INFORMATION ASYMMETRY, SEGMENT DISCLOSURES, AND COST OF EQUITY CAPITAL

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CHAPTER I

INTRODUCTION

This study extends the value-relevance research on the association between the cost of equity capital and the level of segment disclosures. Using the *ex ante* measures of the cost of equity capital and a hand-developed index measure of the level of segment disclosures, this study finds that the theoretical negative association between the cost of equity capital and the level of segment disclosures is increasing in the existing probability of informed trade. This study also finds mixed evidence in support of the contention that the negative association between the cost of equity capital and the level of segment disclosures is increasing (decreasing) in the absence (presence) of managerial blockholdings. Further, the increasing effect of probability of informed trade dominates the decreasing effect of the presence of managerial blockholdings. Overall, evidence suggests that the negative association between the cost of equity capital and the level of segment disclosures is increasing in the probability of informed trade and absence of managerial blockholdings.

Theory predicts a negative association between the cost of equity capital and the level of financial disclosures of the firm. A higher level of disclosure leads to a reduction of information asymmetry between managers and investors which results in the reduction of cost of equity capital of the firm. However, the evidence in favor of a negative association between the cost of equity capital and the level of disclosure has been mixed.

The objective of this study is to examine factors that may affect the relationship between the cost of equity capital and the disclosure level of the firm. Specifically, this study identifies and tests two factors which may affect the theoretical negative relationship between the cost of equity capital and the level of disclosure – information asymmetry among different types of investors, and information asymmetry between managers and investors (shirking behavior of managers).

Disclosures reduce information asymmetry existing between managers and investors and hence, reduce the cost of equity capital of the firm. The negative association between the cost of equity capital and disclosures, because of a reduction in information asymmetry between managers and investors, may also be dependent on a second type of information asymmetry that exists between different types of investors (e.g., well informed vs. less-informed investors, domestic vs. foreign investors, etc.). The direction and strength of association between this type of information asymmetry and the level of disclosure could affect the overall association between the cost of equity capital and disclosures. The first research question in this study specifically addresses the effect of information asymmetry that exists among different types of investors on the overall association between the cost of equity capital and the level of disclosure.

The second research question studies the effect of managerial blockholdings on the association between the cost of equity capital and the level of disclosure of the firm. Separation of ownership and control results in agency problems between managers and owners (shareholders). Alignment of interests of managers and shareholders helps reduce the agency problem. Therefore, the severity of the agency problem decreases with an increase in managerial ownership (LaFond and Roychowdhury, 2008). Presence of managerial blockholding can affect the association between the cost of equity capital and the level of disclosure. It can make it stronger by reducing the moral hazard (agency) problem whereby the managers of the firm may engage in shirking behavior. The moral hazard problem may reduce the reliance of investors on the financial disclosure of the firm. However, it may also make it weaker if increased managerial blockholdings affect the quality of disclosures adversely. Increased managerial blockholdings may result in more managed earnings and reduce the quality of disclosures.

The third research question looks at the combined effect of the information asymmetry existing among different type of investors and the managerial blockholdings on the association between cost of equity capital and disclosures.

This study uses segment disclosures provided by US firms to examine the three research questions. Sample firms have enough variation using the hand-developed measure of the level of segment disclosure. Bens and Monahan (2004) find that quality of segment disclosure as measured by segment information disaggregation is a good proxy of overall quality of disclosure. The examination of segment disclosures by itself adds to the literature emphasizing the importance of segment disclosure regulations in place (e.g., SFAS # 131 and IFRS 8).

This study contributes towards the information asymmetry literature which until recently has concentrated on the information asymmetry between managers and investors (principal-agent) ignoring the information asymmetry that may exist among different types of investors. Another contribution of this study is towards the disclosure literature which predicts a negative relationship between the cost of equity capital and the level of disclosure. Prior literature has found mixed evidence in support of this association. This study helps explain this mixed evidence by examining two additional factors (probability of informed trade and managerial ownership) that may affect the relationship between the cost of equity capital and the level of disclosure. This study also contributes to the literature on segment disclosure. Only one study (Bens and Monahan, 2004) examines the association between the market valuation of the firm and the level of segment disclosure. The drawback of the study by Bens and Monahan (2004) lies in the measure of the quality of segment disclosure which only looks at one aspect of the segment disclosure, namely, degree of segregation. In this study, I develop a measure of the *level* of segment disclosures based on hand collected data which is a more comprehensive measure and covers several different aspects of segment disclosure.

It is important to understand the association between the cost of equity capital and the level of disclosure in order to understand how investors process reported segment information in the presence of different types of information asymmetries and different fundamental factors while evaluating a firm. Also, it is important to understand the importance of the managerial blockholdings in controlling the shirking behavior of the managers (agents) and how it affects the value relevance of the disclosed information. This research also provides relevant information for testing the effectiveness of segment information provided by firms under SFAS # 131 (US-GAAP) as well the effectiveness of IFRS 8 of the International Accounting Standards Board (IASB). In 2006, IASB adopted IFRS 8 for segment reporting by international firms which is quite similar to SFAS # 131 of US-GAAP in defining operating segments.

The remainder of the paper is organized as follows. The next chapter reviews prior literature on the association between the cost of equity capital, information asymmetry, and disclosures. Chapter III discusses the hypotheses development for the study. Chapter IV describes the sample data and research methodology to test the hypotheses. Chapter V provides and discusses the results of analyses followed by the concluding chapter. Appendix A discusses development of the measure of the level of segment disclosure based on hand collected data.

CHAPTER II

LITERATURE REVIEW

2.1 Information Asymmetry

Information asymmetry occurs when one group of participants has better or timelier information than other groups (Copeland et al., 2005). Two types of information asymmetry are discussed in prior literature – one, between managers of the firm and the investors, and two, between the investors themselves (e.g. well informed vs. less informed, domestic vs. foreign investors, or institutional investors vs. individual).

The first type of information asymmetry is often the result of principal-agent conflicts (e.g. Jensen and Meckling, 1976; Lambert, 2001). Managers of the firm possess superior information about the firm's prospects over the investors of the firm. This leads to the problem of adverse selection faced by the investors (e.g. Akerlof, 1970; Healy and Palepu, 2001). This may also lead to a moral hazard problem whereby the managers may not always work in the best interest of the shareholders. Firms use corporate governance mechanisms to check this type of information asymmetry.

The second type of information asymmetry (information asymmetry among different types of investors) has received less attention in the literature. The source of this kind of information asymmetry is private information possessed by a group of well-informed investors against the other investors who are not as well informed. Information asymmetry among investors could arise because of the ability of a group of sophisticated investors to process publicly available information into private information signals (e.g. Kim and Verrecchia, 1994). Information asymmetry may also be the result of selective disclosures of material information made by the firms to a group of investors (usually large and institutional investors) before others (usually small and individual investors). To mitigate the practice of selective disclosure, the SEC passed Regulation Fair Disclosure (RegFD) in Fall 2000. However, there is no regulatory mechanism in place to reduce the probability of informed trade by sophisticated investors whereby such investors can process the publicly available information to their advantage.

2.2 Cost of Equity Capital.

The cost of equity capital can be defined as the expected rate of return of the current and prospective equity shareholders. It is the return demanded by the equity shareholders to bear the risks associated with the firm which in turn affects stock prices. As a firm becomes riskier, the investors demand a higher return resulting in a higher cost of equity capital.

Various firm characteristics are associated with the firm's risk, return, and cost of equity capital. Fama and French (1992, 1993, 1995, 1996) show that average stock returns are related to overall market returns, firm size, and book-to-market equity. Basu (1983) documents the relation between stock returns and earnings yield. Bhandari (1988) documents a relationship between stock returns and the debt-to-equity ratio. Fama and French (1996) call these factors "asset pricing anomalies" because these patterns in average stock returns are not explained by the capital asset pricing model (CAPM) developed by Sharpe (1964) and Litner (1965). According to the CAPM, expected returns (or cost of equity capital) are linearly related only to the systematic risk of the firm.

A wide body of literature uses average realized returns as a proxy for expected returns or in other words, proxy for the cost of equity capital. Being an *ex post* measure of returns, average realized returns are a poor proxy of the cost of equity capital (e.g. Gebhart et al., 2001; and Botosan, 1997). CAPM based models represent alternative estimation methods for determining the cost of equity captial. However, risk premia calculations in CAPM models are still based on the past realized returns and hence provide an imprecise measure of the cost of equity capital (Gebhart et al., 2001).

Due to problems with the models based on *ex post* measures of returns, implied cost of equity capital *(internal rate of return)* estimation has gained recent attention. Such estimation methods use discounted cash flows (payoffs) to infer the implied cost of equity capital. These methods are known as residual income models or dividend discount models often referred to as Edward Bell Ohlson (EBO) models developed by Edwards and Bell (1961), and Feltham and Ohlson (1995). Several variants of the EBO model have been used in recent studies to calculate the cost of equity capital (e.g. Botosan, 1997; Gebhardt et al., 2001; Claus and Thomas, 2001; Gode and Mohanram, 2003). These models vary in their definition of residual income and calculation of the terminal value used in the model. Botosan (1997) uses the EBO valuation model equating market price of a firm's stock to the sum of expected dividends discounted at the cost of equity capital. Frankel and Lee (1998) implement the EBO model using analysts' earnings forecasts for expected income. Gebhardt et al. (2001) use expected future cash flows in the EBO model to calculate the implied cost of equity capital. The Gode and Mohanram

(2003) model, and the Claus and Thomas (2001) model are other commonly used versions of EBO model. Botosan and Plumlee (2005) assess different alternative proxies for the expected risk premium. They find that risk premiums calculated using the target price method (Botosan and Plumlee, 2002) and using the price earnings growth (PEG) ratio method (Easton, 2004) are consistently and predictably related to risk while other alternatives were not. Under the target price method, an infinite series of future cash flows in an EBO model is truncated at the end of year five by inserting a forecasted terminal value. Under the PEG ratio method, the risk calculation is based on the ratio of long-run earnings' forecasts (as opposed to short-term earnings forecast in Easton, 2004) and initial price.

This study uses four alternative EBO models and a fifth, as an arithmetic average of the four, to calculate the *ex-ante* cost of equity capital for reasons discussed above. These models are discussed in detail in Chapter IV. Major results of the study are based on the average measure.

2.3 Association between Financial Disclosure, Information Asymmetry and Cost of Equity Capital

Theory suggests a positive relation between information asymmetry and the firm's cost of equity capital because investor's perceived risk of the firm (beta) increases in asymmetric information and vice versa (e.g. Barry and Brown, 1985; Handa and Linn, 1993; Coles et al., 1995; Hubbard, 1998). Finance and accounting literature posits that information disclosures reduce information asymmetry, improve shareholder welfare, and hence reduce a firm's cost of equity capital (e.g Diamond, 1985; Glosten and Milgrom, 1985; Amihud and Mendelson, 1986; Diamond and Verrecchia, 1991; Botosan, 1997; Healy and Palepu, 2001; Botosan and Plumlee, 2002; Habib, 2006).

Various reasons have been cited in the research for the reduction in the cost of equity capital with an increase in financial disclosure. Diamond and Verrecchia (1991) show that revealing public information reduces information asymmetry in general, increases liquidity in the market, and hence increases demand from large investors of the firm's securities which reduces the firm's cost of equity capital. Welker (1995) concludes that uninformed investors price protect against potential losses resulting from adverse selection which influences the bid-ask spread (a proxy for cost of equity capital). He predicts an inverse relation between bid-ask spread and disclosure policy and a positive relation between spread and the proportion of trade coming from informed traders. Callahan et al. (1997) conclude that improvement in the information environment of firms through better disclosure reduces transaction costs, and hence the cost of equity capital. Thus, "the disclosure policy of a firm serves as a mechanism that can mitigate information asymmetry and lower firms' cost of external financing" (Francis et al., 2005).

Financial disclosures of a firm are defined as the mandatory and voluntary disclosures made by the managers of the firm regarding the firm's financial performance in order to help investors evaluate the firm for making investment decisions. Many studies on financial disclosure consider voluntary disclosures only (e.g. Verrecchia, 1983; Meek et al., 1995; Francis et al., 2008; Langberg and Sivaramakrishnan, 2008) while others consider the level of overall disclosure (e.g. Botosan, 1997; Botosan and Plumlee, 2002; Kumar et al., 2008).

Some association studies on disclosures look at the quality of disclosures rather than the level of disclosure. Leuz and Verrecchia (2005) conclude that information quality affects firms' future cash flows lowering the cost of capital. Byard and Shaw (2003) find that the precision of analysts' forecasts increases in the quality of disclosures. In an international study, Hail and Leuz (2006) conclude that countries with a better information environment have a significantly lower cost of equity capital. Sengupta (1998) concludes that firms with higher disclosure quality have a lower cost of debt. He refers to the quality of disclosures as the degree of detail and clarity in annual and quarterly reports, accessibility of top management for discussion, frequency of press releases, and timeliness of the disclosure. For the purpose of this paper, quality of segment disclosure is defined as the amount or the level of segment disclosure (mandatory and voluntary) provided by the firm in their 10-K filings with the SEC.

Another stream of literature looks at the value relevance of specific disclosures such as intangibles and R&D activities of a firm (e.g. Aboody and Lev, 1998; Gu and Lev, 2004). In general, they find that the investors use the specific disclosures about intangibles and R&D activities in evaluating the firm.

Accounting literature has also focused on the value relevance of segment and geographic disclosures (pre- and post- SFAS # 131) of multinational corporations (MNCs). Berger and Hann (2003) find that the market values the newly revealed segment information post-SFAS # 131 and the new information also improves the monitoring of the firm. Consistent with the monitoring role of segment information post-SFAS # 131, Hope and Thomas (2008) conclude that voluntary geographic earnings disclosures post-SFAS # 131 restricts managerial empire building (shirking behavior of managers).

Ettredge et al. (2005) conclude that SFAS # 131 increased both the quantity and quality of segment disclosure by examining the relation between segment disclosure and the forward earnings' response coefficient. Hossain (2008) finds an increase in value relevance of the quarterly foreign sales data post-SFAS # 131. Hope et al. (2008) find that mispricing of foreign earnings (documented as the foreign earnings anomaly by Thomas, 1999) lessens post-SFAS # 131. Hope et al. (2009) find that disclosure of foreign earnings under SFAS #131 is priced by the investors and is associated with firm's information environment. Botosan and Stanford (2005) find that segment disclosure under SFAS #131 improves the information environment of the firm as suggested by the increased reliability of analysts on public data post-SFAS # 131. Behn et al. (2002) find that geographic segment information under SFAS #131 is more informative and useful to analysts as evidenced by reduced forecast errors. Nichols et al. (1995) also find improvement in forecast accuracy of analysts after the disclosure of geographic segment information post-SFAS # 14. Overall, evidence on segment disclosure suggests that segment disclosure help improve the analysts' forecasts and investors' overall information by improving information environment of the firm.

Contrary to theory, empirical research also provides some evidence of a positive relationship between the cost of equity capital and disclosure (e.g. Botosan and Plumlee, 2002; Bushee and Noe, 2000). Botosan and Plumlee (2002) conclude that cost of equity capital increases with more timely disclosures (quarterly disclosures) possibly through increased stock volatility. Bushee and Noe (2000) conclude that increased disclosure increase ownership by aggressively trading "transient" institutions which subsequently increase stock return volatility or in other words, increases *ex-post* cost of equity rather than decrease it.

The relationship between the cost of equity capital and disclosures is also likely a function of management and disclosure credibility. Frost (1997) finds a weaker stock price reaction to disclosures issued by financially distressed U.K. firms as compared to non-distressed U.K. firms suggesting that investors are sensitive to the incentives of management when assessing the credibility of disclosures (Mercer, 2004). According to Mercer (2004), managers have greater incentives to provide overly positive disclosures than overly negative disclosures. Gao (2008) provides a theoretical explanation for the mixed empirical relation between the cost of equity capital and the disclosure quality by introducing the investment effect of disclosure. He analytically shows that the cost of equity capital could increase with disclosure when the adjustment cost of new investment is sufficiently low and the prior expected profitability of existing investment is sufficiently high. Adjustment cost refers to the cost that the firm may incur because of new investment decisions. For example, if Microsoft Inc. and Google Inc. are planning on investing in Yahoo Inc. then the adjustment cost of new investment in Yahoo is higher for Microsoft than for Google because Yahoo's business model is much closer to Google's than to Microsoft's. Lower adjustment cost provides incentives to the management to invest in subpar projects and hence may adversely affect the amount and the credibility of disclosures provided by the management. Similarly, Lambert et al. (2007) analytically show that disclosure quality can change a firm's real decisions, which likely changes the firm's ratio of expected future cash flows to the covariance of these cash flows with the sum of all the cash flows in the market. They call this the *indirect effect* of disclosure on the cost of capital.

Theory predicts an optimal disclosure policy for the firm which is determined by the trade-off between reduced information asymmetry (reduced cost of capital) and the increased cost of information disclosures. These information costs could be due to litigation costs (Skinner, 1997), and proprietary costs (Verrecchia, 1983; Hayes and Lundholm, 1996) of disclosing the information. Therefore, higher disclosures reduce cost of equity but not always. There exists an optimal amount of disclosures which is endogenously determined for each firm (Core, 2001).

Another stream of literature tries to explain the mixed results of association between the cost of equity capital and disclosure. Leuz and Verrecchia (2000) attribute the mixed results on the relationship between the cost of equity capital and disclosure to the already rich information environment under US-GAAP. They suggest that the negative relationship between the cost of equity capital and disclosure holds strongly in a poor information environment. In contrast, Cheng et al. (2006) attribute a stronger negative relation between the cost of equity capital and disclosure to an interaction effect between disclosures and a strong shareholder rights regime. In particular, they find that firms with stronger shareholder rights and higher levels of financial disclosures are associated with significantly lower costs of equity capital. Similarly, Francis et al. (2008) conclude that the negative relation between the cost of capital and the voluntary disclosures fades away after controlling for quality of earnings. They suggest a mediation effect of voluntary disclosures whereby voluntary disclosures increase in earnings quality and reduce cost of capital in turn. Some recent studies explain the mixed relationship between information quality and the cost of equity capital by breaking down the overall information uncertainty into public and private information precision using the Barron et al. (1998) model popularly known as the BKLS model (e.g. Botosan et al., 2004). Botosan et al. (2004) find a negative relation between the cost of equity capital and the precision of public information which is offset by a positive relation between the cost of equity capital and the precision of private information. The drawback of these studies lies in their dependence on the BKLS model for separating the overall disclosure quality into public and private information precision. The BKLS model focuses exclusively on the public and private information environment of financial analysts rather than investors. Similarly, Easley et al. (2002) find a strong positive relation between private information precision and the cost of equity capital. They use a private information-based trading (PIN) measure to measure the private information. PIN is a more comprehensive measure compared to the BKLS model as it is based on the information environment of all the investors in general. PIN measure is discussed in detail in Chapter IV. Using the PIN measure, Brown and Hillegeist (2007) find that disclosure quality reduces information asymmetry by reducing the likelihood that investors search for private information and trade on it. Kim and Verrecchia (1991a, 1991b) study the influence of precision (quality) of public information on information asymmetry, price, and volume of trade in the market. They analytically prove that the precision of public information affects the incentives for investors to acquire private information, and thereby affects the information asymmetry across the investors, incentives to trade, and the prices in the market.

Overall, theory supported by analytical research and the empirical evidence suggests that the relationship between the cost of equity capital and the level of disclosure is not unidirectional. In general, theory predicts an inverse relationship between the two, but under some special circumstances, this negative relationship may be mitigated (non-significant) or may even be positive. The objective of the current study is to provide empirical evidence in support of the above mentioned theory and further determine the special circumstances when the negative relationship between the cost of equity and the level of disclosure is significant (non-significant).

This study uses the level of segment disclosure post-SFAS # 131 to test the theory. Segment disclosure is a small yet important part of the overall financial disclosure of the firm. If the results of the study hold well using the level of segment disclosure then we expect to have even stronger results when using the overall level of financial disclosure. In other words, the results using the level of segment disclosure can be generalized for the level of overall financial disclosures. As mentioned earlier, the reason for using the level of segment disclosure in this study is that no study has directly examined the association between the cost of equity capital and the level of segment disclosure and the factors affecting this association.

CHAPTER III

HYPOTHESES DEVELOPMENT

Until recently, prior literature has mostly concentrated on the role of public information only. Theory predicts that the level of public disclosures reduces information asymmetry and a reduction in information asymmetry results in a reduction in the cost of equity capital. But empirical evidence is mixed on the effect of disclosure on the cost of equity capital of the firm.

Recent studies look at the role of private information along with the role of public information. Studies, using the BKLS model to separate information precision into public and private information precision, suggest that the effects of disclosure on the cost of equity capital are mixed because of the contrasting roles of public and private information (Botosan et al. 2004). However, Easley et al. (2002) use a different approach to measure the private information precision and empirically find that stocks with higher probabilities of information-based trading (a proxy for high private information precision) have higher rates of return.

This study makes an attempt to distinguish between the two kinds of information asymmetries, study the relationship of the two information asymmetries with the level of disclosure, and their effect on the cost of equity capital of the firm. The two types of information asymmetries are – (1) information asymmetry among the investors (Type I hereafter) whereby some investors are better informed than other investors, and (2) principal-agent information asymmetry (Type II hereafter) whereby managers (agents) have superior information over shareholders (principal). Type I information asymmetry leads to a problem of adverse selection whereby uninformed investors incur losses with respect to informed investors because well informed investors may possess private signals that less informed investors do not. On the other hand, Type II information asymmetry leads to a problem of moral hazard whereby the managers could engage in selfish behavior. To study the effect of disclosure level on the cost of equity capital, one needs to observe the effect of disclosure on the two types of prevailing information asymmetries. Level of disclosure, in general, reduces information asymmetry but results may be stronger in a poor information environment as evidenced by Leuz and Verrecchia (2000) and Botosan (1997). But we do not know if similar results hold when we separately examine Type I and Type II information asymmetry.

The effect of the level of disclosures on Type I information asymmetry is context specific because of differing roles of public and private information, and the presence of different types of investors. Higher disclosure levels may or may not result in the reduction of Type I information asymmetry. Institutional investors are better able to produce a superior assessment of firm’s financial performance based on the available public information than individual investors can. For example, Kim and Verrecchia (1994) find that informed market participants (such as analysts or large shareholders) process public information into private information to generate an information advantage over their relatively uninformed counterparts. Hence, a public signal can further increase the information asymmetry between the sophisticated institutional investors and individual investors. An increase in Type I information asymmetry may result in higher returns (*ex ante*) demanded by the investors in general. Easley and O'Hara (2004) analytically show that investors demand a higher return (*ex ante*) to hold stocks with greater private information. On the other hand, increased amount of disclosure may actually help reduce the Type I information asymmetry, which may exist as a result of limited amount of disclosure, among different types of investors. Limited amount of disclosure may provide an opportunity to the sophisticated institutional investors to gain an informational advantage over individual investors and provides incentives for information processing leading to higher information asymmetry among the two types of investors. Brown and Hillegeist (2007) conclude that disclosures reduce the likelihood of information processing and information based trading by sophisticated investors.

From above discussion it can be hypothesized that disclosures are more effective in reducing the cost of equity capital when the likelihood of information based trading (Type I information asymmetry) is higher. The negative relationship between the cost of equity capital and level of disclosure may be dependent on prevailing Type I information asymmetry. Or in other words, the negative association between the cost of equity capital and the level of disclosures may be stronger when Type I information asymmetry or the likelihood of information based trading is high. Using a special case of segment disclosures, the first hypothesis can be stated as:

H_1: The negative relation between the cost of equity capital and the level of segment disclosures is increasing in higher probability of information based trading (Type I information asymmetry).

This study specifically uses segment disclosures provided by the US firms under SFAS # 131 instead of more general overall disclosure. The reason is that no study (to the best of my knowledge) has directly examined the association between the cost of equity capital and segment disclosure. However, Bens and Monahan (2004) find a positive association between the excess value of diversification (*ex post*) and disclosure quality for multi-segment firms. If the results hold in favor of H_1 using the level of segment disclosure then it would hold for the level of overall disclosure too, since segment disclosure is a small yet important part of overall disclosure of the firm.

Theory predicts that the cost of equity capital is increasing in probability of managerial shirking behavior (Jensen and Meckling 1976). Alignment of interests of owners and managers may affect the real decisions made by the managers. Manager of a firm with low or no managerial ownership is more likely to make decisions in favor of a new investment even if the marginal profitability of the new project is low or the risks associated with the new investment project are high (i.e. empire building). The actions taken by the managers may not always be in the best interest of the shareholders encouraging the shirking behavior by the managers. This is the moral hazard problem (e.g. Holmstrom 1979, Jensen and Smith 1985, Holmstrom and Milgrom 1987) referred to earlier as Type II information asymmetry. Bebchuk and Stole (1993) analytically show that in absence of monitoring, managers may undertake subpar investment projects if they believe that such decisions will be rewarded with high stock returns in the short-term. Hope and Thomas (2008) find that in absence of monitoring, managers invest in less profitable or inefficient projects thereby increasing the risk of future cash flows.

Theoretically, managerial ownership of stock helps reduce the moral hazard problem by aligning the interests of managers with those of the shareholders (e.g. Jensen and Meckling 1976; Myers 1977). As a result managers take on value enhancing projects which improves firm performance and hence reduce the cost of equity capital. But the evidence so far has been mixed. Some studies find a positive relation between managerial ownership and firm performance (e.g. Morck et al. 1988; Core and Larcker 2002) while others do not find a significant relation between the two (e.g. Agrawal and Knoeber 1996; Demsetz and Villalonga 2001; Cheung et al. 2006).

A positive association between managerial ownership and firm value indicates that the firms with low (high) managerial ownership will have higher (lower) cost of equity capital. A firm with low managerial ownership (higher managerial shirking) may use disclosures as remedial measure to reduce the higher returns demanded by the investors. Prior literature finds evidence supporting a negative relationship between managerial ownership and level of disclosures. Baek et al. (2009) find a negative association between managerial ownership and the level of discretionary disclosures. Gelb (2000) also finds that firms with lower managerial ownership are more likely to have higher disclosure ratings. As a result, the negative association between the cost of equity capital and disclosures is increasing in reduced managerial blockholdings. However, the firms with better aligned interests of managers and owners (increased managerial blockholdings) may not experience this increasing effect on the negative association between the cost of equity capital and the level of disclosures. This is because, for the firms with managerial blockholdings (better aligned interests of managers and owners), the costs of providing higher level and quality of disclosures may be higher than the benefits accruing from it.

The following hypothesis tests this idea and could provide an alternative explanation for the mixed relation between the cost of equity capital and the level of disclosure. Therefore, hypothesis two can be stated as:

H_2: The negative relation between the cost of equity capital and the level of segment disclosures is decreasing (increasing) in high (low) managerial blockholdings. (Assuming the decreasing effect of managerial blockholding on the association)

This study also tests the following joint hypothesis based on H_1 and H_2. Segment disclosure may be more effective in poor investor information environment *(H_1)* and when the interests of managers and owners are not properly aligned *(H_2)*. Thus, the stronger negative association between the cost of equity capital and disclosure, when probability of information based trading is high, is mitigated in the presence of managerial blockholdings (i.e., when probability of managerial shirking is low). Or in other words, the interaction effect of the level of segment disclosures and probability of informed trade in reducing the cost of equity capital is mitigated when managerial blockholdings are present. Formally H_3 can be stated as:

H_3:The negative association between the cost of equity capital and the interaction effect of the level of segment disclosures and probability of informed based trading is decreasing (increasing) in presence (absence) of managerial blockholdings.

Earlier theory predicts a negative relationship between the cost of equity capital and the level of disclosure while empirically the evidence has been mixed. The above three hypotheses predict and test the strength of this theoretical negative relationship under certain situations. The next chapter describes the research methodology and empirical proxies to be used to test the above hypotheses.

CHAPTER IV

VARIABLE MEASUREMENTS AND RESEARCH METHODOLOGY

4.1 Variable Measurements

4.1.1 Level of Segment Disclosure

In 1997, Statement of Financial Accounting Standard (SFAS) No. 131, *Disclosures about Segments of an Enterprise and Related information,* of US-GAAP replaced SFAS # 14 issued in 1976. Under the new regulation, multi-segment firms were required to report information about operating segments in their financial statements as the *primary* segments. Operating segments for this purpose are defined as the segments of financial reporting used by managers of the firm for making business decisions. Industry and geographic segment classifications not reported as operating segments are reported under *secondary* segment information.

This study uses three different measures to measure the level of segment disclosures. The first measure of the level of segment disclosures is developed based on hand collected data. In order to evaluate the segment disclosures provided in the 10-K filings, a comprehensive score of segment disclosures is developed based on the mandatory and voluntary segment information disclosed by the firms in their 10-K filings. The objective of the segment disclosure score (*SDSCORE*) is to provide cross-sectional rankings of the firms based on segment information disclosed in their 10-K filings. *Appendix A* shows development and validation of the measure, *SDSCORE*.

Primary results of this study are based on the first measure of segment disclosures (*SDSCORE*). For comparison purposes, a second measure based on Bens and Monahan (2004) is also used in the analysis. They use a measure of segment information disaggregation, *DISAGG*, as a measure of disclosure quality. This measure of information disaggregation was initially used by Piotroski (2003) and Berger and Hann (2003). *DISAGG* equals the natural log of the ratio of the number of reported segments to the number of reported business activities.

$$DISAGG = ln\left[\frac{\#\ of\ reported\ segments}{\#\ of\ business\ activities}\right]$$

The number of reported segment equals the number of operating segments reported by the firm in the annual financial statements as per Compustat Segment database. The number of business activities equals the number of two-digit SIC codes in which the firm operates as per the *LexisNexis Corporate Affiliations – U.S. Public Companies*. *DISAGG* provides an objective measure of segment disclosures and measures the extent to which operating activities are reported separately. One disadvantage of using this measure of segment disclosures is that it ignores the content of segment disclosures made by the firm under SFAS # 131 and only focuses on one aspect of segment information – number of reported operating segments. It also ignores the segment information provided under the *secondary* segment information (if any). Bens and Monahan (2004) also point out that *DISAGG* provide no information about the underlying precision of the information disclosed and that *DISAGG* will be lower for vertically integrated firms which may not necessarily be because of loss of information.

Data for the variable *DISAGG* is then winsorized at 1 percent and 99 percent level to avoid the effect of outliers in the data. *DISAGG* is used as a second proxy of the level of segment disclosures in the analysis.

This study also uses a third measure of the level of segment disclosures (*WORDS*). According to this measure, level of segment disclosures is defined as the natural log of the number of words used in reporting segment information under SFAS 131 disclosures provided by the firm.

$$WORDS = ln(\# \ of \ words)$$

where,

# of words = number of words used in reporting segment information under SFAS # 131 disclosures made by the firm in 10-K filings.

Data for the variable *WORDS* is then winsorized at 1 percent and 99 percent level to avoid the effect of outliers. *WORDS* is used as the third proxy of the level of segment disclosures.

4.1.2 Probability of information-based trading (PIN)

Hypothesis 1 and 3 require a proxy to measure the information asymmetry among different types of investors (type II information asymmetry). This is measured using the probability of information-based trading (*PIN*) for a given firm-year, which is based on the EKO model developed by Easley, Kiefer, and O’Hara (1997). EKO model is widely used in market microstructure literature in finance to proxy for information based trading. For a detailed discussion of this measure see Easley et al. (1997, 2002). *PIN* measure represents the expected fraction of trades that are information-based over the overall trades. The model assumes that private information events occur at the beginning of the trading day with probability α. The private information contains "bad" news with probability δ and "good" news with probability $(1 - \delta)$. Bad (good) news signals that a profit maximizing trade is to sell (buy) the stock. Buy and sell orders from traders arrive according to Poisson processes throughout each trading day. Orders from risk-neutral and competitive informed traders arrive at rate μ on information event days (good or bad news days), orders from uninformed buyers arrive at rate ε_b, and orders from uninformed sellers arrive at rate ε_s on any trading day. Informed traders buy if they know good news and sell if they know bad news. Figure 1 illustrates the tree diagram of the trading process as per Easley et al. (2002).

-----------Insert Figure 1from Page 74 right about here-----------

Assuming the Poisson process, the likelihood function induced by trade process on a single trading day is:

$$L(\theta|B,S) = (1-\alpha)e^{-\varepsilon_b}\frac{\varepsilon_b^B}{B!}e^{-\varepsilon_s}\frac{\varepsilon_s^S}{S!} + \alpha\delta e^{-\varepsilon_b}\frac{\varepsilon_b^B}{B!}e^{-(\mu+\varepsilon_s)}\frac{(\mu+\varepsilon_s)^S}{S!}$$
$$+ \ \alpha(1-\delta)e^{-(\mu+\varepsilon_b)}\frac{(\mu+\varepsilon_b)^B}{B!}e^{-\varepsilon_s}\frac{\varepsilon_s^S}{S!} \qquad (1)$$

where,

B = total buy trades for the day;

S = total sell trades for the day;

θ = $(\alpha, \mu, \varepsilon_b, \varepsilon_s, \delta)$ is the parameter vector.

Thus, likelihood function across I trading days is

$$V = L(\theta|K) = \prod_{i=1}^{I} L(\theta|B_i, S_i) \qquad (2)$$

where,

(B_i, S_i) is trade data for day $i = 1, \ldots, I$ and $K = ((B_1, S_1), \ldots, (B_I, S_I))$ is the data set. Estimates for parameters of model (α, μ, ε_b, ε_s, δ) are estimated by maximizing (2) over θ given the data K. Using these parameters (i.e. α, μ, ε_b, ε_s), *PIN* can be estimated using,

$$PIN = \frac{\alpha\mu}{\alpha\mu + \varepsilon_b + \varepsilon_s} \qquad (3)$$

The numerator in the formula for *PIN* represents the expected number of orders from privately-informed investors and the denominator represents the expected number of total orders each day. Thus, *PIN* represents the expected fraction of trades that are information-based. Equation 3 shows that the probability of information-based trading is increasing in private information events (α) and more informed trading (μ), and decreasing in uninformed trading (ε_b and ε_s).

Estimating *PIN* empirically requires estimation of parameter vector θ. To estimate θ, the daily numbers of buy and sell orders for 12 months during 2005 for each firm is required. Trade orders data is collected from Trades and Quotes (TAQ) database with a minimum of 30 days trading data required for each firm. Each trade is classified as buyer-initiated or seller-initiated using Lee-Ready algorithm (Lee and Ready, 1991). This algorithm uses current bid and ask quotes to determine trade direction. Buy (sell) trades are more likely to be executed at or near ask (bid). Therefore, trade that takes place above (below) the midpoint of the current quoted spread is classified as a buy (sell). Trades taking place at midpoint are classified using “tick test” based on the price of the most recent transaction. Following Hasbrouck (1988), all trades occurring within five seconds of each other are classified as single trade.

Parameters are estimated using the maximum likelihood function in equation (2) and assuming that the daily arrival rate of uninformed buy orders is equal to the daily arrival rate of sell orders, i.e., $\varepsilon_b = \varepsilon_s = \varepsilon$. As a result of this assumption, equation (3) can be rewritten as,

$$PIN = \frac{\alpha\mu}{\alpha\mu + 2\varepsilon} \tag{4}$$

PIN is calculated by using the resulting parameter estimates from estimation of likelihood function in equation (4). Data for variable *PIN* is then winsorized at the 5 percent and 95 percent level to avoid outliers. For maintaining the normality and linearity of the data, following natural log transformation of *PIN* is used in the analysis. Thus,

$$LPIN = ln\ (PIN)$$

Variable *LPIN* is used as a measure of probability of informed trading in the analysis to study the association between the cost of equity capital and the level of segment disclosures. Value of *PIN*, as a measure of probability, lies between 0 and 1. Natural log of values between 0 and 1 is negative. Therefore, the value of *LPIN* is negative for all observations. Lower negative value of *LPIN* corresponds to a higher probability of informed trading while higher negative value of *LPIN* corresponds to a lower probability of informed trading. For example, *PIN* = 0.8 corresponds to *LPIN* = -0.22 and *PIN* = 0.2 corresponds to *LPIN* = -1.61. Probability of informed trade is higher for *PIN* = 0.8 as compared to *PIN* = 0.2. Therefore, *LPIN* = -0.22 (mathematically larger) as compared to *LPIN* = -1.61 (mathematically smaller) corresponds to a higher probability of information based trading. There is a significantly high positive (approx. 97%) correlation between *PIN* and *LPIN*. High probability of informed trading corresponds to a higher information asymmetry among investors and hence, increased cost of equity capital. Therefore, *LPIN* is expected to be positively associated with the cost of equity capital.

4.1.3 Managerial blockholdings

Hypotheses 2 and 3 require a dummy variable for managerial blockholdings to control for the managerial ownership as a proxy for managerial shirking behavior. If the interests of managers and owners are aligned then managers would avoid shirking behavior and avoid investing in inefficient projects. Lafond and Rowchowdhury (2008) conclude that accounting conservatism is decreasing in managerial ownership indicating a reduction in agency problem with an increase in managerial ownership. Presence of managerial blockholdings (higher managerial ownership) corresponds to reduced shirking behavior of the managers. Dummy variable *NOBLOCK* indicates the absence of managerial blockholdings in the sample firm. *NOBLOCK* is equal to zero if the firm has manager(s) with more than 4 percent stock ownership in the firm and equal to one if no manager has more than 4 percent ownership.[1]

4.1.4 Implied cost of equity capital (*ex ante*)

This study estimates *ex* ante cost of equity capital implied by analysts' earnings forecasts and stock prices. Five alternative proxies of implied cost of equity capital are calculated. The first four proxies are - (1) R_{GLS} based on Gebhardt, Lee, and Swaminathan (2001) model; (2) R_{GM} based on Ohlson and Juettner-Nauroth model (2005) as implemented by Gode and Mohanram (2003); (3) R_{CT} based on the Claus and Thomas

[1] Managers in some firms own more than 4 percent but less than 5 percent stock to avoid being included in the definition of blockholders. Such managers are also included as blockholders for this study.

(2001) model; and (4) R_{PEG} based on the Easton (2004) model. There is no consensus in the literature as to which model performs the best in measuring implied cost of equity. To mitigate the measurement error associated with one particular model, a fifth proxy (R_{AVG}) of the cost of equity capital is calculated as an arithmetic average of above four proxies. All four models are variants of the dividend-discount model or EBO residual income model. The dividend discount model can be written as (Botosan and Plumlee 2005):

$$P_0 = \sum_{t=1}^{\infty}(1+r)^{-t} E_0\,(dps_t) \qquad (5.1)$$

where:

P_0 = price at time t = 0 (at the beginning of the year 2006);

r = estimated cost of equity capital;

$E_0(.)$ = the expectations operator; and

dps_t = dividends per share.

Using the clean surplus accounting, equation (5.1) can be converted to the residual income model:

$$P_0 = B_0 + \sum_{t=1}^{\infty}\frac{E_t[NI_t - rB_{t-1}]}{(1+r)^t} \qquad (5.2)$$

where,

$E_t[.]$ = the expectations operator at time t;

NI_t = net income for the period t;

B_t = book value at time t;

Other variables are defined as before.

Following four models have been used to estimate five proxies of implied cost of equity capital.

Gebhardt, Lee, and Swaminathan (2001) Model, R_{GLS}

This model developed by Gebhardt *et al.* (2001), GLS hereafter, uses a 12-year forecast horizon. The resulting model is shown below in equation (6).

$$P_0 = b_0 + \sum_{t=1}^{11}(1 + R_{GLS})^{-t}\big((FROE_t - R_{GLS})b_{t-1}\big) + (R_{GLS}(1 + R_{GLS})^{11})^{-1}((FROE_{12} - R_{GLS})b_{11}) \quad (6)$$

where,

$FROE_t$ = forecasted return on equity for period t equals $\frac{FEPS_t}{b_{t-1}}$ for periods t = 1,2, and 3. $FEPS_t$ is the earnings per share forecast for year t. $FEPS_1$ and $FEPS_2$ are *IBES* analysts' one-year-ahead and two-year-ahead earnings per share forecast. $FEPS_3$ equals $FEPS_2$ times one plus *IBES* analysts' consensus long-term growth forecast. When the long-term growth forecast is not available in *IBES* then long-term growth forecast is calculated as ($FEPS_2$ – $FEPS_1$) – 1. $FROE_4$ to $FROE_{12}$ are calculated using linear interpolation to industry median *ROE* using the procedure in GLS.

b_0 = book value per share in year t = 0 calculated as book value at the beginning of the year divided by number of shares outstanding at the beginning of the year;

b_t = year t book value divided by number of shares outstanding at the beginning of the year t. Using clean surplus accounting, $B_t = B_{t-1} + FEPS_t + FDPS_t$. *FEPS* is forecasted earnings per share from the *IBES* database. *FDPS* is forecasted dividend per share and equals *FEPS* times year t

dividend payout ratio. For periods t = 4 to 12, *FEPS* is calculated using *FROE* in the formula $FROE_t = (FEPS_t / b_{t-1})$

R_{GLS} = estimated cost of equity capital; and

P_0 = as defined earlier.

Following GLS (2001), this estimate assumes that each firm's *ROE* reverts to industry median *ROE* in a linear fashion over periods 4 through 12. Firms are divided into 48 industries based on the Fama and French (1997) classification. Industry median *ROE* equals ten-year median *ROE* for all firms (excluding the firms with negative income) within the same industry. *FROE* for periods 4 through 12 is calculated using this industry median *ROE*. *FROE* value thus obtained can be used to calculate *FEPS* for periods 4 through 12 as explained above.

Gode and Mohanram (2003) implementation of Ohlson and Juettner-Nauroth Model, R_{GM}

Gode and Mohanram (2003), GM hereafter, estimate implied cost of equity capital using the following implementation of Ohlson-Juettner model (Equation 7 below).

$$R_{GM} = A + \sqrt{A^2 + (\frac{FEPS_{t+1}}{P_t})(g_2 - (r_f - 0.03))} \quad (7)$$

where,

$$A = \frac{1}{2}\{(r_f - 0.03) + \frac{DPS_{t+1}}{P_t}\};$$

g_2 = short-term growth rate that equals *IBES* long-term growth forecast where available and $\{(FEPS_{t+1}/ FEPS_t) - 1\}$when forecast is not available;

DPS_{t+1} = Forecasted dividend per share for year $t+1$, calculated as $FEPS_{t+1}$ times year t dividend payout ratio;

$FEPS_{t+1}$ = *IBES* analyst one-year ahead earnings per share forecast;

r_f = the risk-free rate, equal to the yield on ten year US treasury bond;

R_{GM} = implied cost of equity capital as per GM model.

A major assumption of this model is that short-term growth rate (g_2) decays to the risk-free rate minus three percent (r_f – 0.03) perpetually.

Claus and Thomas (2001) model

Claus and Thomas (2001) model, hereafter CT, is similar to the GLS model except that it assumes that the abnormal earnings after five years grow at a long term growth rate of (1 + g_{lt}) in perpetuity. Mathematically, the model can be stated as in equation (8) below.

$$P_0 = b_0 + \sum_{i=1}^{5} \frac{[FEPS_i - R_{CT}(b_{i-1})]}{(1 + R_{CT})^i} + \frac{[FEPS_5 - R_{CT}(b_4)](1 + g_{lt})}{(R_{CT} - g_{lt})(1 + R_{CT})^5} \qquad (8)$$

where,

R_{CT} = estimated cost of equity capital as per CT model;

g_{lt} = long-term abnormal earnings growth rate beyond year five in future, equal to ten-year US treasury bonds yield minus three percent.

FEPS, *b*, and *P* are as defined earlier.

[$FEPS_i - R_{CT}(b_{i-1})$] represents the abnormal earnings for period *i*.

A major assumption for this model is that after year five in future, abnormal earnings grow at a constant rate equal to the risk-free rate minus three percent (r_f – 0.03).

Easton (2004) modified PEG ratio method

Under this method, the implied cost of equity capital is estimated using Easton (2004) modified PEG ratio model (Equation 9 below).

$$r_{PEG} = \sqrt{\frac{FEPS_2 - FEPS_1 + (r_{peg} * DPS_1)}{P_0}} \quad (9)$$

where,

P_0 = as defined earlier;

R_{PEG} = estimated cost of equity capital;

DPS_1 = dividends per share for year 1 as defined earlier; and

$FEPS_t$ = forecasted earnings per share in year t as defined earlier.

Estimating this model requires $FEPS_2$ to be greater than $FEPS_1$.

4.2 Model Specifications

Hypotheses 1 tests the effect of the cost of equity capital and the level of segment disclosures given the probability of information-based trading. Specifically, Hypothesis 1 states that when the probability of information-based trading is high, the negative association between between the cost of equity capital and the level of disclosures will be stronger. The probability of informed trading (*PIN*) is measured using the EKO model. The following three models are used to test hypothesis 1. Model 1.1 uses a subjective measure of segment disclosures (*SDSCORE*) based on the segment disclosures provided by the firm under SFAS 131 disclosures in 10-K filings. Model 1.2 uses an objective measure of segment disclosures (*DISAGG*) based on the disaggregation of segment disclosures of the firm as in Berger and Hann (2003). And Model 1.3 uses a measure

(*WORDS*) based on the number of words used in segment disclosures provided by the firm under SFAS 131 disclosures. All these variables have been discussed in detail in earlier sections.

$$R_{i(t+1)} = \beta_0 + \beta_1 LPIN_{it} + \beta_2 SDSCORE_{it} + \sum_{n=3}^{11} \beta_n \, Control\_Variables_i + \beta_{12}(LPIN_{it} * SDSCORE_{it}) + \varepsilon_{it} \quad \text{(Model 1.1)}$$

$$R_{i(t+1)} = \beta_0 + \beta_1 LPIN_{it} + \beta_2 DISAGG_{it} + \sum_{n=3}^{11} \beta_n \, Control\_Variables_{it} + \beta_{12}(LPIN_{it} * DISAGG_{it}) + \varepsilon_{it} \quad \text{(Model 1.2)}$$

$$R_{i(t+1)} = \beta_0 + \beta_1 LPIN_{it} + \beta_2 WORDS_{it} + \sum_{n=3}^{11} \beta_n \, Control\_Variables_{it} + \beta_{12}(LPIN_{it} * WORDS_{it}) + \varepsilon_{it} \quad \text{(Model 1.3)}$$

where,

R_i	=	cost of equity capital of firm *i* for the year *t*,
$Control\_Variables_i$	=	variables other than the level of segment disclosures which may affect cost of equity (discussed in detail in next section) of firm *i*,
$LPIN_i$	=	Variable indicating the natural log of the variable *PIN* as calculated using EKO model for firm *i*, and
$SDSCORE_i$	=	Rank corresponding to the level of segment disclosures based on variable *SDINDEX* for firm *i*,

$DISAGG_i$ = Measure of the level of segment disclosures based on segment information disaggregation for firm *i* as discussed earlier,

$WORDS_i$ = Natural log of number of words (*WORDS*) used under SFAS # 131 disclosures.

Hypothesis 2 tests the association between the cost of equity capital and the level of segment disclosures in the presence of managerial blockholdings. As discussed earlier, managerial blockholdings (*NOBLOCK*) is an indicator variable equal to 1 when managerial blockholdings are present and equal to 0 in the absence of managerial blockholdings. Model (2) is used to test Hypothesis 2.

$$R_{i(t+1)} = \beta_0 + \beta_1 SDSCORE_{it} + \beta_2 NOBLOCK_{it} + \sum_{n=3}^{11} \beta_n Control\_Variables_{it} + \beta_{12}(SDSCORE_{it} * NOBLOCK_{it}) + \varepsilon_{it} \quad \text{(Model 2)}$$

where,

$NOBLOCK_i$ = indicator variable with value equal to 1 if managerial blockholding(s) is present and equal to 0 if there is no managerial blockholding for the sample firm.

All other variables are same as defined earlier.

Hypothesis 3 tests hypotheses 1 and 2 together and tests the significance of the three-way interaction between the level of segment disclosures, the probability of informed trade, and the managerial blockholding. In other words, hypothesis 3 tests if the probability of informed trade and managerial blockholdings jointly affect the negative association between the cost of equity capital and the level of segment disclosures. This is tested using the following two models. Model (3.1) only tests the significance of the three-way interaction between the three variables of interest while ignoring the two-way interactions. Model (3.2) is an all encompassing model which tests the significance of two-way as well as three-way interactions together. If the three-way interaction is not significant in Model (3.2), then Model (3.3) excludes the three-way interaction from all encompassing model. Model (3.3) tests the two-way interactions only between *SDSCORE* and *LPIN*, and between *SDSCORE* and *NOBLOCK*.

$$R_{i(t+1)} = \beta_{0it} + \beta_1 SDSCORE_{it} + \beta_2 LPIN_{it} + \beta_3 NOBLOCK_{it} + \sum_{n=4}^{12} \beta_n \, Control\_Variables_{it} + \beta_{13}(SDSCORE_{it} * LPIN_{it} * NOBLOCK_{it}) + \varepsilon_{it} \quad \text{(Model 3.1)}$$

$$R_{i(t+1)} = \beta_{0it} + \beta_1 SDSCORE_{it} + \beta_2 LPIN_{it} + \beta_3 NOBLOCK_{it} + \sum_{n=4}^{12} \beta_n \, Control\_Variables_{it} + \beta_{13}(SDSCORE_{it} * LPIN_{it}) + \beta_{14}(SDSCORE_{it} * MGR_{it}) + \beta_{15}(SDSCORE_{it} * LPIN_{it} * NOBLOCK_{it}) + \varepsilon_{it} \quad \text{(Model 3.2)}$$

$$R_{i(t+1)} = \beta_{0it} + \beta_1 SDSCORE_{it} + \beta_2 LPIN_{it} + \beta_3 NOBLOCK_{it} + \sum_{n=4}^{12} \beta_n \, Control\_Variables_{it} + \beta_{13}(SDSCORE_{it} * LPIN_{it}) + \beta_{14}(SDSCORE_{it} * NOBLOCK_{it}) + \varepsilon_{it} \quad \text{(Model 3.3)}$$

All variables are the same as defined earlier.

4.3 Control variables

Based on prior literature, this study incorporates nine control variables that may affect the association between the cost of equity capital and the disclosure. These variables are – firm size, returns on assets, market beta, market-to-book value of equity ratio, sales growth, firm leverage, analyst following, industry, and stock return volatility.

4.3.1 Firm size

The proxy for firm size (*SIZE*) is defined as the natural log of market value of equity (Compustat item # 199 * # 25) at the end of fiscal year 2005. It captures the differences in firm value between large and small firms. Prior research has documented a lower cost of equity capital for larger firms (e.g. Botosan, 1997; Gebhardt *et al.*, 2001; Botosan and Plumlee, 2002; Cheng *et al.*, 2006). Therefore, a negative association between the cost of equity capital and *SIZE* is expected.

4.3.2 Return on assets

Return on assets (*ROA*) is used as a proxy for firm performance. *ROA* is defined as the ratio of income before extraordinary items (data item # 18) scaled by total assets (data item # 6) of the firm at the end of fiscal year 2005. Firms with better performance tend to have lower cost of equity capital. Therefore, *ROA* is expected to have a negative association with the cost of equity capital.

4.3.3 Market beta

Market beta (*BETA*) proxies for the market risk and is calculated from a market model using daily stock returns over the 12 month period during 2005. Prior research has documented a positive association between the cost of equity capital and market beta (e.g. Botosan, 1997; Gebhardt *et al.*, 2001; Cheng *et al.*, 2006). Firms with increased market risk tend to have higher cost of equity capital. Therefore, *BETA* is expected to have a positive coefficient.

4.3.4 Book-to-market ratio

Book-to-market ratio (*LBM*) controls for the growth opportunities of the firm. *LBM* is measured as the natural log of the ratio of book value of equity (# 60) to market value of equity (# 199 * # 25) at the end of fiscal year 2005. A high *LBM* corresponds to fewer growth opportunities. Prior research reports that firms with fewer growth opportunities have higher cost of equity capital (e.g. Fama and French, 1995; Gebhardt *et al.*, 2001; Cheng *et al.*, 2006). Hence, *LBM* is expected to have a positive coefficient.

4.3.5 Sales growth

Sales growth (*SG*) is used as a second proxy of firm growth. *SG* is measured as the mean of growth in sales (#12) during last two fiscal years (2004 and 2005). Firms with higher *SG* are expected to have better growth opportunities and hence, lower cost of equity capital. On the other hand Cheng et al. (2006) predict a positive association between firm's growth variable and the cost of equity capital. Therefore, no prediction is made regarding the association of *SG* with implied cost of equity capital.

4.3.6 Firm leverage

Firm leverage (*LEV*) is measured as the ratio of debt (# 9 + # 34) to market value of equity at the end of the fiscal year 2005. Cost of equity capital increases with increase in leverage. Higher debt in capital structure (higher leverage) of the firm indicates greater credit risk of the firm thereby, increasing the cost of capital. Prior research has found a positive association between the cost of equity and leverage (e.g. Botosan, 1997; Gebhardt *et al.*, 2001; Botosan and Plumlee, 2002). Therefore, *LEV* is expected to have a positive coefficient.

4.3.7 Analyst following

Analyst following (*FOLLOW*) proxies for the information environment of the firm. *FOLLOW* is an indicator variable with value equal to 1 when number of analysts following the sample firm is greater than the median number of analysts following for all sample firms during the year 2005 as per IBES analysts' database. Firm's information environment may affect its disclosure practices and the firm value. Firms with better information environment are expected to have a lower cost of equity capital because of reduced information asymmetry. Therefore, *FOLLOW* is expected to bear a negative coefficient.

4.3.8 Industry

INDUSTRY variable is used in analysis to control for the industry effects on the cost of equity capital. Firms in different industries may bear different industry-specific risks. Firms in low risk industries bear higher valuation than high risk industries. *INDUSTRY* is measured as the three-digit SIC code of the firm.

4.3.9 Volatility of stock returns

Volatility of stock returns may affect the cost of equity (Bushee and Noe, 2000). Higher volatility of stock returns corresponds to higher risk and thereby, increases the cost of equity capital. Therefore, *STDRET* is expected to have a positive coefficient. Volatility of stock returns (*STDRET*) is measured as the natural log of mean of the annual standard deviation of daily stock returns over a period of five years using CRSP database.

$$STDRET = log(mean\_STDRET)$$

where,

$$mean\_STDRET = \sum_{i=1}^{5}(standard\ deviation\ of\ returns\ for\ the\ year\ i)$$

The next chapter describes the sample and the data used for analyses and presents the results of analyses.

CHAPTER V

DATA AND RESEARCH FINDINGS

5.1 Sample and Data

The sample consists of December fiscal year end firms listed in the US during the year 2005 that have all the required accounting and returns data needed for estimation of models in this study. Therefore, the initial sample includes firms listed on Compustat's annual database, the Center for Research in Security Prices (CRSP) daily returns file, IBES detail database, and industry segment data available on Compustat's industry segment file. Following Botosan (1997), firms in manufacturing industries with SIC in 3312-3399, 3411-3499, 3511-3599, and 3610-3649 are included. This results in a sample consisting of 101 firms for the year 2005. As a result of missing data for estimating the implied cost of equity capital, the final sample consists of 84 firms. Implied cost of equity capital is calculated using 5 different measures as discussed in Chapter IV. To control the endogeneity in the analysis, there is one period lag between dependent and independent variables. Thus, implied cost of equity is estimated for the year 2006 while all the independent variables are calculated based on the data for the fiscal year 2005. The sample period is chosen to conduct the study during post-SFAS-131, post RegFD, and post-SOX period. Data for the study are obtained from Compustat Annual, Compustat Industrial Segment, CRSP, IBES, and Edgaronline databases.

Table 1 provides the distribution of all the variables used in analysis. Comparing R_{GLS}, R_{GM}, R_{CT}, and R_{PEG}, reveals that R_{GM} (mean value approximately 11%) and R_{PEG} (mean value approximately 12%) estimate the implied cost of equity capital higher than R_{GLS} (mean value approximately 8%) and R_{CT} (mean value approximately 9%). The mean value of implied cost of equity based on arithmetic mean of the four measures, R_{AVG}, is approximately 10%. An average firm has a *SDSCORE* of 0.83. Mean *DISAGG* value is 1.38 and mean value of *WORDS* is 6.26. An average firm has a 14.3% probability of informed trading based on the EKO model. This corresponds to a mean value of -2.048 for the variable *LPIN*. An average firm earns 7.5% return on its assets and has a sales growth approximately equal to 23%. Market risk of an average firm is 1.43 as measured by *BETA*. An average firm has a book to market value ratio (*LBM*)of -1.01. An average firm has approximately 23% debt to market value of equity and approximately 8 analysts following the firm. Median number of analysts following a firm is 6. Mean stock volatility (*STDRET*) over a five year period is -3.64 for an average firm.

---------- Insert Table 1 from Page 86 right about here ----------

Table 2 below provides Pearson and Spearman rank correlation coefficients between five different measures of implied cost of equity capital. Pearson correlation method uses raw data while Spearman correlation (nonparametric) method uses ranks. All the correlations are significant at 1% level. All four alternative measures of implied cost of equity capital are strongly (more than 66%) and significantly (p-value less than 0.01) correlated to the average measure (R_{AVG}). Correlation of R_{GLS} with R_{GM} and R_{PEG} is less than 50 percent while all other correlations are stronger and greater than 50 percent. Variable R_{AVG} is used for further analyses as an estimate of implied cost of equity capital.

Comparative results using other alternatives are provided and discussed wherever necessary but the main results of the study are concluded based on R_{AVG} as a measure of implied cost of equity capital.

---------- Insert Table 2 from Page 88 right about here ----------

Table 3 shows correlation coefficients (both Pearson and Spearman) between different explanatory variables used in the analyses in this study. The results are discussed based on Pearson correlation coefficients, though the Spearman correlation results are also consistent. There is a large and significant correlation of -0.48 between size of the firm (*SIZE*) and the probability of informed trade (*LPIN*) confirming the results from prior research that larger firms have lower probability of information based trading (Easley *et al.*, 2002). *LPIN* is positively and significantly correlated (0.27) with *LBM* indicating that firms with lower growth opportunities tend to have a higher probability of informed trading. There is significant negative correlation (-0.31) between *LPIN* and *FOLLOW* confirming that firms with better information environment have a lower probability of informed trading. There is a significant positive correlation (0.29) between *LPIN* and *NOBLOCK* indicating that presence of higher managerial blockholdings results in increased probability of informed trade. It is noteworthy that on one hand, managerial blockholdings increase the information asymmetry among the shareholders (current as well as future) by increasing the probability of information-based trading while on the other hand, it reduces the information asymmetry between managers (*agents*) and shareholders (*owners*) by aligning their interests. There is a significant negative correlation between *SIZE* and *LBM* (-0.21) confirming that smaller (larger) firms have fewer (higher) growth opportunities. There is a significantly large positive correlation (0.64) between *SIZE* and *FOLLOW* confirming the results from prior research that larger firms tend to have a larger analyst follwing. A significantly positive correlation (0.38) between *SIZE* and *SDSCORE* indicates that larger firms tend to have a higher level of segment disclosures. Smaller firms tend to have a higher volatility of stock returns as indicated by a significantly negative correlation (-0.46) between *SIZE* and *STDRET*. Sample firms with higher returns on assets (*ROA*) are significantly and negatively correlated to *LBM* (-0.31) and *LEV* (-0.55) indicating that firms with better returns have higher valuation in a market and have lower debt in their capital structure. There is a significantly large positive correlation (0.32) between *BETA* and *STDRET* indicating that riskier firms have a higher volatility of stock returns. There is a significant negative correlation (-0.21) between *STDRET* and *FOLLOW* indicating that firms with better analyst following have lesser volatility of stock returns and tend to be less risky. A significant negative correlation (-0.30) between *SDSCORE* and *STDRET* indicates that firms with a higher level of segment disclosures have lesser volatility of stock returns and tend be less risky. A significant negative correlation (0.38) between *NOBLOCK* and *SIZE* indicates that larger firms tend to have low (or no) managerial blockholdings. Firms with managerial blockholdings tend to attract lesser number of analysts as indicated by a significant negative correlation between *NOBLOCK* and *FOLLOW* (-0.32).

---------- Insert Table 3 from Page 89 right about here ----------

Table 4 shows correlation coefficients for all five alternatives of implied cost of equity capital with all the explanatory variables used in the study. Note that the correlation coefficient between the implied cost of equity capital and the level of segment disclosures, as measured by *SDSCORE*, is negative (except for R_{GLS}). The results are consistent for *DISAGG* and *WORDS* as a measure of the level of segment disclosures. The correlation coefficients are significant only for R_{PEG} as the measure of implied cost of equity capital. There is a strong positive correlation (greater than 25%) of *LPIN* with R_{AVG}, R_{CT}, and R_{PEG} indicating that firms with a higher probability of informed trade have higher implied cost of equity capital. Though insignificantly, R_{GLS} and R_{GM} are also positively correlated to *LPIN*. There is significant and strong negative correlation of *SIZE* with R_{AVG}, R_{CT}, and R_{PEG}. *SIZE* is also negatively (insignificantly) correlated with R_{GLS} and R_{GM}. This indicates that larger firms have lower cost of equity capital. Similarly, there is a strong negative correlation between implied cost of equity capital and return on assets. There is a positive correlation (significant for R_{GLS} and R_{CT}) between implied cost of equity capital and *LBM* confirming the results from prior research that firms with fewer growth opportunities have higher cost of equity capital. Firms with higher amount of debt in their capital structure have higher cost of equity capital as indicated by a strong positive correlation between the cost of equity capital alternatives (R_{AVG}, R_{GM}, R_{CT}, and R_{PEG}) and *LEV*. Similarly riskier firms with higher volatility of stock returns have higher cost of equity capital as indicated by a strong positive correlation between the cost of equity capital alternatives (R_{AVG}, R_{GM}, R_{CT}, and R_{PEG}) and *STDRET*.

---------- Insert Table 4 from Page 90 right about here ----------

Correlation between three different measures of the level of segment disclosures is discussed in detail in Appendix A. Variable *SDSCORE* is used in further analyses as a proxy for the level of segment disclosures. Comparative results using other alternative proxies are also provided and discussed wherever necessary but main results of the study are concluded based on *SDSCORE* as a measure of the level of segment disclosures.

5.2 Analyses and results

In this section, the results of cross-sectional analyses are reported that investigate how the level of segment disclosure relate to the cost of equity capital in the presence of information asymmetry among different type of shareholders as well as information asymmetry between managers and shareholders. This section is divided into three subsections. The first section examines the role of information asymmetry among different types of shareholders (as measured by probability of information-based trading) on the relation between the cost of equity capital and the level of segment disclosures addressing H_1. Section two discusses the role of information asymmetry between managers and shareholders on the relation between the cost of equity capital and the level of segment disclosures addressing H_2. Finally, I examine the role of the two information asymmetries together on the relation between the cost of equity capital and the level of segment disclosures addressing H_3.

5.2.1 Effect of the probability of informed trade on the association between the cost of equity capital and the level of segment disclosures

Models 1.1, 1.2, and 1.3 examine the effect of probability of informed trading on the association between the cost of equity capital and the level of segment disclosures. The three models use three different proxies of the level of segment disclosures. Model 1.1 uses *SDSCORE*, Model 1.2 uses *DISAGG*, and Model 1.3 uses *WORDS* as a measure of the level of segment disclosures. Tables 5, 6, and 7 present the results of Models 1.1, 1.2, and 1.3 respectively. The main results of this study are based on Model 1.1 which uses a hand-developed measure of the level of segment disclosures (*SDSCORE*) based the hand-collected SFAS # 131 data of sample firms. Results for Models 1.2 and 1.3 are presented for comparison purposes.

Panel A of Table 5 presents the results for Model 1.1 using R_{AVG} as a measure of the implied cost of equity capital and *SDSCORE* as a proxy of the level of segment disclosures. Column 1, 2, and 3 presents the results for the model excluding the interaction effect of *SDSCORE* and *LPIN*. Column 1 includes *SDSCORE* main effect only, column 2 includes *LPIN* main effect only, and column 3 includes main effects of *SDSCORE* and *LPIN* both. These results show that neither main effect is significant although the main effect of *LPIN* is nearly significant. Both main effects have the expected sign. *SDSCORE* is negatively related to R_{AVG} confirming the theoretical prediction that higher level of segment disclosures reduces cost of equity capital. Similarly, *LPIN* is positively related to R_{AVG} indicating that cost of equity capital is increasing in information asymmetry. The Wald test of equality of the main effects of *SDSCORE* and *LPIN* in column 3 shows that the two main effects are not very different. This result suggests that the positive main effect of *LPIN* (0.012) is offset by the negative main effect of *SDSCORE* (-0.004) when the interaction effect is not included in the model. Column 4 provides results for the model including main effects of *SDSCORE* and *LPIN* along with the interaction effect of (*SDSCORE * LPIN*). Results show that the two main effects (*SDSCORE* and *LPIN*) as well as the interaction effect (*SDSCORE * LPIN*) are all significant and have the expected association with the cost of equity capital. The coefficient on *SDSCORE* is -0.086 indicating that the cost of equity capital is decreasing in the level of segment disclosures. Similarly, the coefficient on *LPIN* is 0.049 confirming the positive association between the cost of equity capital and the probability of informed trade. The interaction effect of *SDSCORE* and *LPIN* is also significant and has a coefficient of -0.041 indicating that the negative effect of the level of segment disclosures (*SDSCORE*) on the cost of equity capital is higher when the probability of informed trade (*LPIN*) is high. This is an interesting result which helps us understand the previously evidenced mixed association between the cost of equity capital and disclosures. This result is in agreement with prior research (e.g. Botosan 1997) which predicts a stronger negative association between the cost of equity capital and disclosures for the firms with weaker information environment. However, this result is based on the private information environment of the firm as against the overall information environment. Results of the Wald test in column 4 indicate that there is a significant difference between the two main effects of *SDSCORE* and *LPIN*. Negative effect of *SDSCORE* is stronger than the positive effect of *LPIN* on the cost of equity capital. The Wald statistic testing the significance of the summed coefficients of main effect of *SDSCORE* and the interaction effect of *SDSCORE* and *LPIN* ($\beta_{SDSCORE} + \beta_{SDSCORE * LPIN}$) indicates that the sum is reliably negative and nearly significant (p-value = 0.137). This confirms that the negative association of the cost of equity capital and the level of segment disclosures (*SDSCORE*) is increasing in the probability of informed trade (*LPIN*). The Wald statistic testing the significance of the summed coefficients of the main effect of *LPIN* and the interaction effect of *SDSCORE* and *LPIN* ($\beta_{LPIN} + \beta_{SDSCORE * LPIN}$) indicates that the sum is reliably negative and significant (p-value = 0.041). This confirms that the positive relation of the cost of equity capital with the probability of informed trade is decreasing in the level of segment disclosures (*SDSCORE*).

The other explanatory variables have the expected signs except the *SIZE*. The coefficients on *SIZE* are very small in magnitude and highly insignificant. *LEV* is consistently positive and significant in all the four columns indicating that firms with higher debt portion have a higher cost of equity capital as a result of increased credit risk. *LBM* and *BETA* are consistently positive and significant (nearly significant in column 1) indicating that the lower valued firms and the firms with increased market risk have a higher cost of equity capital.

Panel B of Table 5 shows the results for Model 1.1 using the other four alternatives of the implied cost of equity capital (R_{GLS}, R_{GM}, R_{CT}, and R_{PEG}). Results are consistent for the main effects and the interaction effects as predicted except the significance levels. Results using R_{GM} as a proxy for implied cost of equity capital show significant main effects of *SDSCORE* (coeff. = -0.170, p-value = 0.008) and *LPIN* (coeff. = 0.085, p-value = 0.005), and a significant interaction effect of *SDSCORE* and *LPIN* (coeff. = -0.075, p-value = 0.015). The Wald test statistics for the two summed coefficients were also significant using R_{GM} as a proxy of the implied cost of equity capital confirming that negative association between the cost of equity capital and the level of segment disclosures is increasing in the probability of informed trade and the positive association between the cost of equity capital and the probability of informed trade is decreasing in the level of segment disclosures.

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Table 6 shows the regression results for Model 1.2 using *DISAGG* as a proxy of the level of segment disclosures and R_{AVG} as a proxy of the implied cost of equity capital. Results in columns 1, 2, and 3 include only the main effects of *DISAGG* and *LPIN* and in column 4 include the main effects as well as the interaction effects of *DISAGG* and *LPIN*. The results are similar to the results obtained for Model 1.1. Coefficients on *DISAGG* are negative as predicted in columns 1, 3, and 4 but not significant. Coefficients on *LPIN* are nearly significant in columns 2 and 3 but not in column 4. The coefficient on the interaction effect of *DISAGG* and *LPIN* in column 4 is negative but not significant. None of the Wald statistics are significant. Thus, the results using *DISAGG* as a proxy of the level of segment disclosures have the coefficients with the expected signs on the variables of interest but none of the coefficients are significant in the model. It can be concluded that results are consistent with Model 1.1 but not significant. The reason for insignificant results could be that *DISAGG* may not be a good proxy for the level of segment disclosures. *DISAGG* might only be measuring the level of vertical integration of the firm rather than the level of segment disclosures.

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Table 7 provides the regression results for Model 1.3 using *WORDS* as a proxy of the level of segment disclosures and R_{AVG} as the proxy of the implied cost of equity capital. Columns 1, 2, and 3 only include the main effects of *WORDS* and *LPIN* while column 4 includes the main effects as well as the interaction effect of *WORDS* and *LPIN*. The main effect of *WORDS* is small and insignificant when interaction is not included in the model while the main effect of *LPIN* is nearly significant in the models excluding the interaction effect. Results in column 4 show a large significant effect of *WORDS* (coeff. = -0.055, p-value = 0.003) and a significant effect of *LPIN* (coeff. = 0.188, p-value = 0.002). The interaction effect of *WORDS* and *LPIN* is also significant (coeff. = -0.027, p-value = 0.003) indicating that the negative association between the cost of equity capital and the level of segment disclosures is increasing in the probability of informed trade. The Wald test statistics in column 4 are all significant. This indicates that the negative effect of *WORDS* is significantly different from the positive effect of *LPIN* on the cost of equity capital. Also, the negative association between the cost of equity capital and the level of segment disclosures is increasing in probability of informed trade. Thus, the results using *WORDS* as a proxy of the level of segment disclosures are consistent with the results of Model 1.1 using *SDSCORE* as a proxy of the level of segment disclosures.

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5.2.2 Effect of managerial blockholdings on the association between the cost of equity capital and the level of segment disclosures

Table 8 provides the regression results for Model 2 examining the effect of managerial blockholdings on the association between the cost of equity capital and the level of segment disclosures. Absence of managerial blockholdings is used as a proxy for the information asymmetry between the managers and the shareholders. It is expected that the negative association between the cost of capital and the level of segment disclosures will be more significant for the firms with no managerial blockholdings (higher Type II information asymmetry). Such firms are expected to use disclosures as a remedial measure to reduce the moral hazard problem and information asymmetry that exists between managers of the firm and the investors. In other words, it is expected that the negative association between the cost of equity capital and the level of segment disclosures is increasing in the absence of managerial blockholdings.

Panel A of Table 8 shows the regression results for Model 2 using R_{AVG} as a proxy for the implied cost of equity capital. Columns 1 and 2 include only the main effects of *SDSCORE* and *NOBLOCK* respectively. There is negative but insignificant effect of *SDSCORE* on the cost of equity capital in Column 1. The main effect of *NOBLOCK* in Column 2 is positive and significant as expected indicating that the firms with no managerial blockholdings have higher cost of equity capital because of higher Type II information asymmetry. Column 3 includes the main effects of both *SDSCORE* and *NOBLOCK* but not the interaction effect. Results in Column 3 show a significant positive effect of the absence of managerial blockholdings on the cost of equity capital but the negative effect of *SDSCORE* is not significant. Column 4 includes the interaction effect of *SDSCORE* and *NOBLOCK* along with the main effects. Results in Column 4 show a negative but insignificant association of the cost of equity capital with the level of segment disclosures. Absence of managerial blockholdings is positively (nearly significant) associated with the cost of equity capital. The coefficient on the interaction of *SDSCORE* and *NOBLOCK* is positive though insignificant. The Wald statistics are all insignificant. The Wald statistic for the summed coefficients ($\beta_{NOBLOCK} + \beta_{SDSCORE * NOBLOCK}$) is negative and nearly significant (p-value = 0.116) indicating that the positive association between the cost of equity capital and the absence of managerial blockholdings is decreasing in the level of segment disclosures indicating that higher level of segment disclosures help reduce the cost of equity capital for the firms with no managerial blockholdings as against the firms with managerial blockholdings. Comparing the R^2 in columns 3 and 4 indicates that there is no improvement in the model with the inclusion of the interaction term. Thus, Model 2 works as well without the interaction term as with the inclusion of the interaction term.

Panel B of Table 8 reports the results for Model 2 using alternative proxies of the cost of equity capital. All the results are similar to the results obtained using R_{AVG} except the one using R_{GM} as the proxy for the cost of equity capital. Model using R_{GM} has a significant negative coefficient on the main effect of *SDSCORE*. Overall, the interaction effect of *SDSCORE* and *NOBLOCK* is not significant.

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5.2.3 Joint effect of probability of informed trade and managerial blockholding(s) on the association between the cost of equity capital and the level of segment disclosures

Next, the association between the cost of equity capital and the level of segment disclosures is studied in the joint presence of probability of informed trade and managerial blockholdings. It is expected that the firms with higher probability of informed trade (proxy for Type I information asymmetry) and no blockholdings (proxy for Type II information asymmetry) will have a stronger negative association between the cost of equity capital and the level of segment disclosures. Results of these analyses are reported in Table 9.

Panel A of Table 9 report results using R_{AVG} as a measure of the implied cost of equity capital. Column 1 only includes the main effects of *SDSCORE, LPIN,* and *NOBLOCK* and the three-way interaction between the three. No two-way interactions are included here. Results show an insignificant three-way interaction of *SDSCORE, LPIN*, and *NOBLOCK*. All the three main effects have expected signs with only the effect of *LPIN* being significant at 10% level.

Column 2 in Panel A of Table 9 shows the regression results for an all encompassing model including the three main effects (*SDSCORE*, *LPIN*, and *NOBLOCK*), two two-way interactions (*SDSCORE * LPIN*, and *SDSCORE * NOBLOCK*), and one three-way interaction (*SDSCORE * LPIN * NOBLOCK*). All three main effects have the expected signs and are significant at 10% level with *SDSCORE* being of larger magnitude (coeff. = -0.083, p-value = 0.01). The two two-way interactions are also significant at 10% level with expected signs and are of approximately similar magnitude. These results confirm hypotheses 1 and 2. The negative association between the cost of equity capital and the level of segment disclosures is increasing in the probability of informed trade while the negative association between the cost of equity capital and the level of segment disclosures is increasing in the absence of managerial blockholdings. The three-way interaction is not significant (p-value = 0.58) but has the expected negative. Insignificant three-way interaction indicates that the two types of information asymmetries do not affect the negative association between the cost of equity capital and the level of segment disclosures jointly.

Results in Column 2 show an insignificant three-way interaction. Therefore, the three-way interaction between *SDSCORE*, *LPIN*, and *NOBLOCK* is dropped out in Model 3.3. Column 3 in Panel A of Table 9 shows the regression results for Model 3.3. Results are similar to the results presented in Column 2 for the encompassing Model 3.2. All three main effects of *SDSCORE*, *LPIN*, and *NOBLOCK* are significant at the 1% level and bear the expected signs. Coefficient on *SDSCORE* (coeff. = -0.146, p-value = 0.002) has the largest magnitude among the three. Interaction between *SDSCORE* and *LPIN* is significant at the 1% level and bears the expected negative sign indicating that the negative association between the implied cost of equity capital and the level of segment disclosure is increasing in probability of informed trade. The coefficient on the interaction between *SDSCORE* and *NOBLOCK* is also significant at the 5% level and bears the expected negative sign indicating that the negative association between the implied cost of equity capital and the level of segment disclosure is increasing in the absence of managerial blockholdings. A comparison of R^2 in column 2 and 3 indicates that the model without the three-way interaction (column 3) works as well as the model including the three-way interaction (column 2). The R^2 for both models is approximately 40%. As a result, there is no evidence in favor of hypothesis 3. Thus, it can be concluded that the two information asymmetries affect the negative association between the cost of equity capital and the level of segment disclosures independently rather than jointly.

Panel B of Table 9 shows the results for Model 3.3 (excluding the three-way interaction) using the alternative proxies of the implied cost of equity capital. The results are consistent with the results in Panel A. The model using R_{GM} as the proxy of the cost of equity capital provides the strongest results with a R^2 of approximately 40%.

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A closer examination of the magnitude of the coefficients reveals that the increasing effect of the probability of informed trade dominates the effect of the absence of managerial blockholdings in both, Models 3.2 and 3.3. The Wald test statistics (not shown in Table) in Model 3.3 for the equality of the two two-way interactions ($\beta_{SDSCORE\ *}$

$_{LPIN} = \beta_{SDSCORE * NOBLOCK}$) is significant (p-value = 0.007) indicating that the interaction *SDSCORE * LPIN* (coeff. = -0.056) dominates the interaction *SDSCORE * NOBLOCK* (coeff. = 0.045). Also, the effect of Type II information asymmetry as measured by absence of managerial blockholdings becomes significant only in presence of Type I information asymmetry as measured by the probability of informed trade. This evidence suggests that Type I information asymmetry is the dominant form of asymmetry and the investors demand higher returns in presence of Type I information asymmetry.

Prior research suggests an entrenchment effect for the firms with higher managerial blockholdings (e.g. Claessens et al. 2002). To control for the entrenchment effect, a sensitivity analysis is done by classifying the sample firms into three groups- no managerial blockholdings, low managerial blockholdings, and high managerial blockholding. To do this two dummy variables are introduced in Model 2 replacing the variable *NOBLOCK* in Model 2. Dummy variable *HBLOCK* equals 1 if the total managerial blockholdings are greater than 30%. This group of sample firms corresponds to the firms with high managerial blockholdings. Similarly, dummy variable *NOBLOCK* equals 1 if there are no managerial blockholdings corresponding to the firms with no managerial blockholdings. As a result, default group consist of firms with low managerial blockholdings. It is expected that the firms with high managerial blockholdings or no blockholdings have higher *ex ante* cost of equity capital as compared to firms with low blockholdings. Therefore, the negative association between the cost of equity capital and the level of segment disclosures will be stronger for such firms with high or no managerial blockholdings. Results using *HBLOCK* and *NOBLOCK* are shown in Table 10.

Column 1 of Table 10 includes main effects of *SDSCORE*, *HBLOCK*, and *NOBLOCK* and the two two-way interactions (*SDSCORE*HBLOCK* and *SDSCORE*NOBLOCK*). None of the main effects or the interaction effects is significant. Column 2 includes the main effects of *SDSCORE*, *LPIN*, *HBLOCK*, and *NOBLOCK* and the three two-way interactions (*SDSCORE*LPIN*, *SDSCORE*HBLOCK* and *SDSCORE*NOBLOCK*). Main effects of *SDSCORE*, *LPIN* and *NOBLOCK* are significant at 5% level. Two-way interactions between *SDSCORE* and *LPIN*, and *SDSCORE* and *NOBLOCK* are both significant at 5% level. Column 3 shows results for the all encompassing model using main effects, two-way interactions and the three way interactions. None of the three way interactions are significant. Comparing adjusted R^2 for models shown in Column 2 and 3 indicates that the inclusion of three-way interactions do not add significant information to the model in Column 2. Overall results support the H_1 and H_2 as concluded previously.

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Overall, the evidence in support of H_1 is the strongest in all the analyses. Mixed evidence is found in the support of H_2. There was no significant evidence in support of H_2 in the analyses presented in Table 8 where the probability of informed trade was not controlled for. However, significant evidence is found in support of H_2 in the analyses reported in Table 9 and 10 when the probability of informed trade is controlled for. No evidence is found in support of H_3.

CHAPTER VI

CONCLUSIONS

The purpose of this study is to investigate the association between the cost of equity capital and the level of segment disclosures of the US firms in the presence of two types of information asymmetry. Prior theory predicts a negative association between the cost of equity capital and the level of segment disclosure. This study, specifically, examines two situations under which the negative association between the cost of equity capital (*ex ante*) and the level of segment disclosures may be increasing or decreasing.

The first situation predicts that the negative association between the cost of equity capital and the level of segment disclosures is increasing in the presence of information asymmetry among various types of shareholders/ investors. Information asymmetry existing among shareholders is proxied by the probability of informed trade. Alternatively, the positive association between the cost of equity capital and the probability of informed trade is decreasing in the level of segment disclosures. Evidence in the study supports this hypothesis. The interaction effect of *LPIN* and *SDSCORE* on the implied cost of equity capital is significantly negative indicating that the negative relation between the cost of equity capital and the level of segment disclosures is increasing in the probability of informed trade. The insignificant negative association between the cost of equity capital and the level of segment disclosures becomes significant in the presence of probability of informed trade. There is a significant increasing effect of the probability of informed trade on the negative association between the cost of equity capital and the level of segment disclosures. Alternatively, there is a significant decreasing effect of the level of segment disclosures on positive association between the cost of equity and the probability of informed trade. This is an interesting result, consistent with Botosan (1997) result, and provides an explanation to the mixed evidence found in prior research on the association between the cost of equity capital and the level of disclosures. Benefits of disclosing more segment information are significant for the firms whose *ex ante* cost of equity capital is higher as a result of prevailing information asymmetries. Information asymmetry among different type of investors which results in private information based trading is a dominant form of information asymmetry.

The second situation predicts that the negative association between the cost of equity capital and the level of segment disclosures is increasing in the absence of managerial blockholdings, a mechanism to reduce the information asymmetry between the managers and the shareholders. There is no conclusive evidence in support of this hypothesis. Evidence do not support this hypothesis when the probability of informed trade (Type I information asymmetry) is not controlled for. But there is evidence in support of the hypothesis when the probability of informed trade is controlled for in the model. However, the three-way interaction of probability of informed trade, managerial blockholdings, and the level of segment disclosures is not significant (Hypothesis 3). Overall, this suggests that the managerial blockholdings help reduce the cost of equity capital by reducing the information asymmetry between the managers and the shareholders. Also, the negative association between the cost of equity capital and the level of segment disclosures is increasing in the absence of managerial blockholdings when probability of informed trade is controlled for in the model. This finding suggests that the firms with higher information asymmetry, in general, use higher level of segment disclosures as a remedial measure to reduce the cost of equity capital. This is interesting evidence and needs to be explored further. In future research, it would be interesting to explore the association between the probability of informed trade and managerial ownership. There is a positive correlation between the two indicating that a firm with higher probability of informed trade have higher managerial ownership or vice versa.

This study uses the data of US firms. However, the results of this study are also applicable in the international setting. Firms reporting under International Accounting Standards use IFRS 8 of IASB to report their segment disclosure. Under the ongoing convergence project between the FASB and the IASB, the IASB has adopted SFAS # 131 of FASB verbatim to report the segment disclosure under IFRS 8. Hence, the results of this study are extendable to firms who report segment information using IFRS 8.

One major contribution as well as a limitation of this study lies in the developed measure of the level of segment disclosures. It is a major contribution because no such detailed measure is yet available in the literature to measure the level of segment disclosures covering all the important aspects of segment information disclosed under SFAS # 131. The limitation of this measure is that it involves some amount of subjectivity on the part of the researcher in awarding the scores to the firm-years. To overcome this limitation, most of the questions are Yes/ No type objective questions. Another limitation of this measure is that the researcher only includes those questions which he/she deemed important to measure the level of segment disclosures. This may lead to a bias whereby some important aspects may have been left out while some other unimportant aspects may have been included in the measure. Also, this measure uses the same weight for all aspects which may not be the case because some aspects of segment information may be more important than others to the investors in evaluating the firm. Another limitation of this study is that it is limited to only one year of financial data, namely year 2005.

The results of this study extend the literature on the relationship between the cost of equity capital and the level of segment disclosure. The results provide evidence in favor of the importance of segment disclosure in reducing the cost of equity capital. It provides evidence that the existence of different types of information asymmetry affects the theoretical negative relationship between the cost of equity capital and the level of segment disclosure. These results are extendable to the level of overall disclosure of the firm because segment disclosure, being a small yet important part of overall disclosure, has a significant effect on the implied cost of equity capital of the firm in presence of information asymmetry. Therefore, the results should be even stronger with the level of overall disclosure of the firm.

Overall, segment disclosures are an important part of the overall disclosure of the firm and are valued by the investors while evaluating a firm, especially in presence of information asymmetry. Also, the information asymmetry existing among different type of investors is a dominant form of information asymmetry affecting the association between cost of equity capital and the level of segment disclosure.

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APPPENDIX A

	Question	**Scale**
	Operating (Primary) Segment Disclosures	
1.	How may operating segments are used to report operating segment financial information?	More than two (2); Two (1); Single segment (0)
2	General information and description of operating segments?	Maximum(2); Partial (1); None (0)
3	Are sales, profit/loss, depreciation, and assets, as per Para 25 of SFAS 131, disclosed?	Yes (2); No (0)
4	Disclosure of items (other than depreciation) included in measurement of profit/loss of operating segments as per Para 27 of SFAS 131?	Maximum(2); Partial (1); None (0)
5	Does the firm disclose more than one measure of profit/ loss for the operating segments?	Yes (2); No (0)

6a*	Are there any material transactions between the reportable segments?	Yes; No; Not disclosed
6b	Is the basis of accounting for any transaction between reportable segments disclosed?	Yes (2); No (0)
7	Disclosure of capital expenditures of operating segments?	Yes (2); No (0)
8	Is the reconciliation of reportable segments' measures of profit/ loss to the enterprise's consolidated income before income taxes, extraordinary income, discontinued operations, and the cumulative effect of changes in accounting principles shown?	Yes (2); No (0)
9	Is the reconciliation of reportable segments' assets to the enterprise's consolidated assets shown?	Yes (2); No (0)
10	Is the reconciliation of segment income and assets shown separately in detail (quality of reconciliation)?	Yes, for both (2); Yes, for one only (1); No (0)
11	Are liabilities of operating segments disclosed?	Yes (2); No (0)
12	Reconciliation of reportable segments' liabilities (if disclosed) to the enterprise's consolidated liabilities shown separately?	Yes (2); No (0)

13	Comparison of operating segment information with prior periods?	Yes (2); No (0)
14	Are there any other voluntarily disclosed items associated with operating segments?	Two or more(2); One only (1); None (0)
	Geographic Disclosures	
15*	Are geographic segments also the operating segments?	Yes; No
16	Does the firm disclose geographic segments if it has foreign operations/subsidiaries?	Yes (2); No (0)
17	How many geographic segments are used to report the geographic information? Is it two segments (domestic vs. foreign) or is it more than two geographic segments reported?	More than two segments for both assets and sales (2); more than two segments for sales (assets) and only two segments for assets (sales) (1); two segments for both sales and assets (0)
18	Does the firm disclose the basis of allocation of sales to the geographic segments? (Disclosure of whether the geographic sales are based on country/region of shipment or country/region of destination?)	Yes (2); No (0)
19	Are revenues from external customers,	Yes (2); No (0)

	attributed to enterprise's country of domicile and attributed to all foreign countries/ regions in total, reported?	
20	Are long-lived assets, located in country of domicile and those located in all foreign countries/ regions in total, reported?	Yes (2); No (0)
21	Is foreign financial data reported at country level or regional level?	Yes, all of it at country level (2); Yes, at regional/country level mixed; No (0)
22	Is profit/ loss metric disclosed for geographic segments?	Yes (2); No (0)
23	Is geographic segment information compared to prior period?	Yes (2); No (0)
24	Other voluntarily disclosed items about geographic segments?	Two or more (2); One only (1); None (0)
	Other Disclosures	
25a	Is the name of major customer disclosed in the customer revenue information?	Yes (2); No (0)
25b**	Are there any other disclosures associated with customer revenue or profit/loss?	Yes (1); No (0)
26	Consistency of segmentation used in business summary section and segmentation used for	Yes (2); No (0)

	segment disclosures in notes as per SFAS 131?	
27	Consistency of segmentation used in MD & A section and segmentation used for segment disclosures in notes as per SFAS 131?	Yes (2); No (0)
28	Are revenues from external customers for each product and service reported if operating segments are not based on products?	Yes (2); No (0)
29	Are there any other voluntarily disclosed items associated with segments based on products/services?	Yes (2); No (0)
30	Does the firm provide an attestation that a similar format of segment information is used internally for management purposes?	Yes(2); No (0)
31	Is there any other type of segment information disclosed apart from operating and geographic segments?	Yes (2); No (0)

* *No score is awarded on questions 6a and 15.*

** *Maximum score on question 25b is 1 only. Most of the firms only provide the amount of revenue (as dollar amount or percentage of total revenue) from major customers without disclosing the names of such customers. As a result, the weightage of such information is low.*

The total of scores on all the questions is the total score (*TSCORE*) for level of segmental disclosures for the respective firm-year. An index of segment disclosure score (*SDSCORE*) is calculated by scaling the *TSCORE* of the firms by number of question on which a particular firm is evaluated. Firms with foreign operations (whether they provide geographic segment disclosures or not) and with significant transactions between operating segments are evaluated on a total 31 questions, namely, questions 1-31. And therefore, *SDSCORE* for these firms equals *TSCORE/* 31. Firms with foreign operations but no significant transactions between operating segments are evaluated on a total of 30 questions, namely, questions 1-5 and 7-31. Thus, *SDSCORE* for such firms equals *TSCORE*/ 30. Firms with no foreign operations but with significant transactions between operating segments are evaluated on a total of 21 questions, namely, questions 1-14 and 25-31. Hence, *SDSCORE* for such firms equals *TSCORE*/ 21. Firms with no foreign operations and no significant transactions between operating segments are evaluated on a total of 20 questions. Hence, *SDSCORE* for such firms equals *TSCORE*/ 20. Firms with no SFAS 131 segment disclosures have a *SDSCORE* = 0. Data is windsorized at 1 percent and 99 percent level for the variable *SDSCORE*. This scaled score for the level of segment disclosures (*SDSCORE*) is used as a proxy for the level of segment disclosures in the analysis.

Assessment of validity of *SDSCORE*

Botosan (1997) demonstrates that disclosure index of financial disclosures is a useful research tool. Similarly, an index of segment disclosures can become an important research tool. This study uses a hand-developed index of segment disclosures to study the effect on cost of equity capital in presence of information asymmetry. However, the development and application of such index requires subjective assessments by the researcher. Therefore, most of the questions used in the development of index are Yes/ No type questions to maximize the objectivity of the index. But the presence of some amount of subjectivity requires us to assess the validity of the resulting measure (*SDSCORE*).

Following Botosan (1997), I expect the measure of the level of segment disclosures to be positively correlated with size and leverage of the firm, and the number of analysts following the firm. Larger firms are expected to provide higher level of disclosures. Firms with higher amount of debt in their capital structure are expected to maintain a higher level of disclosures as compared to firms with low or no debt because disclosures help firms reduce the cost of debt (Sengupta, 1998). Similarly, firms with better disclosures have higher analyst following. Table A-1 presents the correlation coefficients between measure of segment disclosures (*SDSCORE*) and firm size (*SIZE*), leverage (*LEVERAGE*), and number of analysts following the firm (*ANALYSTS*). Using the Spearman correlation coefficients, results in Table A-1 show a positive and significant correlation of *SDSCORE* with firm size, leverage, and number of analysts following the firm. Correlation of *SDSCORE* with firm size and leverage is significant at 1% level while correlation of *SDSCORE* with number of analyst following is significant at 5% level. Pearson correlation coefficients also show a positive correlation of *SDINDEX* with firm size, leverage, and number of analysts. But the correlation coefficient between *SDSCORE* and leverage is not significant at 10% level while other two correlation coefficients are significant at 5% level.

Panel B of Table A-1 also presents the results of regression of *SDSCORE* on three firm level characteristics - firm size, leverage, and number of analysts following the firm. Results show that firm size, leverage, and analyst following continue to be positively associated with the level of segment disclosures and explain approximately 13 percent variation in *SDSCORE*. Coefficient on firm size is significant at 5% level.

---------- Insert Table A-1 from Page 84 right about here ----------

A second analysis is used to assess the validity of *SDSCORE*. Specifically, I look at the correlation between *SDSCORE* and disclosure quality measure based on disaggregation of segment information (*DISAGG*), as defined earlier in Chapter IV. Bens and Monahan (2004) conclude that *DISAGG* is positively correlated with AIMR disclosure rankings and works as a good measure of disclosure quality. Table A-2 presents the correlation coefficients (Pearson and Spearman) between *SDSCORE* and *DISAGG*. Results show a positive, strong, and significant correlation between *SDSCORE* and *DISAGG*. All the correlations (both Pearson's and Spearman's correlation) are significant at 1% significance level.

---------- Insert Table A-2 from Page 85 right about here ----------

A third analysis looks at the correlation of *SDSCORE* with the natural log of number of words used in SFAS # 131 disclosure of the firm. Natural log of number of words is termed as *WORDS*. Table A-2 presents the correlation coefficients between *SDSCORE* and *WORDS*. Results show a positive, strong, and significant correlation between the two measures of the level of segment disclosure. This is an interesting result as the correlation between *SDSCORE* and *WORDS* is more than 80% indicating that number of words used in disclosures can serve as a good proxy for the level of disclosures.

The above analyses support the validity of *SDSCORE* as a measure of the level of segment disclosure.

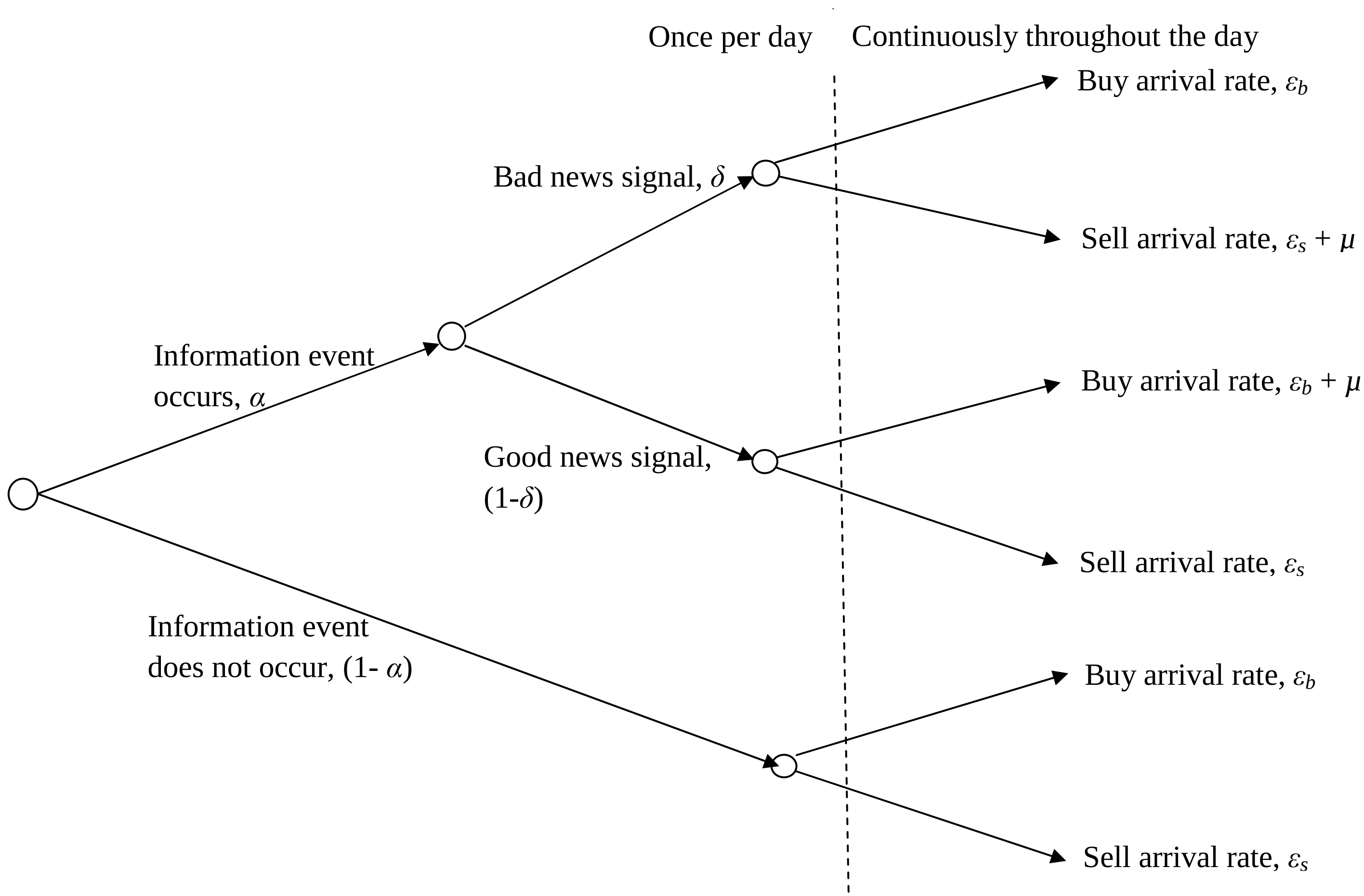

Figure 1. Trading process for EKO model. α is the probability of information event, δ is probability of bad news signal, (1-δ) is the probability of good news signal, μ is the daily arrival rate of uninformed trade, ε_b is the daily arrival rate of uninformed buy orders, and ε_s is the daily arrival rate of uninformed sell orders. Nodes to left of dotted line occur once per day and the trades to the right of line occur continuously throughout the day.

Table A-1. Analyzing *SDSCORE* against variables – *SIZE*, *LEV* and *# ANALYSTS*

PANEL A: Correlation analyses

	SDSCORE	*SIZE*	*LEV*	*# ANALYSTS*
SDSCORE		0.384***	0.076	0.300**
SIZE	0.411***		-0.068	0.717***
LEV	0.288***	0.160		-0.087
# ANALYSTS	0.270**	0.745***	0.170	

PANEL B: Regression analyses

	INTERCEPT	*SIZE*	*LEV*	*# ANALYSTS*	Adj-R^2
SDSCORE	0.209	0.083**	0.113	0.003	0.128
SDSCORE	0.162	0.093***	0.110		0.137

In Panel A, entries above the diagonal represent Pearson correlations and entries below represent Spearman correlations.
***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively based on two-tailed tests.

Table A-2. Correlation analyses between *SDSCORE, DISAGG,* and *WORDS*

	SDSCORE	*DISAGG*	*WORDS*
SDSCORE		0.512***	0.816***
DISAGG	0.467***		0.464***
WORDS	0.829***	0.351***	

Entries above the diagonal represent Pearson correlations and entries below represent Spearman correlations.
***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively based on two-tailed tests.

Table 1. Descriptive Statistics

Variable	N	Mean	Std. Dev.	5%	25%	50%	75%	95%
R_{AVG}	84	0.101	0.029	0.066	0.082	0.095	0.112	0.153
R_{GLS}	84	0.083	0.022	0.054	0.067	0.081	0.095	0.119
R_{GM}	84	0.113	0.041	0.070	0.092	0.106	0.126	0.189
R_{CT}	84	0.090	0.032	0.053	0.070	0.084	0.103	0.137
R_{PEG}	84	0.119	0.043	0.064	0.089	0.110	0.137	0.205
SDSCORE	84	0.830	0.315	0.355	0.581	0.935	1.048	1.226
DISAGG	84	1.384	0.783	0.000	0.916	1.386	1.946	2.485
WORDS	84	6.261	1.031	4.419	6.051	6.485	6.807	7.296
PIN	84	0.143	0.067	0.053	0.094	0.129	0.173	0.299
LPIN	84	-2.048	0.463	-2.940	-2.368	-2.045	-1.756	-1.206
SIZE	84	6.925	1.323	4.929	5.976	6.898	7.844	9.033
ROA	84	0.075	0.071	-0.006	0.038	0.062	0.108	0.180
BETA	84	1.434	0.540	0.506	1.134	1.469	1.728	2.277
LBM	84	-1.008	0.471	-1.850	-1.253	-0.964	-0.703	-0.201
SG	84	0.228	0.190	0.020	0.112	0.172	0.287	0.585
LEV	84	0.228	0.293	0.000	0.019	0.152	0.311	0.884
STDRET	84	-3.643	0.319	-4.097	-3.878	-3.703	-3.433	-3.080
# ANALYSTS	84	8.202	6.987	1	3	6	11	23
FOLLOW=1	46	0.548	0.501	-	-	-	-	-
NOBLOCK=1	56	0.667	0.474	-	-	-	-	-
HBLOCK=1	9	0.107	0.311	-	-	-	-	-

R_{GLS}, R_{GM}, R_{CT}, and R_{PEG} are the measures of implied cost of equity capital based on GLS (2001), GM (2003), CT (2001), and Easton (2004) models. R_{AVG} is the average measure of implied cost of equity equal to the arithmetic mean of R_{GLS}, R_{GM}, R_{CT}, and R_{PEG}. *SDSCORE* is the scaled rank measure of the level of segment disclosures based on a hand developed measure of the level of segment disclosures. *DISAGG* is the measure of disaggregation of the segment information used as a proxy for the level of segment disclosures based on Berger and Hann (2003) and Bens and Monahan (2004). Variable *WORDS* is the measure of the level of segment disclosures based on number of words disclosed under SFAS # 131 disclosures. *PIN* is the measure of probability of informed trade based on the EKO (1997) model. *LPIN* is the natural log of the *PIN*. *SIZE* is the natural log of the market value of firm. *ROA* is calculated as income before extraordinary items scaled by total assets of the firm. *BETA* is the measure of market risk calculated from market model using daily returns over the 12 month period. *LBM* is ratio of book value to market value of equity. *SG* is a measure of sales growth calculated as the mean of sales growth during past two years. *LEV* is a measure of firm leverage calculated as a ratio of debt to market value of equity. *STDRET* is a measure of volatility of stock returns calculated as the natural log of mean of the annual standard deviation of daily stock returns over a period of five years. *# ANALYSTS* is the number of analysts following a firm during the fiscal year. *FOLLOW* = 1 if the number of analysts is greater than or equal to median number of analysts following the sample firms. *NOBLOCK* = 1 if the firm has no managerial blockholdings. *HBLOCK* = 1 if the total managerial blockholdings are greater than or equal to 30%.

Table 2. Pearson and Spearman correlations among different estimates of implied cost of equity capital

	R_{AVG}	R_{GLS}	R_{GM}	R_{CT}	R_{PEG}
R_{AVG}		0.661^{***}	0.887^{***}	0.902^{***}	0.846^{***}
R_{GLS}	0.628^{***}		0.465^{***}	0.613^{***}	0.373^{***}
R_{GM}	0.852^{***}	0.412^{***}		0.758^{***}	0.640^{***}
R_{CT}	0.906^{***}	0.597^{***}	0.775^{***}		0.656^{***}
R_{PEG}	0.811^{***}	0.367^{***}	0.539^{***}	0.658^{***}	

Entries above the diagonal represent Pearson correlations and entries below represent Spearman correlations.
***, **, and * denote significance at the 1%, 5%, and 10% significance levels, respectively based on two-tailed tests.

Table 3. Correlation between explanatory variables used in analyses

	LPIN	*SIZE*	*ROA*	*BETA*	*LBM*	*SG*	*LEV*	*FOLLOW*	*STDRET*	*SDSCORE*	*NOBLOCK*
LPIN		-0.481***	-0.137	-0.129	0.268**	-0.179	0.104	-0.306***	-0.008	-0.101	0.292***
SIZE	-0.436***		-0.022	0.009	-0.214**	-0.113	-0.068	0.642***	-0.462***	0.384***	-0.380***
ROA	-0.142	0.064		-0.129	-0.311***	0.242**	-0.548***	-0.197*	-0.118	-0.050	-0.043
BETA	-0.077	-0.105	-0.087		-0.192*	0.108	0.032	0.013	0.317***	-0.224**	-0.126
LBM	0.235**	-0.237**	-0.331***	0.072		-0.044	-0.178	-0.052	-0.214*	-0.023	0.118
SG	-0.221**	-0.115	0.396***	0.191*	-0.150		-0.103	-0.231**	0.252**	-0.081	-0.020
LEV	0.011	0.160*	-0.522***	-0.048	0.043	-0.121		-0.084	0.168	0.076	-0.010
FOLLOW	-0.318***	0.664***	-0.181*	-0.059	-0.051	-0.227**	0.277**		-0.210*	0.178	-0.321***
STDRET	-0.001	-0.492***	-0.226**	0.358***	-0.082	0.275**	-0.041	-0.296***		-0.297***	0.178
SDSCORE	-0.109	0.411***	-0.081	-0.222**	-0.057	-0.141	0.288***	0.270**	-0.286***		-0.171
NOBLOCK	0.305***	-0.349***	-0.037	-0.057	0.121	-0.085	-0.126	-0.273**	0.194*	-0.191*	

Entries above the diagonal represent Pearson correlations and entries below it represent Spearman correlations; ***, **, and * denote significance at the 1%, 5%, and 10% significance levels, respectively based on two-tailed tests.

Table 4. Pearson correlation coefficients of explanatory variables with implied cost of equity capital

	R_{AVG}	R_{GLS}	R_{GM}	R_{CT}	R_{PEG}
SDSCORE	-0.119	0.037	-0.115	-0.067	-0.182*
DISAGG	-0.158	0.093	-0.125	-0.186*	-0.219**
WORDS	-0.145	0.068	-0.139	-0.084	-0.233**
LPIN	0.289***	0.141	0.179	0.253**	0.350***
NOBLOCK	-0.089	-0.132	-0.174	-0.023	0.011
SIZE	-0.294***	-0.175	-0.120	-0.362***	-0.322***
ROA	-0.349***	-0.272**	-0.246**	-0.178	-0.437***
BETA	0.227**	0.228**	0.215**	0.093	0.222**
LBM	0.171	0.278***	0.036	0.202*	0.137
SG	0.060	0.091	0.110	0.093	-0.061
LEV	0.348***	0.096	0.331***	0.250**	0.391***
FOLLOW	-0.161	-0.221**	-0.081	-0.280***	-0.036
STDRET	0.307***	0.122	0.256**	0.212*	0.367***

***, **, and * denote significance at the 1%, 5%, and 10% significance levels, respectively based on two-tailed tests.

Table 5. Effect of *SDSCORE*, *LPIN*, and (*SDSCORE*LPIN*) on the implied cost of equity capital: Model (1.1) OLS estimates of regression coefficients

Panel A. Implied Cost of Equity Capital = R_{AVG}

	(1) Coeff. (p-value)	(2) Coeff. (p-value)	(3) Coeff. (p-value)	(4) Coeff. (p-value)
Intercept	0.405 (0.000)***	0.394 (0.000)***	0.401(0.000)***	0.446 (0.000)***
SIZE (-)	-0.001 (0.700)	0.001 (0.874)	0.001 (0.798)	0.001 (0.877)
ROA (-)	-0.057 (0.368)	-0.043 (0.485)	-0.045 (0.476)	-0.047 (0.446)
BETA (+)	0.009 (0.115)	0.010 (0.070)*	0.010 (0.094)*	0.009 (0.095)*
LBM (+)	0.015 (0.084)*	0.014 (0.087)*	0.014 (0.088)*	0.014 (0.094)*
SG (?)	0.004 (0.792)	0.009 (0.592)	0.009 (0.593)	0.009 (0.551)
LEV (+)	0.025 (0.076)*	0.025 (0.072)*	0.025 (0.070)*	0.027 (0.050)**
FOLLOW (-)	-0.008 (0.328)	-0.006 (0.388)	-0.007 (0.368)	-0.005 (0.471)
STDRET (+)	0.012 (0.330)	0.017 (0.175)	0.016 (0.188)	0.017 (0.175)
INDUSTRY (?)	-0.001 (0.030)**	-0.001 (0.053)*	-0.001 (0.050)**	-0.001 (0.090)*
SDSCORE (-)	**-0.004 (0.723)**		**-0.004 (0.707)**	**-0.086 (0.047)****
LPIN (+)		**0.012 (0.109)**	**0.012 (0.110)**	**0.049 (0.017)****
*SDSCORE*LPIN* (-)				**-0.041 (0.051)***
Adj- R^2 (N = 84)	0.278	0.302	0.294	0.322
		Wald test of $\beta_{SDSCORE} = \beta_{LPIN}$	**0.008 (0.212)**	**0.037 (0.031)****
			Wald test of $\beta_{SDSCORE} + \beta_{SDSCORE*LPIN}$	**-0.127 (0.137)**
			Wald test of $\beta_{LPIN} + \beta_{SDSCORE*LPIN}$	**0.008 (0.041)****

Panel B. OLS estimates of regression coefficients for Model (1.1) using alternative estimates of the implied cost of equity capital

	$R = R_{GLS}$ Coeff. (p-value)	$R = R_{GM}$ Coeff. (p-value)	$R = R_{CT}$ Coeff. (p-value)	$R = R_{PEG}$ Coeff. (p-value)
Intercept	0.147 (0.128)	0.742 (0.000)***	0.411 (0.003)***	0.484 (0.004)***
SIZE (-)	0.001 (0.779)	0.008 (0.161)	-0.003 (0.526)	-0.004 (0.517)
ROA (-)	-0.052 (0.319)	-0.030 (0.740)	0.009 (0.904)	-0.115 (0.191)
BETA (+)	0.011 (0.022)**	0.009 (0.275)	0.006 (0.357)	0.012 (0.149)
LBM (+)	0.014 (0.045)**	0.014 (0.255)	0.017 (0.075)*	0.010 (0.388)
SG (?)	0.008 (0.551)	0.024 (0.310)	0.008(0.661)	-0.002 (0.928)
LEV (+)	0.005 (0.645)	0.041 (0.040)**	0.029 (0.074)*	0.031 (0.100)*
FOLLOW (-)	-0.011 (0.078)*	-0.010 (0.351)	-0.011 (0.223)	0.011 (0.311)
STDRET (+)	0.005 (0.643)	0.023 (0.196)	0.007 (0.645)	0.032 (0.069)*
INDUSTRY (?)	-0.000 (0.947)	-0.001 (0.011)**	-0.001 (0.106)	-0.000 (0.473)
SDSCORE (-)	**-0.040 (0.270)**	**-0.170 (0.008)*** **	**-0.054 (0.293)**	**-0.082 (0.182)**
LPIN (+)	**0.024 (0.154)**	**0.085 (0.005)*** **	**0.030 (0.218)**	**0.057 (0.049)** **
*SDSCORE*LPIN* (-)	**-0.025 (0.160)**	**-0.075 (0.015)** **	**-0.028 (0.257)**	**-0.036 (0.224)**
Adj- R^2 (N = 84)	0.170	0.284	0.192	0.367
Wald test of $\beta_{SDSCORE} + \beta_{SDSCORE * LPIN}$	**-0.065 (0.182)**	**-0.245 (0.024)** **	**-0.082 (0.510)**	**-0.118 (0.382)**
Wald test of $\beta_{LPIN} + \beta_{SDSCORE * LPIN}$	**-0.001 (0.351)**	**0.010 (0.017)** **	**0.002 (0.466)**	**0.021 (0.031)** **

***, **, and * denote significance at the 1%, 5%, and 10% significance levels, respectively based on two-tailed tests.

Table 6. Effect of *DISAGG, LPIN,* and (*DISAGG*LPIN*) on the implied cost of equity capital: Model (1.2) OLS estimates of regression coefficients

Implied Cost of Equity Capital = R_{AVG}				
	(1)	(2)	(3)	(4)
	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
Intercept	0.406 (0.000)***	0.394 (0.000)***	0.402 (0.000)***	0.401 (0.000)***
SIZE (-)	-0.001 (0.695)	0.001 (0.874)	0.001 (0.800)	0.001 (0.791)
ROA (-)	-0.059 (0.350)	-0.043 (0.485)	-0.047 (0.455)	-0.051 (0.425)
BETA (+)	0.010 (0.091)*	0.010 (0.070)*	0.010 (0.073)*	0.010 (0.072)*
LBM (+)	0.014 (0.093)*	0.014 (0.087)*	0.014 (0.099)*	0.014 (0.106)
SG (?)	0.005 (0.779)	0.009 (0.592)	0.009 (0.582)	0.010 (0.542)
LEV (+)	0.023 (0.110)	0.025 (0.071)*	0.023 (0.104)	0.022 (0.130)
FOLLOW (-)	-0.007 (0.333)	-0.006 (0.388)	-0.007 (0.375)	-0.006 (0.416)
STDRET (+)	0.012 (0.308)	0.017 (0.175)	0.017 (0.173)	0.017 (0.187)
INDUSTRY (?)	-0.001 (0.029)**	-0.001 (0.053)**	-0.001 (0.049)*	-0.001 (0.069)*
DISAGG (-)	**-0.002 (0.646)**		**-0.002 (0.641)**	**-0.010 (0.572)**
LPIN (+)		**0.012 (0.109)**	**0.011 (0.111)**	**0.018 (0.234)**
*DISASS*LPIN* (-)				**-0.004 (0.632)**
Adj- R^2 (N = 84)	0.279	0.302	0.295	0.287
		Wald test of $\beta_{DISAGG} = \beta_{LPIN}$	**0.009 (0.104)**	**0.008 (0.378)**
			Wald test of $\beta_{DISAGG} + \beta_{DISAGG * LPIN}$	**-0.014 (0.800)**
			Wald test of $\beta_{LPIN} + \beta_{DISAGG * LPIN}$	**0.014 (0.252)**

***, **, and * denote significance at the 1%, 5%, and 10% significance levels, respectively based on two-tailed tests.

Table 7. Effect of *WORDS, LPIN,* and (*WORDS*LPIN*) on the implied cost of equity capital: Model (1.3) OLS estimates of regression coefficients

Panel A. Implied Cost of Equity Capital = R_{AVG}

	(1) Coeff. (p-value)	(2) Coeff. (p-value)	(3) Coeff. (p-value)	(4) Coeff. (p-value)
Intercept	0.415 (0.000)***	0.394 (0.000)***	0.409 (0.000)***	0.732 (0.000)***
SIZE (-)	-0.001 (0.736)	0.001 (0.874)	0.001 (0.773)	0.000 (0.926)
ROA (-)	-0.056 (0.376)	-0.043 (0.485)	-0.044 (0.485)	-0.024 (0.688)
BETA (+)	0.009 (0.133)	0.010 (0.070)*	0.009 (0.107)	0.011 (0.052)*
LBM (+)	0.015 (0.078)*	0.014 (0.087)*	0.014 (0.083)*	0.015 (0.059)
SG (?)	0.005 (0.737)	0.009 (0.592)	0.010 (0.550)	0.013 (0.408)
LEV (+)	0.025 (0.074)*	0.025 (0.072)*	0.025 (0.069)*	0.030 (0.022)**
FOLLOW (-)	-0.007 (0.332)	-0.006 (0.386)	-0.007 (0.375)	-0.004 (0.543)
STDRET (+)	0.013 (0.314)	0.017 (0.175)	0.017 (0.178)	0.019 (0.111)
INDUSTRY (?)	-0.001 (0.028)**	-0.001 (0.053)*	-0.001 (0.048)**	-0.001 (0.077)*
WORDS(-)	**-0.002 (0.542)**		**-0.002 (0.561)**	**-0.055 (0.003)*****
LPIN (+)		**0.012 (0.109)**	**0.012 (0.113)**	**0.188 (0.002)*****
*WORDS*LPIN* (-)				**-0.027 (0.003)*****
Adj- R^2 (N = 84)	0.281	0.302	0.296	0.368
		Wald test of $\beta_{WORDS} = \beta_{LPIN}$	**0.010 (0.090)**	**0.133 (0.002)*****
			Wald test of $\beta_{WORDS} + \beta_{WORDS*LPIN}$	**-0.082 (0.011)****
			Wald test of $\beta_{LPIN} + \beta_{WORDS*LPIN}$	**0.161 (0.004)*****

***, **, and * denote significance at the 1%, 5%, and 10% significance levels, respectively based on two-tailed tests.

Table 8. Effect of *SDSCORE*, *NOBLOCK*, and (*SDSCORE*NOBLOCK*) on the implied cost of equity capital: Model (2) OLS estimates of regression coefficients

Panel A. Implied Cost of Equity Capital = R_{AVG}

	(1) Coeff. (p-value)	(2) Coeff. (p-value)	(3) Coeff. (p-value)	(4) Coeff. (p-value)
Intercept	0.405 (0.000)***	0.381 (0.000)***	0.390 (0.000)***	0.390 (0.000)***
SIZE (-)	-0.001 (0.700)	-0.002 (0.466)	-0.002 (0.573)	-0.002 (0.552)
ROA (-)	-0.057 (0.368)	-0.046 (0.455)	-0.047 (0.445)	-0.061 (0.338)
BETA (+)	0.009 (0.115)	0.008 (0.129)	0.008 (0.171)	0.008 (0.168)
LBM (+)	0.015 (0.084)*	0.016 (0.054)*	0.016 (0.055)*	0.014 (0.110)
SG (?)	0.004 (0.792)	0.001 (0.967)	0.001 (0.969)	0.004 (0.802)
LEV (+)	0.025 (0.076)*	0.026 (0.058)*	0.026 (0.056)*	0.020 (0.175)
FOLLOW (-)	-0.008 (0.328)	-0.009 (0.230)	-0.009 (0.214)	-0.010 (0.183)
STDRET (+)	0.012 (0.330)	0.015 (0.201)	0.015 (0.217)	0.013 (0.273)
INDUSTRY (?)	-0.001 (0.030)**	-0.001 (0.057)*	-0.001 (0.052)*	-0.001 (0.040)**
SDSCORE (-)	**-0.004 (0.723)**		**-0.004 (0.653)**	**0.011 (0.564)**
NOBLOCK (+)		**0.012 (0.066)***	**0.012 (0.065)***	**0.028 (0.122)**
*SDSCORE*NOBLOCK* (-)				**-0.021 (0.336)**
Adj- R^2 (N = 84)	0.278	0.310	0.302	0.302
		Wald test of $\beta_{SDSCORE} = \beta_{NOBLOCK}$	**0.008 (0.177)**	**0.017 (0.149)**
			Wald test of $\beta_{SDSCORE} + \beta_{SDSCORE*NOBLOCK}$	**-0.010 (0.568)**
			Wald test of $\beta_{NOBLOCK} + \beta_{SDSCORE*NOBLOCK}$	**0.007 (0.116)**

Panel B. OLS estimates of regression coefficients for Model (2) using alternative estimates of the implied cost of equity capital

	$R = R_{GLS}$ Coeff. (p-value)	$R = R_{GM}$ Coeff. (p-value)	$R = R_{CT}$ Coeff. (p-value)	$R = R_{PEG}$ Coeff. (p-value)
Intercept	0.106 (0.254)	0.642 (0.000)***	0.367 (0.007)***	0.443 (0.009)***
SIZE (-)	0.000 (0.948)	0.004 (0.442)	-0.004 (0.317)	-0.009 (0.103)
ROA (-)	-0.045 (0.391)	-0.054 (0.563)	-0.002 (0.981)	-0.144 (0.125)
BETA (+)	0.010 (0.037)**	0.007 (0.420)	0.005 (0.452)	0.010 (0.234)
LBM (+)	0.015 (0.031)**	0.013 (0.303)	0.017 (0.099)*	0.010 (0.415)
SG (?)	0.004 (0.782)	0.017 (0.483)	0.007 (0.713)	-0.011 (0.639)
LEV (+)	0.005 (0.675)	0.028 (0.195)	0.022 (0.208)	0.026 (0.241)
FOLLOW (-)	-0.014 (0.028)**	-0.018 (0.109)	-0.015 (0.096)*	0.006 (0.576)
STDRET (+)	0.007 (0.510)	0.018 (0.310)	0.006 (0.673)	0.023 (0.203)
INDUSTRY (?)	-0.000 (0.958)	-0.001 (0.003)***	-0.001 (0.070)*	-0.001 (0.249)
SDSCORE (-)	**0.009 (0.359)**	**-0.031 (0.076)***	**-0.005 (0.693)**	**-0.014 (0.397)**
NOBLOCK (+)	**0.011 (0.443)**	**0.049 (0.069)***	**0.031 (0.144)**	**0.021 (0.422)**
*SDSCORE*NOBLOCK* (-)	**-0.001 (0.951)**	**-0.040 (0.219)**	**-0.026 (0.316)**	**-0.018 (0.576)**
Adj- R^2 (N = 84)	0.193	0.253	0.212	0.311

***, **, and * denote significance at the 1%, 5%, and 10% significance levels, respectively based on two-tailed tests.

Table 9. Effect of *SDSCORE*, *LPIN*, *NOBLOCK*, (*SDSCORE*LPIN*), (*SDSCORE*NOBLOCK*), and (*SDSCORE*LPIN*NOBLOCK*) on the implied cost of equity capital: Model (3.1, 3.2, and 3.3) OLS estimates of regression coefficients

Panel A: Implied cost of capital = R_{AVG}

	(1) Coeff. (p-value)	(2) Coeff. (p-value)	(3) Coeff. (p-value)
Intercept	0.384 (0.001)***	0.451 (0.000)***	0.447 (0.000)***
SIZE (-)	0.001 (0.836)	0.000 (0.931)	0.000 (0.975)
ROA (-)	-0.029 (0.642)	-0.061 (0.309)	-0.062 (0.301)
BETA (+)	0.008 (0.143)	0.008 (0.124)	0.008 (0.142)
LBM (+)	0.016 (0.055)*	0.010 (0.195)	0.010 (0.199)
SG (?)	0.005 (0.760)	0.015 (0.336)	0.014 (0.355)
LEV (+)	0.028 (0.053)*	0.016 (0.248)	0.016 (0.237)
FOLLOW (-)	-0.009 (0.244)	-0.009 (0.225)	-0.009 (0.218)
STDRET (+)	0.021 (0.090)*	0.019 (0.112)	0.019 (0.105)
INDUSTRY (?)	-0.001 (0.109)	-0.000 (0.119)	-0.000 (0.133)
SDSCORE (-)	**-0.007 (0.627)**	**-0.083 (0.010)***	**-0.146 (0.002)*****
LPIN (+)	**0.016 (0.094)***	**0.073 (0.000)*****	**0.074 (0.000)*****
NOBLOCK (+)	**0.011 (0.401)**	**0.053 (0.005)*****	**0.053 (0.004)*****
*SDSCORE*LPIN* (-)		**-0.055 (0.036)****	**-0.063 (0.003)*****
*SDSCORE*NOBLOCK* (-)		**-0.065 (0.094)***	**-0.047 (0.031)****
*SDSCORE*LPIN*NOBLOCK* (-)	**-0.002 (0.823)**	**-0.009 (0.585)**	
Adj- R^2 (N = 84)	0.320	0.397	0.403

Panel B. OLS estimates of regression coefficients for Model (3.3) using alternative estimates of the implied cost of equity capital

	$R = R_{GLS}$ Coeff. (p-value)	$R = R_{GM}$ Coeff. (p-value)	$R = R_{CT}$ Coeff. (p-value)	$R = R_{PEG}$ Coeff. (p-value)
Intercept	0.140 (0.137)	0.748 (0.000)***	0.414 (0.003)***	0.486 (0.003)***
SIZE (-)	0.001 (0.847)	0.007 (0.168)	-0.003 (0.456)	-0.004 (0.465)
ROA (-)	-0.049 (0.345)	-0.060 (0.477)	-0.006 (0.931)	-0.131 (0.144)
BETA (+)	0.010 (0.038)**	0.006 (0.393)	0.005 (0.465)	0.010 (0.197)
LBM (+)	0.014 (0.053)*	0.007 (0.541)	0.014 (0.158)	0.007 (0.585)
SG (?)	0.008 (0.567)	0.033 (0.133)	0.013 (0.490)	0.003 (0.896)
LEV (+)	0.003 (0.794)	0.022 (0.271)	0.019 (0.267)	0.022 (0.297)
FOLLOW (-)	-0.013 (0.034)**	-0.016 (0.122)	-0.014 (0.116)	0.008 (0.456)
STDRET (+)	0.008 (0.432)	0.026 (0.117)	0.009 (0.553)	0.033 (0.058)*
INDUSTRY (?)	0.000 (0.777)	-0.001 (0.013)**	-0.001 (0.145)	-0.000 (0.561)
SDSCORE (-)	**-0.051 (0.158)**	**-0.188 (0.002)*** **	**-0.065 (0.203)**	**-0.091 (0.135)**
LPIN (+)	**0.036 (0.048)** **	**0.127 (0.000)*** **	**0.052 (0.043)** **	**0.079 (0.012)** **
NOBLOCK (+)	**0.024 (0.138)**	**0.092 (0.000)*** **	**0.049 (0.033)** **	**0.048 (0.079)* **
*SDSCORE*LPIN* (-)	**-0.035 (0.061)* **	**-0.114 (0.000)*** **	**-0.049 (0.064)* **	**-0.056 (0.075)* **
*SDSCORE*NOBLOCK* (-)	**-0.014 (0.445)**	**-0.086 (0.007)*** **	**-0.045 (0.098)* **	**-0.045 (0.168)**
Adj- R^2 (N = 84)	0.215	0.401	0.236	0.384

***, **, and * denote significance at the 1%, 5%, and 10% significance levels, respectively based on two-tailed tests.

Table 10. Sensitivity test using dummy variables for high and no managerial blocks

Implied cost of capital = R_{AVG}	(1)	(2)	(3)
Variable	Coeff. (p-value)	Coeff. (p-value)	Coeff. (p-value)
Intercept	0.396 (0.001)***	0.452 (0.000)***	0.505 (0.000)***
SIZE (-)	-0.002 (0.560)	0.000 (0.981)	0.001 (0.891)
ROA (-)	-0.070 (0.316)	-0.068 (0.295)	-0.077 (0.237)
BETA (+)	0.008 (0.196)	0.008 (0.166)	0.007 (0.236)
LBM (+)	0.014 (0.122)	0.010 (0.213)	0.008 (0.305)
SG (?)	0.005 (0.751)	0.015 (0.339)	0.015 (0.340)
LEV (+)	0.019 (0.231)	0.015 (0.296)	0.012 (0.426)
FOLLOW (-)	-0.010 (0.184)	-0.009 (0.219)	-0.011 (0.138)
STDRET (+)	0.013 (0.306)	0.019 (0.125)	0.019 (0.112)
INDUSTRY (?)	-0.001 (0.039)**	-0.000 (0.130)	-0.001 (0.054)*
SDSCORE (-)	**0.010 (0.617)**	**-0.010 (0.019)****	**-0.106 (0.046)****
HBLOCK (+)	**0.004 (0.921)**	**0.002 (0.948)**	**0.004 (0.898)**
NOBLOCK (+)	**0.029 (0.132)**	**0.054 (0.007)*****	**0.056 (0.005)*****
*SDSCORE*HBLOCK (-)*	**0.001 (0.976)**	**0.002 (0.964)**	**0.097 (0.193)**
*SDSCORE*NOBLOCK (-)*	**-0.021 (0.370)**	**-0.047 (0.043)****	**-0.041 (0.323)**
LPIN (+)		**0.074 (0.000)*****	**0.072 (0.001)*****
*SDSCORE*LPIN*		**-0.063 (0.004)*****	**-0.068 (0.015)****
*SDSCORE*LPIN*HBLOCK (+)*			**0.053 (0.129)**
*SDSCORE*LPIN*NOBLOCK (-)*			**0.005 (0.791)**
Adj- R^2 (N = 84)	0.283	0.387	0.392

***, **, and * denote significance at the 1%, 5%, and 10% significance levels, respectively based on two-tailed tests.

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Biographical:

Personal Data:

Born in Udaipur, INDIA, August 14, 1977. Son of Snehlata Saini and Purshottam Saini. Married to Baljinder Kaur on July 11, 2006.

Education:

Completed the requirements for the Doctor of Philosophy in Accounting at Oklahoma State University, Stillwater, Oklahoma in May, 2010.

Received Master of Accountancy Degree from University of Mississippi, University, MS in May, 2005; Master of Management Science in Finance Degree from Devi Ahilya Vishwavidyalaya, Indore, INDIA in 2001; Bachelor of Business Management Degree from Mohanlal Sukhadia University, Udaipur, INDIA in 1999.

Experience:

Instructor of Accounting at Western Michigan University, Kalamazoo, MI (Dec. 2009-currently)
Visiting Assistant Professor of Accounting at Oklahoma State University, Tulsa, OK (Fall, 2007-Fall, 2009)
Research Assistant in Accounting at Oklahoma State University, Stillwater, OK (Fall, 2006-Spring, 2007)
Teaching Assistant in School of Accounting at Oklahoma State University, Stillwater, OK (Fall, 2005-Spring, 2006)
Teaching and Research Associate in Department of Finance at Indian Institute of Management, Indore, INDIA (July, 2001-June,2002)

Professional Memberships: American Accounting Association

Name: Jagjit Singh Saini   Date of Degree: May, 2010

Institution: Oklahoma State University   Location: Stillwater, Oklahoma

Title of Study: INFORMATION ASYMMETRY, SEGMENT DISCLOSURES, AND COST OF EQUITY CAPITAL

Pages in Study: 100   Candidate for the Degree of Doctor of Philosophy

Major Field: Accounting

Scope and Method of Study:

Using the *ex ante* measures of the cost of equity capital and a hand-developed index measure of the level of segment disclosures, this study examines the theoretical negative association between the cost of equity capital and the level of segment disclosure in presence of the probability of informed trade and the managerial blockholding. OLS regression estimates are obtained using the US firms data for the year 2005.

Findings and Conclusions:

This study finds that the theoretical negative association between the cost of equity capital and the level of segment disclosures is increasing in the existing probability of informed trade. This study also finds mixed evidence in support of the contention that the negative association between the cost of equity capital and the level of segment disclosures is increasing in the absence of managerial blockholdings. Further, the increasing effect of probability of informed trade dominates the effect of managerial blockholdings on the association between the cost of equity capital and the level of segment disclosure. Overall, the evidence suggests that the negative association between the cost of equity capital and the level of segment disclosures is increasing in the probability of informed trade and the absence of managerial blockholdings.

ADVISER'S APPROVAL: Don Herrmann