Taking Advantage of Transparency: the Relation between Public Information Transparency and Outside Director Trading Profitability

by

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“Not only so, but we also rejoice in our sufferings, because we know that suffering produces perseverance; perseverance, character; and character, hope. And hope does not disappoint us, because God has poured out his love into our hearts by the Holy Spirit, whom he has given us.”

Romans 5:3-5

DEDICATION

To my parents—my achievements today are so minor compared to your continuous support all these years. Yet I know you've never meant for me to make such a comparison—all you want is for me to be happy, and I hereby assure you: happy I will be.

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ABSTRACT

This paper studies the relation between the transparency of a firm's public information environment and the insider trading profitability of its outside directors. I compare the same outside director's trading returns at different firms with different levels of public information transparency, and find that the same director makes higher purchase returns at firms with more transparent public information. Additional tests indicate that these findings are unlikely to be a result of variations in outside directors' private information sets, or these directors' litigation risks. Transparent public information thus appears to assist outside directors in forming their information sets and increasing their informational advantage over investors.

CHAPTER 1

INTRODUCTION

How does the transparency of a firm's public information environment affect the insider trading profitability of its outside directors? At first glance, it seems that transparent public information improves the information sets of investors and therefore should reduce outside directors' trading profitability, as it does to the trading profitability of managers and inside directors (hereafter "pure insiders") found by prior literature (Frankel and Li, 2004).[1] However, this conjecture relies on the implicit assumption that outside directors' informational advantage comes solely from their access to nonpublic information. Yet the validity of this assumption has not been tested: despite the robust evidence on the *existence* of corporate insiders' (including outside directors') informational advantage (e.g., Seyhun,1986, 1992; Ravina and Sapienza, 2010), the *source* of such advantage remains largely unexplored. In this paper, I take up this task and investigate whether transparent public information can assist outside directors in forming their information sets and increase their insider trading profitability.

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[1] I follow Bushman et al. (2004) and define the transparency (opacity) of a firm's information environment as the "availability (unavailability) of firm-specific information to those outside publicly traded firms." See also Maffett (2012). Accordingly, "public information" refers to information that is available to parties outside the firm and "private information" (or "internal information") refers to information that can only be acquired via channels unavailable to those outside the firm. Note that the term "private information" has been used differently in prior literature: it refers to information possessed by an insider or informed trader that is superior to that possessed by uninformed traders. Although the informed trader's *overall information signal* is not observable by uninformed traders (and therefore "private"), public information could contribute to the forming of that information signal (Kim and Verrecchia, 1994, 1997). In other words, the source of the informed trader's signal does not have to be nonpublic. In this paper, I use terms such as "outside director's information sets" or "outside director's superior information" to refer to the *overall* information signal possessed by the outside director that is not observable to investors (i.e. "private information" that is used by prior literature). See Chapter 2 for more discussion.

Transparent public information could improve the information sets of outside directors and increase their informational advantage in two ways. First, it can serve as a foundation for outside directors to gather and/or process more private information. Public information such as analyst reports provide a broad and comprehensive summary about a firm's operation, performance and valuation (Asquith et al. 2005). Lacking direct involvement in their firms' daily operation, outside directors often need such information as a starting point to further acquire and/or process more detailed and/or specific private information. This is very different from pure insiders: the latter's deep involvement in managing and operating the firm enables them to gain extensive firm-specific knowledge and therefore, they are less likely to refer to public information. Second, outside directors' opportunities to acquire information from nonpublic channels could enable them to better interpret public information than pure outsiders do (Kim and Verrecchia, 1994). This is because their private knowledge about their firms provides them with a context or background to the information that is publicly available. In other words, public information combined with the outside directors' private knowledge generates new information sets that are superior to the information sets of pure outsiders.[2] In short, the unique position of outside directors makes it possible for information from public and private channels to complement each other; an informational advantage of outside directors can thus arise in a transparent public information environment.

[2] Private knowledge about the firm also allows pure insiders to better process public information than investors do. However, this complementary effect between public and private information may not translate into higher trading profitability for pure insiders for two reasons. First, pure insiders have a higher chance to acquire private information that could be superior to the information signals generated from processing public information (Verrecchia, 1982; Diamond, 1985; Kim and Verrecchia, 1997). Therefore, the transparency of a firm's public information environment is less likely to have an impact on the information set of a pure insider than on that of an outside director. Second, even when pure insiders generate informational advantage by acquiring private information *and* processing public information, the effect of public information transparency on the trading profitability for these two channels are confounding: *ceteris paribus*, it decreases trading profitability for the former channel and increases trading profitability for the latter. Thus, the more private information an insider acquires, the more likely that the former effect dominates and public information transparency reduces trading profitability.

Although transparent public information is more likely to improve the information sets of outside directors' than to improve those of pure insiders', it is also possible that the public information environment of a firm is irrelevant to the quality of information that outside directors possess. This is likely to occur when information from private channels subsumes or supplants public information (Verrecchia, 1982; Diamond, 1985). In other words, outside directors could be just like pure insiders: they may not need public information as a base for further information acquisition, and/or they may not process public information because information acquired from internal sources is superior.[3] Thus, public information transparency may have no effect on the quality of outside directors' information sets. At the same time, the information sets of pure outsiders are improved by transparent public information (Healy and Palepu, 2001; Hong et al., 2000); thus, under this scenario, the overall informational advantage (and therefore the trading profitability) of outside directors would decrease with public information transparency.

One concern needs to be addressed when testing the relation between public information transparency and outside director trading profitability: unobservable characteristics of outside directors could be correlated with the information environment and their trading behavior. For example, outside directors who invest much time and/or energy in information acquisition may be drawn to firms with high quality public information (Beasley et al., 2010)[4]. These outside directors are also more likely to make higher insider trading profits due to their engagement in information acquisition and processing, even though the information they acquire and trade on could come solely from internal channels. Thus, an association between the transparency of public information and the trading returns of outside directors may simply be driven by outside

[3] The superiority of internal information could be due to either higher precision or lower acquisition or processing costs (Verrecchia, 1982; Diamond, 1985).

[4] Survey results by Beasley et al. (2010) show that it is common practice for outside directors to examine a firm's public information (e.g., SEC filings, corporate websites, analyst reports) before deciding to join the firm.

directors' (unobservable) habit in information acquisition and trading (Hillier, Korczak and Korczak, 2013).

To overcome this problem, I exploit the feature that many outside directors sit on multiple boards. Specifically, I study a sample of 599 outside directors at 921 U.S. public firms from 2000 to 2010 and require that each outside director in the sample sits on at least two boards. In so doing, I can use an outside director as her own control and test the correlation between the differential trading profitability of *the same outside director* at two different firms and the differential level of public information transparency between those two firms.

I use two important components of a firm's public information environment to capture its overall transparency: financial statements and analyst information. In particular, I use the ability of financial statement items in predicting future cash flows (Barth et al., 2001) to measure financial statement transparency, and I measure analyst information quality using analyst following, forecast dispersion and forecast errors.[5]

I separately examine the profitability of open market purchases and sales because litigation concerns and liquidity needs may render the information content of sales to be different from that of purchases (Noe, 1999; Lakonishok and Lee, 2001; Cheng and Lo, 2006; Brochet, 2010).[6] I find that the differences in the open market *purchase* returns made by the same director between the two firms in each firm pair is positively associated with the differences in public information transparency between the two firms. In other words, the same outside director makes higher returns from her purchases at firms with more transparent public information. On average,

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[5] See Chapter 3 and Appendix for more details of the measures. The results are robust to using alternative measures of financial statement transparency and analyst information quality. See Chapter 7 for details.

[6] Specifically, litigation risk is higher for insider sales than for insider purchases (Noe, 1999; Cheng and Lo, 2006); therefore, the likelihood that an outside director may possess superior information but refrain from trading on it is higher for sales than for purchases. Also, insider sales are more likely to be driven by liquidity needs compared to insider purchases. See Chapter 6 for more details.

one standard deviation increase in the difference in public information transparency is associated with 2.8 to 3.1 percentage-point higher returns made by the outside director at the more transparent firm.[7] The evidence is consistent with outside directors having a larger informational advantage over equity investors in a more transparent public information environment.

One alternative explanation of the above findings is that transparency of a firm's public information environment is correlated with the quality of its outside directors' information from private channels (Dichev et al., 2012). I conduct two additional sets of tests to address this issue. First, I study the cases when outside directors have more chances to access information from internal sources. If public information transparency merely captures internal information quality, its effect should be more pronounced when outside directors' chances to access internal information increases. I proxy for outside directors' access to private information using the importance of the outside director's position on the board measured by the number of committee positions held (Duellman et al., 2011),[8] and the social connections between the outside director and the CEO (Cao et al., 2011). I find that the effect of public information is *mitigated* by these factors, suggesting that public information is more important for outside directors who have *limited* access to private information.

Second, I examine the effect of one of my public information measures, namely analyst information quality, on outside director trading profitability for firms that are highly affected by the macro-economy. Prior research suggests that analysts' expert inputs in their macro-economic

[7] This accounts for about 10% of the average absolute difference in returns made by the same outside director across two firms. See Chapter 5 for details.

[8] The amount of private information available to members across different board committees may vary; however, besides the chance of accessing private information through the committee position, the number of total committees an outside director serves may also signal her overall importance as a board member, and the more important an outside director is, the higher the chance that she will have access to more private information. Additional tests show that the results are also robust to including only audit committee and compensation committee positions. See Chapter 6 for details.

analyses are more valuable for firms that are highly exposed to macroeconomic conditions (Hutton et al., 2012). Thus, the association between analyst information quality and trading profitability should be more pronounced for these firms if what I document is the effect of analyst information rather than unobservable internal information. Consistent with my prediction, I find that the effect of the analyst information is stronger for outside directors at these firms.

All the above results are specific to purchases. I find no such effects in outside director sales. In fact, for my sample, trading returns of outsider director sales are considerably lower than are trading returns of outside director purchases: the mean size-adjusted six-month and twelve-month sales (purchase) returns are 1% (7%) and 0% (13%), respectively.[9] This finding is consistent with the insider trading literature which finds that trading returns are driven largely by purchases (Lakonishok and Lee 2001). In addition, I find that the association between public information transparency and outside director sales returns is sensitive to litigation risk, whereas the association between public information transparency and purchase returns is not. These findings suggest that purchases are a better proxy for information-driven trades than sales.

This paper extends the insider trading literature by documenting the *source* of informational advantage that outside directors have over investors. Prior studies in the insider trading literature provide robust evidence in the superior information possessed by corporate insiders (Seyhun, 1986, 1992; Ravina and Sapienza, 2010), yet *how* the superior information is formed is not explicitly examined, but is generally *assumed* to come from sources unavailable to parties outside the firm. The findings of this paper suggest that for outside directors, public

[9] The trading returns are computed as the buy-and-hold returns starting from the date which an outside director makes a purchase or sale. The returns for sales are multiplied by -1 to capture the potential loss avoided by making the sale.

information can facilitate information acquisition and processing and their informational advantage can arise in a transparent information environment. These results are in contrast to prior literature's finding that public information transparency *reduces* the trading profitability of pure insiders (Frankel and Li, 2004). This paper thus highlights the heterogeneity among corporate insiders in the dominating source of their informational advantage.

The remainder of this paper is structured as follows: Chapter 2 reviews prior literature and develops the hypothesis; Chapter 3 discusses the research design; Chapter 4 presents the sample selection process and the descriptive statistics; Chapters 5 through 7 discuss the empirical findings; and Chapter 8 concludes and discusses implications for future research.

CHAPTER 2

RELATED LITERATURE AND HYPOTHESIS DEVELOPMENT

Prior Literature

This paper is related to a large literature on the profitability of insider trading. This literature provides robust evidence in the abnormal trading returns of corporate insiders (e.g., Seyhun, 1986, 1992; Lakonishok and Lee, 2001; Ke, Huddart and Petroni, 2003; Piotroski and Roulstone, 2004; Ravina and Sapienza, 2010). Specific to the trading profitability of outside directors, Ravina and Sapienza (2010) document that outside directors make abnormal returns, although the returns are lower than those made by pure insiders. Overall, the literature has taken it as a given that corporate insiders have informational advantage over equity investors; therefore, several studies use insider trading returns as a proxy for information asymmetry between insiders and investors. For example, Frankel and Li (2004) use the abnormal trading returns made by pure insiders to measure the information asymmetry between investors and insiders, and study the effectiveness of several types of public information in reducing this asymmetry. Outside directors, however, are excluded from their sample because their focus is on the information asymmetry between *managers* and investors. Other studies along this line include: Aboody and Lev (2000), in which the authors take the positive association between insider trading returns and R&D activities as evidence that R&D increases information asymmetry; Aboody, Hughes and Liu (2005), in which the authors interpret the positive association between insider trading profitability of a firm and its exposure to the information risk factor as suggesting that information risk increases cost of capital through insider trading; and

Huddart and Ke (2007), in which the authors use insider trading returns to validate several proxies for information asymmetry and document mixed evidence across different proxies.

A common attribute of these studies is that it is taken as a given that insiders have better information than investors do, yet the question of *how* the superior information is formed is not explicitly answered. Two recent studies on outside directors' information sources provide some answer to this question, although the primary focus is on the sources that are not publicly available. Specifically, Cao et al. (2011) find that outside directors who have social connections with managers make higher abnormal trading returns than their peers. Their findings are consistent with social connections serving as a channel for private information transfer from managers to outside directors. Duellman et al. (2011) document that the abnormal trading returns of audit committee members are higher than their peers, suggesting that an audit committee position offers more opportunities to gather private information. This paper extends this line of research by examining the possibility that *public* information can also help outside directors form their superior information sets. Combined with prior literature's finding that pure insiders make lower trading returns under a more transparent information environment (Frankel and Li, 2004), this paper sheds light on the heterogeneity among different groups of corporate insiders in the contributing factors of their informational advantages.

Hypothesis Development

Although I do not aim to test any particular analytical model, my analysis is motivated by two strands of theoretical literature. The first strand models the trading behavior of corporate insiders (Huddar et al., 2001; Huddart and Ke, 2007). In these models, the profitability of insider trading is driven by two components of an insider's informational advantage: the investors' prior uncertainty in the firm's value and the precision of the insider's information signal. The insider

reaps higher trading returns when the market is more uncertain about the firm's value (i.e. lower precision of investors' information *ex ante*) and/or when the insider possesses more precise information.[10] This strand of literature is agnostic on the determinants of each of these two components.

A firm's public information environment can affect both components. In particular, transparent public information improves the information sets of equity investors and thus reduces their uncertainty about the firm's value, therefore reducing the insider's informational advantage, *ceteris paribus* (Healy and Palepu, 2001; Row (1) of Figure 1). The effect of public information transparency on the precision of the insider's information, however, is not straightforward, and a second strand of analytical literature can help shed light on this issue. Specifically, this literature analyzes the effect of public information on private information acquisition the information asymmetry between informed and uninformed traders. If the private information that can be acquired by the informed trader is a complement to the public information, then public information triggers private information acquisition and information asymmetry increases (Kim and Verrecchia, 1994, 1997). On the other hand, if the private information signal is an alternative or substitute to the public information signal, then public information crowds out private information gathering (Verrecchia, 1982; Diamond, 1985).

For outside directors, either or both of the above two scenarios can happen due to their unique informational position in the firm (see Row (2) of Figure 1). Their position is between that of pure insiders and pure outsiders. On the one hand, they are unlike pure insiders who have

[10] This literature uses the term "private information" to refer to the information signal possessed by the insider when making trading decisions. However, this information does not necessarily come from nonpublic channels (although often widely assumed so). As discussed below, an insider's superior information could come from better processed public information. In this case, the insider's overall information signal can be considered "private" in the sense that it is not available to outsiders (outsiders do not have access to private information which facilitates better information acquisition and processing); however, information from public channels contribute to the formation of this signal.

first hand information from direct involvement in the operations of the firm; on the other hand, they are also different from pure outsiders who rely solely on publicly disclosed information. Pure insiders can privately transfer (at least part of) their information to outside directors. In addition, outside directors can acquire private information from channels other than management, such as internal and external auditors (Wong, 2011).

Outside directors' relatively remote position from their firm's operation compared to pure insiders makes it possible that they rely on public information to form and improve their own information sets. First, they could use public information as a foundation to gather and/or process information from internal channels. This is because information from internal channels is often more specific and detailed than information provided to the public. Outside directors often face the problem of "information overload"—receiving information from management with too much detail and it is a challenge for them to synthesize such information (National Association of Corporate Directors, 2009). Information provided to parties outside the firm, however, often offers a broad and comprehensive summary of a firm's performance and valuation. One example would be analyst reports that contain firm-specific information processed and synthesized by financial analysts using their expertise (Ramnath, Rock and Shane, 2008; Lehavy, Li and Merkley, 2011). Therefore, public information could facilitate outside directors in collecting and processing information from internal channels and contribute to better information sets possessed by outside directors.

A second reason why a transparent information environment may help increase outside directors' informational advantage is that outside directors' private information could enable them to better interpret or process public information (Kim and Verrecchia, 1994). For example, faced with the same analyst report on the changes in the industry conditions that the firm

operates in, an outside director who has communicated with managers on the firm's strategic plans has more insight in how the industry condition changes would impact the firm's strategies than a pure outsider does. In other words, the outside director now has superior information over equity investors because of her ability to better process the analyst report, and such ability would be useless absent the report.

In sum, transparent public information can contribute to the forming of superior information possessed by outside directors by assisting them in acquiring more private information, or giving them the opportunity to utilize their superior ability in processing public information. Under this scenario, the transparency of public information environment generates confounding effects on the two components of outside directors' informational advantage (Column (1) of Figure 1): it reduces *investors'* prior uncertainty about firm value (thus *reduces* outside directors' informational advantage), and it increases the precision of outside directors' information sets (thus *increases* their informational advantage). Hence, the overall impact of public information transparency on the trading profitability of outside directors depends on which one of these two effects dominates.

Although outside directors are more likely to rely on public information when forming their own information sets than are pure insiders, it is also possible that information from private channels can subsume or supplant public information. With sufficient information sharing between pure insiders (or other parties such as internal auditors and consultants) and outside directors, outside directors' understanding in their firms can be very close to that of pure insiders. Under this scenario, outside directors would be able to process the detailed internal information without having to refer to public information. Also, even though outside directors' private knowledge about their firms still allows them to better process public information than

investors do, they may not choose to do so because private communication could give them better information, and/or information of the same quality at lower costs. In this case, public information environment is at best irrelevant to the precision or quality of outside directors' information sets. At the same time, transparent public information improves the information sets of investors (Column (2) of Figure 1). Thus, public information transparency reduces outside directors' informational advantage and therefore their trading profitability.[11]

The above analyses are summarized in Figure 1. In short, transparent public information environment may affect outside directors' informational advantage and trading profitability in the following ways: 1) it reduces outside director's informational advantage by improving investors' information sets, and 2) it increases (or have no effect on) outside directors' informational advantage by improving (or not affecting) their information sets. The following hypothesis (stated in the null form) thus arises:

Hypothesis: The transparency of a firm's public information environment is not associated with the insider trading profitability of its outside directors.

[11] An extreme case would be when pure insiders can completely transfer all their private information to outside directors at no cost. Thus, outside directors essentially become pure insiders and the effect of public information transparency on the informational advantage would be the same for pure insiders and outside directors, i.e. the informational advantage (and therefore the trading profitability) decreases with public information transparency as documented by Frankel and Li (2004).

CHAPTER 3

RESEARCH DESIGN

Controlling for Unobservable Outside Director Characteristics

A key feature of this paper's research design is that I focus on outside directors sitting on at least two boards and for each director I compare her trading profitability across the different firms she serves to control for unobservable outside director characteristics. Prior literature finds that a significant portion of insider trading profitability is explained by individual characteristics of the insider (Hillier, Korzack and Korzack, 2013); in addition, unobservable outside director characteristics are likely to be correlated with both their trading profitability and the firms' public information environment. Specifically, firms with more transparent public information could attract directors who put more weight on the information environment when deciding whether to accept the board positions. These outside directors therefore would be more likely to acquire and process firm-specific information and make more profitable trades. In other words, the higher trading profitability of these directors is not driven by the firm's public information environment, but by their inclination to gather and process information.[12]

To use an outside director as her own control, I test whether an outside director's differential level of trading profitability across the firms she serves is positively associated with

[12] The fact that outside directors sit on boards of firms with different level of public information transparency suggests that the matching between outside directors and firms on information environment is imperfect. This is not surprising given that there are many factors that may affect an outside director's decision to join a firm, examples include (but not limited to) reputation and prestige (Fama, 1980), learning opportunities (Beasley et al., 2010) and networking (Beasley et al., 2010). However, to the extent that information environment may be one of the factors that determine the matching between outside directors and firms, controlling for such matching is important in addressing the potential bias caused by it.

the differential level of public information transparency across those firms. Specifically, I first take a pair of firms (e.g. Firm A and Firm B) that share the same outside director. Then, I compute the trading profitability of that director at Firm A and Firm B, respectively. Next, I take the difference in the director's trading profitability between Firm A and Firm B. I then compute the differential level of public information transparency between Firm A and Firm B using an approach similar to the one I use to compute differential level of trading profitability.[13] To test whether the differential trading profitability of the same outside director is associated with the differential level of public information transparency between the two firms,[14] I estimate the following regression:

$$Dif\_Profit=\alpha+\beta_1 Dif\_Public\_Information\_Transparency+\sum\beta_k Dif\_Controls+\epsilon, \quad (1)$$

where *Dif_Profit* and *Dif_Public_Information_Transparency* indicates the differential levels of trading profitability and public information transparency, respectively.

Thus, a positive association between the difference in trading profitability and the difference in public information transparency indicates that the same outside director's trading profitability is higher at the firm with higher public information transparency.

Measuring Outside Director Trading Profitability

The measure for an outside director's trading profitability at each firm is computed as the average of her open market trading returns during the trading years. The specific steps are the following: first, for each trade the director has made, I calculate the buy-and-hold returns over the three-month, six-month, nine-month and twelve-month horizons starting from the trading

[13] The details of computing the levels of trading profitability and public information transparency are discussed in the next two sections of this chapter.

[14] For outside directors sitting on more than two boards, the differences are taken between each pair of firms. Thus, for an outside director who serves on N boards, the number of observations for that director is N*(N-1)/2. In my sample, the number of directors who serve 2, 3, 4, 5 firms are 487, 92, 18 and 2, respectively. To account for the potential correlation of error terms within each director, I cluster the standard errors by director.

date.[15] This raw return is then adjusted by subtracting the buy-and-hold returns of the relevant CRSP's NYSE/AMEX/NASDAQ capitalization-based decile portfolio.[16] For outside director sales, I multiply the returns by negative one because conceptually the profitability of sales is the potential loss avoided. Trades made on the same date are considered one transaction. Thus, this measure captures the timing ability of outside directors when making their trading decisions.

Next, I average the returns for the trades made during each year. Lastly, for each director-firm, the yearly average returns are averaged to arrive at the trading profitability of the outside director at the firm (*Buy/Sell_Ret_3m, Buy/Sell_Ret_6m, Buy/Sell_Ret_9m, Buy/Sell_Ret_12m*).

Measuring Public Information Transparency

There are many components to a firm's public information environment, and prior literature provides limited theoretical and/or empirical evidence on which specific types or sources of information are (most) helpful for the improvement of outside directors' information sets. For example, in their review of the literature on the information acquisition of board members, Armstrong et al. (2010) *conjecture* that "…regulators, analysts, the media and other information intermediaries" are all "likely to assist outside directors" in information collection. Therefore, rather than analyzing each and every piece of public information, I choose to measure the *overall transparency* of a firm's public information environment. In particular, I examine the quality or transparency of two types of public information that are most likely able to capture the

[15] I compute the returns over different horizons because one cannot identify which sale of an outside director is related to a particular prior purchase. Also, under Rule 16(b) of the Securities and Exchange Act of 1934, insiders have to give up any profit earned from a transaction that is offset within six months.

[16] An alternative is to use the Fama-French Four Factor Model to estimate abnormal returns. Using this approach requires an estimation period prior to the trading dates, yet the daily factor returns are volatile and therefore requires a long estimation period to yield stable estimates (e.g., Womack 1996). Therefore, I use size-adjusted returns and control for firm characteristics such as book-to-market ratio. As a robustness check, I use estimation periods of 365 and 730 trading days and the results are qualitatively similar, albeit weaker (see Chapter 7 for more details).

transparency of a firm's overall information environment, although the information sources of outside directors may include but not be limited to these information types.

The first type is financial statements. It is well documented that financial statements are an important source of public information and are useful for the valuation and investment decisions of security holders (SFAC No. 8, Chapter 1. FASB, 2010; Kothari, 2001; Beyer et al., 2010). Therefore, the quality of a firm's financial statements captures an important aspect of the transparency of its public information environment. Given that trading profitability captures outside directors' information about their firms' valuation, I choose to examine the usefulness of financial statements in facilitating valuation decisions. In particular, I measure the transparency of financial statements using the ability of the components of accounting earnings to predict future cash flows. The ability of a firm to generate cash flows is directly related to its valuation. Therefore, the Financial Accounting Standard Board (FASB) states that "existing investors, lenders, and other creditors use financial information to assess the reporting entity's prospects for future net cash inflows to the entity. Such information may be used to estimate the value of the reporting entity" (SFAC No.8, FASB, 2010). Specifically, I follow Barth et al. (2001) and estimate the following regression by year and Fama-French 48 industry:

$$CF_{t+1}=\alpha + \beta_1 CF_t + \beta_2 \Delta AR_t + \beta_3 \Delta INVT_t + \beta_2 \Delta AP_t + \beta_2 DPAM_t + \beta_2 OTHER_t + \epsilon, \quad (2)$$

where *CF* is net cashflow from operating activities less the accrual portion of extraordinary items and discontinued operations; *ΔAR* is change in accounts receivable; *ΔINVT* is change in inventory; *ΔAP* is change in accounts payable; *DPAM* denotes depreciation and amortization expense, and *OTHER* refers to other accrual components of earnings before extraordinary items and discontinued operations (*EARN*), calculated as *EARN-(CF +ΔAR + ΔINV – ΔAP – DPAM*). The absolute value of the error terms (*Predict_CF*) from equation (2) measures the ability of

accounting accrual items in forecasting future cash flows; higher absolute error indicates lower forecasting ability.

A second type of public information that is representative of a firm's public information environment is information from financial analysts. Financial analysts are trained professionals who contribute to firms' public information environment both by releasing new information and by interpreting information that is already available (Asquith et al., 2005; Lehavy et al., 2011). It is well documented that various components in the analyst reports are informative to capital market participants.[17] Specifically, I examine the number of analysts following the firm (*N_Analyst*) and the dispersion and error of analyst forecasts (*Dispersion* and *FC_Error*). Higher analyst following indicates more information from financial analysts, and higher dispersion and forecast error indicate lower precision or quality of analyst forecasts.[18]

I compute the financial statement transparency measures as of the beginning of each trading year, and the proxies for analyst information quality are measured for forecasts outstanding as of the 30th day subsequent to prior year's earnings announcement (Givoly et al., 2009).[19] The measures are then averaged across the trading years for each outside director.[20]

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[17] See Ramnath, Rock and Shane (2008) for a review of this literature.

[18] See Appendix for the specifics in the construction of the measures.

[19] The results are robust to using forecasts outstanding on the 60th, 90th and 120th days subsequent to prior years' earnings announcements.

[20] Although I merely aim to use the quality of financial statements and analyst information as proxies for the transparency of a firm's public information environment, each proxy does measure the quality of a specific type of information. I conjecture that the importance of these two types of public information is not the same for outside directors. This is because financial statements are firm-generated public information whereas analyst reports contain expert inputs from financial analysts. The likelihood that an outside director can acquire information of the same content as financial statements from internal channels is higher than the probability of her getting the exact same information as that in analyst reports from private channels. However, exploring which specific source of public information is most useful to outside directors is beyond the scope of this paper. See also the Discussion section of this chapter.

Controlling for Access to Private Information

The above measures for public information transparency are likely to be correlated with private information quality. There are at least two reasons why this may be the case. First, prior studies suggest that the majority of firms use the same accounting information for internal decision making and external financial reporting (Shroff, 2011; Dichev et al., 2012). Second, managers who have the incentive to provide opaque information to outsiders are also likely to have the incentive to hide information from their board members. Therefore, it is important to control for outside directors' access to private information. Prior studies and survey evidence suggest that outside directors generally rely on both formal and informal channels to acquire private information (Beasley et al., 2009; Cao et al., 2012). Formal private information channels refer to communication that happens within the working environment, such as board and committee meetings, and informal private information channels refer to communication that happens outside of the working environment, such as social interactions between outside directors and managers. Outside directors' opportunities to access private information through formal channels vary by their specific positions and/or tasks on the boards (Duellman et al., 2011). Therefore, I control for formal access to private information using the outside director's committee positions: audit committee (*Audit_Committee*), compensation committee (*Compen_Committee*) and nomination committee (*Nomin_Committee*). The opportunity to access informal private information channels also differs among outside directors. Sociological research suggests that the frequency of social interactions between two people depends on numerous factors including similarities in personal traits and the existence of social connections (McPherson, Smith-Lovin and Cook, 2001). I therefore control for an outside director's informal access to private information using the existence of a social connection with the CEO (*Tie*; Cao et al., 2011). Specifically, an outside director is considered "socially connected" with the CEO if

she and the CEO have 1) previously worked at the same firm other than the one for which she is currently the outside director, 2) gone to the same university and/or 3) been in the same charity, club or other not-for-profit organizations.[21]

Other Control Variables

I control for various firm characteristics:[22] *firm complexity* (stock return volatility: *Ret_Vol*, market-to-book ratio: *MTB*, R&D intensity: *RND*, leverage: *Leverage*, intensity of intangible assets: *Intangibles*, number of business segments: *N_Segments*, firm size: *Size*, industry concentration: *Ind_Concentration*, geographical concentration: *Geo_Concentration* [Bushman et al., 2004]); *firm performance* (return on assets: *ROA*); *corporate governance mechanisms* (total number of people on board: *Board_Size*, percentage of outside directors on board: *Board_Indep*, percentage of institutional holdings: *Institution*, and restrictions on insider trading: *Restrict* [Roulstone, 2003]); and *insider trading characteristics* (average open market purchase or sales returns of managers: *Inside_Ret*, and total number of insiders making open market trades: *N_People_Purchase/Sale*). Controlling for the insider trading characteristics is important in making sure that my results are not driven by the overall trading profits of insiders. I also control for the average dollar value of the outside director's purchases during the year (*Tran_Size*), and outside director industry expertise (*Ind_Expert*), which may vary depending on the firm she serves and likely affects her information acquisition.

For each director-firm, I measure the variables as of the beginning of the purchase years and take the average across those years. Then I take the difference between the firms that share the same outside director.

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[21] I acknowledge that these variables are noisy proxies for the quality of private information an outside director acquires. I further address the concern that the public information transparency measures may be capturing the quality of private information in Chapter 6.

[22] Appendix demonstrates the specific construction of these variables.

Discussion

The design of averaging trading profitability and public information transparency at the director-firm level across all trading years deserves some further discussion. An alternative to this design would be selecting specific events of the releasing of public information and examining the trading profitability right after the events. Although this design may generate sharper inferences regarding causality, I choose not to use it for the following reasons. First, this alternative design requires selecting specific public information events that are expected to be informative to outside directors. However, as discussed above, it is *ex ante* not clear *which specific type* of public information is used by outside directors—prior theoretical and empirical studies provide limited guidance on this issue. Thus, I choose instead to examine the transparency of the *overall public information environment* and use proxies that most likely capture such transparency. Second, this alternative design would exclude trades that do not occur shortly after any specific public information event, yet there is no reason to assume that those trades are *solely* based on internal information.[23]

[23] For the initial purchase sample, only 3,240 out of 50,250 trades happen within 5 days after earnings announcements. Thus, confining trades to be shortly after certain information events would significantly reduce the number of trades included in the study.

CHAPTER 4

SAMPLE AND DESCRIPTIVE STATISTICS

Sample Selection

I start from a sample of board members from BoardEx. BoardEx covers 14,864 firms with 97,802 outside directors from 2000 to 2010. Insider trading data are obtained from Thompson Insider Filing dataset. I include only open market purchases and open market sales not related to option exercises. The intersection of BoardEx and Thompson Insider Filing dataset yields 4,869 firms and 23,502 outside directors.[24] Requiring the outside directors to sit on at least two boards yields 3,707 outside directors serving 3,661 firms. There are 1,486 outside directors (at 2,031 firms) who have made at least one open market trade at each firm they serve. I also require that firms have available data from Compustat and CRSP to compute the size-adjusted returns and the control variables (1,767 firms and 1,237 outside directors). Constructing the public information environment variables further reduces the sample to 921 firms and 599 outside directors.

Descriptive Statistics

Firm characteristics

Tables 1.1 through 1.3 report descriptive statistics on firm characteristics. Table 1.1 compares my sample firms with firms that are at the intersection of Compustat and CRSP. Overall, my sample firms are considerably larger (mean assets of $9,362.08 million compared to

[24] Outside directors from BoardEx are merged with Thompson Insider Filing dataset using director names.

$2236.75 million for Compustat and CRSP intersection firms), more profitable (mean ROA of 0% vs. -8%), and have higher institutional ownership (mean ownership of 72% vs. 44%) and higher analyst following (7.65 vs. 4.76 on average).[25]

Table 1.2 and Table 1.3 report the same firm characteristics for my sample firms in years during which at least one outside director in my sample has made a purchase (Table 1.2) or sale (Table 1.3). There is no drastic difference between the information environment in trade years vs. non-trade years: the mean stock return volatility in purchase years is statistically higher than it is in non-purchase years (0.0301 vs. 0.0298), yet the magnitude of the difference is small (0.0003). Also, the median stock return volatilities are not statistically different. There is also no significant difference between share turnover for purchase years and non-purchase years. Firms in purchase years have higher mean analyst forecast error (0.74 vs. 0.59) and forecast dispersion (0.0410 vs. 0.0396), but there is no significant difference in the medians. Overall, it does not appear that the trades made by outside directors in my sample happen in years that the firms are in particularly volatile or uncertain states.

The differences between sale and non-sale years in Table 1.3 are overall similar to the differences between purchase and non-purchase years in Table 1.2. One notable difference is that outside directors in my sample tend to make purchases when the market-to-book ratio is lower and when the firm is less profitable (lower ROA), whereas they tend to make sales when the firms have higher market-to-book ratios and higher ROAs. This is consistent with the evidence found by prior studies that insiders are contrarians (Piotroski and Roulstone, 2005).

[25] Analyst measures for the Compustat and CRSP intersection firms are computed only for firms with I/B/E/S data available.

Outside director characteristics

The sample selection process requires that the outside directors in my sample sit on at least two boards and have traded the stocks of at least two firms that they serve. *Ex ante,* this requirement should result in my sample including outside directors who are more reputable (Kaplan and Reishus, 1990) and are more inclined to trade. Therefore, it is likely that they are more sophisticated compared to their peers. The statistics in Table 2 confirm this expectation. In particular, Table 2 compares individual characteristics of my sample outside directors with the outside directors who are on the same boards with the sample directors but are not included in my final sample ("peer directors"). Although the numbers of years the sample outside directors have spent on their firms are lower relative to their peers (1.71 years of difference in the mean), they tend to hold more committee positions (1.39 vs. 1.18 on average), are more likely to be designated as the financial expert on the audit committee (0.26 vs. 0.15 on average) and are more likely to have worked in another firm that is in the same industry as the current firm (0.12 vs. 0.08 on average).[26]

Table 3 reports the absolute values of the differences of variables in my regressions between pairs of firms that share the same outside director.[27] Outside directors can sit on boards

[26] The statistical significance of the differences in medians of the variables in Table 2 are computed using the Wilcoxon-Mann-Whitney Rank Sum test, which is similar to an independent sample T-test, except that it makes no parametric assumption regarding the underlying distribution of the variables. The test addresses whether the *distribution* of the variables across the two groups are statistically significant; therefore, even when the medians across the two groups are the same (for example, the number of committee chairs, whether the director is the audit committee expert, whether the director is an industry expert and whether the director is female), the underlying distribution could still be statistically different. However, the Wilcoxon-Mann-Whitney test does assume independence between groups. To test whether the independence assumption is violated, I conduct a bootstrap test in which I randomly assign directors into "sample" group and "peer" group and repeat the process for 50 times. The results (untabulated) show that the statistical significance of the differences in the medians of the individual characteristics across the "sample" group and the "peer" group does not change from that reported in Table 2; therefore, it does not appear that the independence assumption is driving the differences.

[27] The variables in my regression are signed differences. However, reporting the distributions of the signed differences is not informative because the positive differences would be offset by the negative differences. Therefore I report the differences in absolute values.

of firms with big differences in size (the mean of the absolute difference in the log of market capital is 2.14, suggesting that one firm is more than twice the size as the other). There is also reasonable variation in public information transparency measures across the firms that share the same outside director: for example, the average absolute differences in *N_Analyst* and *FC_Error* are 5.37 and 0.93, which account for 70% and 148% of the average levels (per Table 1.1) respectively.

Outside director trading characteristics

The individual characteristics reported in Table 2 suggest that the outside directors in my sample are likely to be more financially sophisticated compared to their peers. Therefore, it is not surprising that they are able to make more profitable trades as shown in Table 4.1. In particular, Tables 4.1 and 4.2 compare the trading profitability, trading size and trading frequency of the sample outside directors with their peers. Table 4.1 (4.2) reports the statistics for purchases (sales). The mean (median) differences between buy-and-hold size adjusted returns of purchases made by the sample outside directors and the returns made by their peers are 2% to 10% (2% to 7%) depending on the horizon. The sample outside directors also tend to trade in larger size, and the number of trades they make at each firm per year ("frequency") tends to be smaller. Overall, the statistics in Table 4.1 suggest that outside directors in my sample have better timing abilities when making purchases.

However, these outside directors do not appear to be more informed than their peers are when making sales (Table 4.2). The mean (median) returns made by the sample outside directors are close to zero and are not significantly different (are significantly lower) compared to the mean (median) returns made by their peers. These statistics suggest that purchases of these

directors are more likely to reflect their superior information than are sales. I examine the nature of this information next.

CHAPTER 5

MAIN RESULTS

Tables 5.1 and 5.2 report the results from estimating Equation (1). Table 5.1 presents analyses on purchases and Table 5.2 reports results on sales. The results in Table 5.1 suggest that outside director purchase returns over the three-month and six-month horizons are negatively associated with the absolute error of financial statement items in predicting future cash flows (*Dif_Predict_CF*), and that analyst forecast error (*Dif_FC_Error*) is negatively associated with outside director purchase returns over the six, nine and twelve-month horizons. There is no significant association between analyst following or forecast dispersion and purchase profitability. Overall, the evidence is consistent with transparent public information environment helps increase outside directors' informational advantage and trading profitability. The economic magnitudes are also meaningful. One standard deviation changes in *Dif_Predict_CF* and *Dif_FC_Error* are associated with 0.10 and 0.11 standard deviation changes, respectively, in the six-month differential purchase profitability. The standard deviation of differences in six-month purchase returns is 28 percentage points in my sample, and the average difference is 30 percentage points. Thus, the 0.10 and 0.11 standard deviation changes amount to 2.8 and 3.1 percentage points of differences in returns, respectively. In other words, the outside director makes about three percentage points higher returns at the more transparent firm when the differential public information transparency between the two firms increases by one standard deviation. This accounts for 9.3% and 10.3% of the average absolute difference in six-month returns an outside director makes across two firms.

In contrast to the evidence on open market purchases, there is no significant association between the public information measures and outside director sales profitability (Table 5.2). This result mirrors the descriptive statistics in Table 4.2 that suggest that outside directors in my sample do not appear to be making the sales based on superior information they have. This finding is also consistent with prior insider trading research that suggests that insider sales are less informative than purchases (Lakonishok and Lee 2001).

CHAPTER 6

ALTERNATIVE EXPLANATIONS

There are several potential alternative explanations to the documented positive association between public information transparency and outside director purchase profitability. In particular, the association could be driven by: 1) litigation risk faced by outside directors that are correlated with both their trading decisions and the transparency of a firm's information environment; 2) the measures of public information transparency merely capturing the unobservable quality of private communication between outside directors and pure insiders; 3) outside directors who make superior trading returns being more informed and therefore more effective in improving their firms' public information environment (i.e. reverse causality); 4) the measures of public information transparency merely capturing the predictability of firm performance; 5) the measures of public information transparency merely capturing the liquidity of the firm's stocks (and therefore the cost to trading its stocks); 6) the positive association merely capturing the ability of the public information transparency measures in predicting future stock returns; 7) the sample selection and/or research design. In this chapter I address these concerns.

Litigation Risk

The tests I conduct on outside directors' trading profitability is predated on outside directors choosing to trade, without explicitly modeling such choices. This raises the possibility that the results in Tables 5.1 and 5.2 might be driven by some factor that is correlated with both outside directors' choices to trade on their private information and their firms' public information

environment. One potential factor is litigation risk. Specifically, Skinner (1997) and Field et al. (2005) find that transparent public information deters securities litigation. As a result, outside directors may be more comfortable trading in firms with more transparent public information and therefore reap higher returns.[28] To address this possibility, I examine whether the association between public information transparency and outside director trading profitability is affected by litigation risk. Specifically, I create an index that measures the firm's *ex ante* litigation risk. The index includes variables that predict litigation risk as documented by Kim and Skinner (2011): stock return volatility, stock return skewness, sales growth, stock turnover and absolute market-adjusted returns. For the pairs of firms that share the same outside director, I obtain the percentile rankings of the absolute differences in each of these variables and the index is the sum of these rankings. In other words, a higher ranking (higher index) of a pair of firms indicates a larger difference between the litigation risk of the two firms in the pair. I then partition my sample into firm-pairs with absolute differences in litigation risk that are above and below the median ("high difference in litigation risk" vs. "low difference in litigation risk"). If differences in public information transparency merely capture differences in litigation risk, then the association between public information transparency and outside director trading profitability should be stronger for the firm-pairs that have higher differences in litigation risk.

The results in Tables 6.1 through 6.4 do not support this alternative explanation for outside director purchases. The effects of financial statement transparency and analyst forecast errors on purchase profitability for firm-pairs with high differential litigation risk are not stronger than the effects for firm-pairs with low differential litigation risk. For outside director sales,

[28] Prior studies find that although the principal sanction from lawsuits against directors is not direct financial loss (Black et al., 2004), the harm to reputation is significant (Fama, 1980; Srinivasan, 2005; Fich and Shivdasani, 2007). Therefore, it is plausible that outside directors take litigation risk into account when making their trading decisions (Brochet, 2010; Huddart, Ke and Shi, 2007).

Table 6.5 reports that for firm-pairs with differential litigation risk above the median, more transparent financial statement information is associated with higher sales profitability for the three-month horizon, whereas financial statement transparency is not associated with sales profitability for firm-pairs with low difference in litigation risk. However, there is no significant difference across the two subsamples when sales returns are measured in longer horizons.

The results in Tables 6.1 through 6.8 highlight an interesting difference between the outside directors' purchases and sales in my sample. Table 6.5 suggests that transparent public information (in particular financial statement information) does play a role in mitigating the litigation concerns faced by outside directors when making sales, particularly in the short horizon. However, this role is not reflected in outside director purchases (Tables 6.1 through 6.4). This is consistent with litigation concern for insider purchases being not as severe as it is for sales (Noe, 1999; Cheng and Lo, 2006; Brochet, 2010). In other words, the role of transparent public information in reducing litigation concern becomes less important if outside directors are not as concerned about litigation risk when making purchases to begin with. Overall, the results in Tables 6.5 through 6.8 together with the statistics in Table 4.2 highlight the fact that litigation risk is a prominent feature of sales but not of purchases. Thus, in subsequent tests, I focus on outside director purchases.

Correlation between Public and Private Information Quality

Public information transparency and private information access

The main regression results in Table 5.1 suggest that public information is associated with outside directors' informational advantage underlying their purchase decisions. One concern when interpreting these results is that public information transparency may be correlated with (unobservable) private information quality. Specifically, the same information system of a

firm generates both public and private information (Dichev et al., 2012), and managers' incentive to disclose public information to equity investors could be correlated with their incentive to communicate private information to outside directors. I conduct the following tests to address this concern.

First, I explore whether outside directors' access to private information affects the association between public information transparency and their trading profitability. If public information transparency merely captures the quality of unobservable private information of outside directors', then the association should be stronger when outside directors have more chances to access private information. On the contrary, if my tests indeed capture the effect of the public information environment, the association should be weaker. This is because the more chances an outside director gets to acquire internal information, the closer her position is to the pure insiders. Thus, it is more likely that the information she collects from private channels can subsume or supplant public information, as is the case for pure insiders.

I separately examine outside directors' formal and informal private information channels. To measure an outside director's formal access to private information, I use the number of board committees she sits on (Duellman et al. 2011). A higher number of committee positions indicates a higher level of involvement in board activities, thus more opportunities to acquire private information. In Table 7.1, I interact the difference in the number of committee positions held by the outside director between the two firms (*Dif_Committee*) with the difference in the public information variables.[29] For brevity, I report the test results on six-month and twelve-month purchase returns. The table shows that the effects of analyst following, forecast dispersion and

[29] The number of committee positions held by an outside director at a firm equals 1, 2, and 3 respectively for an outside director who sits on one, two and all three of audit, compensation and nomination committees. Thus, *Dif_Committee* is the difference in *Committee* between the two firms that the outside director serves.

forecast error on twelve-month purchase returns are mitigated by *Dif_Committee*.[30] This is consistent with the prediction that public information quality is less important for outside directors who have greater access to private information through formal channels.

The opportunity to access private information may vary across different committee positions. Audit committee members are in charge of overseeing the financial reporting and internal control system and therefore frequently communicate with internal and external auditors, whereas compensation committee members frequently communicate with compensation consultants. Nomination committee members, however, are in charge of searching and nominating board members and frequently rely on search firms and focus on the "chemistry" between the candidates and the existing board members (Clune et al., 2013). Therefore, the role of nomination committee members is arguably more ceremonial compared to the roles of compensation and audit committee members, and the opportunity to acquire private information regarding the firm's performance and valuation is arguable lower for nomination committee members than members of the other two committees.[31] Following this logic, in Table 7.2 I include only audit committee and compensation committee members when constructing the *Dif_Committee* variable and the results are still consistent with my prediction.[32]

I then examine an outside director's access to informal private information channels. I use social connections between the outside director and the CEO (*Tie*) as a proxy for the opportunity to interact with corporate insiders in social occasions (Cao et al., 2012). Specifically, BoardEx provides information on three types of social connections: connections via employment

[30] The results for nine-month returns are similar to those for twelve-month returns and the results for three-months returns are similar to those for six-month returns.

[31] Although all board members get the opportunity to share their information with the board during board meetings, it is unlikely that information acquired separately by each outside director gets transferred in full to the entire board (Hansen, 1999).

[32] There is no significant interaction effect between *Dif_Committee* and the information variables when including only one of the three committees.

(i.e., worked at the same firm other than the current one), education (i.e., went to the same university) and social activities (i.e., have participated in the same clubs, charities and/or other organizations).

I interact the difference in the existence of an outside director's connections with the CEOs between the two firms she serves (*Dif_Tie*). The results are shown in Table 7.3. The effect of financial statement transparency (*Dif_Predict_CF*) is mitigated by *Dif_Tie* both for six-month and twelve-month purchase returns. Again, the evidence mitigates the concern that it is the correlated omitted private information quality that drives my results, as long as the correlation between unobservable private information quality and my proxies for public information transparency do not vary based on the number of committee positions an outside director has, or the existence of social connections between the outside director and the CEO.

High cyclicality vs. low cyclicality firms

To lend further support to the validity of my measures (in particular, the analyst information measures) in capturing the effect of public information, I examine a situation where I expect the content of analyst information to be more useful to outside directors. Specifically, prior research finds that financial analysts have an advantage in interpreting macroeconomic data compared to corporate insiders (Jennings, 1987; Hutton et al., 2012). Therefore, information on the macro-economy provided by analysts is likely to assist outside directors, especially when the firm's operation is highly impacted by macroeconomic conditions. Accordingly, I follow Hutton et al. (2012) and partition the sample into two groups: firms of which earnings are more affected by the macro-economy (high cyclicality) and firms that are less affected by the macro-economy (low cyclicality). For each trading year, I measure cyclicality using the R^2 from a regression of a firm's earnings on GDP, energy prices and interest rate spreads over the prior twelve quarters

and then average the R^2s across the quarters during the trading year. Thus, if high quality analyst information complements outside directors' private information, one would expect the results to be stronger for high cyclicality firms.

Tables 8.1 and 8.2 report the results. The effect of forecast error on six-month returns is significantly stronger for high cyclicality firms (Table 8.1) and the effects of forecast error and forecast dispersion on twelve-month returns are significantly stronger for high cyclicality firms (Table 8.2).[33] The evidence is consistent with analyst information quality being more important for outside directors when the information provided by analysts is more relevant to evaluating the firm. It is unlikely that the correlation between analyst information quality and private information quality is stronger for high cyclicality firms. Thus, the results in Tables 8.1 and 8.2 mitigate the concern that analyst information quality merely captures the effect of private information quality.

Reverse Causality

The direction of causation in this paper runs from public information transparency to the outside directors' informational advantage. I acknowledge that the direction of causality could be reversed: more informed outside directors generate higher trading profits; armed with their superior information, they become more effective in improving their firms' information environment. However, I contend that the results in this paper are not consistent with this reversed direction of causation. Specifically, outside directors who are more involved in the board activities should be better able to improve the firm's information environment. Thus, one would expect the association between public information transparency and outside director

[33] The results for nine-month returns are similar to those for twelve-month returns and the results for three-months returns are similar to those for six-month returns.

trading profitability to be strengthened by the number of committee positions held by the director. However, the results in Tables 7.1 and 7.2 indicate the opposite. In other words, the results are more consistent with public information environment affecting outside director information sets, even though I cannot fully rule out the possibility of reverse causality.

Controlling for Earnings Predictability

One potential common construct captured by my empirical proxies of public information transparency is the predictability of a firm's fundamental performance. When a firm's operation and performance is more predictable, so does its future cash flows; also, its analysts are likely to have lower uncertainty and/or disagreement regarding its future earnings. At the same time, the *private* information of outside directors' is also likely to be more precise. In contrast, when a firm operates in a highly uncertain environment, it is possible that even its insiders (including outside directors) are clueless about its future performance. As a result, outside directors make lower purchase returns when their firms' fundamental performance is hard to predict, not when the information environment is opaque.

I conduct two tests to address this concern. First, I control for the predictability of earnings (*Predictability*), measured by the absolute value of the fitted residual from an eight-year rolling regression of one year ahead earnings on current earnings.[34] Table 9.1 reports the results. Specifically, the association between *Dif_Predict_CF* and outside director purchase returns is no longer statistically significant. However, earnings predictability has been used widely as a measure for earnings quality in prior literature (see Dechow, Ge and Schrand [2010] for a review), and the Pearson (Spearman) correlation between *Dif_Predict_CF* and *Dif_Predictability* is 19% (21%). Therefore, the measure could also be capturing some aspect of public information

[34] The earnings are measured as earnings before extraordinary items and scaled by beginning of year total assets.

transparency, and it is difficult to distinguish the effect of one from the other.[35] In addition, the association between analyst forecast errors and profitability remains robust, and the effect of analyst following on the six-month purchase returns becomes marginally significant in the predicted direction. Overall, the evidence does not lend support to the claim that the predictability of firm performance drives the results.

A second test I perform is that I remove the fundamental components of cash flow predictability from *Predict_CF* by regressing it on the standard deviation of cash flows over the past five years, the standard deviation of sales over the past five years, the operating cycle and size (Dechow and Dichev, 2002). The residual (*Predict_CF_NoFund*) is thus the unexplained portion of the ability of accounting items in predicting future cash flows by these firm fundamentals.[36] I report the results in Table 9.2. Again, the association between this new measure for accounting transparency and outside director purchase returns is no longer statistically significant for the three and six-month horizons, and for the twelve-month horizon, the association is significant in the direction opposite to my prediction. The association between forecast errors and trading profitability remains robust. This piece of evidence combined with the results in Table 9.1 suggests that caution must be applied when interpreting the association between *Dif_Predict_CF* and purchase profitability.

Controlling for Liquidity

Another factor that is correlated with both public information transparency and the trading profitability of informed traders is the liquidity or depth of the market of the firm's stock. Both theory and empirical evidence suggest that stock market liquidity increases with

[35] The association between *Dif_Predictability* and the trading returns is not statistically significant when not including *Dif_Predict_CF* in the regressions.
[36] See Appendix for details.

information transparency (Kyle, 1985; Lang, Lins and Maffett, 2009). Furthermore, an outside director would be more inclined to trade when the stock of her firm is more liquid (higher market depth) under an imperfect competition framework (Kyle, 1985). Therefore, the higher purchase profitability of outside directors at more transparent firms could reflect outside directors' increased willingness to trade on their *private* information in more liquid stocks, rather than public information improving the precision of their overall information sets. To address this concern, I control for the average stock liquidity over each year prior to each trade using the empirical measure constructed by Amihud (2002):

$$Liquid = \left(-\frac{1}{D_{iy}}\right) \times \sum_{t=1}^{D_{iy}} \left(\frac{|R_{iyd}|}{VOLD_{iyd}}\right), \quad (3)$$

where R_{iyd} is the return on stock *i* on day *d* of year *y*, $VOLD_{iyd}$ is the respective daily volume in dollars, and D_{iy} is the number of days for which data are available for stock *i* in year *y*. This ratio gives the absolute (percentage) price change per dollar of daily trading volume, or the daily price impact of the order flow. This follows Kyle's (1985) concept of illiquidity—the response of price to order flow—and Silber's (1975) measure of thinness, which is defined as the ratio of absolute price change to absolute excess demand for trading. I multiply the original Amihud (2002) measure by negative one so that higher value of *Liquid* indicates higher liquidity.

Table 10 shows that the results are not affected by stock liquidity: both *Dif_Predict_CF* and *Dif_FC_Error* remain statistically significant. Therefore, it does not appear that the transparency measures are capturing outside directors' propensity to trade on private information when the stocks are more liquid.

Public Information Transparency and Future Stock Returns

Prior studies have documented association between information transparency and/or uncertainty and future firm performance and/or stock returns. For example, Li (2008) find that firms with more readable annual reports (therefore more transparent) demonstrate more persistent and positive earnings; Deither, Malloy and Scherbina (2002) find that higher analyst forecast dispersion leads to *lower* future stock returns. These studies all document that higher transparency leads to higher future earnings or returns, and the association between transparency and trading profitability documented here is only statistically significant for purchases. Hence, it is *ex ante* possible that the positive association between public information transparency and outside directors' trading profitability is just reflecting the predictive ability of the information measures on future stock returns.

To verify whether it is indeed the case, I take the transparency measures and test their ability to predict six-month and one-year ahead stock returns. Specifically, for each year, I partition the sample into firms with transparency measures above the median and those with transparency measures below the median. Then I calculate the six-month and one-year ahead stock returns for each firm group. If these measures predict future stock returns *without the timing choices of outside directors*, then I would expect the firms that are in the higher transparency group to exhibit higher future stock returns than the firms that are in the lower transparency group.

Table 11 presents the results. The only public information transparency measure that is significantly associated with future stock returns in the same direction predicted in my main tests is analyst forecast dispersion—higher forecast dispersion (therefore lower transparency) is associated with lower future stock returns, confirming the findings in Diether et al. (2002). However, in my main tests, the association between dispersion and outside director purchase

profitability is never statistically significant, while the measures that do have a significant effect on purchase profitability (i.e. *Predict_CF* and *FC_Error*) do not appear to predict future stock returns on their own. In other words, the association documented in the main analyses relies on the *timing choices* of outside directors to be statistically significant. Therefore, Table 11 is inconsistent with the claim that the results are driven by the ability of information transparency to predict future returns and have nothing to do with outside directors' superior timing ability.[37]

Trading Profitability of Pure Insiders and Firm Level Analysis

In order to control for unobservable outside director characteristics, I require that the outside directors in my sample serve at least two firms. Studying their trading behavior across the different firms thus require that my sample outside directors have traded in at least two of the firms they serve. A cost to this requirement is the significant reduction in the number of firms and outside directors in my sample; therefore, it raises the concern that the positive association between transparency and trading profitability for outside directors is an artifact resulted from the sample selection. As discussed in Chapter 4, this requirement results in my sample firms being larger and operating in an overall richer information environment, and my sample directors being more sophisticated. It is possible that less sophisticated outside directors serving in smaller or more opaque firms do not have the ability or the opportunity to process public information and combine it with their private information sets, and therefore, my results may not be generalizable to all outside directors at all firms. However, the purpose of this paper is to provide evidence on the possibility that outside directors' informational advantage can arise in a transparent public

[37] In untabulated tests, I perform the same analysis by year. For *Predict_CF*, higher *Predict_CF* (i.e. lower transparency) is associated with lower future returns only in two out of the ten years: 2002 and 2007, and in four out of the ten years, *Predict_CF* is *positively* associated with futures stock returns. For *FC_Error*, only in 2003 and 2009 is it negatively and significantly associated with future stock returns (and in 2001, 2002, 2007 and 2008 it is positively and significantly associated with future stock returns). Thus, neither proxy that is significant in the main analysis appears to be consistently predicting future stock returns across the sample period.

information environment, and highlight the existence of heterogeneity among different groups of corporate insiders. Hence, generalizability is not a major concern. Nevertheless, a related concern needs to be addressed, namely the possibility that *all insiders* in my sample firms make higher trading returns when the information environment is more transparent. In other words, it is not the informational position of outside directors but some special characteristics of the sample firms that result in the association.

To test whether this argument is valid, I examine the purchase profitability of *pure insiders.* Table 12.1 presents the results from the regression of firm-level pure insider purchase profitability and the transparency of public information. The findings are consistent with prior literature: pure insider trading profitability *decreases* with public information transparency (Frankel and Li, 2004), except for analyst forecast error.[38] Specifically, analyst following (forecast dispersion) is negatively (positively) associated with purchase profitability of pure insiders. *Predict_CF* is also positively associated with trading profitability, yet the association is only statistically significant in the three-month horizon. The only measure that is statistically significant in the same direction as in the tests for outside directors is analyst forecast error. Overall, it does not appear that all insiders in my sample make higher trading returns at more transparent firms, thus highlighting the difference between pure insiders and outside directors.

Another potential alternative explanation related to the design is that the first-difference specification puts additional restrictions to the regression model and the documented association is an artifact of this model specification. To test whether this is the case, I conduct firm-level tests on the trading profitability of outside directors. The results in Table 12.2 are overall robust to this specification, except that the association between *Predict_CF* and *Buy_Ret_3m* is no

[38] The measure for analyst information transparency in Frankel and Li (2004) is analyst following. The results in Table 12.1 confirms their findings.

longer statistically significant. Therefore, it does not support the claim that the results in the main analysis are driven by the first-difference specification.

CHAPTER 7

ROBUSTNESS CHECKS

This chapter presents robustness checks of the main results in Chapter 5 using alternative measures for information environment transparency and trading profitability.

Alternative Measures for Public Information Transparency

Alternative measures for financial statement transparency: earnings-price association and accrual quality

I adopt two alternative measures for the transparency or quality of financial statements. The first one is the proportion of stock price that is explained by accounting earnings and book value (Francis and Schipper, 1999; Frankel and Li, 2004). Specifically, it is computed as the R^2 from an eight-year rolling regression of stock price three months after the fiscal year end on earnings and book value of equity (*Value_Relevance*). Using this measure is relevant for two reasons: first, it captures the extent to which *investors* incorporate accounting information when making their trading decisions. To the extent that the stock market is efficient, this measure captures the usefulness of accounting information for valuation decisions and is therefore also suitable for the setting of this paper. Second, Frankel and Li (2004) use this measure as their proxy for financial statement quality. Thus, it is informative to compare the effect of this measure on outside director trading profitability with that on the profitability of pure insiders.

Table 13.1 presents the results. There is very weak evidence that *Value_Relevance* is positively associated with the trading profitability of outside directors: the association is only statistically significant in one of the eight specifications (Column 3 on the six-month horizon). I

propose two potential reasons why the association is weaker using *Value_Relevance*, although exploring the actual reason is beyond the scope of this paper. First, the validity of *Value_Relevance* as a measure for information transparency depends on the assumption of market efficiency, which may not hold. Second, given that outside directors have access to internal information and their informational advantage comes from *combining* the public information with their private information, they may not use public information in the same way that equity investors do. Therefore, *Value_Relevance* may not capture the usefulness of financial statements in assisting *outside directors'* valuation decisions.

Table 13.2 presents the results of using another measure as a proxy for financial statement transparency: accrual quality proposed by Dechow and Dichev (2002) and modified by McNichols (2002). In particular, I take the error term from a firm-specific ten-year rolling regression of total current accruals on lagged, current and one year ahead operating cash flows, changes in revenue and growth in property, plant and equipment.[39] I then multiply the absolute value of the error term by negative one so that higher value of the measure (*DD*) indicates higher accrual quality. Overall, there is no significant association between *Dif_DD* and *Dif_Buy_Ret*, except for the three-month horizon, where the differential level of accrual quality is positively associated with the differential level of trading profitability by the same outside director, consistent with my hypothesis.

Alternative measures of analyst information quality

In Table 14, I use two alternative measures of analyst information quality proposed by Barron et al. (1998). These measures aim to capture the overall information environment faced by analysts. The first is the analysts' overall information uncertainty (*Overall_Uncertainty*).

[39] See also the Appendix for details of this measure.

Barron et al. (1998) posit that the uncertainty faced by analysts (i.e. analysts' expected variance of a firm's earnings conditional on her available information) consists of two components: common uncertainty and idiosyncratic uncertainty. The former captures the precision of information shared by all analysts and the latter measures the precision of each analyst's private information. The overall uncertainty is the sum of the two sources of uncertainty and captures the precision or quality of common and idiosyncratic information that gets incorporated in analyst forecasts. The second is analysts' common information uncertainty (*Common_Uncertainty*), which measures only the precision or quality of information shared by all analysts.[40]

The results in Table 14 are consistent with my hypothesis. Both *Dif_Overall_Unertainty* and *Dif_Common_Uncertainty* are significantly correlated with *Dif_Buy_Ret* in the six, nine and twelve-month horizons: the higher the transparency of the information environment faced by analysts, the larger the informational advantage of outside directors.

Alternative Measures of Trading Profitability

In the main tests I use the size-adjusted returns to measure outside director trading profitability and control for risk factors such as size and book-to-market ratio. One alternative would be using the Fama-French Four Factor Model (Fama and French, 1993). I do not use this alternative in my main analysis because it requires an estimation period prior to the trading dates, yet the daily factor returns are volatile and therefore it requires a long estimation period (e.g., 60 months prior to the trading date as in Womack [1996]) to yield stable coefficient estimates (Ravina and Sapienza, 2010). Using such a long estimation period significantly reduces my sample size. Therefore, in Table 15 I use estimation periods of 365 (*Dif_Buy_FFRet_6m1*) and

[40] See the Appendix for the specifics in the construction of the measure.

730 (*Dif_Buy_FFRet_6m2*) days.[41] The association between analyst forecast error and outside director purchase profitability is robust to these alternative specifications, whereas the association between financial statement transparency and purchase profitability is no longer statistically significant.

Discussion

The analyses in this chapter and the previous chapter suggest that overall, the effects of analyst information quality measures appear to be more robust than those of the financial statement transparency measures. I put forward one potential explanation of this phenomenon, although it is beyond the scope of this paper to explore the reason. In this paper, both groups of measures are supposed to capture the transparency of the *overall information environment*, yet each group is still capturing different sources of public information. It is possible that financial statement information is not as helpful as information from analysts in assisting outside directors. This is not surprising given that many firms require outside directors to approve their quarterly financial statements before they are made public, and *all firms* require board approval before releasing their 10-K filings. Thus, information in the financial statements would be easily substituted by information from internal channels. In contrast, analyst reports contain expert inputs of financial analysts that offer additional insight to firm performance and valuation that may not be easily substituted by private information (Hutton et al., 2012).

[41] For parsimony I only report the returns over the six-month horizon. The results over other horizons are similar.

CHAPTER 8

CONCLUSION

This paper studies whether outside directors reap higher insider trading returns when a firm is in a more transparent public information environment. By comparing the same outside director's trading profitability across all the different firms she serves, I find that the same outside director makes higher open market purchase returns at firms with more transparent public information. I interpret the results as suggesting that transparent public information can help outside directors form information sets that are superior to the information sets of investors. Further analyses indicate that the results are not driven by potential unobservable factors that are correlated with both trading profitability and pubic information transparency, such as the quality of private information, litigation risk, predictability of firm performance and stock liquidity. The results—in particular the association between analyst forecast error and purchase profitability—are also robust to firm-level analyses and alternative measures of information transparency and abnormal trading returns.

This paper extends prior insider trading literature by exploring the source of outside directors' informational advantage. In particular, it is taken as a given by prior literature that insiders have superior information, and the source of such information is widely assumed to be from internal channels. This paper shows that for outside directors, informational advantage can arise in a transparent *public* information environment. This finding highlights the existence of a spectrum of informational positions of corporate insiders and the heterogeneity in how the informational advantage may arise for different insiders along the spectrum.

The complementary effect between public and private information for outside directors also speaks to the theoretical literature on whether public information crowds out or triggers private information acquisition (Verrecchia, 1982; Diamond, 1985; Kim and Verrecchia, 1994). This paper, together with prior literature (Frankel and Li, 2004), suggests that both scenarios can happen in the insider trading setting, and which particular scenario dominates depends on the specific informational position of the insider: for pure insiders who are directly involved in managing the firm, the chances of getting private information that can subsume and/or supplant public information is high, and more transparent public information would reduce their informational advantage; for outside directors who are relatively remote from their firm's daily operation, transparent public information can facilitate further private information acquisition, and interpreting public information with the help of private information can generate superior overall information sets.

One caveat of interpreting the findings of this paper is that the evidence does not point to any particular source or type of public information that is useful for outside directors. The evidence only suggests that the transparency of the *overall public information environment* can give rise to outside directors' informational advantage.[42] The question of which particular source of information is useful for outside directors and why it is useful could be explored by future research.

Another interesting question related to the topic of this paper is *how* outside directors *use* their informational advantage in their roles as advisors and monitors. A large literature in corporate governance examines the association between the transparency of a firm's information

[42] It appears from the robustness of the results that analyst information is more useful for outside directors than financial statement information; however, the research design in this paper cannot give *direct* evidence on outside directors' *usage* of any particular type of information.

environment and the percentage of outside directors on its board, with the implicit assumption that the information would be useful for outside directors to be effective monitors and/or advisors.[43] The focus of this paper is on the *source* rather than the *use* of outside directors' information; however, the results suggest that public information could *potentially* be one source of information for the monitoring/advising roles of outside directors and this issue would be interesting for future research to explore.

[43] See for example, Vafeas (2000) Ahmed and Duellman (2007), Boone et al. (2007), Petra (2007), Coles et al. (2008), Linck et al. (2008), Cai et al. (2009), Duchin et al. (2010), Ferreira et al. (2011). See also Armstrong et al. (2010) and Adams et al. (2010) for a review of this literature.

Figure 1: Summary of Hypothesis Development

	(1) Public Information Complements Private Information	(2) Public Information Substitutes Private Information
(1) Precision of Investors' Information	Increase	Increase
(2) Precision of Insiders' Information	Increase	No Effect
(3) **Insider's Informaitonal Advantage ((2)-(1))**	**Unclear**	**Decrease**

Table 1.1: Comparing Sample Firms with Firms that Have Both Compustat and CRSP Data

	No. of firm-years		Mean			Median			Standard deviation	
Variables	Firms with Compustat and CRSP data	Sample firms	Firms with Compustat and CRSP data	Sample firms	Difference	Firms with Compustat and CRSP data	Sample firms	Difference	Firms with Compustat and CRSP data	Sample firms
Assets	44,321	8,501	2,236.75	9,362.08	7125.33***	277.29	1,933.47	1656.18***	8,424.61	18,903.37
Sales	44,270	8,501	1,087.14	5,214.67	4127.53***	131.23	1,391.51	1260.28***	3,713.02	8,854.92
Market_Cap	44,303	8,501	1,326.50	6,645.54	5319.04***	170.50	1,733.28	1562.78***	4,777.14	11,733.70
Leverage	44,189	8,501	0.15	0.19	0.04***	0.07	0.15	0.08***	0.19	0.19
MTB	44,256	8,501	2.46	3.21	0.75***	1.67	2.30	0.63***	3.61	3.94
RND	44,312	8,501	0.05	0.05	-0.00***	0.00	0.00	0.00***	0.12	0.10
ROA	44,260	8,501	-0.08	0.00	0.08***	0.01	0.04	0.03***	0.32	0.20
Intangibles	43,882	8,501	0.80	0.77	-0.03***	0.89	0.84	-0.05***	0.23	0.21
N_Segments	37,098	8,501	2.21	2.85	0.64***	1.00	3.00	2.00***	1.59	1.93
Geo_Concentration	28,906	8,501	0.77	0.65	-0.12***	0.90	0.63	-0.27***	0.27	0.29
Ind_Concentration	36,373	8,501	0.87	0.81	-0.06***	1.00	1.00	0.00	0.23	0.27
Ret_Vol	44,022	8,501	0.04	0.03	-0.01***	0.03	0.03	-0.00***	0.02	0.02
Spread	44,010	8,501	0.02	0.01	-0.01***	0.01	0.00	-0.01***	0.03	0.01
Turnover	44,041	8,501	0.01	0.01	0.00***	0.00	0.01	0.01***	0.01	0.01
Institution	36,038	8,501	0.44	0.72	0.28***	0.40	0.75	0.35***	0.32	0.23
FC_Error	19,851	8,501	0.73	0.63	-0.1***	0.06	0.04	-0.02***	2.19	2.04
Dispersion	15,288	8,501	0.05	0.04	-0.01***	0.00	0.00	-0.00***	0.14	0.13
N_Analyst	20,081	8,501	4.76	7.65	2.89***	3.00	6.00	3.00***	4.44	5.50
Board_Size	36,815	8,501	9.25	12.42	3.17***	9.00	13.00	4.00***	3.37	3.33
Board_Indep	36,815	8,501	0.71	0.66	-0.05***	0.71	0.64	-0.07***	0.14	0.12

Note: This table presents presents firm characteristics in my sample and compares them with firms that are in the intersection of Compustat and CRSP. The unit of observation is firm-year. Three statistics are presented: the mean, the median and the standard deviation. For each statistic, the first column presents firms in the intersection between Compustat and CRSP, and the second column presents firms in my sample. The third column (if applicable) presents the difference between the sample firms and firms with Compustat and CRSP data (sample firms – Compustat & CRSP firms). ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively. *Assets* are total assets (in millions); *Sales* are net sales (in millions); *Market_Cap* is price per share multiplied by the number of shares outstanding (in millions) as of the fiscal year end date; *Spread* is the average daily bid-ask spread scaled by price over the fiscal year; *Turnover* is trading volume divided by shares outstanding. All variables are winsorized at the 1st and 99th percentiles. See Appendix for definitions of other variables.

Table 1.2: Comparing Sample Firm Characteristics in Purchase Years with Non-purchase Years

	No. of firm-years		Mean			Median			Standard deviation	
Variables	**Non-trade years**	**Trade years**	**Non-trade years**	**Trade years**	**Difference**	**Non-trade years**	**Trade years**	**Difference**	**Non-trade years**	**Trade years**
Assets	6,389	2,112	8,740.16	11,244.36	2504.2***	1,833.29	2,268.20	434.91***	18,026.22	21,233.47
Sales	6,389	2,112	5,051.81	5,707.55	655.74***	1,320.19	1,594.20	274.01***	8,711.49	9,260.22
Market_Cap	6,389	2,112	6,426.91	7,307.12	880.21***	1,685.21	1,874.10	188.89*	4,777.14	11,733.70
Leverage	6,389	2,112	0.18	0.20	0.02***	0.15	0.16	0.01**	0.18	0.20
MTB	6,389	2,112	3.25	3.10	-0.15	2.33	2.14	-0.19**	3.94	3.94
RND	6,389	2,112	0.05	0.05	0.00	0.00	0.00	0.00**	0.10	0.11
ROA	6,389	2,112	0.00	-0.01	-0.01***	0.04	0.03	-0.01***	0.19	0.22
Intangibles	6,389	2,112	0.77	0.76	-0.01**	0.84	0.84	-0.00	0.21	0.23
N_Segments	6,389	2,112	2.84	2.88	0.04	3.00	3.00	0.00	1.92	1.95
Geo_Concentration	6,389	2,112	0.65	0.65	0.00	0.63	0.63	0.00	0.29	0.28
Ind_Concentration	6,389	2,112	0.82	0.81	-0.01	1.00	1.00	-0.00	0.27	0.27
Ret_Vol	6,389	2,112	0.03	0.03	0.00***	0.03	0.03	0.00	0.02	0.02
Spread	6,389	2,112	0.01	0.00	-0.01***	0.00	0.00	-0.00	0.01	0.01
Turnover	6,389	2,112	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01
Institution	6,389	2,112	0.72	0.72	0.00	0.75	0.74	-0.01	0.23	0.23
FC_Error	6,389	2,112	0.59	0.74	0.15***	0.04	0.04	0.00	1.94	2.28
Dispersion	6,389	2,112	0.04	0.04	0.00**	0.00	0.00	0.00	0.12	0.15
N_Analyst	6,389	2,112	7.55	7.92	0.37***	6.00	6.00	0.00***	5.48	5.54
Board_Size	6,389	2,112	12.35	12.66	0.31***	12.00	13.00	1.00***	3.29	3.44
Board_Indep	6,389	2,112	0.65	0.67	0.02***	0.64	0.65	0.01***	0.12	0.12

Note: This table compares sample firm statistics for years during which at least one outside director in the sample has conducted one purchase. Three statistics are presented: the mean, the median and the standard deviation. For each statistic, the first column presents firms in the intersection between Compustat and CRSP, and the second column presents firms in my sample. The third column (if applicable) presents the difference between the sample firms and firms with Compustat and CRSP data (sample firms – Compustat & CRSP firms). ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively. *Assets* are total assets (in millions); *Sales* are net sales (in millions); *Market_Cap* is price per share multiplied by the number of shares outstanding (in millions) as of the fiscal year end date; *Spread* is the average daily bid-ask spread scaled by price over the fiscal year; *Turnover* is trading volume divided by shares outstanding. All variables are winsorized at the 1st and 99th percentiles. See Appendix for definitions of other variables.

Table 1.3: Comparing Sample Firm Characteristics in Sale Years with Non-sale Years

	No. of firm-years		Mean			Median			Standard deviation	
Variables	**Non-trade years**	**Trade years**	**Non-trade years**	**Trade years**	**Difference**	**Non-trade years**	**Trade years**	**Difference**	**Non-trade years**	**Trade years**
Assets	7,069	1,432	9,181.98	10,252.49	1070.51**	1,899.58	2,003.76	104.18*	17,875.49	20,504.98
Sales	7,069	1,432	5,195.53	5,309.48	113.95**	1,321.31	1,446.64	125.33**	8,720.06	8,874.27
Market_Cap	7,069	1,432	6,533.94	7,196.74	662.80**	1,573.54	1,879.52	305.98*	9,838.80	10,648.46
Leverage	7,069	1,432	0.19	0.15	-0.04***	0.14	0.10	-0.04***	0.19	0.18
MTB	7,069	1,432	3.14	3.55	0.41***	2.39	2.89	0.50**	3.83	4.14
RND	7,069	1,432	0.05	0.05	0.00	0.00	0.00	0.00	0.10	0.09
ROA	7,069	1,432	-0.01	0.03	0.04***	0.04	0.05	0.01***	0.19	0.18
Intangibles	7,069	1,432	0.76	0.79	0.03***	0.85	0.87	0.02**	0.22	0.22
N_Segments	7,069	1,432	2.86	2.82	-0.04	3.00	3.00	0.00	1.90	1.87
Geo_Concentration	7,069	1,432	0.65	0.66	0.01	0.62	0.65	0.03	0.29	0.28
Ind_Concentration	7,069	1,432	0.81	0.85	0.04	1.00	1.00	0.00	0.25	0.24
Ret_Vol	7,069	1,432	0.03	0.03	0.00	0.03	0.03	0.00	0.02	0.02
Spread	7,069	1,432	0.01	0.00	-0.01**	0.00	0.00	0.00	0.01	0.01
Turnover	7,069	1,432	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01
Institution	7,069	1,432	0.72	0.74	0.02	0.75	0.75	0.00	0.24	0.22
FC_Error	7,069	1,432	0.61	0.71	0.10**	0.04	0.04	0.00	2.08	1.76
Dispersion	7,069	1,432	0.04	0.04	0.00	0.00	0.00	0.00	0.13	0.12
N_Analyst	7,069	1,432	7.55	8.10	0.55***	6.00	7.00	1.00**	5.67	5.84
Board_Size	7,069	1,432	12.50	12.07	-0.43***	12.00	12.00	0.00	3.29	3.37
Board_Indep	7,069	1,432	0.66	0.65	-0.01	0.64	0.64	0.00	0.12	0.12

Note: This table compares sample firm statistics for years during which at least one outside director in the sample has conducted one sale. Three statistics are presented: the mean, the median and the standard deviation. For each statistic, the first column presents firms in the intersection between Compustat and CRSP, and the second column presents firms in my sample. The third column (if applicable) presents the difference between the sample firms and firms with Compustat and CRSP data (sample firms – Compustat & CRSP firms). ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively. *Assets* are total assets (in millions); *Sales* are net sales (in millions); *Market_Cap* is price per share multiplied by the number of shares outstanding (in millions) as of the fiscal year end date; *Spread* is the average daily bid-ask spread scaled by price over the fiscal year; *Turnover* is trading volume divided by shares outstanding. All variables are winsorized at the 1st and 99th percentiles. See Appendix for definitions of other variables.

Table 2: Outside Director Characteristics

Variables	No. of firm-directors		Mean			Median			Standard deviation	
	Peers	Sample directors	Peers	Sample directors	Difference	Peers	Sample directors	Difference	Peers	Sample directors
No. of years on board	11,179	1,332	6.35	4.89	-1.46***	3.89	3.40	-0.49***	6.56	4.61
No. of years in firm	11,179	1,332	6.70	4.99	-1.71***	3.90	3.47	-0.43***	7.21	4.88
Total number of other public board positions	11,179	1,332	3.30	5.18	1.88***	2.67	4.75	2.08***	2.47	2.73
Total number of committee positions on board	11,123	1,332	1.18	1.39	0.21***	1.00	1.36	0.36***	0.77	0.68
Total number of committee chairs	11,123	1,332	0.25	0.36	0.11***	0.00	0.00	0.00***	0.39	0.42
Audit committee financial expert	11,123	1,332	0.15	0.26	0.11***	0.00	0.00	0.00***	0.33	0.41
Industry expert	11,180	1,332	0.08	0.12	0.04***	0.00	0.00	0.00***	0.27	0.32
Employment connections with the CEO	11,180	1,332	0.20	0.20	0.00	0.00	0.00	0.00	0.38	0.37
Educational connections with the CEO	11,180	1,332	0.11	0.10	-0.01	0.00	0.00	0.01	0.29	0.28
Other social connections with the CEO	11,180	1,332	0.20	0.19	-0.01	0.00	0.00	0.02	0.37	0.37
Age	11,094	1,332	59.37	60.45	1.08***	60.00	61.00	1.00***	8.85	7.08
Gender	11,180	1,332	0.12	0.17	0.05***	0.00	0.00	0.00***	0.33	0.37

Note: This table presents descriptive statistics for the sample directors and compare them with outside directors of the same firms as the sample directors but not included in the sample ("peers"). The unit of observation is firm-director. Three statistics are presented: the mean, the median and the standard deviation. For each statistic, the first column presents characteristics of the sample directors' peers, and the second column presents outside directors in my sample. The third column (if applicable) presents the difference between the sample directors and their peers (sample directors– peers). ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively. *No. of years on board* is the total number of years the director has been on the firm's board; *No. of years in firm* is the total number of years the director has been in the firm (including years not on the board); *Total number of other public board positions* is the total number of public firms that the director serves as a board member other than the current firm; *Total number of committee positions on board* is the number of board committees that the director sits on within the firm; *Total number of committee chairs* is the number of board committees in the firm that the director serves as the committee chair; *Audit committee financial expert* is an indicator variable that equals 1 if the director is identified by the firm as the financial expert on the audit committee and 0 otherwise; *Industry expert* is an indicator variable that equals 1 if the outside director has worked in firms that are in the same industry as the current firm, and zero otherwise; *Employment connections with the CEO* is an indicator variable that equals 1 if the outside director has worked in the same firm with the CEO other than the current firm, and 0 otherwise; *Education connections with the CEO* is an indicator variable that equals 1 if the outside director has gone to the same university with the CEO, and 0 otherwise; *Other social connections with the CEO* is an indicator variable that equals 1 if the outside director joins the same club, charity or other social organizations with the CEO, and 0 otherwise; *Age* is the average age of the outside director while on the board; *Gender* is an indicator variable that equal 1 if the outside director is female, and 0 if the outside director is male. All variables are winsorized at the 1st and 99th percentiles.

Table 3: Regression Variables

Variables	n	Mean	S.D.	0.25	Mdn	0.75
ABS_Dif_Buy_Ret_3m	873	0.21	0.20	0.07	0.15	0.28
ABS_Dif_Buy_Ret_6m	873	0.30	0.28	0.10	0.22	0.44
ABS_Dif_Buy_Ret_9m	873	0.38	0.36	0.12	0.27	0.54
ABS_Dif_Buy_Ret_12m	873	0.44	0.41	0.14	0.32	0.58
ABS_Dif_Sell_Ret_3m	515	0.18	0.15	0.06	0.14	0.24
ABS_Dif_Sell_Ret_6m	515	0.24	0.21	0.08	0.18	0.34
ABS_Dif_Sell_Ret_9m	515	0.31	0.28	0.09	0.22	0.44
ABS_Dif_Sell_Ret_12m	515	0.34	0.29	0.10	0.27	0.48
ABS_Dif_Predict_CF	873	0.07	0.10	0.01	0.04	0.08
ABS_Dif_N_Analyst	873	5.37	4.39	2.00	4.00	8.00
ABS_Dif_Dispersion	873	0.07	0.17	0.00	0.01	0.05
ABS_Dif_FC_Error	873	0.93	2.13	0.03	0.17	0.76
ABS_Dif_Ret_Vol	873	0.02	0.02	0.01	0.01	0.02
ABS_Dif_Inside_Buy_3m	873	0.08	0.15	0.00	0.01	0.11
ABS_Dif_Inside_Buy_6m	873	0.12	0.19	0.00	0.02	0.16
ABS_Dif_Inside_Buy_9m	873	0.15	0.24	0.00	0.02	0.20
ABS_Dif_Inside_Buy_12m	873	0.18	0.29	0.00	0.02	0.23
ABS_Dif_Inside_Sell_3m	515	0.09	0.11	0.00	0.05	0.13
ABS_Dif_Inside_Sell_6m	515	0.14	0.16	0.00	0.09	0.22
ABS_Dif_Inside_Sell_9m	515	0.18	0.21	0.00	0.11	0.27
ABS_Dif_Inside_Sell_12m	515	0.19	0.23	0.00	0.11	0.30
ABS_Dif_Restrict	873	0.32	0.47	0.00	0.00	1.00
ABS_Dif_Transize	873	110000.00	220000.00	10788.50	34127.00	96079.30
ABS_Dif_MTB	873	3.41	4.31	0.78	1.86	4.06
ABS_Dif_RND	873	0.39	0.48	0.00	0.00	1.00
ABS_Dif_Leverage	873	0.20	0.17	0.06	0.16	0.29
ABS_Dif_Intangibles	873	0.21	0.19	0.06	0.16	0.32
ABS_Dif_Log_N_Segments	873	0.59	0.49	0.14	0.56	0.92
ABS_Dif_Ind_Concentration	873	0.23	0.25	0.00	0.14	0.42
ABS_Dif_Geo_Concentration	873	0.30	0.25	0.04	0.28	0.50
ABS_Dif_ROA	873	0.18	0.24	0.04	0.08	0.21
ABS_Dif_Size	873	2.14	1.61	0.89	1.77	3.05
ABS_Dif_N_People_Purchase	873	1.42	1.30	0.50	1.00	2.00
ABS_Dif_Board_Size	873	2.86	2.15	1.00	2.50	4.00
ABS_Dif_Board_Indep	873	0.13	0.10	0.04	0.10	0.20
ABS_Dif_Institution	873	0.23	0.18	0.09	0.17	0.33
ABS_Dif_Audit_Committee	873	0.34	0.45	0.00	0.00	1.00
ABS_Dif_Nomin_Committee	873	0.42	0.47	0.00	0.00	1.00
ABS_Dif_Compen_Committee	873	0.45	0.47	0.00	0.25	1.00
ABS_Dif_Ind_Expert	873	0.15	0.35	0.00	0.00	0.00
ABS_Dif_Tie	873	0.46	0.50	0.00	0.00	1.00

Note: This table presents descriptive statistics of absolute values of the first differences of firm and outside director characteristics. For example, for an outside director who serves two firms A and B, *ABS_Dif_Variable* indicates the differences between *Variable* of firm A and firm B. See Appendix for variable definitions. All variables are winsorized at the 1st and 99th percentiles.

Table 4.1: Outside Director Purchase Characteristics

	No. of Obs		Mean			Median			Standard deviation	
Variable	**Peers**	**Sample directors**	**Peers**	**Sample directors**	**Difference**	**Peers**	**Sample directors**	**Difference**	**Peers**	**Sample directors**
Buy_Ret_3m	65,768	4,718	0.03	0.05	0.02***	0.00	0.02	0.02***	0.25	0.25
Buy_Ret_6m	66,008	4,718	0.03	0.07	0.04***	-0.01	0.02	0.03***	0.35	0.36
Buy_Ret_9m	66,218	4,718	0.03	0.09	0.06***	-0.03	0.02	0.05***	0.44	0.46
Buy_Ret_12m	66,430	4,718	0.03	0.13	0.10***	-0.04	0.03	0.07***	0.50	0.54
Buy_Raw_3m	65,768	4,718	0.05	0.07	0.02***	0.02	0.04	0.02***	0.28	0.29
Buy_Raw_6m	66,008	4,718	0.08	0.12	0.04***	0.04	0.06	0.02***	0.42	0.45
Buy_Raw_9m	66,218	4,718	0.11	0.16	0.05***	0.05	0.08	0.03***	0.53	0.58
Buy_Raw_12m	66,430	4,718	0.14	0.22	0.08***	0.06	0.11	0.05***	0.64	0.70
Tran_Size	68,987	4,925	66,822.34	90,000.00	23177.66***	12,360.00	26,400.00	14040.00***	210,000.00	390,000.00
Frequency 1	78,882	9,067	0.49	0.45	-0.04***	0.00	0.00	0.00***	1.15	1.01
Frequency 2	20,420	2,466	1.90	1.67	-0.23***	1.00	1.00	0.00***	1.56	1.31

Note: This table presents descriptive statistics for the purchase profitability, purchase size and purchase frequency of sample outside directors and compare them with outside directors of the same firms as the sample directors but not included in the sample ("peers"). The unit of observation for trading profitability and trading size variables is each individual trade, and the unit of observation for trading frequency variables is director-firm-year. Three statistics are presented: the mean, the median and the standard deviation. For each statistic, the first column presents characteristics of the sample directors' peers, and the second column presents outside directors in my sample. The third column (if applicable) presents the difference between the sample directors and their peers (sample directors–peers). ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively. All variables are defined in Appendix and winsorized at the 1st and 99th percentiles.

Table 4.2: Outside Director Sale Characteristics

	No. of Obs		Mean			Median			Standard deviation	
		Sample		Sample			Sample			Sample
Variable	**Peers**	**directors**	**Peers**	**directors**	**Difference**	**Peers**	**directors**	**Difference**	**Peers**	**directors**
Sell_Ret_3m	68,370	4,239	0.01	0.00	-0.01	0.01	0.01	0.00	0.18	0.18
Sell_Ret_6m	68,494	4,239	0.01	0.01	0.00	0.03	0.01	-0.02*	0.26	0.26
Sell_Ret_9m	68,622	4,239	0.01	0.00	-0.01	0.04	0.02	-0.02*	0.32	0.32
Sell_Ret_12m	68,696	4,239	0.01	0.00	-0.01	0.05	0.03	-0.02*	0.36	0.36
Sell_Raw_3m	68,370	4,239	0.00	-0.01	-0.01	-0.01	-0.01	0.00	0.20	0.21
Sell_Raw_6m	68,494	4,239	-0.02	-0.02	0.00	-0.01	-0.03	-0.02	0.29	0.31
Sell_Raw_9m	68,622	4,239	-0.04	-0.05	-0.01	-0.02	-0.04	-0.02	0.37	0.39
Sell_Raw_12m	68,696	4,239	-0.06	-0.07	-0.01	-0.03	-0.05	-0.02	0.42	0.45
Tran_Size	72,007	4,469	1,100,000.00	1,900,000.00	800000.00***	140,000.00	250,000.00	110000.00***	4,400,000.00	6,400,000.00
Frequency 1	59,806	5,310	0.65	0.66	0.01	0.00	0.00	0.00***	1.79	1.67
Frequency 2	14,779	1,460	2.64	2.40	-0.24***	1.00	1.00	0.00***	2.79	2.45

Note: This table presents descriptive statistics for the sale profitability, sale size and sale frequency of sample outside directors and compare them with outside directors of the same firms as the sample directors but not included in the sample ("peers"). The unit of observation for trading profitability and trading size variables is each individual trade, and the unit of observation for trading frequency variables is director-firm-year. Three statistics are presented: the mean, the median and the standard deviation. For each statistic, the first column presents characteristics of the sample directors' peers, and the second column presents outside directors in my sample. The third column (if applicable) presents the difference between the sample directors and their peers (sample directors– peers). ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively. All variables are defined in Appendix and winsorized at the 1st and 99th percentiles.

Table 5.1: Outside Director Purchase Profitability and Public Information Transparency

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variables	**Dif_Buy_Ret_3m**		**Dif_Buy_Ret_6m**		**Dif_Buy_Ret_9m**		**Dif_Buy_Ret_12m**	
Independent Variables								
Dif_Predict_CF	-0.2211**	-0.2097*	-0.3633**	-0.3381**	0.1868	0.2182	0.1380	0.1800
	(-2.04)	(-1.92)	(-2.22)	(-2.04)	(0.73)	(0.85)	(0.61)	(0.78)
Dif_N_Analyst	0.0009	0.0008	0.0013	0.0012	0.0006	0.0004	0.0033	0.0030
	(0.50)	(0.49)	(0.59)	(0.52)	(0.19)	(0.12)	(0.90)	(0.83)
Dif_Dispersion	0.0808		0.0584		0.0363		0.0748	
	(1.30)		(0.78)		(0.31)		(0.52)	
Dif_FC_Error		-0.0069		-0.0191***		-0.0249***		-0.0324***
		(-1.40)		(-3.56)		(-4.10)		(-3.40)
Control Variables								
Dif_Ret_Vol	-0.0308	-0.0706	-2.0929***	-2.1394***	-3.6609***	-3.7064***	-4.6020***	-4.6717***
	(-0.05)	(-0.12)	(-2.70)	(-2.76)	(-4.14)	(-4.22)	(-4.94)	(-5.04)
Dif_Inside_Ret	0.3415***	0.3362***	0.5947***	0.5803***	0.7007***	0.6820***	0.8040***	0.7797***
	(5.15)	(4.96)	(6.15)	(5.95)	(6.49)	(6.30)	(7.01)	(6.86)
Dif_Restrict	0.0076	0.0080	0.0023	0.0057	-0.0206	-0.0156	-0.0206	-0.0145
	(0.42)	(0.44)	(0.10)	(0.27)	(-0.69)	(-0.53)	(-0.57)	(-0.41)
Dif_Tran_Size	0.0000**	0.0000**	0.0000*	0.0000	0.0000**	0.0000*	0.0000**	0.0000**
	(2.55)	(2.51)	(1.73)	(1.63)	(2.03)	(1.89)	(2.35)	(2.15)
Dif_MTB	-0.0006	-0.0006	-0.0043	-0.0041	-0.0024	-0.0022	-0.0002	0.0001
	(-0.34)	(-0.33)	(-1.62)	(-1.53)	(-0.84)	(-0.77)	(-0.05)	(0.03)
Dif_RND	0.0043	0.0038	0.0057	0.0058	0.0199	0.0204	0.0327	0.0332
	(0.24)	(0.21)	(0.23)	(0.23)	(0.59)	(0.61)	(0.80)	(0.82)
Dif_Leverage	-0.0429	-0.0489	-0.0514	-0.0587	-0.0703	-0.0775	-0.0901	-0.1011
	(-1.06)	(-1.21)	(-0.85)	(-0.97)	(-0.96)	(-1.06)	(-1.08)	(-1.21)
Dif_Intangibles	-0.0055	0.0032	-0.0342	-0.0164	-0.0642	-0.0425	-0.0766	-0.0473
	(-0.14)	(0.08)	(-0.65)	(-0.31)	(-1.02)	(-0.68)	(-1.11)	(-0.70)
Dif_Log_N_Segments	0.0193	0.0189	-0.0043	-0.0056	-0.0010	-0.0027	0.0258	0.0236
	(1.19)	(1.16)	(-0.20)	(-0.26)	(-0.03)	(-0.10)	(0.80)	(0.73)
Dif_Ind_Concentration	0.0135	0.0141	-0.0128	-0.0122	0.0096	0.0102	0.0329	0.0338
	(0.39)	(0.41)	(-0.27)	(-0.26)	(0.15)	(0.16)	(0.49)	(0.51)
Dif_Geo_Concentration	0.0118	0.0080	-0.0198	-0.0241	0.0161	0.0120	0.0337	0.0273
	(0.43)	(0.29)	(-0.55)	(-0.67)	(0.34)	(0.25)	(0.59)	(0.48)
Dif_ROA	0.0126	0.0072	-0.0280	-0.0353	-0.0418	-0.0496	-0.0984	-0.1098
	(0.33)	(0.18)	(-0.43)	(-0.54)	(-0.54)	(-0.64)	(-1.20)	(-1.37)
Dif_Size	0.0028	0.0031	-0.0067	-0.0057	-0.0110	-0.0097	-0.0162*	-0.0145
	(0.57)	(0.63)	(-1.06)	(-0.91)	(-1.41)	(-1.25)	(-1.72)	(-1.57)
Dif_N_People_Purchase	-0.0025	-0.0013	-0.0052	-0.0026	-0.0042	-0.0010	-0.0055	-0.0011
	(-0.52)	(-0.27)	(-0.73)	(-0.36)	(-0.44)	(-0.10)	(-0.50)	(-0.10)

Table 5.1: Outside Director Purchase Profitability and Public Information Transparency (Cont.)

Dif_Board_Size	0.0028	0.0023	-0.0001	-0.0009	-0.0048	-0.0056	-0.0056	-0.0068
	(0.85)	(0.71)	(-0.03)	(-0.20)	(-0.83)	(-1.02)	(-0.85)	(-1.08)
Dif_Board_Indep	-0.1605**	-0.1479*	-0.1519	-0.1261	-0.3102**	-0.2787*	-0.2677*	-0.2251
	(-2.09)	(-1.93)	(-1.44)	(-1.20)	(-2.17)	(-1.96)	(-1.66)	(-1.40)
Dif_Institution	-0.0739*	-0.0671	-0.0522	-0.0442	-0.0492	-0.0412	-0.0438	-0.0317
	(-1.73)	(-1.59)	(-0.87)	(-0.75)	(-0.65)	(-0.55)	(-0.52)	(-0.38)
Dif_Audit_Committee	-0.0033	-0.0038	-0.0138	-0.0134	-0.0116	-0.0106	-0.0189	-0.0178
	(-0.18)	(-0.20)	(-0.51)	(-0.50)	(-0.32)	(-0.29)	(-0.47)	(-0.45)
Dif_Nomin_Comittee	-0.0180	-0.0188	-0.0119	-0.0144	0.0039	0.0007	-0.0074	-0.0116
	(-1.09)	(-1.14)	(-0.47)	(-0.56)	(0.12)	(0.02)	(-0.20)	(-0.32)
Dif_Compen_Committee	0.0234	0.0213	0.0449*	0.0413*	0.0394	0.0352	0.0330	0.0271
	(1.33)	(1.21)	(1.91)	(1.76)	(1.29)	(1.17)	(0.90)	(0.76)
Dif_Ind_Expert	0.0489*	0.0501*	0.0546	0.0541	0.0269	0.0254	0.0691	0.0678
	(1.76)	(1.80)	(1.22)	(1.21)	(0.50)	(0.48)	(1.28)	(1.28)
Dif_Tie	0.0028	0.0004	0.0219	0.0180	0.0121	0.0077	0.0166	0.0104
	(0.19)	(0.03)	(1.01)	(0.83)	(0.46)	(0.29)	(0.56)	(0.36)
Constant	0.0026	0.0021	-0.0057	-0.0058	-0.0155	-0.0154	-0.0105	-0.0105
	(0.21)	(0.17)	(-0.33)	(-0.34)	(-0.71)	(-0.71)	(-0.43)	(-0.44)
Observations	873	873	873	873	873	873	873	873
R-squared	0.11	0.12	0.15	0.16	0.15	0.16	0.15	0.16
Cluster by director	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents the regression that tests the relation between an outside director's relative purchase profitability across the different firms she serves and the relative transparency of public information of those firms. The research design and construction of variables are described in Chapter 3 and Appendix. All variables are defined in Appendix . If an outside director sits on more than two boards, the differences of the variables are taken across each pair of firms. Thus, for an outside director who serves on N boards, the number of observations for that director is N(N-1)/2. ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively. The standard errors are clustered by director.

Table 5.2: Outside Director Sale Profitability and Public Information Transparency

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variables	**Dif_Sell_Ret_3m**		**Dif_Sell_Ret_6m**		**Dif_Sell_Ret_9m**		**Dif_Sell_Ret_12m**	
Independent Variables								
Dif_Predict_CF	-0.0801	-0.0787	-0.0918	-0.0937	0.0447	0.0396	0.0491	0.0455
	(-1.00)	(-0.97)	(-0.82)	(-0.84)	(0.33)	(0.29)	(0.26)	(0.24)
Dif_N_Analyst	-0.0001	-0.0000	-0.0019	-0.0018	-0.0035	-0.0034	-0.0015	-0.0012
	(-0.09)	(-0.02)	(-1.00)	(-0.95)	(-1.44)	(-1.39)	(-0.54)	(-0.44)
Dif_Dispersion	0.1008		0.0977		0.1090		0.2332	
	(0.89)		(0.71)		(0.75)		(1.37)	
Dif_FC_Error		0.0027		0.0057		0.0092		0.0127
		(0.28)		(0.48)		(0.68)		(0.82)
Control Variables								
Dif_Ret_Vol	0.2075	0.2290	0.0915	0.1121	0.2774	0.3003	-0.2472	-0.1979
	(0.36)	(0.40)	(0.14)	(0.17)	(0.32)	(0.35)	(-0.23)	(-0.18)
Dif_Inside_Ret	0.3725***	0.3697***	0.5831***	0.5807***	0.8886***	0.8864***	0.8090***	0.8033***
	(5.07)	(5.00)	(6.82)	(6.81)	(9.24)	(9.26)	(7.47)	(7.40)
Dif_Restrict	0.0375*	0.0358*	0.0371	0.0358	0.0484	0.0472	0.0489	0.0455
	(1.88)	(1.81)	(1.42)	(1.38)	(1.49)	(1.45)	(1.27)	(1.19)
Dif_Tran_Size	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000**	0.0000**
	(0.01)	(-0.03)	(0.65)	(0.62)	(0.43)	(0.40)	(2.23)	(2.17)
Dif_MTB	0.0009	0.0011	0.0068*	0.0069**	0.0078*	0.0080*	0.0053	0.0057
	(0.43)	(0.54)	(1.96)	(2.00)	(1.65)	(1.68)	(1.14)	(1.23)
Dif_RND	0.0075	0.0076	-0.0103	-0.0104	-0.0032	-0.0034	-0.0037	-0.0038
	(0.40)	(0.40)	(-0.40)	(-0.41)	(-0.10)	(-0.11)	(-0.10)	(-0.10)
Dif_Leverage	-0.0300	-0.0307	-0.0125	-0.0138	0.0105	0.0085	0.0130	0.0102
	(-0.67)	(-0.69)	(-0.20)	(-0.22)	(0.15)	(0.12)	(0.17)	(0.13)
Dif_Intangibles	-0.0290	-0.0316	-0.0127	-0.0165	0.0211	0.0155	0.0351	0.0263
	(-0.83)	(-0.90)	(-0.26)	(-0.34)	(0.34)	(0.25)	(0.48)	(0.36)
Dif_Log_N_Segments	-0.0145	-0.0145	-0.0048	-0.0044	-0.0260	-0.0252	-0.0324	-0.0317
	(-0.91)	(-0.92)	(-0.21)	(-0.19)	(-0.96)	(-0.93)	(-1.08)	(-1.05)
Dif_Ind_Concentration	-0.0369	-0.0422	-0.0447	-0.0479	-0.1017	-0.1033	-0.1322*	-0.1403*
	(-0.87)	(-1.00)	(-0.80)	(-0.84)	(-1.54)	(-1.58)	(-1.71)	(-1.80)
Dif_Geo_Concentration	0.0179	0.0174	0.0471	0.0460	0.1168**	0.1150**	0.1023*	0.0998*
	(0.62)	(0.60)	(1.32)	(1.28)	(2.57)	(2.52)	(1.96)	(1.91)
Dif_ROA	0.1555***	0.1513**	0.1875***	0.1821***	0.2775***	0.2704***	0.3433***	0.3309***
	(2.66)	(2.58)	(2.89)	(2.83)	(3.29)	(3.23)	(2.93)	(2.82)
Dif_Size	0.0013	0.0019	-0.0014	-0.0007	-0.0062	-0.0055	-0.0101	-0.0086
	(0.21)	(0.31)	(-0.17)	(-0.09)	(-0.60)	(-0.52)	(-0.89)	(-0.76)
Dif_N_People_Sale	0.0110	0.0115	0.0324***	0.0325***	0.0382**	0.0380**	0.0359**	0.0362**
	(1.18)	(1.23)	(2.67)	(2.67)	(2.59)	(2.56)	(2.38)	(2.39)

Table 5.2: Outside Director Sale Profitability and Public Information Transparency (Cont.)

Dif_Board_Size	-0.0052	-0.0054	0.0000	-0.0001	0.0009	0.0009	0.0033	0.0031
	(-1.45)	(-1.51)	(0.00)	(-0.01)	(0.15)	(0.16)	(0.55)	(0.51)
Dif_Board_Indep	-0.1048	-0.1012	0.0531	0.0556	0.0608	0.0629	0.0748	0.0812
	(-1.57)	(-1.53)	(0.62)	(0.65)	(0.60)	(0.62)	(0.60)	(0.65)
Dif_Institution	-0.0166	-0.0178	-0.0236	-0.0244	-0.0252	-0.0257	-0.0760	-0.0780
	(-0.45)	(-0.48)	(-0.42)	(-0.44)	(-0.37)	(-0.37)	(-0.95)	(-0.98)
Dif_Audit_Committee	0.0394**	0.0410**	0.0606**	0.0616**	0.0622**	0.0629**	0.0640**	0.0667**
	(2.10)	(2.18)	(2.43)	(2.48)	(2.28)	(2.31)	(2.09)	(2.20)
Dif_Nomin_Comittee	0.0066	0.0078	0.0241	0.0256	0.0389	0.0409	0.0264	0.0298
	(0.40)	(0.47)	(1.07)	(1.12)	(1.42)	(1.47)	(0.92)	(1.03)
Dif_Compen_Committee	-0.0306*	-0.0305*	-0.0263	-0.0262	-0.0239	-0.0237	-0.0228	-0.0225
	(-1.85)	(-1.85)	(-1.13)	(-1.12)	(-0.83)	(-0.82)	(-0.70)	(-0.70)
Dif_Ind_Expert	-0.0126	-0.0110	0.0044	0.0059	-0.0108	-0.0094	0.0302	0.0336
	(-0.44)	(-0.39)	(0.11)	(0.15)	(-0.20)	(-0.17)	(0.45)	(0.50)
Dif_Tie	0.0030	0.0029	-0.0165	-0.0166	-0.0260	-0.0260	-0.0310	-0.0311
	(0.18)	(0.18)	(-0.82)	(-0.82)	(-1.11)	(-1.11)	(-1.11)	(-1.11)
Constant	-0.0058	-0.0053	-0.0106	-0.0102	0.0108	0.0112	0.0032	0.0043
	(-0.53)	(-0.49)	(-0.77)	(-0.73)	(0.62)	(0.64)	(0.17)	(0.23)
Observations	515	515	515	515	515	515	515	515
R-squared	0.20	0.20	0.27	0.27	0.33	0.33	0.26	0.26
Cluster by director	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents the regression that tests the relation between an outside director's relative sale profitability across the different firms she serves and the relative transparency of public information of those firms. The research design and construction of variables are described in Chapter 3 and Appendix. All variables are defined in Appendix. If an outside director sits on more than two boards, the differences of the variables are taken across each pair of firms. Thus, for an outside director who serves on N boards, the number of observations for that director is N(N-1)/2. ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively. The standard errors are clustered by director.

Table 6.1: Outside Director Three-month Purchase Profitability and Public Information Transparency: Partition by Litigation Risk

	(1)	(2)	(3)	(4)
Dependent Variable	**Dif_Buy_Ret_3m**		**Dif_Buy_Ret_3m**	
	High difference in litigation risk		*Low difference in litigation risk*	
Dif_Predict_CF	0.0601	0.1046	-0.1827	-0.1771
	(0.28)	(0.48)	(-1.41)	(-1.36)
Dif_N_Analyst	-0.0012	-0.0013	0.0009	0.0010
	(-0.36)	(-0.39)	(0.41)	(0.43)
Dif_Dispersion	0.0756		0.0160	
	(0.57)		(0.21)	
Dif_FC_Error		-0.0092		-0.0046
		(-1.08)		(-0.80)
Control Variables	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes

Table 6.2: Outside Director Six-month Purchase Profitability and Public Information Transparency: Partition by Litigation Risk

	(1)	(2)	(3)	(4)
Dependent Variable	**Dif_Buy_Ret_6m**		**Dif_Buy_Ret_6m**	
	High difference in litigation risk		*Low difference in litigation risk*	
Dif_Predict_CF	0.0410	0.1340	-0.3461**	-0.3281**
	(0.15)	(0.50)	(-2.36)	(-2.21)
Dif_N_Analyst	-0.0026	-0.0030	0.0043	0.0044
	(-0.64)	(-0.78)	(1.28)	(1.31)
Dif_Dispersion	-0.0082		0.0407	
	(-0.05)		(0.35)	
Dif_FC_Error		-0.0267***		-0.0146*
		(-3.42)		(-1.94)
Control Variables	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes

Table 6.3: Outside Director Nine-month Purchase Profitability and Public Information Transparency: Partition by Litigation Risk

	(1)	(2)	(3)	(4)
Dependent Variable	**Dif_Buy_Ret_9m**		**Dif_Buy_Ret_9m**	
	High difference in litigation risk		*Low difference in litigation risk*	
Dif_Predict_CF	**0.5196**	**0.5805**	-0.2225	-0.1814
	(1.26)	**(1.37)**	(-1.25)	(-1.00)
Dif_N_Analyst	-0.0022	-0.0026	0.0020	0.0022
	(-0.33)	(-0.39)	(0.45)	(0.52)
Dif_Dispersion	-0.0602		0.0054	
	(-0.29)		(0.04)	
Dif_FC_Error		-0.0200**		-0.0331***
		(-1.98)		(-3.83)
Control Variables	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes

Table 6.4: Outside Director Twelve-month Purchase Profitability and Public Information Transparency: Partition by Litigation Risk

	(1)	(2)	(3)	(4)
Dependent Variable	**Dif_Buy_Ret_12m**		**Dif_Buy_Ret_12m**	
	High difference in litigation risk		*Low difference in litigation risk*	
Dif_Predict_CF	**0.7028**	**0.7745**	-0.2966	-0.2351
	(1.53)	**(1.64)**	(-1.45)	(-1.15)
Dif_N_Analyst	-0.0014	-0.0017	0.0023	0.0027
	(-0.18)	(-0.22)	(0.49)	(0.57)
Dif_Dispersion	0.0167		0.0501	
	(0.07)		(0.26)	
Dif_FC_Error		-0.0196*		-0.0497***
		(-1.74)		(-3.12)
Control Variables	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes

Table 6.5: Outside Director Three-month Sale Profitability and Public Information Transparency: Partition by Litigation Risk

	(1)	(2)	(3)	(4)
Dependent Variable	**Dif_Sell_Ret_3m**		**Dif_Sell_Ret_3m**	
	High difference in litigation risk		*Low difference in litigation risk*	
Dif_Predict_CF	**-0.2723****	**-0.2747****	0.0967	0.1176
	(-2.12)	**(-2.15)**	(0.71)	(0.86)
Dif_N_Analyst	0.0035	0.0036	-0.0015	-0.0017
	(1.21)	(1.24)	(-0.77)	(-0.89)
Dif_Dispersion	0.0556		-0.0776	
	(0.24)		(-0.48)	
Dif_FC_Error		0.0079		-0.0100
		(0.35)		(-0.92)
Control Variables	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes

Table 6.6: Outside Director Six-month Sale Profitability and Public Information Transparency: Partition by Litigation Risk

	(1)	(2)	(3)	(4)
Dependent Variable	**Dif_Sell_Ret_6m**		**Dif_Sell_Ret_6m**	
	High difference in litigation risk		*Low difference in litigation risk*	
Dif_Predict_CF	-0.2005	-0.1963	0.0924	0.0714
	(-0.88)	(-0.87)	(0.48)	(0.38)
Dif_N_Analyst	0.0029	0.0027	-0.0026	-0.0024
	(0.61)	(0.56)	(-1.06)	(-1.04)
Dif_Dispersion	-0.1078		0.0692	
	(-0.32)		(0.44)	
Dif_FC_Error		-0.0133		0.0100
		(-0.45)		(0.65)
Control Variables	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes

Table 6.7: Outside Director Nine-month Sale Profitability and Public Information Transparency: Partition by Litigation Risk

	(1)	(2)	(3)	(4)
Dependent Variable	**Dif_Sell_Ret_9m**		**Dif_Sell_Ret_9m**	
	High difference in litigation risk		*Low difference in litigation risk*	
Dif_Predict_CF	0.0192	0.0166	0.0062	-0.0112
	(0.07)	(0.06)	(0.03)	(-0.05)
Dif_N_Analyst	0.0001	0.0003	-0.0049	-0.0043
	(0.01)	(0.04)	(-1.64)	(-1.47)
Dif_Dispersion	-0.1210		0.1940	
	(-0.32)		(0.85)	
Dif_FC_Error		0.0091		0.0089
		(0.31)		(0.56)
Control Variables	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes

Table 6.8: Outside Director Twelve-month Sale Profitability and Public Information Transparency: Partition by Litigation Risk

	(1)	(2)	(3)	(4)
Dependent Variable	**Dif_Sell_Ret_12m**		**Dif_Sell_Ret_12m**	
	High difference in litigation risk		*Low difference in litigation risk*	
Dif_Predict_CF	0.1264	0.1143	-0.0708	-0.0643
	(0.47)	(0.42)	(-0.28)	(-0.26)
Dif_N_Analyst	0.0021	0.0028	-0.0026	-0.0019
	(0.29)	(0.39)	(-0.70)	(-0.49)
Dif_Dispersion	0.0077		0.2585	
	(0.02)		(0.79)	
Dif_FC_Error		0.0395		-0.0018
		(1.09)		(-0.11)
Control Variables	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes

Note: Tables 6.1 through 6.8 present the differential effect of public information transparency on an outside director's trading profitability for firm-pairs that exhibit high vs. low absolute difference in litigation risk. **Tables 6.1 through 6.4** examine outside director purchase profitability. **Tables 6.5 through 6.8** examine outside director sales profitability. The difference in litigation risk is measured as an index that ranks the absolute differences between each firm-pair in stock return volatility, stock return skewness, sales growth, stock turnover and absolute market adjusted returns (Kim and Skinner, 2011). The coefficients in bold indicate that the differences between firm-pairs with high vs. low differences in litigation risk are statistically significant at the 10% level at least. See Appendix for more detailed variable definitions. The control variables are the same as in Table 5 and are omitted for parsimony. ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively. All variables are winsorized at 1% and 99% and standard errors are clustered by director.

Table 7.1: Public Information Transparency and the Number of Board Committee Positions

	(1)	(2)	(3)	(4)
Dependent Variables	**Dif_Buy_Ret_6m**		**Dif_Buy_Ret_12m**	
Dif_Predict_CF	-0.0727	-0.0400	0.3308	0.3804
	(-0.50)	(-0.27)	(1.38)	(1.58)
Dif_N_Analyst	0.0015	0.0015	0.0017	0.0019
	(0.56)	(0.58)	(0.41)	(0.45)
Dif_Dispersion	0.0344		-0.0556	
	(0.39)		(-0.38)	
Dif_FC_Error		-0.0196***		-0.0326***
		(-3.74)		(-2.92)
*Dif_Predict_CF*Dif_Committee*	-0.2434	-0.4154	-0.2621	-0.6411
	(-0.75)	(-1.18)	(-0.53)	(-1.19)
*Dif_N_Analyst*Dif_Committee*	-0.0039	-0.0042	-0.0077	-0.0085*
	(-1.09)	(-1.19)	(-1.52)	(-1.70)
*Dif_Dispersion*Dif_Committee*	0.1914		0.4842**	
	(1.46)		(2.10)	
*Dif_FC_Error*Dif_Committee*		0.0139		0.0360**
		(1.51)		(2.40)
Control Variables	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes

Note: This table presents the interaction effect of number of board committee positions and public information transparency on outside director trading profitability. *Committee* equals 1, 2, and 3 respectively for an outside director who sits on one, two and all three of audit, compensation and nomination committees. Thus, *Dif_Committee* is the difference in *Committee* between the two firms that the outside director serves. The control variables are the same as in Table 6 and are omitted for parsimony. ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively. All variables are winsorized at 1% and 99% and standard errors are clustered by director.

Table 7.2: Public Information Transparency and Audit and Compensation Committee Positions

	(1)	(2)	(3)	(4)
Dependent Variables	**Dif_Buy_Ret_6m**		**Dif_Buy_Ret_12m**	
Dif_Predict_CF	-0.0909	-0.0535	0.3112	0.3727
	(-0.64)	(-0.37)	(1.34)	(1.52)
Dif_N_Analyst	0.0013	0.0013	0.0020	0.0022
	(0.48)	(0.48)	(0.49)	(0.52)
Dif_Dispersion	0.0343		-0.1203	
	(0.40)		(-0.85)	
Dif_FC_Error		-0.0205***		-0.0343***
		(-3.92)		(-3.05)
*Dif_Predict_CF*Dif_Committee*	-0.0505	-0.0838	0.3362	0.2258
	(-0.14)	(-0.22)	(0.55)	(0.34)
*Dif_N_Analyst*Dif_Committee*	-0.0068*	-0.0064*	-0.0129**	-0.0124*
	(-1.81)	(-1.66)	(-2.03)	(-1.74)
*Dif_Dispersion*Dif_Committee*	0.3143		0.8534**	
	(1.56)		(2.03)	
*Dif_FC_Error*Dif_Committee*		0.0029		0.0122
		(0.32)		(0.88)
Control Variables	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes

Note: This table presents the interaction effect of number of board committee positions and public information transparency on outside director trading profitability. *Committee* equals 1 or 2 respectively for an outside director who sits on one or two of the audit committee and compensation committee. Thus, *Dif_Committee* is the difference in *Committee* between the two firms that the outside director serves. The control variables are the same as in Table 6 and are omitted for parsimony. ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively. All variables are winsorized at 1% and 99% and standard errors are clustered by director.

Table 7.3: Public Information Transparency and Social Connections with the CEO

	(1)	(2)	(3)	(4)
Dependent Variables	**Dif_Buy_Ret_6m**		**Dif_Buy_Ret_12m**	
Dif_Predict_CF	-0.0925	-0.0409	0.2939	0.3742
	(-0.62)	(-0.27)	(1.24)	(1.55)
Dif_N_Analyst	0.0020	0.0017	0.0022	0.0020
	(0.71)	(0.64)	(0.50)	(0.46)
Dif_Dispersion	0.0382		-0.0763	
	(0.43)		(-0.48)	
Dif_FC_Error		-0.0216***		-0.0356***
		(-3.59)		(-3.65)
*Dif_Predict_CF*Dif_Tie*	0.4648**	0.5203**	0.9169***	0.9125***
	(1.99)	(2.25)	(2.93)	(2.87)
*Dif_N_Analyst*Dif_Tie*	-0.0038	-0.0040	0.0004	-0.0003
	(-1.01)	(-1.06)	(0.07)	(-0.05)
*Dif_Dispersion*Dif_Tie*	-0.1091		-0.0787	
	(-0.79)		(-0.35)	
*Dif_FC_Error*Dif_Tie*		-0.0121		0.0118
		(-1.31)		(0.70)
Control Variables	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes

Note: This table presents the interaction effect of social connections with the CEO and public information transparency on outside director trading profitability. An outside director is defined as having: i) *employment ties* with the CEO if they were both previously employed by the same firm other than the current firm; ii) *educational ties* with the CEO if they received education from the same university; iii) *social ties* with the CEO if they are connected via other social activities such as clubs and/or charities. For each director-firm, *Tie* is an indicator variable that equals one if the outside director has connections with the CEO through one of the three types of social connections. *Dif_Tie* is the difference in *Tie* between the two firms that the same outside director serves. The control variables are the same as in Table 6 and are omitted for parsimony. ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively. All variables are winsorized at 1% and 99% and standard errors are clustered by director.

Table 8.1: Public Information and Outside Director Purchase Profitability: Six-month Horizon

	(1)	(2)	(3)	(4)
Dependent Variable	**Dif_Buy_Ret_6m**		**Dif_Buy_Ret_6m**	
	High Cyclicality		*Low Cyclicality*	
Dif_Predict_CF	-0.5907***	-0.5497***	-0.2270	-0.2139
	(-3.20)	(-3.09)	(-0.98)	(-0.95)
Dif_N_Analyst	0.0045	0.0051	-0.0043	-0.0042
	(1.06)	(1.21)	(-0.75)	(-0.74)
Dif_Dispersion	0.2181		0.1852	
	(0.66)		(1.29)	
Dif_FC_Error		**-0.0330****		-0.0000
		(-2.23)		(-0.00)
Control Variables	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes

Table 8.2: Public Information and Outside Director Purchase Profitability: Twleve-month Horizon

	(1)	(2)	(3)	(4)
Dependent Variable	**Dif_Buy_Ret_12m**		**Dif_Buy_Ret_12m**	
	High Cyclicality		*Low Cyclicality*	
Dif_Predict_CF	-0.7065**	-0.7219**	-0.0666	-0.0430
	(-2.19)	(-2.23)	(-0.25)	(-0.15)
Dif_N_Analyst	0.0081	0.0075	-0.0055	-0.0053
	(1.40)	(1.41)	(-0.73)	(-0.70)
Dif_Dispersion	**-0.2876**		0.4549*	
	(-0.87)		(1.89)	
Dif_FC_Error		**-0.0438***		0.0062
		(-1.94)		(0.34)
Control Variables	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes

Note: Tables 8.1 and 8.2 present the differential effect of public information transparency on an outside director's trading profitability for firms that are more vs. less affected by the macro economy using a fully interacted model. **Table 8.1 (8.2)** reports the results using six (twelve)-month size-adjusted returns as the dependent variable. Specifically, for each firm-year in the sample, I compute the R^2s from regressions over the prior 12 quarters of a firm's earnings on GDP, energy prices and interest rate spreads, following Hutton, Lee and Shu (2012). I then average the three R^2s for each quarter. *Cyclicality* for each firm-year is the average of the quarterly measures during the year. I define *high (low) cyclicality* as firm-years which the averaged R^2 is above (below) the median (the median is 50.4%). Each independent variable is interacted with an indicator variable that equals one for high cyclicality and zero otherwise. The control variables are the same as in Table 5 and omitted for parsimony. The coefficients in bold indicate that the difference between high cyclicality firms and low cyclicality firms are statistically significant at the 10% level at least. ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively. All variables are winsorized at 1% and 99% and standard errors are clustered by director.

Table 9.1: Public Information Transparency and Outside Director Purchase Profitability: Controlling for Earnings Predictability

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	**Dif_Buy_Ret_3m**		**Dif_Buy_Ret_6m**		**Dif_Buy_Ret_9m**		**Dif_Buy_Ret_12m**	
Dif_Predict_CF	-0.1973	-0.1951	-0.1902	-0.1840	0.2904	0.2997	0.4040	0.4162
	(-1.27)	(-1.24)	(-0.77)	(-0.74)	(1.10)	(1.12)	(1.36)	(1.38)
Dif_N_Analyst	0.0022	0.0023	0.0048*	0.0048*	0.0048	0.0049	0.0070	0.0072*
	(1.13)	(1.15)	(1.79)	(1.84)	(1.28)	(1.32)	(1.64)	(1.68)
Dif_Dispersion	-0.0349		-0.0313		-0.0223		-0.0200	
	(-0.52)		(-0.34)		(-0.14)		(-0.11)	
Dif_FC_Error		-0.0080		-0.0170**		-0.0232***		-0.0299***
		(-1.16)		(-2.23)		(-2.82)		(-2.98)
Dif_Predictability	0.1864	0.1963	0.3858	0.4302	0.2914	0.3630	0.0342	0.1314
	(0.72)	(0.77)	(1.04)	(1.19)	(0.70)	(0.89)	(0.08)	(0.33)
Observations	553	553	553	553	553	553	553	553
R-squared	0.08	0.08	0.14	0.14	0.16	0.17	0.18	0.20
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents the regression that tests the relation between an outside director's relative trading profitability across the different firms she serves and the relative transparency of public information of those firms. The model specification is the same as that in Table 5.1, except that the differential level of earnings predictability (*Dif_Predictability*) is controlled for. *Predictability* is the absolute value of the fitted residual from a firm specific eight-year rolling regression of one-year ahead future earnings on current earnings. ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively. All variables are winsorized at 1% and 99% and standard errors are clustered by director.

Table 9.2: Public Information Transparency and Outside Director Purchase Profitability: Removing the Effect of Firm Fundamentals

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	**Dif_Buy_Ret_3m**		**Dif_Buy_Ret_6m**		**Dif_Buy_Ret_9m**		**Dif_Buy_Ret_12m**	
Dif_Predict_CF_NoFund	0.2924	0.4262	-0.2072	-0.0022	0.5725	0.8209	1.6502**	1.9166***
	(0.68)	(0.98)	(-0.33)	(-0.00)	(0.81)	(1.15)	(2.41)	(2.73)
Dif_N_Analyst	-0.0013	-0.0010	-0.0024	-0.0019	-0.0058	-0.0051	-0.0033	-0.0025
	(-0.54)	(-0.40)	(-0.71)	(-0.55)	(-1.28)	(-1.14)	(-0.69)	(-0.54)
Dif_Dispersion	-0.0987		-0.1103		-0.1292		-0.1186	
	(-1.37)		(-1.14)		(-0.67)		(-0.52)	
Dif_FC_Error		-0.0193***		-0.0278***		-0.0335***		-0.0351***
		(-4.26)		(-4.79)		(-4.48)		(-3.72)
Observations	351	351	351	351	351	351	351	351
R-squared	0.08	0.11	0.19	0.22	0.20	0.23	0.21	0.23
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents the regression that tests the relation between an outside director's relative trading profitability across the different firms she serves and the relative transparency of public information of those firms. The model specification is the same as that in Table 5.1, except that the financial statement transparency measure *Predict_CF_NoFund* is the fitted residual from a regression by year and industry of *Predict_CF* on the standard deviation of cash flows over the past five years, the standard deviation of sales over the past five years, the operating cycle and size (see Appendix for details). ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively. All variables are winsorized at 1% and 99% and standard errors are clustered by director.

Table 10: Public Information Transparency and Outside Director Purchase Profitability: Controlling for Liquidity

VARIABLES	(1) Dif_Buy_Ret_3m	(2) Dif_Buy_Ret_3m	(3) Dif_Buy_Ret_6m	(4) Dif_Buy_Ret_6m	(5) Dif_Buy_Ret_9m	(6) Dif_Buy_Ret_9m	(7) Dif_Buy_Ret_12m	(8) Dif_Buy_Ret_12m
Dif_Predict_CF	-0.2007*	-0.1869*	-0.3522**	-0.3232*	0.1884	0.2238	0.1335	0.1829
	(-1.83)	(-1.69)	(-2.09)	(-1.90)	(0.72)	(0.85)	(0.57)	(0.78)
Dif_N_Analyst	0.0008	0.0008	0.0014	0.0013	0.0007	0.0005	0.0033	0.0030
	(0.46)	(0.44)	(0.61)	(0.55)	(0.22)	(0.16)	(0.87)	(0.80)
Dif_Dispersion	0.0664		0.0547		0.0360		0.0950	
	(1.11)		(0.70)		(0.29)		(0.62)	
Dif_FC_Error		-0.0073		-0.0191***		-0.0247***		-0.0323***
		(-1.49)		(-3.56)		(-4.02)		(-3.40)
Dif_Liquid	0.0038	0.0036	-0.0080	-0.0071	-0.0134	-0.0118	-0.0049	-0.0033
	(0.38)	(0.36)	(-1.16)	(-0.97)	(-0.72)	(-0.61)	(-0.25)	(-0.17)
Observations	862	862	862	862	862	862	862	862
R-squared	0.11	0.11	0.15	0.16	0.15	0.16	0.15	0.16
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents the regression that tests the relation between an outside director's relative trading profitability across the different firms she serves and the relative transparency of public information of those firms. The model specification is the same as that in Table 5.1, except that the differential level of stock liquidity (*Dif_Liquid*) is controlled for. *Liquid* is the empirical measure of stock liquidity from Amihud (2002), computed as the ratio of daily stock returns over the daily dollar volume, then averaged across the year and multiplied by negative one. ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively. All variables are winsorized at 1% and 99% and standard errors are clustered by director.

Table 11: Public Information Transparency and Future Stock Returns

	Buy_Ret_6m				Buy_Ret_12m			
	Predict_CF	**N_Analyst**	**Dispersion**	**FC_Error**	**Predict_CF**	**N_Analyst**	**Dispersion**	**FC_Error**
Below the median	0.019	0.026	0.029	0.018	0.045	0.094	0.108	0.088
Above the meidan	0.026	0.013	0.010	0.022	0.048	0.095	0.082	0.103
Difference Above-Below	0.007	-0.013	-0.019	0.004	0.003	0.001	-0.026	0.015
T-statistic	1.17	-2.28	-3.26	0.65	0.38	0.10	-2.34	1.37

Note: This table presents the differences in six-month (*Ret_6m*) and one-year (*Ret_12m*) ahead size-adjusted stock returns for firms with above and below the median transparency measures. Firms are sorted into each group by year.

Table 12.1: Firm Level Analysis for Pure Insiders

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variables	**Buy_Ret_3m**		**Buy_Ret_6m**		**Buy_Ret_9m**		**Buy_Ret_12m**	
Predict_CF	0.0989**	0.0931*	0.1041	0.0965	0.0328	0.0216	0.0568	0.0448
	(2.05)	(1.94)	(1.58)	(1.47)	(0.39)	(0.26)	(0.58)	(0.46)
N_Analyst	-0.0024***	-0.0026***	-0.0038***	-0.0040***	-0.0046***	-0.0049***	-0.0048***	-0.0052***
	(-2.77)	(-2.95)	(-3.19)	(-3.33)	(-2.99)	(-3.20)	(-2.69)	(-2.94)
Dispersion	0.0533*		0.0816**		0.1002*		0.0782	
	(1.79)		(2.01)		(1.92)		(1.30)	
FC_Error		-0.006		-0.0071		-0.0115		-0.0144
		(-2.85)		(-2.47)		(-3.14)		(-3.41)
Observations	921	921	921	921	921	921	921	921
R-squared	0.06	0.07	0.06	0.06	0.07	0.07	0.06	0.07
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents firm-level regression of pure insider purchase returns on public information transparency variables. The research design and variable construction are described in Chapter 4 and Appendix. ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively.

Table 12.2: Firm Level Analysis for Outside Directors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variables	**Buy_Ret_3m**		**Buy_Ret_6m**		**Buy_Ret_9m**		**Buy_Ret_12m**	
Predict_CF	0.0318	0.0281	-0.2078**	-0.2130**	-0.0132	-0.0183	-0.1306	-0.1376
	(0.44)	(0.39)	(-2.16)	(-2.21)	(-0.10)	(-0.14)	(-0.85)	(-0.90)
N_Analyst	0.0010	0.0008	0.0028	0.0026	0.0025	0.0021	0.0024	0.0019
	(0.72)	(0.64)	(1.60)	(1.47)	(1.07)	(0.90)	(0.86)	(0.69)
Dispersion	0.0170		-0.0108		-0.1210		-0.1135	
	(0.39)		(-0.18)		(-1.54)		(-1.21)	
FC_Error		-0.0051		-0.0085*		-0.0121**		-0.0148**
		(-1.50)		(-1.88)		(-2.01)		(-2.07)
Observations	921	921	921	921	921	921	921	921
R-squared	0.09	0.09	0.16	0.16	0.15	0.15	0.13	0.13
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents firm-level regression of outside director purchase returns on public information transparency variables. The research design and variable construction are described in Chapter 4 and Appendix. ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively.

Table 13.1: Alternative Measures of Financial Statement Transparency: Earnings-Returns Association

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	**Dif_Buy_Ret_3m**		**Dif_Buy_Ret_6m**		**Dif_Buy_Ret_9m**		**Dif_Buy_Ret_12m**	
Dif_Value_Relevance	0.0275	0.0233	0.0588*	0.0501	0.0394	0.0267	0.0600	0.0453
	(1.22)	(1.04)	(1.94)	(1.63)	(0.99)	(0.68)	(1.18)	(0.91)
Dif_N_Analyst	0.0015	0.0016	0.0041*	0.0042*	0.0039	0.0040	0.0066*	0.0066*
	(0.94)	(1.01)	(1.81)	(1.88)	(1.16)	(1.21)	(1.72)	(1.76)
Dif_Dispersion	0.0620		0.0604		0.0691		0.0375	
	(1.06)		(0.84)		(0.64)		(0.28)	
Dif_FC_Error		-0.0103***		-0.0231***		-0.0344***		-0.0409***
		(-2.92)		(-4.59)		(-5.66)		(-5.58)
Observations	873	873	873	873	873	873	873	873
R-squared	0.11	0.12	0.15	0.16	0.15	0.16	0.15	0.16
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents the regression that tests the relation between an outside director's relative trading profitability across the different firms she serves and the relative transparency of public information of those firms. The model specification is the same as that in Table 5.1, except that the financial statement transparency measure *Value_Relevance* is the R2 from an eight-year rolling regression of stock price three months after the fiscal year end on earnings and book value of equity. ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively. All variables are winsorized at 1% and 99% and standard errors are clustered by director.

Table 13.2: Alternative Measures of Financial Statement Transparency: Accrual Quality

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	**Dif_Buy_Ret_3m**		**Dif_Buy_Ret_6m**		**Dif_Buy_Ret_9m**		**Dif_Buy_Ret_12m**	
Dif_DD	0.7308*	0.7608**	0.3945	0.3812	-0.2919	-0.3002	-0.4964	-0.4712
	(1.87)	(2.01)	(0.62)	(0.62)	(-0.41)	(-0.44)	(-0.68)	(-0.66)
Dif_N_Analyst	0.0008	0.0009	0.0013	0.0017	-0.0006	-0.0002	0.0010	0.0013
	(0.40)	(0.46)	(0.42)	(0.55)	(-0.17)	(-0.05)	(0.23)	(0.31)
Dif_Dispersion	-0.0835		0.0007		-0.0172		-0.0917	
	(-1.10)		(0.01)		(-0.12)		(-0.55)	
Dif_FC_Error		-0.0126**		-0.0197**		-0.0245***		-0.0257***
		(-2.41)		(-2.52)		(-3.11)		(-2.79)
Observations	468	468	468	468	468	468	468	468
R-squared	0.09	0.10	0.13	0.14	0.15	0.17	0.15	0.17
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents the regression that tests the relation between an outside director's relative trading profitability across the different firms she serves and the relative transparency of public information of those firms. The model specification is the same as that in Table 5.1, except that the financial statement transparency measure *DD* is the accrual quality from Dechow and Dichev (2002) as modified by McNichols (2002). See Appendix for details. ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively. All variables are winsorized at 1% and 99% and standard errors are clustered by director.

Table 14: Alternative Measures of Analyst Information Quality: Overall Uncertainty and Common Uncertainty

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	**Dif_Buy_Ret_3m**		**Dif_Buy_Ret_6m**		**Dif_Buy_Ret_9m**		**Dif_Buy_Ret_12m**	
Dif_Predict_CF	-0.2112*	-0.2094*	-0.3408**	-0.3376**	0.2156	0.2185	0.1761	0.1806
	(-1.94)	(-1.92)	(-2.06)	(-2.04)	(0.84)	(0.85)	(0.77)	(0.79)
Dif_N_Analyst	0.0008	0.0008	0.0012	0.0012	0.0004	0.0004	0.0031	0.0030
	(0.50)	(0.49)	(0.53)	(0.52)	(0.13)	(0.12)	(0.84)	(0.83)
Dif_Overall_Uncertainty	-0.0055		-0.0164***		-0.0222***		-0.0285***	
	(-1.22)		(-3.16)		(-3.85)		(-3.05)	
Dif_Common_Uncertainty		-0.0073		-0.0198***		-0.0256***		-0.0336***
		(-1.45)		(-3.66)		(-4.12)		(-3.50)
Observations	873	873	873	873	873	873	873	873
R-squared	0.11	0.12	0.16	0.16	0.16	0.16	0.16	0.16
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table presents the regression that tests the relation between an outside director's relative trading profitability across the different firms she serves and the relative transparency of public information of those firms. The model specification is the same as that in Table 5.1, except that the analyst information quality measures, *Overall_Uncertainty* and *Common_Uncertainty* are computed following Barron et al. (1998). See Appendix for details. ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively. All variables are winsorized at 1% and 99% and standard errors are clustered by director.

Table 15: Fama-French Four Factor Returns

	(1)	(2)	(3)	(4)
VARIABLES	**Dif_Buy_FFRet_6m1**		**Dif_Buy_FFRet_6m2**	
Dif_Predict_CF	-0.1748	-0.1335	0.0465	0.1368
	(-0.91)	(-0.67)	(0.19)	(0.54)
Dif_N_Analyst	0.0015	0.0013	0.0025	0.0023
	(0.52)	(0.44)	(0.86)	(0.79)
Dif_Dispersion	0.0575		0.0462	
	(0.43)		(0.37)	
Dif_FC_Error		-0.0206***		-0.0294***
		(-2.63)		(-3.74)
Observations	586	586	550	550
R-squared	0.15	0.16	0.12	0.14
Control Variables	Yes	Yes	Yes	Yes
Cluster by director	Yes	Yes	Yes	Yes

Note: This table presents the regression that tests the relation between an outside director's relative trading profitability across the different firms she serves and the relative transparency of public information of those firms. The model specification is the same as that in Table 5.1, except that the dependent variables, *Dif_Buy_FFRet_6m1* and *Dif_Buy_FFREt_6m2* are six-month abnormal returns estimated using Fama French Four Factor model. See Appendix for details. ***, ** and * indicates statistical significance at 1%, 5% and 10% levels, respectively. All variables are winsorized at 1% and 99% and standard errors are clustered by director.

Appendix: Variable Definition

Dependent Variables:

Buy/Sell_Ret_3/6/9/12m	Average three/six/nine/twelve-month buy-and-hold size-adjusted returns of the firm's stock starting from the date the outside director makes the purchase/sale (the purchases/sales made on the same date are considered one trade) during the fiscal year. Sales returns are multiplied by -1.
Buy/Sell_Raw_3/6/9/12m	Average three/six/nine/twelve-month buy-and-hold returns of the firm's stock starting from the date the outside director makes the purchase/sale (the purchases/sales made on the same date are considered one trade) during the fiscal year. Sales returns are multiplied by -1.
Buy_FF_Ret_6m1	Abnormal returns estimated using the Fama-French Four Factor model (Fama and French, 1993). Estimation period is 365 days prior to the trading year.
Buy_FF_Ret_6m2	Abnormal returns estimated using the Fama-French Four Factor model (Fama and French, 1993). Estimation period is 730 days prior to the trading year.

Public Information Transparency Variables:

Predict_CF	Absolute value of the fitted error term from regressing one year ahead cash flows (net cash flow from operating activities less the accrual portion of extraordinary items and discontinued operations) on changes in accounts receivable, inventory and accounts payable, and amortization and depreciation expense and other accrual components of earnings (Barth et al., 2001).

Appendix: Variable Definition (Cont.)

Predict_CF_NoFund	Absolute value of the fitted error term from regressing *Predict_CF* on standard deviation of operating cash flows over the past five years, standard deviation of sales over the past five years, operating cycle (computed as log{360/[(current receivables + last year's receivables)/2]+360/[(current total inventory+last year's total inventory)/2]}, and size (log of total assets). The regression is conducted by year and industry (two-digit SIC codes).
Common_Uncertainty	Analyst common uncertainty, computed following Barron et al. (1998): Se-Disp/N_Analysts, where N_Analysts is the number of analysts, Disp is the forecast dispersion (variance of the individual analyst forecasts scaled by the absolute value of the actual earnings); Se is the square of forecast error scaled by the absolute value of actual earnings. The measure is computed as of each fiscal quarter and averaged across the four quarters each year. Forecasts older than 90 days are excluded.

Control Variables:

Ret_Vol	Standard deviation of daily stock returns over the fiscal year.
Inside_Buy/Sell_3/6/9/12m	Average three/six/nine/twelve-month buy-and-hold size-adjusted open market purchase/sales returns of inside directors during the fiscal years which the outside director has made her purchases. Sales returns are multiplied by -1.
Dispersion	Analyst forecast dispersion, computed as the variance of the individual analyst forecasts scaled by the absolute value of actual earnings. The measure is computed for forecasts outstanding as of the 30th day subsequent to prior year's earnings announcement. Forecasts older than 90 days are excluded. The results are robust to using unscaled forecast dispersion.
N_Analysts	Number of analysts who have issued an earnings forecast as of the 30th day subsequent to prior year's earnings announcement. Forecasts older than 90 days are excluded.

Appendix: Variable Definition (Cont.)

FC_Error	Analyst forecast error, computed as the square of the difference between the mean analyst forecast and the actual value, scaled by the absolute value of actual earnings. The measure is computed for forecasts outstanding as of the 30th day subsequent to prior year's earnings announcement. Forecasts older than 90 days are excluded. The results are robust to using unscaled forecast errors.
Value_Relevance	R2 from an eight-year rolling regression of stock price three months after the fiscal year end on earnings and book value of equity.
DD	Negative one mutiplies the absolute value of the error term from an eight-year rolling regression of total current accruals (income before extraordinary items minus operating cash flows) on last year's operating cash flow, current year's operating cash flow, one-year ahead future cash flow, growth in total revenue and growth in property, plant and equitment. All variables in the regression are scaled by average total assets.
Overall_Uncertainty	Analyst overall uncertainty, computed following Barron et al. (1998): (1-1/N_Analysts)*Disp+Se, where N_Analysts is the number of analysts, Disp is the forecast dispersion (variance of the individual analyst forecasts scaled by the absolute value of the actual earnings); Se is the square of forecast error scaled by the absolute value of actual earnings. The measure is computed as of each fiscal quarter and averaged across the four quarters each year. Forecasts older than 90 days are excluded.
Inside_Ret	Average buy-and-hold size-adjusted open market trading returns of inside directors during the fiscal years which the outside director has made her purchases. Sales returns are multiplied by -1. The specific horizons (3/6/9/12 months) and transaction type (purchases/sales) correspond to the dependent variables in the regressions.
Restrict	An indicator variable if 75% or more of its insider trading occurred within one month after its quarterly earnings announcements.
Tran_Size	Average dollar value of the purchases made by the outside directors.

Appendix: Variable Definition (Cont.)

Frenquency 1	The average number of trades an outside director makes at each firm per year, including years in which no trade is made.
Frenquency 2	The average number of trades an outside director makes at each firm per year, including only years in which at least a trade is made.
Compen_Committee	An indicator variable if the outside director is on the compensation committee and zero otherwise.
Ind_Expert	An indicator variable if the outside director has work experience at firms in the same Fama-French 48 industry.
Tie	An indicator variable that equals one if the outside director has connections with the CEO via prior employment, education or other social activities and 0 otherwise.
RND	An indicator variable that equals 1 if the ratio of R&D expenditure over total assets ranks in the upper quartile in the sample and 0 otherwise.
Leverage	Long-term debt divided by total assets.
Intangibles	1 minus the ratio of property, plant and equipment over total assets.
(Log_)N_Segments	(Log of) total number of business segments.
Ind_Concentration	Herfindahl index of the sales of business segments, i.e., the sum of the squares of each segment's sales as a percentage of total firm sales.
Geo_Concentration	Herfindahl index of the sales of geographic segments, i.e., the sum of the squares of each segment's sales as a percentage of total firm sales.
Size	Log of market value of equity.
N_People_Purchase/Sale	Number of inside and outside directors who have made open market purchases/sales during the years which the outside director has made her purchases.
ROA	Net income before extraordinary items over total assets.
Board_Size	Number of board members.

Appendix: Variable Definition (Cont.)

Board_Indep	Percentage of outside directors on board.
Institution	Percentage of institutional holdings.
Audit_Committee	An indicator variable if the outside director is on the audit committee and zero otherwise.
Nomin_Committee	An indicator variable if the outside director is on the nomination committee and zero otherwise.
Cyclicality	The average of R^2s from regressions over the prior 12 quarters of a firm's earnings on GDP, energy prices and interest rate spreads, following Hutton, Lee and Shu (2012).
Litigation	An index that includes stock return volatility (the standard deviation of daily stock returns over the fiscal year), stock return skewness (the skewness of daily stock returns over the fiscal year), sales growth (percentage increase in annual sales), stock turnover (annualized daily stock turnover, computed as (1-(1-average daily stock turnover)^(No. of trading days during the year), where average daily stock turnover is the average of number of shares traded per day divided by number of shares outstanding across the trading days during the year) and absolute abnormal returns (absolute value of buy-and-hold market-adjusted returns during the fiscal year) (Kim and Skinner, 2012).
Predictability	Absolute value of the error term from an eight-year rolling regression of one-year ahead future earnings on current earnings (both scaled by beginning-of-year total assets).
Liquid	Negative one multiplies the ratio of the absolute value of daily stock returns over daily dollar trading volume averaged across the year (Amihud, 2002).
Committee	Number of committees the outside director sits on at each firm.
MTB	Market-to-book ratio measured by the log of book value of debt plus market value of equity divided by book value of total assets.

REFERENCES

Aboody, D., Hughes, J., & Liu, J. (2005). Earnings quality, insider trading, and cost of capital. *Journal of Accounting Research*, 43(5), 651-673.

Aboody, D., & Lev, B. (2000). Information asymmetry, R&D, and insider gains.*The journal of Finance*, *55*(6), 2747-2766.

Adams, R. B., B. E. Hermalin, and M. S. Weisbach. (2010). The role of boards of directors in corporate governance: A conceptual framework and survey. *Journal of Economic Literature* 48 (1): 58-107.

Ahmed, A. S., and S. Duellman. (2007). Accounting conservatism and board of director characteristics: An empirical analysis. *Journal of Accounting and Economics* 43 (2): 411-37.

Amihud, Y. (2002). Illiquidity and stock returns: cross-section and time-series effects. *Journal of Financial Markets*, *5*(1), 31-56.

Armstrong, C. S., W. R. Guay, and J. P. Weber. 2010. The role of information and financial reporting in corporate governance and debt contracting. *Journal of Accounting and Economics* 50 (2): 179-234.

Asquith, P., Mikhail, M. B., & Au, A. S. (2005). Information content of equity analyst reports. *Journal of Financial Economics*, *75*(2), 245-282.

Barron, O. E., O. Kim, S. C. Lim, and D. E. Stevens. 1998. Using analysts' forecasts to measure properties of analysts' information environment. *The Accounting Review*: 421-33.

Barth, M. E., Cram, D. P., & Nelson, K. K. (2001). Accruals and the prediction of future cash flows. *The Accounting Review*, *76*(1), 27-58.

Beasley, M. S., J. V. Carcello, D. R. Hermanson, and T. L. Neal. (2009). The audit committee oversight process. *Contemporary Accounting Research* 26 (1): 65-122.

Beyer, A., Cohen, D. A., Lys, T. Z., & Walther, B. R. (2010). The financial reporting environment: Review of the recent literature. *Journal of accounting and economics*, *50*(2), 296-343.

Black, B. S., Cheffins, B. R., & Klausner, M. (2004, April). Outside director liability. In American Law & Economics Association Annual Meetings (p. 11). *Bepress*.

Boone, A. L., L. Casares Field, J. M. Karpoff, and C. G. Raheja. (2007). The determinants of corporate board size and composition: An empirical analysis. *Journal of Financial Economics* 85 (1): 66-101.

Brochet, F. (2010). Information content of insider trades before and after the Sarbanes-Oxley Act. *The Accounting Review*, 85(2), 419-446.

Bushman, R., Q. Chen, E. Engel, and A. Smith. (2004). Financial accounting information, organizational complexity and corporate governance systems. *Journal of Accounting and Economics* 37 (2): 167-201.

Cai, J., Y. Qian, and Y. Liu. (2009). Information asymmetry and corporate governance. *Drexel College of Business Research Paper* no.2008-02.

Cao, Y., D. Dhaliwal, Z. Li, and Y. Yang. (2011). Are all independent directors equally informed? evidence based on their trading returns and social networks. *Working paper.*

Cheng, Q., and K. Lo. (2006). Insider trading and voluntary disclosures. *Journal of Accounting Research* 44 (5): 815-48.

Clune, R., Hermanson, D. R., Tompkins, J. G., & Ye, Z. S. (2013). The Nominating Committee Process: A Qualitative Examination of Board Independence and Formalization. *Contemporary Accounting Research*.

Coles, J. L., N. D. Daniel, and L. Naveen. (2008). Boards: Does one size fit all. *Journal of Financial Economics* 87 (2): 329-56.

Dechow, P. M., & Dichev, I. D. (2002). The quality of accruals and earnings: The role of accrual estimation errors. *The Accounting Review*, *77*(s-1), 35-59.

Dechow, P., Ge, W., & Schrand, C. (2010). Understanding earnings quality: A review of the proxies, their determinants and their consequences. *Journal of Accounting and Economics*, *50*(2), 344-401.

Dichev, I., J. Graham, C. Harvey, and S. Rajgopal. (2012). Earnings quality: Evidence from the field. *Working paper*.

Diamond, D. "Optimal Release of Information by Firms." *The Journal of Finance* 40 (1985): 1071-1094.

Diether, K. B., Malloy, C. J., & Scherbina, A. (2002). Differences of opinion and the cross section of stock returns. *The Journal of Finance*, *57*(5), 2113-2141.

Duchin, R., J. G. Matsusaka, and O. Ozbas. (2010). When are outside directors effective? *Journal of Financial Economics* 96 (2): 195-214.

Duellman, S., J. Guo, Y. Zhang, and N. Zhou. (2011). Audit committee financial experts and insider trading. *Working paper*.

Fama, E. F. (1980). Agency Problems and the Theory of the Firm. *The Journal of Political Economy*, 288-307.

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of financial economics*, *33*(1), 3-56.

Ferreira, D., M. A. Ferreira, and C. C. Raposo. (2011). Board structure and price informativeness. *Journal of Financial Economics* 99 (3): 523-45.

Fich, E. M., & Shivdasani, A. (2007). Financial fraud, director reputation, and shareholder wealth. *Journal of Financial Economics*, *86*(2), 306-336.

Field, L., Lowry, M., & Shu, S. (2005). Does disclosure deter or trigger litigation? *Journal of Accounting and Economics*, *39*(3), 487-507.

Financial Accounting Standards Board (FASB). (2010). Statement of Financial Accounting Concepts No. 8: Chapter 1, The Objective of General Purpose Financial Reporting.

Francis, J., and K. Schipper. (1999). Have financial statements lost their relevance? *Journal of Accounting Research* 37 (2): 319-52.

Frankel, R., and X. Li. (2004). Characteristics of a firm's information environment and the information asymmetry between insiders and outsiders. *Journal of Accounting and Economics* 37 (2): 229-59.

Givoly, D., Hayn, C., & Lehavy, R. (2009). The quality of analysts' cash flow forecasts. *The Accounting Review*, *84*(6), 1877-1911.

Hansen, M. T. (1999). The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. *Administrative Science Quarterly 44* (1): 82-111.

Healy, P. M., & Palepu, K. G. (2001). Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics*, *31*(1), 405-440.

Hillier, D., Korczak, A. and Korczak, P. (2013). Individual Heterogeneity and the Performance of Insider Trading. *Working paper*.

Hong, H., Lim, T., & Stein, J. C. (2000). Bad news travels slowly: Size, analyst coverage, and the profitability of momentum strategies. *The Journal of Finance*,*55*(1), 265-295.

Huddart, S., Hughes, J. S., & Levine, C. B. (2001). Public disclosure and dissimulation of insider trades. *Econometrica*, *69*(3), 665-681.

Huddart, S. J., & Ke, B. (2007). Information Asymmetry and Cross-sectional Variation in Insider Trading*. *Contemporary Accounting Research*, *24*(1), 195-232.

Huddart, S., Ke, B., & Shi, C. (2007). Jeopardy, non-public information, and insider trading around SEC 10-K and 10-Q filings. *Journal of Accounting and Economics*, *43*(1), 3-36.

Hutton, A. P., L. F. Lee, and S. Z. Shu. (2012). Do managers always know better? The relative accuracy of management and analyst forecasts. *Journal of Accounting Research.*

Jennings, R. 1987. Unsystematic security price movements, management earnings forecasts, and revisions in consensus analyst earnings forecasts. *Journal of Accounting Research* 25 (1): 90-110.

Jensen, M. C. (1993). The modern industrial revolution, exit, and the failure of internal control systems. *The Journal of Finance*, *48*(3), 831-880.

Kaplan, S. N., & Reishus, D. (1990). Outside directorships and corporate performance. *Journal of Financial Economics*, 27(2), 389-410.

Ke, B., Huddart, S., & Petroni, K. (2003). What insiders know about future earnings and how they use it: Evidence from insider trades. *Journal of Accounting and Economics*, *35*(3), 315-346.

Kim, I., and D. J. Skinner. (2011). Measuring securities litigation risk. *Journal of Accounting and Economics.*

Kim, O., and R. E. Verrecchia. (1994). Market liquidity and volume around earnings announcements. *Journal of Accounting and Economics* 17 (1): 41-67.

Kim, O., & Verrecchia, R. E. (1997). Pre-announcement and event-period private information. *Journal of accounting and economics*, *24*(3), 395-419.

Kothari, S. P. (2001). Capital markets research in accounting. Journal of Accounting and Economics, 31(1), 105-231.

Kyle, A. S. (1985). Continuous auctions and insider trading. *Econometrica: Journal of the Econometric Society*, 1315-1335.

Lakonishok, J., & Lee, I. (2001). Are insider trades informative? *Review of financial studies*, 14(1), 79-11.

Lang, M., Lins, K. V., & Maffett, M. (2009). Transparency, liquidity, and valuation: International evidence. *Unpublished working paper. University of North Carolina at Chapel Hill*.

Lehavy, R., Li, F., & Merkley, K. (2011). The effect of annual report readability on analyst following and the properties of their earnings forecasts. *The Accounting Review*, 86(3), 1087-1115.

Li, F. (2008). Annual report readability, current earnings, and earnings persistence. *Journal of Accounting and economics*, *45*(2), 221-247.

Linck, J. S., J. M. Netter, and T. Yang. (2008). The determinants of board structure. *Journal of Financial Economics 87* (2): 308-28.

Maffett, M. (2012). Financial reporting opacity and informed trading by international institutional investors. *Journal of Accounting and Economics.*

McNichols, M. F. (2002). Discussion of the quality of accruals and earnings: The role of accrual estimation errors. *The accounting review*, *77*(s-1), 61-69.

McPherson, M., L. Smith-Lovin, and J. M. Cook. (2001). Birds of a feather: Homophily in social networks. Annual Review of Sociology: 415-44.

National Association of Corporate Directors (NACD). (2009). Key Agreed Principles to Strengthen Corporate Governance for U.S. Publicly Traded Firms. *NACD White Paper Series—Series 1*.

Noe, C. F. (1999). Voluntary disclosures and insider transactions. *Journal of Accounting and Economics* 27 (3): 305-26.

Petra, S. T. (2007). The effects of corporate governance on the informativeness of earnings. Economics of Governance 8 (2): 129-52.

Piotroski, J. D., & Roulstone, D. T. (2005). Do insider trades reflect both contrarian beliefs and superior knowledge about future cash flow realizations?.*Journal of Accounting and Economics*, *39*(1), 55-81.

Ramnath, S., S. Rock, and P. Shane. (2008). The financial analyst forecasting literature: A taxonomy with suggestions for further research. *International Journal of Forecast*ing 24 (1): 34-75.

Ravina, E., and P. Sapienza. (2010). What do independent directors know evidence from their trading. *Review of Financial Studies* 23 (3): 962-1003.

Roulstone, D. T. (2003). The relation between insider trading restrictions and executive compensation. *Journal of Accounting Research* 41 (3): 525-51.

Seyhun, H. N. (1986). Insiders' profits, costs of trading, and market efficiency.*Journal of Financial Economics*, *16*(2), 189-212.

Seyhun, H. N. (1992). Why does aggregate insider trading predict future stock returns?. *The Quarterly Journal of Economics*, *107*(4), 1303-1331.

Shroff, N. O. (2011). *Managerial investment and changes in GAAP: An internal consequence of external reporting* (Doctoral dissertation, The University of Michigan).

Silber, W. L. (1975). Thinness in capital markets: The case of the Tel Aviv stock exchange. *Journal of Financial and Quantitative Analysis*, *10*(1), 129-142.

Skinner, D. J. (1997). Earnings disclosures and stockholder lawsuits. *Journal of Accounting and Economics*, *23*(3), 249-282.

Srinivasan, S. (2005). Consequences of financial reporting failure for outside directors: Evidence from accounting restatements and audit committee members. *Journal of Accounting Research*, *43*(2), 291-334.

Vafeas, N. 2000. Board structure and the informativeness of earnings. *Journal of Accounting and Public Policy* 19 (2): 139-60.

Verrecchia, R. “Information Acquisition in a Noisy Rational Expectations Economy.” *Econometrica* 50 (1982): 1415-1430.

Womack, K. L. (1996). Do brokerage analysts' recommendations have investment value? *The Journal of Finance*, *51*(1), 137-167.

Wong, Simon C. Y. (2011). Boards: When best practice isn't enough. *McKinsey Quarterly.*