdown of Cleansing Codes Per Year

This table reports the breakdown of the cleansing indicator per year. The definitions of cleansing indicators are shown in Appendix B. The table below indicates that the proportion of records which could not be verified consistently decreased during the sample period.

Year	R (%)	H(%)	L(%)	I(%)	C(%)	W(%)	Y(%)	S(%)	A(%)
1996	36.47	13.47	7.03	3.68	0.22	0	20.50	0.01	18.62
1997	33.87	18.77	5.92	4.33	0.58	0	33.38	0.02	3.14
1998	41.29	10.92	4.95	8.53	0.46	0	31.00	0.09	2.75
1999	45.45	8.52	6.24	3.46	0.03	0	31.96	2.70	1.64
2000	47.92	8.84	5.22	3.89	0.00	0	29.75	2.73	1.64
2001	51.28	7.62	5.24	3.17	0.00	0	27.69	3.51	1.48
2002	49.44	7.49	3.44	2.24	0.00	0	33.18	3.03	1.18
2003	55.44	6.62	3.89	1.88	0.00	0	29.34	2.39	0.43
2004	59.91	5.83	5.82	1.95	0.00	0	24.11	2.32	0.07
2005	64.88	5.40	4.61	1.54	0.00	0	21.91	1.62	0.03
2006	68.60	4.84	4.50	1.46	0.00	0	19.41	1.16	0.03
2007	68.24	5.99	5.58	1.44	0.00	0	17.31	1.42	0.03
2008	64.26	6.57	5.76	1.18	0.00	0	20.86	1.33	0.03

Appendix D
Variable Definitions

This appendix provides the definitions for the variables used in this study. CEOs' trades are from Thomson Reuters Insider Trading database. Data for the boards of directors are from Risk Metrics. Data for stock prices and firm financial characteristics are from CRSP and Compustat respectively.

Variable	Definition
Insider trades	
Profitability(CAR)	Cumulative Abnormal Return earned during immediate 90 days following a trade
Intensity	The proportion of the number of total shares traded by a CEO in a year to the associated firm's outstanding shares
Proportion	Proportion of the number of traded shares that are estimated to be based on more material nonpublic information, to the number of traded shares that are estimated to be based on less material nonpublic information
Board characteristics	
Board Independence	The proportion of the number of directors with independent status to the board size
Duality	A binary variable that is equal to one when CEO and chairman of the board positions are held by the same individual and zero otherwise
Outside Boards	The average number of board seats in other major companied held by each director on a board
Ownership	Total percentage of control voting power held by firm directors
Control Variables	
Size	Natural logarithm of firm total assets
Book-to-Market Ratio	The proportion of the book value of outstanding shares to the firm market value
Outstanding Shares	The number of common outstanding shares
Liquidity	The proportion of the number of shares traded in a year to the number of common shares outstanding in that year for a firm

Appendix E
Directors Classification

The appendix provides the details of classification of directors, as defined by Risk Metricks.

Classification

Directors can have one of the following board affiliations: Insiders / Employees (E), Affiliated Outsiders / Linked (L), or Independent Outsiders (I). These are defined as follows:

Affiliated Director

- **1.** Inside Director (E)
  - **1.1.** Employee of the company or one of its affiliates (i).
  - **1.2.** Among the five most highly paid individuals (excluding interim CEO).
  - **1.3.** Listed as an officer as defined under Section 16 of the Securities and Exchange Act of 1934 ("Section 16 officer") (ii).
  - **1.4.** Current interim CEO.
  - **1.5.** Beneficial owner of more than 50 percent of the company's voting power (this may be aggregated if voting power is distributed among more than one member of a defined group).
- **2.** Affiliated Outside Director (L)
  - **2.1.** Board Attestation
    - **2.1.1.** Board attestation that an outside director is not independent.
  - **2.2.** Former CEO
    - **2.2.1.** Former CEO of the company (iii,iv).
    - **2.2.2.** Former CEO of an acquired company within the past five years (iv).
    - **2.2.3.** Former interim CEO if the service was longer than 18 months. If the service was between 12 and 18 months an assessment of the interim CEO's employment agreement will be made (v).
  - **2.3.** Non-CEO Executives
    - **2.3.1.** Former Section 16 officer (ii) of the company, an affiliate (i) or an acquired firm within the past five years.
    - **2.3.2.** Section 16 officer (ii) of a former parent or predecessor firm at the time the company was sold or split off from the parent/predecessor within the past five years.
    - **2.3.3.** Section 16 officer (ii), former Section 16 officer, or general or limited partner of a joint venture or partnership with the company.
  - **2.4.** Family Members
    - **2.4.1.** Immediate family member (vi) of a current or former Section 16 officer (ii) of the company or its affiliates (i) within the last five years.
    - **2.4.2.** Immediate family member (vi) of a current employee of company or its affiliates (i) where additional factors raise concern (which may include, but are not limited to, the following: a director related to numerous employees; the company or its affiliates employ relatives of numerous board members; or a non-Section 16 officer in a key strategic role).
  - **2.5.** Transactional, Professional, Financial, and Charitable Relationships

        - **2.5.1.** Currently provides (or an immediate family member (vi) provides) professional services (vii) to the company, to an affiliate (i) of the company or an individual officer of the company or one of its affiliates in excess of $10,000 per year.
        - **2.5.2.** Is (or an immediate family member (vi) is) a partner in, or a controlling shareholder or an employee of, an organization that provides professional services (vii) to the company, to an affiliate of the company, or an individual officer of the company or one of its affiliates in excess of $10,000 per year.
        - **2.5.3.** Has (or an immediate family member(vi) has) any material transactional relationship (viii) with the company or its affiliates (i) (excluding investments in the company through a private placement).
        - **2.5.4.** Is (or an immediate family member (vi) is) a partner in, or a controlling shareholder or an executive officer of, an organization which has any material transactional relationship (viii) with the company or its affiliates (i) (excluding investments in the company through a private placement).
        - **2.5.5.** Is (or an immediate family member (vi) is) a trustee, director, or employee of a charitable or non-profit organization that receives material grants or endowments from the company or its affiliates (i).
    - **2.6.** Other Relationships
        - **2.6.1.** Party to a voting agreement (ix) to vote in line with management on proposals being brought to shareholder vote.
        - **2.6.2.** Has (or an immediate family member (vi) has) an interlocking relationship as defined by the SEC involving members of the board of directors or its Compensation Committee (x).
        - **2.6.3.** Founder (xi) of the company but not currently an employee.
        - **2.6.4.** Any material (xii) relationship with the company.

Independent Outside Director (I)

- **1.** No material (xii) connection to the company other than a board seat.

Appendix F
Director Affiliation Status

This table reports the overall distribution of directors based on their relationship with a firm in the sample. The independent ratio is the proportion of the number of directors with independent status to the total number of directors in a year.

Year	Number of directors	Number of directors with independent status (percent of all directors)	Number of directors with employee status (percent of all directors)	Number of directors with linked or affiliated status (percent of all directors)
1996	14867	8987 (60.45)	3236 (21.76)	2644 (17.78)
1997	15631	9529 (60.97)	3501 (22.40)	2600 (16.63)
1998	17048	10286 (60.34)	3794 (22.25)	2968 (17.41)
1999	17420	10589 (60.83)	3806 (21.85)	3013 (17.29)
2000	16675	10269 (61.58)	3627 (21.75)	2779 (16.66)
2001	16669	10509 (63.05)	3551 (21.30)	2609 (15.65)
2002	13499	8961 (66.38)	2663 (19.72)	1875 (13.89)
2003	13792	9490 (68.81)	2533 (18.36)	1769 (12.83)
2004	13820	9755 (70.59)	2445 (17.69)	1620 (11.72)
2005	13582	9743 (71.75)	2293 (16.88)	1543 (11.36)
2006	13372	9651 (72.17)	2164 (16.18)	1556 (11.64)
2007	13338	10320 (77.37)	2157 (16.17)	852 (6.38)
2008	13754	10733 (78.04)	2159 (15.69)	862 (8.27)

Appendix G
Correlation Matrix

This table shows the correlation between explanatory and control variables used in the models. Significance levels for 1%, 5%, and 10% levels are marked by ***, **, and * respectively.

Panel A. Buy trades

	CAR	Board Independence	Duality	Multiple Directorship	Independent Director Ownership	Size	B/M	Liquidity
CAR	1.0000							
Board Independence	0.0247*	1.0000						
Duality	-0.0020	-0.0627***	1.0000					
Multiple Directorship	-0.0075	0.1895***	0.0050	1.0000				
Director Ownership	0.0345**	0.0854***	-0.0674	0.0292**	1.0000			
Size	-0.0703***	0.0962***	0.1527***	0.1647***	-0.0206	1.0000		
B/M	-0.0079	0.0383***	-0.0426***	-0.0383***	0.0090	0.0002	1.0000	
Liquidity	-0.0027	-0.0286**	0.0097	-0.0154	-0.0034	0.0077	-0.0090*	1.0000

Panel B. Sell trades

	CAR	Board Independence	Duality	Multiple Directorship	Independent Director Ownership	Size	B/M	Liquidity
CAR	1.0000							
Board Independence	0.0162***	1.0000						
Duality	-0.0202***	0.0880***	1.0000					
Multiple Directorship	0.0089	0.1324***	0.0140**	1.0000				
Director Ownership	0.0014	0.0791***	-0.0456***	-0.0051	1.0000			
Size	0.0816***	0.1145***	0.0659***	0.3462***	-0.0306***	1.0000		
B/M	0.0001	0.0407***	-0.0040	-0.0110*	0.0242***	-0.0025	1.0000	
Liquidity	-0.1121***	0.0738***	-0.0606***	-0.0043	-0.0488***	-0.0036	-0.0150***	1.0000

Appendix H

Figures and Tables

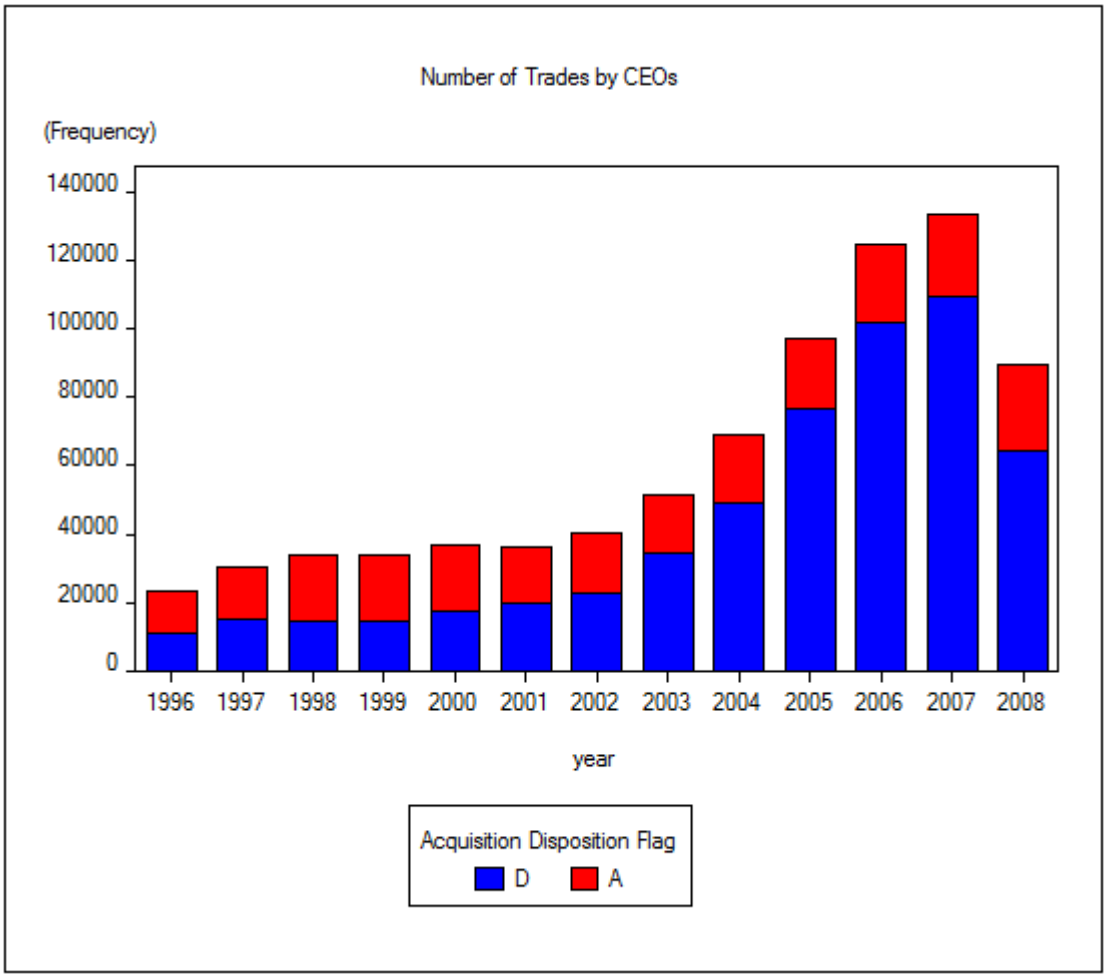

Figure1
Frequency of Buy and Sell Trades by CEOs

This figure shows the trend of the number of transactions for both buy (acquisition) and sell (disposition) trades from 1996 to 2008. Trades flagged as A are buy (acquisition) trades and trades flagged as D are sell (disposition) trades.

Table 1
Breakdown of Insider Trades Based on Transaction Type

This table presents the frequency and percentage of each transaction code in the sample. The sample includes all insider trading transactions by firm CEOs from January 1996 through December 2008 that are reported to the SEC through Form4. The data are from Thomson Reuters Insider database. Records whose validity were not confirmed by Thomson Reuters are excluded from the sample.

Panel A. Transaction type	**Frequency**	**Percent**
General transaction code		
P-Open market or private purchase of non-derivative or derivative security	98,894	17.01
S- Open market or private sell of non-derivative or derivative security	482,433	82.99
V- Transaction voluntarily reported earlier than required	0	0.00

Panel B. Number of distinct firms	Frequency
No. of distinct firms	11,183
No. of distinct firms with buy trades	8,219
No. of distinct firms with sell trades	7,063

Table 2
Trades Summary Statistics

This table presents the summary statistics for the number of shares traded and the size of each individual trade by CEOs reported on Form4 from January 1996 through December 2008. The figures are reported for all trades, buy trades and sell trades separately.

	Mean	25th percentile	Median	75th percentile	Std. dev.
Number of Traded Shares (000s)					
All trades	30.2	0.2	0.8	4.0	1557
Buy trades	81.8	0.5	1.7	5.5	3609
Sell trades	19.6	0.2	0.6	3.3	500
Transaction Volume (000s)					
All trades	9,357	5.5	18.7	76.3	3.5E+6
Buy trades	32,395	2.3	8.5	33.2	8.6E+6
Sell trades	1,540	6.6	21.4	88.7	6.1E+5

Table 3
Breakdown of Trade Volume Based on Year and Sector

This table reports the trade volumes by industry and year. The table is intended to provide a better view of the distribution of buy and sell trades by CEOs in various sectors from January 1996 through December 2008. The reported values are in millions. Sectors are defined by Thomson Reuters.

Panel A. Buy Trades

	Finance	Healthcare	Consumer non durable	Consumer services	Consumer durables	Energy	Transport.	Technology	Basic industries	Capital goods	Public utilities	Misc.	Unclassified	Total
1996	110	44	16	229	13	14	3	81	46	43	28	7	3642	4276
1997	202	76	52	240	8	30	9	75	34	43	39	4	37	849
1998	648	91	63	116	13	282	17	122	32	233	165	8	31	1821
1999	335	349	171	633	115	16	22	114	31	62	95	8	23	1974
2000	223	46	18	593	10	33	14	235	34	39	34	5	38	1322
2001	79	38	11	79	20	40	3	72	9	13	15	0	30	409
2002	2380	37	27	369	7	11	2	97	11	27	29	0	79	3076
2003	247	34	26	126	7	19	1	37	5	163	5	5	28	703
2004	131	37	17	78	6	32	10	57	6	7	3	0	21	405
2005	92	106	8	78	56	156	21	28	58	18	197	0	22	840
2006	126	130	25	140	212	126	5	46	67	12	2	0	19	910
2007	229	214	15	92	14	187	2	73	43	37	3	0	34	943
2008	299	119	28	244	6	404	42	276	42	37	10	0	64	1571
Total	5101	1321	477	3017	487	1350	151	1313	418	734	625	37	4068	19099

Panel B. Sell Trades

	Finance	Healthcare	Consumer non durable	Consumer services	Consumer durables	Energy	Transport.	Technology	Basic industries	Capital goods	Public utilities	Misc.	Unclassified	Total
1996	190	678	234	1532	203	162	133	4643	53	322	11	22	565	8748
1997	619	541	291	1799	124	298	61	2842	166	228	126	14	1054	8163
1998	872	598	357	2885	383	83	126	5125	63	375	185	39	205	11296
1999	1012	649	405	2791	60	847	112	9399	102	443	11788	16	452	28076
2000	556	1566	190	2496	223	486	88	9964	75	504	364	48	327	16887
2001	658	1158	345	2645	172	455	446	3850	100	359	189	7	70	10454
2002	465	797	455	2010	257	115	101	1261	112	162	75	3	637	6450
2003	949	798	933	2109	509	143	101	4302	187	284	60	1	54	10430
2004	1186	1774	847	3239	682	417	183	3286	551	609	204	3	71	13052
2005	1564	1428	630	2456	617	1081	151	4467	735	563	323	2	60	14077
2006	2056	1465	869	5083	256	1475	272	3233	545	883	255	21	49	16462
2007	1762	1438	811	2092	405	915	171	4040	553	1354	396	49	49	14035
2008	1192	865	375	1396	209	1399	195	1754	397	782	222	0	34	8820
Total	13081	13755	6742	32533	4100	7876	2140	58166	3639	6868	14198	225	3627	166950

Table 4
Board and CEO Characteristics

This table presents the summary statistics for board characteristics that influence the board's ability to monitor the CEO's trading activities. In Panel A, Board Independence is the percentage of the number of independent directors to the total board size in a firm. Outside Boards is the average number of major board seats held by independent directors of a firm. Ownership is the combined percentage of stocks controlled by independent directors in a firm. Duality is a binary variable, which is equal to one when CEO and chairman of the board positions are occupied by the same individual and zero otherwise. The mean value for Duality represents the proportion of firms in which CEO and chairman positions are occupied by the same individual. Panel B reports the number of outside boards, stock ownership, and tenure for CEOs who reported at least one buy or sell trade during the sample time period.

	Mean	25th percentile	Median	75th percentile	Std dev
Panel A. Board Characteristics					
Board Independence	66.18	55.55	69.23	80.00	17.77
Outside Boards	0.93	0.33	0.83	1.33	0.72
Ownership	1.32	0	0.0	0.0	5.60
Duality	0.64	-	-	-	-
Panel B. CEO Characteristics					
Outside Board	0.60	0	0	1	0.92
Ownership	4.97	0	1.50	3.80	11.24
Tenure	10.62	4	8	14	28.00

Table 5
Firm Characteristics Summary Statistics

This table reports summary statistics for firms in the sample. The data, which are from Compustat, include firm Size (measured as Total Assets), Number of Common Shares Outstanding, Number of Common Shares Traded, Book-to-Market Ratio (measured as Book Value of Equity divided by Market Value of Equity), and Market Value (measured as the number of outstanding shares multiplied by stock price at the end of firms' fiscal years). Firm characteristics are reported separately for buy and sell trades.

	Mean	25th percentile	Median	75th percentile	Std. dev.
Panel A. Buy Trades					
Size ($Million)	3437	54.76	243.66	882.70	44331
B/M	1.25	0.32	0.61	1.03	63
Common Shares Outstanding,(million)	53.35	7.86	16.77	38.05	295
Annual Common Shares Traded (million)	85.74	3.7	14.1	50.1	483
Market Value ($ million)	1219.98	34.98	114.20	427.25	10871.84
Panel B. Sell Trades					
Size ($ million)	5451.43	135.63	497.14	1948.87	36332
B/M	0.25	0.22	0.38	0.60	10
Common Shares Outstanding,(million)	109.02	13.68	29.86	70.04	391
Annual Common Shares Traded (million)	228.85	15.53	55.82	166.71	765
Market Value ($ million)	4538.82	205.00	672.91	2204.52	17676

Table 6
CEO Insider Trades Abnormal Returns

This table presents the summary statistics for abnormal returns earned by firm CEOs from January 1996 through December 2008. The proportion of trades with favorable return (positive abnormal return for buy trades and negative abnormal returns for sell trades) are reported for each category. Abnormal returns are calculated using the Fama-French 4-Factor model for a 90-day window following each trade. The estimation period for the Fama-French 4-Factor model starts from 250 days before a trade takes place and ends 10 days before the trade. The factors needed for the Fama-French model are obtained from French's Web site (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french). Due to the possibility that trades executed in one day may be reported collectively or separately, only one transaction per day is considered for the statistics.

	N	Mean (%)	25th pct. (%)	Median (%)	75th pct (%)	Std. dev. (%)	No. of trades with positive (negative) CAR for buy (sell) trades (% of total trades)
Buy	41,710	14.66***	-11.63	9.46	36.54	59.62	25,685 (61.57%)
Sell	83,083	-6.05***	-27.08	-6.08	14.51	54.47	49,167 (59.18%)

Table 7
Test of Equality of CAR Means Based on Size and B/M Ratio

This table presents the test of equality of means for large versus small firms and value versus growth firms. Median value for size and the B/M ratio of the firms in the sample are the cutoff values for the categorization. Size is measured as the value of total assets, and the B/M ratio is measured as the book value of equity to market value of equity. Only one trade per distinct date is considered for this table. T-statistics and corresponding p-value for the test of mean equality is also reported.

	Larger firms (>median Size)	Smaller firms (<median Size)	T-Stat (p-value)	Value firms (> median B/M)	Growth firms (<median B/M)	T-Stat (p-value)
Buy trades	0.1323	0.1866	4.5603	0.1835	0.1473	2.9615
	(0.3881)	(0.8717)	(0.0001)	(0.4342)	(0.8089)	(0.0031)
	(# of obs.: 6292)	(# of obs.: 7168)		(# of obs.: 5165)	(# of obs.: 8295)	
Sell trades	-0.0612	-0.1543	12.3334	-0.0541	-0.1073	5.5971(0.0001)
	(0.3617)	(0.6037)	(0.0001)	(0.4054)	(0.4866)	
	(# of obs.: 10002)	(# of obs.:. 6368)		(# of obs.: 3035)	(# of obs.: 13335)	

Table 8
Internal Corporate Governance and Abnormal Return of Insider Trades

This table presents the results for the OLS regression of equation (5). The dependent variable is the CAR over a 90-day window following each trade by CEOs from January 1996 through December 2008. Abnormal returns are calculated through the Fama-French 4-factor model. Explanatory variables include Board Independence, measured as the proportion of the number of independent directors to entire board size; Duality, a binary variable that is equal to one when the CEO and chairman of the board are the same individual and zero otherwise; Multiple Directorship, measured as the average number of outside directorships held by each independent director on the board; and Director Ownership, measured as the total percentage of shares held by independent directors on a board to the number of the firm's outstanding shares. Control variables are Size, as the natural logarithm of total assets, the B/M ratio, as the book to market value of the equity, and Liquidity, as the proportion of annual traded shares to the number of shares outstanding in the firm. SOX is a binary variable, which is equal to one if the transaction date is after the SOX implementation date and zero otherwise.

	Buy	Buy	Buy	Buy	Buy	Sell	Sell	Sell	Sell	Sell
Constant	94.0424***	62.8166***	92.2203***	86.5457***	74.1479***	-9.4761***	-7.3634***	-8.8166**	-25.2970***	-13.8157***
	(24.4329)	(24.4036)	(24.4175)	(8.8959)	(9.5459)	(2.7073)	(2.6676)	(2.7751)	(3.5391)	(3.8345)
Board Independence	0.0110				0.0222	0.0350***				0.0232*
	(0.0279)				(0.0308)	(0.0104)				(0.0134)
Duality		1.2698			0.8423		-0.6271*			-0.4309*
		(1.0597)			(1.1593)		(0.3469)			(0.3444)
Multiple Directorship			-1.1693*		-1.3757*			-0.4157		-0.9874***
			(0.7157)		(0.7847)			(0.2651)		(0.3436)
Directors Ownership				0.2026**	0.1966*				-0.1538***	-0.1479***
				(0.0983)	(0.1012)				(0.0339)	(0.0332)
Size	-2.4302***	-2.3363***	-2.2238***	-2.8778***	-2.6398***	0.3643***	0.3450***	0.4494***	0.5197***	0.7049***
	(0.3039)	(0.3651)	(0.3743)	(0.4017)	(0.4319)	(0.1127)	(0.1134)	(0.1237)	(0.1467)	(0.1636)
B/M Ratio	-0.3336***	-0.3311***	-0.3351***	-0.3342***	-0.3375***	-0.5374***	-0.5322***	-0.5395***	-0.3995**	-0.3633**
	(0.0735)	(0.0735)	(0.0735)	(0.0759)	(0.0757)	(0.1561)	(0.1565)	(0.1562)	(0.1726)	(0.1724)
Liquidity	1.2746***	1.2396***	1.2716***	1.6139***	1.5819***	-1.0571***	-1.0156***	-1.0442***	-0.9168***	-0.8835***
	(0.3039)	(0.3102)	(0.3039)	(0.3428)	(0.3468)	(0.0680)	(0.0683)	(0.0679)	(0.0827)	(0.0830)
SOX	-67.1815***	-47.9311***	-67.5885***	-40.3673***	-41.4710***	22.0411***	11.7936***	22.5979***	17.4567***	12.7233***
	(3.2934)	(3.1478)	(3.1028)	(5.3064)	(5.3716)	(0.9032)	(0.8675)	(0.8872)	(1.1770)	(1.2891)
Observations	4,791	4,609	4,791	4,276	4,136	27,390	26,907	27,390	19,617	19,239

R-Square	0.2730	0.2767	0.2734	0.2429	0.2505	0.3513	0.3509	0.3511	0.3012	0.3057
Prob. >F Stat.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Significant at 1% (***), 5% (**), and 10% (*) levels.

Table 9
Impacts of SOX on the Effectiveness of Internal Governance Mechanisms

This table presents the influence of SOX on the relation between internal governance mechanisms and abnormal return of CEOs' insider trading from January 1996 through December 2008 through an OLS regression of equation (6). The dependent variable is the CAR over a 90-day window following each trade. Abnormal returns are calculated by the Fama-French 4-factor model. Explanatory variables are board independence, measured as the proportion of number of independent directors to entire board size; Duality, a binary variable which is equal to one when the CEO and chairman of the board are the same individual; Multiple Directorship, measured as average number of outside directorships by independent directors; and Director Ownership as the total stock ownership (as a percent of outstanding shares) by independent directors. Size is measured as a natural logarithm of total assets; the B/M ratio is the book to market value of equity; and Liquidity is the proportion of annual traded shares to total number of share outstanding. SOX is equal to one if transaction date is after SOX implementation date and zero otherwise. Interactive variables between regulation variables (SOX) and the internal governance measures represent the change in impact of the governance mechanisms due to SOX.

	Buy	Buy	Buy	Buy	Sell	Sell	Sell	Sell
Constant	69.0089***	63.3303***	92.5445***	86.3808***	-8.6831***	-9.3929**	-24.8420***	-24.5839***
	(25.1914)	(24.3879)	(24.4267)	(8.8944)	(2.8309)	(2.7012)	(2.8130)	(3.5362)
Independence	0.0089				0.0262*			
	(0.0302)				(0.0138)			
Duality		-0.6833				2.5806		
		(1.2853)				(0.5407)		
Multiple Directorship			1.0957*				-1.4885***	
			(0.6120)				(0.3566)	
Ownership				0.2935***				-0.4263***
				(0.1117)				(0.0517)
Size	-2.4315***	-2.3720***	-2.2515***	-2.8826***	0.3532***	0.3711***	0.4459**	0.4878***
	(0.3548)	(0.3652)	(0.3779)	(0.4016)	(0.1133)	(0.1134)	(0.1237)	(0.1466)
B/M Ratio	-0.3335***	-0.3382***	-0.3361***	-0.3335***	-0.5354***	-0.5087***	-0.5292***	-0.3872**
	(0.0735)	(0.0735)	(0.0735)	(0.0780)	(0.1561)	(0.1565)	(0.1561)	(0.1723)
Liquidity	1.2737***	1.2082***	1.2701***	1.7040***	-1.0575***	-1.0160***	-1.0442***	-0.9156***
	(0.3040)	(0.3102)	(0.3039)	(0.3468)	(0.0680)	(0.0682)	(0.0679)	(0.0826)
SOX		-51.4377***	-68.1172***	-39.6351***		13.8986***	37.6954***	14.3010***
		(3.4067)	(3.2543)	(5.3224)		(0.9756)	(1.0042)	(1.1842)

SOX * Independence	0.0131 (0.0747)				-0.0034* (0.0189)			
SOX * Duality		5.8830** (2.1954)				-3.2937*** (0.6995)		
SOX * Multiple Directors			0.9019 (1.6733)				2.1662*** (0.4817)	
SOX * Ownership				-0.4091* (0.2387)				0.4774*** (0.0683)
Observations	4,791	4,609	4,791	4,276	27,390	26,907	27,390	19,617
R-Square	0.2730	0.2779	0.2734	0.2435	0.3513	0.3515	0.3516	0.3030
Prob.>F Stat.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Significant at 1% (***), 5% (**), and 10% (*) levels.

Table 10
Impacts of SOX on the Effectiveness of Internal Governance Mechanisms by Separate Regressions

This table presents the influence of SOX on the relationship between internal governance mechanisms and abnormal return of CEOs' insider trading from January 1996 through December 2008 through an OLS regression of equation (6) separately for before- and after-SOX eras. The dependent variable is the CAR over a 90-day window following each trade. Abnormal returns are calculated by the Fama-French 4-factor model. Explanatory variables are board independence, measured as the proportion of the number of independent directors to entire board size; Duality, a binary variable which is equal to one when the CEO and chairman of the board are the same individual; Multiple Directorship, measured as average number of outside directorships by independent directors; and Director Ownership, as the total stock ownership (as a percent of outstanding shares) by independent directors. Size is measured as natural logarithm of total assets, the B/M ratio is the book to market value of equity and Liquidity is the proportion of annual traded shares to total number of share outstanding. T-stat and corresponding p-value show the result for the test of equality of variables of interest for before- and after-SOX periods.

	Pre-SOX buy	Post-SOX buy	t-test (p-value)	Pre-SOX sell	Post-SOX sell	t-test (p-value)
Constant	70.8579*** (11.0057)	36.4776* (20.8813)		-0.4146 (5.7663)	-51.2317*** (4.6426)	
Board Independence	0.0124 (0.0332)	0.1616 (0.1134)	1.08 (0.2816)	0.0271** (0.0133)	0.0181* (0.0104)	0.54 (0.5913)
Duality	0.0358 (1.3716)	4.4379** (2.1217)	1.94 (0.0528)	0.7057 (0.6966)	-2.454*** (0.5195)	-2.91 (0.0036)
Multiple Directorship	1.3229* (0.6014)	-1.5652 (1.9833)	-0.42 (0.6714)	-1.3361*** (0.4830)	-0.1330 (0.4613)	3.62 (0.0003)
Directors ownership	0.2559** (0.1201)	-0.0031 (0.2084)	-1.13 (0.2601)	-0.4269*** (0.0602)	0.1127*** (0.0348)	0.4627 (0.0688)
Size	-2.7594*** (0.5106)	-1.2115 (0.8175)		0.0958 (0.2446)	1.5734*** (0.1977)	
B/M Ratio	-0.3293*** (0.0779)	0.9557 (1.6546)		-1.5870* (0.2003)	-4.1727*** (0.8993)	
Liquidity	1.7707*** (0.4542)	0.5040 (0.5881)		-1.1807*** (0.1169)	-0.1282 (0.1154)	
Observations	3196	940		10,973	8,266	
R-Square	0.2451	0.3106		0.2757	0.3833	
Prob > F	0.0000	0.0000		0.0000	0.0000	

Significant at 1% (***), 5% (**), and 10% (*) levels.

Table 11
Internal Corporate Governance and Significance of Underlying Information

This table presents the influence of SOX on the relationship between internal governance mechanisms and abnormal return of CEOs' insider trading from January 1996 through December 2008 through equation (6) OLS regression. The sample for this regression includes buy trades with positive abnormal return and sell trades with negative abnormal return. The dependent variable is the CAR over a 90-day window following each trade. Abnormal returns are calculated by the Fama-French 4-factor model. Explanatory variables include board independence, measured as the proportion of the number of independent directors to entire board size; Duality, a binary variable which is equal to one when the CEO and chairman of the board are the same individual and zero otherwise; Multiple Directorship, measured as the average number of outside directorships held by each director; and Director Ownership, measured as the total percentage of stocks held by independent directors. Control variables include Size, as the natural logarithm of total assets; the B/M ratio, as the book value of equity to the market value of equity; and Liquidity, as the proportion of annual traded shares to share outstanding. SOX is a binary variable equal to one if transaction date is after the SOX implementation date and zero otherwise. Interactive variables between regulation variables (SOX) and internal governance measures represent the change in the impact of governance mechanisms due to SOX.

	Buy	Buy	Buy	Buy	Sell	Sell	Sell	Sell
Constant	104.977***	99.0128***	99.3181***	127.8165***	-32.7623***	-34.3411***	-41.5817***	-43.7687***
	(9.0675)	(9.0875)	(9.2788)	(9.3589)	(2.6084)	(2.51157)	(2.5704)	(3.4966)
Independence	-0.0393*				0.0487***			
	(0.0247)				(0.0130)			
Duality		-0.7816				-0.2122		
		(1.3535)				(0.5363)		
Multiple Directorship			-0.6390				0.3240	
			(0.8168)				(0.3488)	
Ownership				0.2614**				-02853***
				(0.1090)				(0.0424)
Size	-3.6578***	-3.5501***	-3.4576***	-4.1831***	-0.8766***	0.8616***	0.7498***	1.0210***
	(0.3996)	(0.4068)	(0.4233)	(0.4246)	(0.1011)	(0.1010)	(0.1094)	(0.1439)

B/M Ratio	-0.2051** (0.0651)	-0.2170** (0.0651)	-0.2123** (0.0651)	-0.2078** (0.0673)	-0.0611*** (0.1059)	-0.0470 (0.1081)	-0.0506 (0.1081)	-0.0388 (0.1202)
Liquidity	2.7124*** (0.3084)	2.6572*** (0.3266)	2.7328*** (0.3185)	3.1510*** (0.3495)	-1.1341*** (0.0614)	-1.2645*** (0.0612)	-1.3020*** (0.0614)	-1.1790*** (0.0748)
SOX	-38.851*** (10.1290)	-36.2215*** (8.2524)	-29.6310*** (5.0534)	-25.3625*** (14.0457)		5.0215*** (1.2084)	9.9638*** (0.8909)	11.7873*** (1.2750)
SOX * Independence	0.0531* (0.366)				-0.0143* (0.0081)			
SOX * Duality		4.3875** (2.3874)				-0.9338* (0.4877)		
SOX * Multiple Directorship			-1.8029 (1.8113)				0.5780* (0.2019)	
SOX * Ownership				-0.3371 (0.2531)				0.2931*** (0.0602)
Observations	3,217	3,089	3,217	2,982	15,520	15,207	15,520	9,456
R-Square	0.1917	0.2015	0.1915	0.1902	0.1819	0.1811	0.1813	0.1946
Prob.> F Stat.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Significant at 1% (***), 5% (**), and 10% (*) levels.

Table 12
Internal Corporate Governance and Materiality of Underlying Information by Separate Regressions

This table presents the influence of SOX and financial regulation on the relationship between internal governance mechanisms and abnormal return of CEOs' insider trading from January 1996 through December 2008 through an OLS regression of equation (6). The dependent variable is the CAR over a 90-day window following each trade. Abnormal returns are calculated by a Fama-French 4-factor model. Explanatory variables include board independence, measured as the proportion of independent directors to entire board size; Duality, a binary variable which is equal to one when the CEO and chairman of the board are the same individual; Multiple Directorship, measured as average outside directorships held by each director; and Director Ownership as the total share ownership by independent directors. Control variables include Size, as the natural logarithm of total assets; the B/M ratio, as the book value of equity to the market value of equity; and Liquidity, as the proportion of annual traded shares to shares outstanding. To test a hypothesis of equality of results coefficients for internal governance mechanisms, a t-test is used and the results for the t-test and correspondent p-value are reported.

	Pre-SOX buy	Post-SOX buy	t-test (p-value)	Pre-SOX sell	Post-SOX sell	t-test (p-value)
Constant	121.3837*** (11.8172)	36.9256* (20.8222)		-39.6562*** (6.1090)	-30.3165*** (4.486)	
Board Independence	-0.0467* (0.0236)	0.2681*** (0.1014)	1.99 (0.0462)	0.0485** (0.0191)	0.0297* (0.0162)	-2.40 (0.0163)
Duality	-0.3341 (1.4082)	3.6361* (2.1962)	1.78 (0.0745)	-1.2173* (0.7455)	-0.9953* (0.4449)	-0.10 (0.9178)
Multiple Directorship	-0.2610 (0.8831)	-5.0995** (2.0592)	-1.85 (0.0643)	0.1922 (0.5106)	1.3701*** (0.3901)	2.16 (0.0312)
Directors Ownership	0.2242* (0.1170)	0.0273 (0.2322)	-0.73 (0.4651)	-0.3042*** (0.0532)	0.0252 (0.0313)	5.14 (0.0001)
Size	-4.3302 (0.5449)	-3.4166*** (0.8425)		0.9698*** (0.2548)	0.9118*** (0.1707)	
B/M Ratio	-0.2190*** (0.0674)	-0.8713 (1.7064)		-0.0265 (0.1467)	-1.7079* (0.8545)	
Liquidity	2.8801*** (0.4460)	2.4031 (0.6185)		-1.16663 (0.1155)	-1.2355*** (0.1041)	
Observations	2,173	699		4,930	4,273	
R-Square	0.2247	0.1919		0.1511	0.2293	
Prob. > F	0.0000	0.0000		0.0000	0.0000	

Significant at 1% (***), 5% (**), and 10% (*) levels.

Table 13
Intensity of Insider Trades and Internal Governance Mechanisms

This table presents the relationship between the internal governance mechanisms and the intensity of trades by the CEOs by running an OLS regression on equation (7) on the full sample. Intensity is the natural logarithm of the proportion of total shares traded by a CEO in a year to the number of firm's outstanding shares. Explanatory variables include Board Independence, measured as the proportion of the number of independent directors to entire board size; Duality, a binary variable which is equal to one when the CEO and chairman of the board are the same individual and zero otherwise; Multiple Directorship, measured as the average number of outside directorships held by each director; and Director Ownership, measured as the total percentage of stocks held by independent directors. Control variables include Size, as the natural logarithm of total assets; the B/M ratio, as the book value of equity to the market value of equity; and Liquidity, as the proportion of annual traded shares to share outstanding. SOX is a binary variable equal to one if transaction date is after the SOX implementation date and zero otherwise. Interactive variables between regulation variables (SOX) and internal governance measures represent the change in impact of governance mechanisms due to SOX.

	Buy	Buy	Buy	Buy	Buy	Sell	Sell	Sell	Sell	Sell
Constant	8.6574***	8.1517***	7.5199***	7.2570***	7.5879***	8.2415***	8.0848***	7.3594***	7.5044***	7.3476***
	(0.7790)	(0.7760)	(0.7926)	(0.7922)	(0.8661)	(0.3803)	(0.3552)	(0.3829)	(0.3733)	(0.4325)
Independence	-0.0139***				-0.0113***	-0.0130***				-0.0085***
	(0.0030)				(0.0033)	(0.0019)				(0.0021)
Duality		0.4235***			0.4093***		0.3627***			0.4032***
		(0.1194)			(0.1193)		(0.0745)			(0.0748)
Multiple Directors			-0.0588		0.0143			-0.3342***		-0.2302***
			(0.0893)		(0.0924)			(0.0566)		(0.0599)
Directors Ownership				0.0079***	0.0063**				0.0119***	0.0090***
				(0.0025)	(0.0028)				(0.0016)	(0.0017)
Size	-0.5697***	-0.6003***	-0.5395***	-0.5501***	-0.5415***	-0.4843***	-0.5079***	-0.4467***	-0.4645***	-0.4352***
	(0.0301)	(0.0309)	(0.0332)	(0.0316)	(0.0355)	(0.0153)	(0.0153)	(0.0174)	(0.0163)	(0.0185)
B/M	-0.0137	-0.0139	-0.0143	-0.0149	0.0131	-0.0195*	-0.0197**	-0.0202**	-0.0198**	-0.0191*
	(0.0115)	(0.0115)	(0.0115)	(0.0115)	(0.0114)	(0.0100)	(0.0099)	(0.0100)	(0.0100)	(0.0099)

Liquidity	0.1769***	0.1648***	0.1792***	0.1818***	0.1718***	0.0988***	0.0938***	0.0955***	0.1019***	0.0986***
	(0.0269)	(0.0277)	(0.0270)	(0.0281)	(0.0284)	(0.0102)	(0.0102)	(0.0101)	(0.0104)	(0.0104)
SOX	-0.4481	-0.1732	-0.3359	0.2275			0.2266*		0.4047***	-0.3685
	(0.4989)	(0.2722)	(0.2649)	(0.2743)			(0.1271)		(0.1105)	(0.2492)
SOX * Independence	0.0010				-0.0006	0.0112***				0.0071**
	(0.0062)				(0.0076)	(0.0028)				(0.0032)
SOX * Duality		0.0782			0.0907		0.1087			0.1010
		(0.1846)			(0.1935)		(0.0934)			(0.0969)
SOX * Multiple Directorship			-0.1023		-0.1114			0.1562**		0.0641
			(0.1601)		(0.1775)			(0.0719)		(0.0801)
SOX * Ownership				0.0036	0.0017				-0.0119***	-0.0087***
				(0.0053)	(0.0059)				(0.0016)	(0.0017)
Observations	2,064	2,018	2,069	1,964	1,911	5,475	5,399	5,484	4,978	4,889
R-Square	0.2718	0.2745	0.2687	0.2445	0.2704	0.2357	0.2422	0.2350	0.2301	0.2508
Prob. > F Stat.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Significant at 1% (***), 5% (**), and 10% (*) levels.

Table 14
Intensity of Insider Trades and Internal Governance Mechanisms by Separate Regressions

This table presents the relationship between the internal governance mechanisms and the intensity of trades by the CEOs through running an OLS regression on equation (7) on the full sample. Intensity is the natural logarithm of the proportion of total shares traded by a CEO in a year to the number of firm's outstanding shares. Explanatory variables include Board Independence, measured as the proportion of the number of independent directors to entire board size; Duality, a binary variable which is equal to one when the CEO and chairman of the board are the same individual and zero otherwise; Multiple Directorship, measured as the average number of outside directorships held by each director; and Director Ownership, measured as the total percentage of stocks held by independent directors. Control variables include Size, as the natural logarithm of total assets; the B/M ratio, as the book value of equity to the market value of equity; and Liquidity, as the proportion of annual traded shares to share outstanding.

	Pre-SOX buy	Post-SOX buy	T-test (p-value)	Pre-SOX sell	Post-SOX sell	T-test (p-value)
Constant	9.3299*** (0.7288)	5.6806*** (1.1313)		7.9243*** (0.5144)	7.3198*** (0.5748)	
Independence	-0.0161*** (0.0029)	-0.0110* (0.0067)	0.92 (0.3573)	-0.0126*** (0.0020)	-0.0047* (0.0029)	2.20 (0.0279)
Duality	0.4458*** (0.1207)	0.3159* (0.1641)	-0.33 (0.7402)	0.4295*** (0.0778)	0.4729*** (0.0797)	0.41 (0.6822)
Multiple Directorship	-0.0262 (0.0703)	-0.1174 (0.1458)	-0.32 (0.7473)	-0.1868*** (0.0489)	-0.1362** (0.0684)	0.82 (0.4114)
Director Ownership	0.0028 (0.0091)	0.0041 (0.0168)	-0.28 (0.7762)	0.0035 (0.0078)	0.0066 (0.0065)	0.31 (0.7600)
Size	-0.6091*** (0.0347)	-0.4619*** (0.0510)		-0.4598*** (0.0244)	-0.4443*** (0.0266)	
B/M	-0.0175 (0.0118)	0.4207*** (0.1129)		0.0174* (0.0104)	-0.0828 (0.1163)	
Liquidity	0.1459*** (0.0378)	0.1723*** (0.0386)		0.0862*** (0.0132)	0.0897*** (0.0181)	
Observations	1242	472		2152	1647	
R-Square	0.2619	0.2202		0.2541	0.2147	
Prob. > F Stat.	0.0000	0.0000		0.0000	0.0000	

Significant at 1% (***), 5% (**), and 10% (*) levels.

Table 15
Corporate Governance and Level of Trades Underlying Nonpublic Information

This table presents the impact of internal governance mechanisms on the proportion of trades with more significant underlying nonpublic information. The following are the results of the OLS regression of equation (8) in which the dependent variable is the proportion of the total number of shares traded with more significant nonpublic information in a year to all shares traded by the CEO in that year. Interactive variables between SOX and board characteristics show the change in the effectiveness of those characteristics due to SOX.

	Buy	Buy	Sell	Sell
Constant	121.9453*** (16.7478)	99.9436*** (17.0296)	103.27*** (10.7611)	35.9603*** (12.6323)
Board Independence	-0.0456 (0.0546)	-0.0439 (0.0546)	-0.04447*** (0.0015)	-0.0520*** (0.0040)
Duality	2.1501 (1.9360)	0.9318 (2.2875)	-0.0540 (1.2192)	-1.1876 (1.6340)
Multiple Directorship	0.1786 (1.3202)	0.1268 (1.3806)	-0.0287 (0.1163)	0.0856 (0.1756)
Directors Ownership	-0.0666 (1.3014)	0.3081* (0.1759)	-0.3927 (0.8538)	-0.4020 (1.1017)
Size	-1.2567* (0.7017)	-1.2292 (0.7049)	-1.0604** (0.4769)	-1.0598** (0.4775)
B/M	-0.1430 (0.2267)	-0.1492 (0.2269)	-0.0681* (0.2323)	-0.0723 (0.2338)
Liquidity	0.1790 (0.6007)	0.1792 (0.5939)	0.8201*** (0.2644)	0.8106*** (0.2665)
SOX	-61.0118*** (0.5922)	-40.1886*** (8.0824)	-55.9375*** (2.7679)	-50.0531*** (3.6235)
SOX * Independence		-0.0224 (0.1624)		0.0167*** (0.0123)
SOX * Duality		6.6022 (4.2682)		2.0786 (2.5864)
SOX * Multiple Directorship		-1.4975 (3.3911)		0.0348 (1.8514)
SOX * Ownership		-0.2782 (0.4040)		-0.2029 (0.2330)
Observations	1,763	1,763	3,794	3,794
R-Square	0.2141	0.2234	0.3508	0.3511

Significant at 1% (***), 5% (**), and 10% (*) levels.

Table 16
Corporate Governance and Proportion of Trades with Different Levels of Underlying Nonpublic Information by Separate Regression

This table presents the impact of the internal governance mechanisms on the trades with different significance (materiality) levels of underlying nonpublic information. The results are obtained through regression of equation (8) separately for before- and after-SOX eras for buy and sell trades. Dependent variable is the proportion of the total number of shares traded with more material nonpublic information in a year to all shares traded by the CEO in that year. The explanatory and controlling variables are as explained in the text and prior tables.

	Pre-SOX buy	Post-SOX buy	T-test (p-value)	Pre-SOX sell	Post-SOX sell	T-test (p-value)
Constant	69.2991*** (19.9475)	87.5055*** (31.6108)		61.9853*** (12.9266)	21.7919 (17.2078)	
Independence	0.0430 (0.0627)	0.0565 (0.1414)	0.20 (0.8453)	-0.05824** (0.0209)	-0.03475* (0.0212)	-2.79 (0.0063)
Duality	-1.3227 (2.4568)	4.8003 (3.4343)	1.53 (0.1255)	-1.1005 (1.8439)	0.8042 (1.5151)	0.77 (0.3928)
Multiple Directorship	-0.8400 (1.4914)	0.7559 (3.2327)	0.42 (0.6772)	0.1601 (1.7556)	-0.8009 (1.0412)	0.05 (0.8643)
Director Ownership	0.2244 (0.1861)	0.4237 (0.3409)	0.39 (0.6971)	0.1481 (0.1871)	-0.2019 (0.1865)	-0.45 (0.2878)
Size	-0.4608 (0.8785)	-0.4702 (1.2938)		-1.5227** (0.6019)	-0.4834 (0.7535)	
B/M	-0.1723 (0.2394)	2.9859 (2.4338)		-0.1030 (0.2396)	7.003 (2.2372)	
Liquidity	0.4119 (0.8357)	-0.7229 (0.8536)		1.0031*** (0.3407)	0.2543 (0.5131)	
Observations	1241	471		2148	1646	
R-Square	0.1854	0.3454		0.3467	0.3799	
Prob. > F Stat.	0.0001	0.0001		0.0001	0.0001	

Significant at 1% (***), 5% (**), and 10% (*) levels.

Table 17
Test of Endogeneity

This table shows the results for the test of a potential endogeneity (in the form of reverse causality) on the observed relationship between strength of internal governance mechanisms and incidence of CEOs' informed insider trading. To rule out the possibility that the relationship is due to the influence of CEOs on the boards monitoring ability, rather than the hypothesized impact of board monitoring on trading behavior of CEOs, the relationship is reexamined by using a subsample of trades that are conducted by CEOs who are less likely to influence their affiliated firms' board of directors due to their short tenures as CEO. The subsample, includes all trades by the CEOs whose tenure is equal to or shorter than two years at the time of the trade. Equation (8) is regressed for the subsample, where, as in tables 15 and 16, the independent variable is the proportion of the number of shares traded in significantly informed trades by a CEO to the total number of shares traded by the CEO within a year. Explanatory, control and interactive variables are similar to those in previous tables.

	Buy	Buy	Sell	Sell
Constant	0.0996 (0.2352)	0.0802 (0.2261)	0.8088*** (0.1957)	0.8331*** (0.1948)
Independence	-0.0004 (0.0007)	-0.0005 (0.0007)	-0.0012* (0.0006)	-0.0018** (0.0007)
Duality	0.0409 (0.0261)	0.0561* (0.0296)	0.0691*** (0.0215)	0.0787*** (0.0260)
Multiple Directorship	0.0472** (0.0182)	0.0537*** (0.0194)	-0.0100 (0.0141)	-0.0098 (0.0163)
Director Ownership	0.0011 (0.0015)	0.0015 (0.0017)	-0.0001 (0.0021)	-0.0018 (0.0035)
Size		-0.0053 (0.0088)	-0.0376*** (0.0070)	-0.0379*** (0.0070)
B/M	0.0605* (0.0360)	0.0018 (0.0052)	-0.0096 (0.0311)	-.0091 (0.0312)
Liquidity	0.0078 (0.0082)	0.0091 (0.0087)	0.0245*** (0.0044)	0.0251*** (0.0044)
SOX	-0.0666 (0.1080)	0.0098 (0.1974)	0.0157 (0.0598)	-0.1666 (0.1119)
SOX * Independence		0.0005 (0.0023)		0.0024* (0.0013)
SOX * Duality		-0.0592 (0.0643)		-0.0407 (0.0452)
SOX * Busyness		-0.0355 (0.0508)		0.0046 (0.0306)
SOX * Ownership		-0.0010 (0.0038)		0.0022 (0.0043)
Observations	406	406	357	357
R-Square	0.2629	0.3540	0.3053	0.3144

Significant at 1% (***), 5% (**), and 10% (*) levels.

Vita

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