JOURNAL OF FINANCIAL REPORTING
Vol. 1, No. 1
Spring 2016
pp. 65–95

American Accounting Association
DOI: 10.2308/jfir-51322

A Re-Examination of the Cost of Capital Benefits from Higher-Quality Disclosures

Frank Heflin
Florida State University

James R. Moon, Jr.
Georgia State University

Dana Wallace
University of Central Florida

ABSTRACT: Prior research suggests a negative relation between disclosure and costs of capital, but Francis, Nanda, and Olsson (2008; hereafter FNO) find the relation weakens considerably or disappears after controlling for earnings quality. Their results suggest that prior research may incorrectly attribute the capital market benefits of earnings quality to disclosure quality. FNO utilize a self-constructed disclosure measure similar to Botosan (1997), while considerable cost of capital research relies on Association for Investment Management and Research (AIMR) disclosure ratings. We posit that AIMR ratings can capture elements of disclosure quality that affect capital costs even in the presence of earnings quality. We introduce earnings quality into the designs of three prominent studies documenting capital market benefits from higher AIMR-rated disclosures. We find that inferences from prior research suggesting that better disclosure quality is associated with lower costs of equity, bid-ask spreads, and costs of debt are robust to conditioning on earnings quality. Further, the economic significance of disclosure quality and earnings quality for costs of capital are roughly equivalent. Additional analyses using non-AIMR disclosure measures suggest that differences between the AIMR ratings and the FNO disclosure measure, rather than differences in sample period, likely explain the disparity in our and FNO's results. We conclude earnings quality does not generally subsume disclosure quality in explaining costs of capital.

Keywords: disclosure; cost of equity; cost of debt; bid-ask spread.

Data Availability: Data are available from sources identified in the paper.

INTRODUCTION

One of the most studied questions in accounting research is whether firms with higher-quality disclosures garner capital market benefits in the form of lower costs of capital. Extensive empirical research supports this link (Welker 1995; Botosan 1997; Sengupta 1998; Botosan and Plumlee 2002; Baginski and Rakow 2012; Chen, Miao, and Shevlin 2015). However, Francis, Nanda, and Olsson (2008; hereafter FNO) argue that the quality of managers' information dictates their voluntary disclosure practices. Therefore, information quality is the more primitive and important determinant of capital market benefits, and disclosure quality has only a second-order effect. Their results support this conjecture. After controlling for information quality, proxied for using earnings quality, the negative relations between their measure of annual report disclosure

We thank Ryan Ball (FARS discussant), Woo-Jin Chang (AAA Annual Meeting discussant), Rick Morton, Marlene Plumlee, Kenny Reynolds, and participants at the 2014 FARS Meeting and the 2015 AAA Annual Meeting for helpful comments and suggestions. We also thank the editor, Catherine M. Schrand, the reviewer, Michael Welker, for their suggestions.

Editor's note: Accepted by Catherine M. Schrand.

Submitted: February 2015
Accepted: September 2015
Published Online: October 2015

quality—one derived using a disclosure "score-card" similar to Botosan (1997)—and the costs of both equity and debt either weaken considerably or disappear completely.[1]

Considerable prior cost of capital research relies on analysts' ratings of disclosure quality compiled by the Association for Investment Management Research (AIMR) ratings, which include a component related to annual reporting quality. FNO's results suggest the cost of capital benefits attributed to disclosure quality in research using AIMR ratings may actually be due to earnings quality. However, there are two reasons why FNO's conclusion may not extend to the studies that use the AIMR ratings of annual reports. First, the AIMR ratings may capture elements of disclosure quality not reflected in FNO's annual report measure. For instance, analysts' ratings may capture meaningful variation in how managers disclose information, and analysts' ratings may by influenced by a more comprehensive set of disclosure choices. Second, events occurring between 1996 (the final year of the AIMR ratings) and 2001 (FNO's sample year), such as the passage of Regulation Fair Disclosure and the bursting of the dot-com bubble, may have significantly altered firms' information environments in a way that reduced the importance of disclosure quality. As such, whether inferences in prior research using AIMR ratings are affected by earnings quality remains unknown.

To investigate this matter, we select three prominent studies documenting cost of capital benefits from higher-quality disclosures, measured using AIMR ratings. None of the three studies considers earnings quality, so we replicate their analyses after adding earnings quality to their designs. Given that FNO examine the cost of equity and cost of debt, we choose Botosan and Plumlee (2002) (cost of equity) and Sengupta (1998) (cost of debt). We also choose Welker (1995) (bid-ask spreads) since theory suggests one of the primary mechanisms through which disclosure reduces the cost of equity is via improved market liquidity (Amihud and Mendelson 1986; Diamond and Verrecchia 1991).[2] We choose these studies because (1) each uses the AIMR annual report ratings, which is important because FNO measure disclosure quality in annual reports; and (2) each study has significantly impacted disclosure research, as evidenced by their large number of citations.[3]

In brief, our results support the inferences reached in prior studies that higher disclosure quality is associated with lower costs of equity, smaller equity market bid-ask spreads, and lower costs of debt.[4] That is, inconsistent with FNO, our evidence suggests disclosure quality has a first-order effect on cost of capital constructs. However, consistent with FNO, our evidence also suggests that earnings quality is important in explaining costs of capital. We find that earnings quality is associated with all three cost of capital measures, although our evidence regarding earnings quality and bid-ask spreads is weak. Regarding economic impact, our results suggest that both disclosure quality and earnings quality are economically important in reducing capital costs. For example, a one-standard-deviation improvement in annual report quality (earnings quality) translates to a 77 basis-point (84 point) reduction in the cost of equity. For bid-ask spreads, disclosure quality is economically more important than earnings quality.

As discussed, differences between our and FNO's results can be explained by a difference in disclosure measure or a difference in sample period. Completely ruling out the latter would require the construction of FNO's hand-collected measure for the AIMR sample period, which is impractical given the absence of electronic filings for the majority of that period. Nevertheless, we conduct additional analyses that attempt to discriminate between the two explanations. Because FNO's results are strongest for the cost of equity, and for the sake of parsimony, we focus our additional analyses on equity capital costs.

We first investigate the relation between the cost of equity and five other measures of disclosure quality that capture aspects of *how* information in 10-K filings is disclosed—report length (Li 2008), report readability (Li 2008), the level of disaggregation in both the balance sheet and income statement (Chen et al. 2015), and a composite score of these four measures. We find evidence that shorter and more readable reports and more disaggregated financial statements all contribute to lower costs of equity. Perhaps more importantly, we find no significant differences in the cost of equity-disclosure quality relation between our sample period and FNO's. We corroborate this evidence with two additional analyses. Namely, we examine the relation between the cost of equity and disclosure quality (measured using AIMR scores) separately for each year of our sample period (1986 to 1996). If disclosure quality became less important over time, then we would likely observe a decline over that 11-year period in the ability of annual report disclosure quality to explain equity capital costs. While power is an issue in this test, we find no such trend and actually observe some evidence of an increase in the importance of disclosure for equity capital costs. Finally, we examine trends in variables likely associated with the importance of disclosure. For a constant set of firms similar to those studied in FNO, we examine over-time changes in analyst following (Botosan 1997), industry concentration (Baginski and Rakow 2012), and capital intensity (Baginski and Rakow 2012). We provide evidence that analyst

[1] FNO use the term "voluntary disclosure," while we generally use the term "disclosure quality." For our purposes, these two terms are synonymous, where increasing levels of each correspond to better and more forthcoming disclosure practices.

[2] Our replications are not exact. That is, due to data constraints, we are generally not able to use identical sample sizes, sample periods or, in some cases, variable construction. We follow prior research as closely as possible, and we are generally able to produce the inferences in the papers we replicate.

[3] See the "Background Literature and Hypothesis Development" section for a summary of this literature.

[4] One caveat is that we find the relation between disclosure quality and implied cost of equity is sensitive to how we specify the disclosure quality scores, although not to how we measure cost of equity. However, the sensitivity of our cost of equity results to how we measure disclosure quality does not depend on whether we include earnings quality among the explanatory variables.

following and industry concentration *decrease* over time, suggesting disclosure importance increases, even though capital intensity increases, which suggests the opposite. In total, this evidence is more consistent with the difference in disclosure measure playing the primary role in explaining differences in our results.

Our paper makes the following contributions. First, our paper provides important evidence regarding relations between disclosure, earnings quality, and costs of capital. As we note above, well-cited research (e.g., Welker 1995; Sengupta 1998; Botosan and Plumlee 2002) suggests better disclosures are associated with lower capital costs. However, FNO's results create uncertainty about whether results from prior disclosure cost of capital studies could be driven by earnings quality, not disclosure quality. Our results alleviate that uncertainty by showing that inferences from past influential research are largely unaffected by earnings quality. In fact, our study is a partial answer to the call by FNO that "further work is needed to fully explain conflicting evidence in the literature concerning relationships among these constructs [disclosure quality, earnings quality, and the cost of capital]" (Francis et al. 2008, 55). Developing a better understanding of these relations is especially important given the growing citations of FNO's results (e.g., Cheng, Liao, and Zhang 2013; Baginski and Rakow 2012; Dhaliwal, Khurana, and Pereira 2011; K. Chen, Z. Chen, and Wei 2011).

Second, we provide, to our knowledge, the first comparisons of the economic importance (i.e., marginal effects) of disclosure quality and earnings quality for costs of capital. Our estimates suggest that both disclosure quality and earnings quality are economically important in reducing costs of capital, after holding constant the effect of the other. Importantly, our results suggest disclosure quality is at least as important as earnings quality in explaining reductions in capital costs and, with respect to bid-ask spreads, perhaps more important than earnings quality.

Third, we offer a potential explanation for why disclosure measures like the AIMR ratings affect capital market costs in the presence of earnings quality while disclosure measures in FNO and Botosan (1997) do not. Specifically, FNO's hypothesis relies on disclosure quality being only a manifestation of the quality of information available to managers. Research suggests that the manner in which this information is delivered affects stock price efficiency and future stock returns (Lee 2012; Callen, Khan, and Lu 2013). In addition to potentially capturing disclosures beyond those in the FNO measure, AIMR ratings likely capture variation in how information is disclosed. This explanation is supported by our supplemental analyses of non-AIMR disclosure measures.

Finally, our paper provides evidence related to the current theoretical discussion regarding the association between information asymmetry and the cost of capital (e.g., Hughes, J. Liu, and J. Liu 2007; Lambert, Leuz, and Verrecchia 2007, 2011; Lambert and Verrecchia 2010; Christensen, de la Rosa, and Feltham 2010). Our evidence supports theory that suggests reductions in information asymmetry (via both higher disclosure *and* earnings quality) lead to lower costs of capital and improved liquidity.

The next section provides a summary of background literature and motivation for our research questions. The third section describes our research design, and the fourth section details the results of our analyses. We report additional analyses in the fifth section, and the sixth section concludes.

BACKGROUND LITERATURE AND HYPOTHESIS DEVELOPMENT

Disclosure Quality and the Cost of Capital

Cost of Equity

Early theoretical models generally support a negative relation between disclosure quality and the cost of equity for at least three reasons. First, more expansive disclosures can reduce information asymmetry and increase stock market liquidity, which reduces transaction costs (e.g., bid-ask spreads) and/or increases demand for the firm's securities. Lower transaction costs and higher demand, in turn, reduce the firm's cost of equity (Amihud and Mendelson 1986; Diamond and Verrecchia 1991). Second, greater disclosure quality reduces investors' risk of error when estimating the parameters of an asset's payoff distribution (Barry and Brown 1985; Coles, Loewenstein, and Suay 1995). Estimation risk increases the cost of equity if investors are unable to diversify it away (Clarkson, Guedes, and Thompson 1996). Third, in rational expectations models, investors interpret nondisclosure as bad news and discount the value of the firm (e.g., Verrecchia 1983).

Recently, the theoretical mechanisms by which reductions in information asymmetry, including those attributable to increased disclosure, contribute to lower costs of equity have been challenged. Namely, Hughes et al. (2007) argue that, in large economies, information asymmetry risk is diversifiable and, therefore, should not influence the cost of capital in the cross-section. Similarly, Christensen et al. (2010) allow for an *ex post* reduction in the cost of equity attributable to increased disclosure, but they contend this benefit is offset by an equal increase in the cost of capital in the period leading up to disclosure. However, other recent theoretical research supports the link between the cost of equity and disclosure quality. For instance, Lambert et al. (2007) show that information asymmetry impacts the cost of capital both directly and indirectly through its effect on a firm's real decisions that alter the distribution of future cash flows. Further, Lambert and Verrecchia (2010) and

Lambert et al. (2011) model security markets with imperfect competition and find that information asymmetry can affect capital costs. Their results suggest that the applicability of theory suggesting no link between information asymmetry and the cost of capital is limited to perfectly competitive markets.

Most empirical evidence supports the notion that higher-quality and more transparent financial disclosures garner cost of equity benefits. Botosan (1997) finds more extensive disclosures by 122 machinery-industry firms are negatively related to equity capital costs, but only for firms with low analyst following. She concludes that the benefits of high disclosure quality arise only in the presence of heightened information asymmetry. Using the AIMR ratings, which allows a larger sample and longer sample period than Botosan (1997), Botosan and Plumlee (2002) find that firms with better AIMR annual report ratings have lower costs of equity. Leuz and Verrecchia (2000) document cost of capital benefits for firms that switched from German to international reporting regimes, which involved increased levels of disclosure. Baginski and Rakow (2012) find that a high-quality management forecasting policy is negatively associated with the cost of equity. Similarly, Li and Zhuang (2012) find high-quality management guidance is associated with reduced underpricing of seasoned equity offerings, presumably reflecting lower costs of equity. Finally, Chen et al. (2015) link more disaggregated financial statements with lower costs of equity.

As we note previously, one of the conduits through which theoretical work suggests better disclosure can reduce equity capital costs is via improved equity market liquidity. Empirically, researchers often measure equity market liquidity using bid-ask spreads, and research supports the notion that better disclosures reduce bid-ask spreads. For example, Welker (1995), Healy, Hutton, and Palepu (1999), and Heflin, Shaw, and Wild (2005) all find that firms with higher AIMR scores exhibit lower bid-ask spreads. Similarly, Bushee and Leuz (2005) show that a regulatory change increasing the mandated disclosures for firms traded via the Over-the-Counter Bulletin Board (OTCBB) resulted in permanent increases in liquidity. Finally, Balakrishnan, Billings, Kelly, and Ljungqvist (2014) find that, following a loss of public information (reduction in analyst coverage), managers increase liquidity by issuing earnings guidance. In total, theoretical and empirical research suggests better-quality disclosures reduce the cost of equity, in part by reducing bid-ask spreads.

Cost of Debt

Lenders differ from investors in at least two important ways. First, unlike stockholders, lenders face only downside risk. Downside risk generally reduces the importance of accounting information related to future growth opportunities.[5] Second, the benefits of increased liquidity are subtler, as open market buying and selling of debt occurs less frequently than equity. Nevertheless, similar theoretical arguments supporting a disclosure quality-cost of equity relation also support a disclosure quality-cost of debt relation, as lenders are subject to similar estimation risk concerns as equity holders. Namely, higher-quality disclosures should increase the accuracy of lenders' assessments of default risk. Thus, firm disclosures that improve the precision of information about the firm plausibly lead to reduced costs of debt.

Sengupta (1998) proposes another potential reason why improved disclosure decreases the cost of debt. He suggests that lenders and underwriters likely consider a firm's disclosure policy and, in the eye of the lender, a lack of disclosure increases the probability the firm is withholding relevant, unfavorable, private information. This signal increases default risk, which increases the risk premium, and therefore the cost of debt. Sengupta's (1998) empirical analyses suggest that firms with higher disclosure quality, measured using total AIMR ratings, have lower yields to maturity and lower total interest costs on new debt. Additionally, Francis, Khurana, and Pereira (2005a) find that firms with higher disclosure quality levels, measured using Center for International Financial Analysis and Research disclosure data, enjoy a lower cost of debt across various countries.

Earnings Quality, Costs of Capital, and Disclosure Quality

FNO define earnings quality as "the precision of the earnings signal emanating from the firm's financial reporting system" (Francis et al. 2008, 54). Compared to firms with poor earnings quality, the reported earnings of high earnings quality firms provide more information to investors about a firm's financial performance (Dechow, Ge, and Schrand 2010). Prior empirical research generally finds that firms with higher earnings quality enjoy lower costs of equity and debt and smaller bid-ask spreads.[6] For example, Francis, Lafond, Olsson, and Schipper (2004) investigate the relation between the cost of equity and several attributes of earnings, such as accruals quality, persistence, value relevance, and conservatism, and find that most relate negatively to the cost of equity. Aboody, Hughes, and Liu (2005) and Francis, LaFond, Olsson, and Schipper (2005b)

[5] An exception is the degree to which these elements relate to default risk. For example, creditors are interested in accounting information that informs them about future growth opportunities if those growth opportunities can reduce (or increase) default risk.

[6] Although earnings quality and disclosure quality are different constructs, the theoretical connection between each and the cost of equity capital is information risk. That is, if information risk is priced, then both better-quality earnings and higher-quality disclosures can reduce investors' information risk (for example, by providing investors with either more accurate or precise predictions of future payoffs or by reducing information asymmetry between investors). See discussions in Francis et al. (2004) and Botosan and Plumlee (2002).

find that earnings quality is a priced risk factor. Francis et al. (2005a) find better earnings quality is associated with higher credit ratings, indicating lower costs of debt. Barth, Konchitchki, and Landsman (2013) find that firms with more transparent earnings (i.e., the extent to which earnings and change in earnings co-vary with returns) experience lower costs of equity. Finally, Bhattacharya, Ecker, Olsson, and Schipper (2012) document a negative relation between earnings quality and bid-ask spreads.

Theory and evidence on the relation between earnings quality and disclosure is mixed. For instance, Diamond and Verrecchia (1991) suggest that, because disclosure reduces information asymmetry, firms with greater information asymmetry increase disclosure. Therefore, if firms with poorer earnings quality have higher information asymmetry, as suggested by Bhattacharya et al. (2012), then Diamond and Verrecchia's (1991) model implies a negative relation between earnings quality and disclosure. However, theory also predicts that disclosure increases with the likelihood that a manager is privately informed since the market interprets nondisclosure as bad news and, in turn, discounts firm valuation (Dye 1985; Jung and Kwon 1988). If managers of firms with high earnings quality are more informed, then earnings quality and disclosure should be positively related. Empirical evidence also supports both a positive and negative relation between earnings quality and disclosure quality. For instance, Tasker (1998) finds a negative relation between conference calls, a measure of disclosure quality, and an industry-based measure of earnings informativeness. In contrast, FNO find that earnings quality (derived from Dechow and Dichev [2002], the modified Jones [1991] model abnormal accruals, and earnings variability) complements disclosure quality in annual reports.

FNO suggest that the association between disclosure quality and the cost of equity is a second-order effect. They note that disclosure theory generally treats information quality as the primitive construct and disclosure quality as a response to information quality. FNO use earnings quality as a proxy for information quality. Consequently, they argue that earnings quality is the more primitive (relative to disclosure quality) driver of the cost of capital benefits previously attributed to disclosure quality. Consistent with this conjecture, they find negative associations between disclosure quality and the costs of equity and debt weaken or disappear completely after conditioning on earnings quality.

Implications

FNO's results suggest that prior empirical studies of disclosure and costs of capital potentially suffer from a correlated omitted variable problem since earnings quality and disclosure quality are related.[7] Extensive empirical research on disclosure and costs of capital uses the AIMR ratings to measure disclosure. Thus, FNO's results suggest this research may have reached conclusions they otherwise would not have if they had considered the effects of earnings quality and disclosure quality simultaneously.

However, there are two reasons why FNO's conclusion may not extend to the studies that use the AIMR ratings. First, the AIMR ratings may capture dimensions of disclosure quality not reflected in FNO's measure of voluntary disclosure in annual reports (i.e., a difference in measure). Second, differences in firms' information environments between FNO's sample period (2001) and the period over which AIMR ratings were generated (early 1980s to 1996) may have altered the relation between cost of equity and disclosure quality (i.e., a difference in sample period). We discuss each of these reasons in more detail next.

As mentioned previously, FNO, following Botosan (1997), use a self-constructed measure of disclosure quality that captures whether a firm discloses various items in an annual report. Disclosures have three primary dimensions: (1) *what* information is disclosed (which FNO's proxy captures, albeit limited to the list of items they track), (2) *how* that information is disclosed (i.e., clarity, readability, level of detail, etc.), and (3) *when* that information is disclosed.[8] Disclosure in annual reports holds timing approximately constant. Thus, the component of the AIMR ratings related to annual reports and FNO's measure are likely very similar on the "when disclosed" dimension. As a count variable, FNO's measure primarily captures *what* firms disclose, but not *how* they disclose that information. Further, FNO's measure is based on a fairly limited set of items. Each component of the AIMR scores, however, likely captures both what information is disclosed and how this information is disclosed. In other words, when reviewing disclosures, analysts are likely influenced both by the amount of items disclosed and by how managers disclose items. Regarding how managers disclose, when rating firms' annual report disclosures, it seems likely analysts would be influenced by the clarity of managers' descriptions of events during the period, the tone managers use when describing a transaction or event, the context of a transaction or event, and additional detail. In fact, the AIMR explicitly

[7] In order for the omission of earnings quality to cause positive bias in the estimate of the disclosure quality coefficient in a regression of cost of capital on disclosure quality, earnings quality and disclosure quality must be positively correlated. Indeed, we find that AIMR disclosure ratings and earnings quality are positively correlated (see Table 2).

[8] As discussed in Li (2008), the SEC has issued guidance on improving the understandability of annual reports, suggesting SEC staff recognize the importance of clarity in disclosures. Further, the SEC mandates timely public disclosure of material events, supporting the notion that "when" information is disclosed is also important.

instructed analysts to consider the clarity of the president's letter and financial highlights, the objectivity of management's review of the year, and how well segment disclosures paralleled actual lines of business (Byard and Shaw 2003). Analysts also plausibly consider a greater range of what is disclosed than is captured by the FNO measure. A perusal of the instructions provided to analysts by the AIMR reveals several items that the AIMR instructed analysts to consider when rating firms' disclosures that are not in the FNO list. A non-exhaustive list includes new products, principal personnel changes, and various information about acquisitions and divestitures.[9] These additional aspects of disclosure potentially captured by the AIMR ratings may not be influenced by the quality of managers' information. If this is the case, then the AIMR ratings of disclosure quality could capture aspects of the firm's information environment that earnings quality does not.

Alternatively, changes in the information environment over time may have rendered disclosure quality, in general, less important, at least in the presence of earnings quality. FNO's sample period is 2001, while the AIMR ratings extend from the early 1980s through 1996. Several economic changes occurred between the AIMR sample period and 2001. Most notably, the AIMR sample period encompasses a period of considerable economic expansion and rising stock prices. Relatedly, this expansionary period concludes in 2001 with the bursting of the dot-com bubble. 2001 is also the first full calendar year following the enactment of Regulation Fair Disclosure in Fall 2000. These economic changes may have made variation in disclosure in annual reports, relative to the quality of earnings, less important in reducing information asymmetry and estimation risk.

As mentioned previously, we replicate three studies—Botosan and Plumlee (2002), Welker (1995), and Sengupta (1998)—documenting benefits of higher-quality disclosures. In addition to being influential and widely cited, all three of these studies employ AIMR ratings as their measure of disclosure, making them appealing for three additional reasons.[10] First, we can more easily replicate these studies since all three use the same measure of disclosure quality and because that measure (the AIMR ratings) is available to us. Second, the consistency of disclosure measurement facilitates comparisons across these studies. For example, if we observe differences between results from tests using cost of equity and tests using cost of debt, then those differences are not attributable to differences in how disclosure is measured. Third, the AIMR ratings include a component based on annual reporting quality, which should capture a dimension of disclosure similar to FNO.

PRIMARY VARIABLES AND SAMPLE

Disclosure Ratings

As previously discussed, we measure the quality of a firm's disclosures using the AIMR reports from the Corporate Information Committee's *Annual Reviews of Corporate Reporting Practices*.[11] These reports are sometimes referred to as *Reports of the Financial Analysts Federation Corporate Information Committee,* or FAF Reports. From the early 1980s to 1996, industry-expert analysts conducted evaluations of the adequacy of firms' disclosures across three venues (discussed shortly). These disclosure ratings carry both advantages and disadvantages relative to self-constructed disclosure scores, as used in FNO and Botosan (1997).

The advantages of using AIMR ratings as a measure of disclosure quality, relative to a self-constructed measure, are as follows. First, the ratings provide a comprehensive measure of firm disclosure, including both the quality of formal disclosures (annual reports) and the quality of informal disclosures (those made at analyst meetings), which is more difficult to capture in a self-constructed index (Healy et al. 1999). Second, industry-expert analysts produce AIMR ratings and, therefore, potentially capture nuances academic researchers do not (Healy and Palepu 2001). Third, unlike self-constructed measures, the AIMR ratings are widely available, making any conclusions drawn easily replicable (Healy and Palepu 2001). Fourth, because the AIMR produced the scores for over a decade, studies employing the scores are not limited to short time spans, as are most studies employing hand-collected disclosure measures (e.g., Francis et al. 2008; Botosan 1997).

Limitations of the AIMR ratings include the following: First, we cannot fully understand how the ratings are constructed, the motivations of the analysts compiling ratings, how firms are chosen for the ratings, or whether analysts take the rating process seriously (Leuz and Verrecchia 2000; Healy and Palepu 2001).[12] Second, the ratings reflect analysts' perceptions of firm

[9] See Byard and Shaw (2003, Appendix) for more detail about the instructions provided to analysts by the AIMR. See Francis et al. (2008, Table 1) for the FNO coding scheme.

[10] FNO follow Botosan (1997) in constructing their disclosure measure and, while Botosan (1997) has been more influential (i.e., has more citations) than the three studies we replicate and extend, the three papers we follow are extremely influential in their own right. For example, Google Scholar reports over 1,200 citations of both Botosan and Plumlee (2002) and Sengupta (1998) and over 900 citations of Welker (1995).

[11] We thank Christine Botosan for graciously providing the AIMR ratings used in this study.

[12] Any bias in the ratings, however, only biases inferences about disclosure quality to the extent the bias co-varies cross-sectionally with cost of capital variables. For example, if all scores are biased downward or upward, then inferences should be unaffected (Lang and Lundholm 1993). Further, individual analysts' evaluations are not public, reducing individual analysts' incentives to produce disclosure ratings that please managers.

disclosure quality, which potentially differ from the perceptions of other market participants, such as investors. Third, AIMR-rated firms are large, potentially limiting generalizability. Fourth, the AIMR ratings are only available for a limited number of years, ending around 1996, which precludes researchers from examining disclosure relations using a more recent sample period. Despite these limitations, the AIMR ratings are well accepted by researchers and have had considerable impact on financial research. A Google Scholar search of the phrase "AIMR Disclosure Ratings" identifies more than 1,400 research papers, and they continue in use despite their datedness (e.g., see Huang and Zhang 2012; Dhaliwal et al. 2011; Mansi, Maxwell, and Miller 2011; Drake, J. Myers, and L. Myers 2009; Jiang, Xu, and Yao 2009). Finally, using a different measure of disclosure quality would make it impossible to assess the impact of earnings quality on the inferences in the papers we replicate.

The AIMR disclosure ratings reflect analysts' assessments of firms' disclosures in three distinct venues. For the "annual published and required information" category ($AR_{i,t}$), analysts rated firms on the completeness and clarity of their annual report to shareholders and the 10-K reports filed with the U.S. Securities and Exchange Commission. For the "quarterly and other published information not required" category ($OP_{i,t}$), analysts rated firms' other disclosures including quarterly reports to shareholders and related 10-Qs, proxy statements, and press releases. For the "investor relations" (sometimes called "other aspects") category ($REL_{i,t}$), analysts rated firms on managements' availability to analysts, candidness in interviews, and other related items (Botosan and Plumlee 2002; Lang and Lundholm 1993). Of the three AIMR components, annual report quality likely corresponds most closely with FNO's measure because FNO construct their measure from disclosures in firms' annual reports. Nonetheless, for completeness, we analyze the total and all three components in our main tests.

When analysts rate the various disclosure categories for each industry, they assign a weight to each disclosure category for that industry based on guidance from the FAF. The sum of the products of the weight and score for each component yields a total disclosure score ($DISCL_{i,t}$). Thus, the overall score reflects not only the quality of each disclosure category, but also its relative importance to firms in an industry. Pooling all un-weighted percentages collectively would result in information loss since certain disclosure categories are more important for some industries than others, making the relation between the capital costs and the disclosure component nonlinear. Considering the likelihood that the weights assigned by analysts capture important information, using the weighted AIMR scores scales the respective disclosure score by the relative importance, as deemed by industry experts. Thus, in our primary analyses, we use the weighted AIMR scores (i.e., those that sum to $DISCL_{i,t}$) rather than the un-weighted raw percentages. However, we conduct sensitivity tests using un-weighted scores (see the "Results" section).

To match the AIMR scores with financial statement data from Compustat and stock data from CRSP, we follow Botosan and Plumlee (2002) and assume the AIMR reports are issued in the fourth quarter of each year and those reports take into account disclosures made in the 12-month period ending on June 30 of that year. Thus, we match each set of disclosure scores to Compustat data corresponding to the fiscal year ending in the 12 months prior to July 1 of the year of the AIMR report.[13]

Earnings Quality

We follow FNO in constructing our earnings quality measure, $EQ_{i,t}$. That is, $EQ_{i,t}$ is the common factor from a factor analysis of three commonly used measures of earnings quality ($EQ1_{i,t}$, $EQ2_{i,t}$, and $EQ3_{i,t}$, defined next), each measured over a ten-year horizon. This single factor captures 90 percent of the variation common to $EQ1_{i,t}$, $EQ2_{i,t}$, and $EQ3_{i,t}$. $EQ1_{i,t}$ is the standard deviation of income before extraordinary items, scaled by assets, for firm i over the ten years ending in fiscal year t. $EQ2_{i,t}$ is the ten-year average of the absolute value of modified Jones model abnormal accruals (Jones 1991; Dechow, Sloan, and Sweeney 1995). In each year, we estimate the cross-sectional modified Jones model for each industry with at least 15 firms. We use the 48 industries from Fama and French (1997). $EQ3_{i,t}$ is the absolute value of the firm-specific residual from the McNichols (2002) modification of the Dechow and Dichev (2002) accruals quality regression.[14] Note that all three proxies inversely measure earnings quality, so the common factor ($EQ_{i,t}$) from $EQ1_{i,t}$, $EQ2_{i,t}$, and $EQ3_{i,t}$ is also an inverse measure of earnings quality. For ease of exposition and interpretation, we multiply $EQ_{i,t}$ by -1.

Cost of Equity, Cost of Debt, and Bid-Ask Spread

Cost of Equity (COE)

Botosan and Plumlee (2002) estimate implied cost of equity in year t by setting the current price equal to the sum of the present values of Value Line estimates of dividends over years $t+1$ through $t+4$ and the price target in period $t+4$. We use cost of equity estimates derived in Brav, Lehavy, and Michaely (2005) and made publicly available by Professor Brav.[15] His cost of

[13] Botosan and Plumlee (2002, footnote 6) describe this time alignment issue in more detail.

[14] We use fiscal years t–9 to t–1 to measure $EQ3_{i,t}$, which requires cash flow data from t–10 to t.

[15] Professor Brav graciously makes his estimates publicly available at: https://faculty.fuqua.duke.edu/~brav/RESEARCH/data_files/ANNUAL_ER_VL.dat. Research budget constraints prevent us from accessing the original data and compiling our own estimates.

equity estimates are derived from Value Line target price and dividend estimates using a discounted dividend growth model. As Francis et al. (2004) note, the Brav et al. (2005) estimates are qualitatively similar to Botosan and Plumlee's (2002) estimates. Our descriptive statistics (discussed later) support the similarity between the Brav et al. (2005) and Botosan and Plumlee (2002) estimates. We match AIMR scores with the earliest cost of equity estimate available after June 30 of the year of the AIMR report.

*Cost of Debt (*COD*)*

Sengupta (1998) measures costs of debt by obtaining bond yields and bond ratings from Moody's Investment Service. Measuring debt costs in this way has two consequences. First, the data must be hand collected for our sample period. Second, not all companies with other required data will have bond ratings or yield information available from Moody's. Both of these consequences reduce sample size.[16] Instead, we employ Standard & Poor's (S&P) long-term issuer credit ratings, which are available through Compustat, to proxy for debt costs. Much research links credit ratings to costs of debt (e.g., Ederington, Yawitz, and Roberts 1987; Hand, Holthausen, and Leftwich 1992; Ziebart and Reiter 1992), and prior research uses credit ratings as a proxy for debt costs (e.g., Jiang 2008; Francis et al. 2005b; Ahmed, Billings, Morton, and Stanford-Harris 2002).[17]

*Bid-Ask Spread (*SPREAD*)*

Welker (1995) uses the natural log of the quoted spread as his primary measure. However, other research (e.g., Lin, Sanger, and Booth 1995; Huang and Stoll 1997) recognizes that many trades are executed inside bid and ask quotes, resulting in actual spreads paid by investors that are nontrivially smaller than quoted spreads. In recognition of this, Heflin et al. (2005) use effective spreads and find that they, like the quoted spreads in Welker (1995), are negatively related to AIMR disclosure ratings. For these reasons, we use the natural log of effective spreads (scaled by the midpoint of the bid and ask quotes at the time of the transaction) in our analyses.[18]

Sample Construction

Our sample for all three analyses (cost of equity, cost of debt, and bid-ask spread) begins with the AIMR disclosure ratings. We use the AIMR ratings from 1986 to 1996, providing 11 years of disclosure data. Like Botosan and Plumlee (2002), we begin with 4,705 firm-year observations having at least a total disclosure score and 3,095 firm-year observations with disclosure component scores. Given that each of our three analyses imposes different data requirements (described in the "Results" section), final sample sizes for each analysis vary. Table 1 displays descriptive statistics for each sample.

For the cost of equity analyses, our final sample totals 1,776 observations with total disclosure scores and 1,671 observations with disclosure component scores. Our cost of equity sample of 1,776 (1,671) firm-year observations with total (component) disclosure scores is substantially lower than Botosan and Plumlee (2002), who report a sample of 3,618 (2,706) observations. The primary reason our sample is smaller than theirs is that we require that each firm-year observation has sufficient time-series data to compute earnings quality. Without the earnings quality data requirements, our sample size is a much more comparable 3,532 (2,477) observations for the total (component) disclosure score analyses. The remaining differences are due to the lack of cost of equity estimates (we obtain them from Professor Brav's website). For firms with missing cost of equity estimates, we are either unable to locate the firm in Brav's data, or we can locate the firm but there is no cost of equity estimate within one year of the AIMR report date. Descriptive statistics, reported in Panel A of Table 1, suggest our sample is very similar to Botosan and Plumlee's (2002). Our mean (median) cost of equity (*COE*) is 15.5 (14.8) percent, while theirs is 16.5 (15.6) percent.

Since we use the effective spreads from Heflin et al. (2005), our bid-ask spread sample is limited to the period in that study (1988–1992), resulting in 626 (607) firm-years with total (component) disclosure scores. Our bid-ask spread sample of roughly 600 firm-year observations is substantially lower than that of Welker (1995), who reports 1,639 observations. Our shorter sample period (1988–1992 versus 1983–1990) and data requirements to compute earnings quality account for the difference. Panel B of Table 1 shows descriptive statistics for our bid-ask spread sample and these statistics are similar to those in prior research.

[16] Regarding sample size, Sengupta (1998, Table 1) reveals that requiring data from Moody's results in a loss of 54 percent of his observations.

[17] Further, Heflin, Shaw, and Wild (2011) produce the same inferences as Sengupta (1998) regarding costs of debt and AIMR disclosure ratings using Standard & Poor's long-term issuer credit ratings to proxy for debt costs. Like Heflin et al. (2011), we set $COD_{i,t}$ equal to 1 for AAA through AA– ratings; 2 for A+ through A– ratings; 3 for BBB+ through BBB– ratings; 4 for BB+ through BB– ratings; and 5 for B+ through CC ratings.

[18] We thank Frank Heflin, Ken Shaw, and John Wild for making their effective spread data available to us.

TABLE 1

Descriptive Statistics

Panel A: Cost of Equity Sample

	n	Mean	Std. Dev.	25%	50%	75%
COE	1,776	0.155	0.065	0.112	0.148	0.191
DISCL	1,776	73.856	13.083	65.800	76.000	83.300
AR	1,671	32.515	7.777	27.800	32.300	36.700
OP	1,671	19.812	4.877	16.300	20.280	23.300
REL	1,671	22.065	7.160	16.900	21.88	27.000
EQ	1,776	0.100	0.557	0.479	0.236	−0.139
LMVE	1,776	7.666	1.335	6.790	7.640	8.538
LBTM	1,776	−0.753	0.595	−1.101	−0.695	−0.356
BETA	1,776	1.074	0.337	0.877	1.103	1.278

Panel B: Bid-Ask Spread Sample

	n	Mean	Std. Dev.	25%	50%	75%
SPREAD (*unlogged*)	626	0.005	0.005	0.001	0.004	0.005
DISCL	626	74.334	11.528	66.700	76.000	83.000
AR	607	32.756	7.074	28.300	32.700	36.700
OP	607	20.179	4.529	16.900	20.700	23.400
REL	607	21.379	6.385	17.000	21.250	25.000
EQ	626	0.018	0.605	0.444	0.167	−0.237
STDRET	626	0.020	0.007	0.015	0.018	0.024
VOL	626	10.814	13.864	2.140	5.779	13.786
PRC	626	42.654	33.895	25.375	35.625	51.125
LOW	626	−0.334	1.452	0.000	0.000	0.000
HI	626	2.303	19.436	0.000	0.000	0.000

Panel C: Cost of Debt Sample

	n	Mean	Std. Dev.	25%	50%	75%
COD	1,354	2.221	1.028	1.000	2.000	3.000
DISCL	1,354	74.512	13.169	66.800	77.000	84.000
AR	1,275	32.592	7.795	28.000	32.700	36.500
OP	1,275	20.079	4.735	16.600	20.900	23.700
REL	1,275	22.107	6.915	17.100	22.000	27.000
EQ	1,354	0.052	0.594	0.474	0.200	−0.206
DE	1,354	0.519	0.809	0.154	0.343	0.599
LASSET	1,354	8.045	1.057	7.321	8.051	8.758
TIE	1,354	4.661	7.453	1.894	3.146	5.493
ROA	1,354	0.157	0.065	0.116	0.152	0.195
MTB	1,354	2.560	2.341	1.384	1.968	3.037
STDRET	1,354	0.018	0.007	0.014	0.017	0.021
RET	1,354	−0.170	0.345	−0.389	−0.158	0.062

This table presents the descriptive statistics. Panel A consists of the sample of firms used in the cost of equity analyses, Panel B consists of the sample of firms used in the bid-ask spread analyses, and Panel C consists of the sample of firms used in the cost of debt analyses.

Variable Definitions:

COE = cost of equity estimates derived from Value Line analyst forecasts of future dividends;

SPREAD = the natural log of the average relative effective spread across all of a firm's eligible transactions in each year. Following Heflin et al. (2005), we measure a transaction's relative effective spread as twice the absolute value of the difference between the executed price and the midpoint of the bid and ask quotes, scaled by the midpoint of the bid and ask quotes at the time of the transaction;

COD = cost of debt, measured as the S&P domestic long-term issuer credit rating, obtained from Compustat. We then categorize these ratings into five categories for use by our ordered logit regression models, with 1 being the highest debt quality and 5 being the lowest debt quality. See footnote 17 for this categorization;

(continued on next page)

TABLE 1 (continued)

DISCL = the total AIMR disclosure score;
AR = the weighted annual report component of the total AIMR score;
OP = the weighted other publication component of the total AIMR score;
REL = the weighted investor relations component of the total AIMR score;
EQ = common factor derived from three different proxies for earnings quality. See the "Primary Variables and Sample" section for a more detailed description;
LMVE = the natural logarithm of market value of equity measured on December 31 of the year preceding the AIMR report;
LBTM = the natural logarithm of book to market ratio measured on the fiscal-year end date;
BETA = the beta coefficient from estimating the firm-specific market models. We require at least 30 months of returns data in the five years preceding the AIMR report date. For firms lacking this 30 months, we use the industry average beta for that period;
STDRET = the standard deviation of daily returns from the calendar year prior to the AIMR report release;
VOL = the average daily dollar value of trading volume over the calendar year prior to the AIMR report release;
PRC = the average of the bid and ask prices on the last trading day of the calendar year preceding the AIMR report release;
$HI = IHI * \{PRICE - 100)$, where *IHI* is an indicator variable taking on a value of 1 if the company mean share price is greater than \$100, and a value of 0 otherwise;
$LOW = ILOW * \{PRICE - 12.5)$, where *ILOW* is an indicator variable taking on a value of 1 if the company mean share price is less than \$12.50, and a value of 0 otherwise;
DE = the debt to equity ratio, computed as total long-term debt divided by the market value of equity at the end of the fiscal year;
LASSET = the natural logarithm of total assets at the end of the fiscal year;
TIE = times interest earned, computed as income before extraordinary items plus interest expense, divided by interest expense;
ROA = earnings before interest, taxes, depreciation, and amortization, divided by total assets;
MTB = the ratio of market value to book value of the firm's equity at the end of the fiscal year; and
RET = the firm's market-adjusted stock return cumulated over the calendar year preceding the AIMR release.

Our cost of debt sample contains 1,354 observations with total scores and 1,275 observations with component scores. Our cost of debt sample size is slightly lower than Sengupta's (1998) sample of 1,704 firm-year observations, largely because of data we require for computing our earnings quality measure. Our sample is slightly more profitable than Sengupta's (1998). From Panel C of Table 1, our sample's mean (median) times-interest-earned (*TIE*) is 4.66 (3.15) and mean (median) return-on-assets (*ROA*) is 0.16 (0.15). Sengupta (1998) reports mean (median) times-interest-earned and return-on-assets of 3.66 (2.52) and 0.04 (0.04), respectively. We conjecture that data requirements for computing earnings quality results in a sample of more profitable firms.

Finally, we note that both the total disclosure scores and their components are roughly the same for all three (equity, debt, and spread) sample groups. The other variable common to all three analyses, earnings quality, is also similar across the three samples. Thus, there appear to be no systematic differences in disclosure levels or earnings quality across the three samples.

RESULTS

Preliminary Analyses

We provide a correlation matrix of our primary variables in Table 2. Insignificant correlation coefficients are italic. We find correlations between each measure of disclosure quality (*DISCL, AR, OP, REL*) and earnings quality (*EQ*) are generally significantly positive, which suggests higher disclosure quality is associated with higher earnings quality.[19] This supports the evidence provided by FNO of a complementary relation between disclosure and earnings quality. Moreover, the correlation coefficients in Table 2 provide preliminary evidence that both earnings quality (*EQ*) and annual report quality (*AR*) are associated with lower costs of equity (*COE*), bid-ask spreads (*SPREAD*), and costs of debt (*COD*), collectively suggesting that both earnings and disclosure quality in annual reports potentially play a role in cost of capital reductions.

Prior to estimating our multivariate models, we conduct an analysis that does not impose a specific functional form on the relation between costs of capital and our disclosure and earnings quality variables. Specifically, for each capital market cost measure (*COE, SPREAD,* and *COD*), we tabulate average values within each quartile of disclosure quality (*DISCL*) and earnings quality (*EQ*). Within each panel of Table 3, the higher-numbered quartiles of *DISCL* (*EQ*) represent higher-quality disclosures (earnings). The t-statistics reported at the bottom of each panel test the difference between mean capital cost measures in the high versus low quartiles of disclosure quality (conditioned on earnings quality), and the t-statistics reported at the far right of each panel test the difference in mean capital cost measures in the high versus low quartiles of earnings quality (conditioned on disclosure quality). Inferences from FNO suggest that we should observe significantly greater average values

[19] The lone exception is the Pearson correlation between *REL* and *EQ*, which is insignificant.

TABLE 2

Correlation Matrix

	DISCL	*AR*	*OP*	*REL*	*EQ*	*COE*	*SPREAD*	*COD*
DISCL	1	0.683	0.588	0.658	0.156	*0.000*	−0.165	−0.227
AR	0.621	1	0.203	0.090	0.104	−0.132	*0.015*	−0.084
OP	0.567	*0.014*	1	0.244	0.088	*0.012*	−0.236	−0.210
REL	0.619	−0.096	0.277	1	0.097	0.149	−0.177	−0.154
EQ	0.170	0.172	0.122	*−0.024*	1	−0.145	−0.154	−0.348
COE	−0.050	−0.057	*−0.018*	*−0.011*	−0.207	1	0.192	*0.061*
SPREAD	−0.206	−0.105	−0.140	−0.113	−0.364	0.319	1	0.487
COD	−0.194	−0.062	−0.179	−0.147	−0.329	0.127	0.393	1

This table presents the Spearman (upper) and Pearson (lower) correlations between the primary variables of interest. Insignificant correlation coefficients are in italic.

Variable Definitions:
DISCL = the aggregate disclosure quality from the AIMR disclosure ratings;
AR, OP, and *REL* = the annual report, other publications, and investor relations components of *DISCL,* respectively;
EQ = earnings quality measured as in FNO;
COE = cost of equity, measured as in Brav et al. (2005);
SPREAD = the natural log of the average relative effective spread across all of a firm's eligible transactions in each year; and
COD = the cost of debt, measured as the S&P domestic long-term issuer credit rating, condensed into five categories.

for *COE, SPREAD,* and *COD* in lower quartiles of *EQ* than in higher quartiles. Further, if *EQ* is indeed the more primitive construct, then we should not observe a significant *DISCL* effect once conditioning on *EQ*.

Panel A (B) of Table 3 tabulates this analysis for *COE* using *DISCL* (*AR*) to measure disclosure quality. We use one-tailed tests of significance. Note that for *COE,* we analyze annual reporting quality (*AR*) in addition to total disclosure rating (*DISCL*) because Botosan and Plumlee (2002) conclude that only the annual reporting quality component of the AIMR score provides a cost of equity benefit. Panel A of Table 3 reports results generally consistent with FNO. That is, moving from the lowest to highest quartile of *EQ* results in a significant *COE* reduction both for the total sample ($p < 0.01$) and within each quartile of *DISCL* ($p \leq 0.01$). However, while the benefit of higher-quality disclosures is evident for the full sample ($p = 0.01$), *COE* differences in high versus low *DISCL* quartiles conditioned on *EQ* are generally not significant, with the lone exception being within the second quartile of earnings quality ($p = 0.01$). Thus, for total disclosure quality, our preliminary analysis supports conclusions in FNO. However, we interpret this result with caution since Botosan and Plumlee (2002) find no relation between the total AIMR score and the cost of equity.

Panel B of Table 3 repeats the analysis in Panel A using quartiles of *AR,* the annual report component of the total AIMR. Botosan and Plumlee (2002) find that *AR* is associated with lower costs of equity. Similar to Panel A, we observe a significant benefit of higher *EQ,* as the means of *COE* in high *EQ* quartiles are significantly lower than in low *EQ* quartiles ($p = 0.01$ or better) in all comparisons. Unlike in Panel A, higher disclosure quality, in this case annual report quality, appears to be associated with significantly lower costs of equity in three of the four *EQ* partitions (p-values between 0.001 and 0.05).[20] In sum, we generally observe significant improvements in *COE* attributable to the quality of a firm's annual reporting quality after controlling for earnings quality.

We next repeat the analyses reported in Panels A and B of Table 3 using our two other capital cost measures—*SPREAD* and *COD*. For *SPREAD* (Panel C), we observe significant reductions attributable to both *EQ* and *DISCL* for the total sample ($p < 0.01$). Moving from the lowest to highest quartile of *EQ* (*DISCL*) within a quartile of *DISCL* (*EQ*) results in a statistically significant reduction in *SPREAD* in three of the four partitions. Interestingly, the only time we do not observe a significant reduction in *SPREAD* attributable to *EQ* (*DISCL*) is in the highest quartile of *DISCL* (*EQ*). In other words, high-quality earnings (disclosures), substantially mutes the benefit of high-quality disclosures (earnings).[21] Nevertheless, we interpret Panel C as suggesting both *EQ* and *DISCL* play important roles in determining a firm's bid-ask spread. Panel D of Table 3 reports mean *COD* values across *DISCL* and *EQ* quartiles. All differences across quartiles are highly significant ($p < 0.01$), suggesting that higher values of *DISCL* and *EQ* offer distinct benefits in reducing the cost of debt.

[20] We refrain from assessing economic significance of *EQ* and *AR* at this point, as the analyses we report in Table 3 do not control for other potentially correlated omitted variables.

[21] We observe a similar pattern in Panel B. Specifically, *AR* is weakly or not significantly associated with *COE* within the higher *EQ* quartiles (Panel B).

TABLE 3

The Effect of Disclosure Quality (Earnings Quality) on Costs of Capital after Conditioning on Earnings Quality (Disclosure Quality)

Panel A: Cost of Equity and Total Disclosure Quality

	EQ Quartiles					
	1	**2**	**3**	**4**	**Total**	**Hi-Low t-stats**
DISCL Quartiles						
1	0.175	0.171	0.167	0.132	0.163	−4.58***
2	0.182	0.156	0.149	0.140	0.155	−4.25***
3	0.160	0.154	0.157	0.139	0.152	−2.51***
4	0.163	0.152	0.163	0.139	0.152	−3.23***
Total	0.169	0.158	0.158	0.138	0.155	−7.41***
Hi-Low t-stats	−1.28	−2.21**	−0.40	0.94	−2.56***	

Panel B: Cost of Equity and Annual Report Quality

	EQ Quartiles					
	1	**2**	**3**	**4**	**Total**	**Hi-Low t-stats**
AR Quartiles						
1	0.182	0.160	0.158	0.141	0.161	−4.74***
2	0.155	0.166	0.154	0.136	0.154	−2.21**
3	0.170	0.164	0.148	0.146	0.157	−2.82***
4	0.159	0.132	0.156	0.130	0.141	−3.56***
Total	0.167	0.155	0.154	0.137	0.152	−7.41***
Hi-Low t-stats	−2.13**	−3.51***	−0.29	−1.68*	−4.68***	

Panel C: Bid-Ask Spread and Total Disclosure Quality

	EQ Quartiles					
	1	**2**	**3**	**4**	**Total**	**Hi-Low t-stats**
DISCL Quartiles						
1	−5.241	−5.459	−5.449	−5.832	−5.453	−4.34***
2	−5.132	−5.544	−5.599	−5.863	−5.531	−4.79***
3	−5.327	−5.618	−5.677	−5.626	−5.566	−2.36***
4	−5.702	−5.777	−5.805	−5.729	−5.757	−0.25
Total	−5.329	−5.592	−5.659	−5.745	−5.583	−6.26***
Hi-Low t-stats	−3.61***	−2.75***	−3.03***	0.90	−5.11***	

Panel D: Cost of Debt and Total Disclosure Quality

	EQ Quartiles					
	1	**2**	**3**	**4**	**Total**	**Hi-Low t-stats**
DISCL Quartiles						
1	3.687	3.382	3.139	2.725	3.308	−5.62***
2	3.603	3.290	2.938	2.509	3.104	−5.78***
3	3.361	2.688	2.633	2.121	2.677	−7.45***
4	2.790	2.296	2.275	2.045	2.306	−4.94***
Total	3.415	2.951	2.737	2.293	2.849	−13.28***
Hi-Low t-stats	−5.54***	−6.27***	−4.85***	−4.23***	−11.89***	

(continued on next page)

TABLE 3 (continued)

***, **, * Denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively, using a one-tailed test of significance.
This table presents, for each capital market measure (*COE, SPREAD,* and *COD*), the cross-tabulated average values within each quartile of disclosure quality (*DISCL*) and earnings quality (*EQ*). Higher-numbered quartiles of *DISCL* (*EQ*) represent higher-quality disclosures (earnings). The t-statistics reported at the bottom of each table test the difference between mean capital market measures in the high versus low quartiles of disclosure quality (conditioned on earnings quality), and the t-statistics reported at the far right of each panel test the difference in mean capital market measures in the high versus low quartiles of earnings quality (conditioned on disclosure quality).

Variable Definitions:
COE = cost of equity, measured as in Brav et al. (2005);
SPREAD = the natural log of the average relative effective spread across all of a firm's eligible transactions in each year;
COD = the cost of debt, measured as the S&P domestic long-term issuer credit rating, condensed into five categories;
DISCL = the aggregate disclosure quality from the AIMR disclosure ratings;
AR = the annual report component of *DISCL;* and
EQ = earnings quality measured as in FNO.

Cost of Equity

To assess the relations between the cost of equity and both disclosure and earnings quality, we estimate various versions of the following regression:[22]

$$COE = a_0 + a_1 DISCL(\text{or } a_{1a}AR + a_{1b}OP + a_{1c}REL) + a_2EQ + a_3LMVE + a_4LBTM + a_5BETA + e \quad (1)$$

We measure all variables for each firm each sample year (i.e., observations are firm-years; we omit firm and year subscripts for brevity). *COE* is the cost of equity, measured as we describe in the "Primary Variables and Sample" section. Our independent variables of primary interest (also described in the "Primary Variables and Sample" section) include:

DISCL = the total disclosure quality score, which is the weighted sum of the three disclosure components (*AR, OP,* and *REL*);
AR = the "annual and other required published information" disclosure rating;
OP = the "other published information not required" disclosure rating;
REL = the "investor relations" disclosure rating; and
EQ = earnings quality.

Based on FNO, we expect the coefficient on *EQ* to be negative. That is, we expect that higher earnings quality is also associated with a lower cost of equity.[23] Based on Botosan and Plumlee (2002), if we exclude *EQ* from Equation (1), then we expect the coefficient on annual report quality (*AR*) to be negative. That is, we expect higher annual report quality to be associated with a lower cost of equity. Results in FNO suggest the coefficient on *AR* should be smaller or insignificant with *EQ* included in Equation (1).[24]

We include year fixed effects in all models. We also include the following control variables and indicate the expected signs on each in Table 4, following Botosan and Plumlee (2002) and FNO (the descriptive statistics for all variables are in Table 1):

LMVE = the natural logarithm of the firm's market value of equity measured on December 31 of the year preceding the AIMR report;
LBTM = the natural logarithm of the firm's book to market ratio measured on the fiscal-year end date; and

[22] We recognize that costs of capital and disclosure quality are likely endogenous. However, approaches that account for endogeneity, such as two-stage least-squares (2SLS), often introduce more bias than ordinary least-squares (OLS), particularly in situations where selected instruments are either not completely exogenous or are only weakly correlated with the endogenous variable (Larcker and Rusticus 2010). Larcker and Rusticus (2010) find that 2SLS estimates of the relation between the cost of equity and disclosure quality are more biased than those obtained via OLS. In an untabulated analysis, we attempt to identify a set of exogenous instruments from prior research and are unable to simultaneously reject under-/weak-identification tests and fail to reject over-identification tests. Thus, in the spirit of Larcker and Rusticus (2010), we report estimates using OLS, which likely reflect less bias than 2SLS in our setting. Nonetheless, because Welker (1995) estimates a system of simultaneous equations using 2SLS with spread and disclosure as endogenous variables, we conduct a sensitivity analysis where we add *EQ* to Welker's (1995) first-stage model and then (following Welker 1995) use 2SLS with *SPREAD* and *DISCL* as endogenous variables. Total disclosure (*DISCL*) remains significantly negative ($p < 0.01$).

[23] Similarly, Aboody et al. (2005) and Francis et al. (2005b) find that earnings quality (measured using accruals quality) is a priced risk factor, implying that investors demand higher returns from firms with poor *EQ,* although Core, Guay, and Verdi (2008) dispute this relation.

[24] Note that we cluster standard errors by firm in all regressions, whereas Botosan and Plumlee (2002) estimate Fama-MacBeth regressions. Petersen (2009) and Thompson (2011) favor clustering standard errors to correct for serial correlation in error terms.

TABLE 4

Effect of Disclosure Quality and Earnings Quality on the Cost of Equity

Variables	Expected Sign	(1)	(2)	(3)	(4)	(5)
Intercept	NA	18.848***	19.391***	17.855***	17.940***	18.342***
		(9.71)	(10.83)	(10.57)	(9.35)	(10.63)
DISCL	−	−0.007			−0.002	
		(−0.49)			(−0.11)	
AR	−		−0.092***			−0.079***
			(−3.99)			(−3.64)
OP	−		0.006			−0.006
			(0.15)			(−0.14)
REL	−		0.102#			0.110#
			(3.57)			(3.96)
EQ	−			−1.524***	−1.520***	−1.534***
				(−3.90)	(−3.86)	(−3.89)
LMVE	−	−0.902***	−0.672***	−0.768***	−0.765***	−0.530***
		(−4.46)	(−4.05)	(−3.73)	(−3.74)	(−3.24)
LBTM	+	−0.295	0.611*	−0.239	−0.241	0.654
		(−0.71)	(1.40)	(−0.58)	(−0.58)	(1.58)*
BETA	+	2.933***	1.841***	2.752***	2.757***	1.757***
		(4.40)	(2.76)	(4.27)	(4.26)	(2.66)
Observations		1,776	1,671	1,776	1,776	1,671
Adjusted R^2		0.188	0.190	0.203	0.203	0.207

***, **, * Denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively. We use a one-tailed test of significance for coefficients with expected signs and two tailed otherwise.
# denotes two-tailed significance at the 5 percent level or less in the opposite direction of the expected sign.
This table presents the results of regressing cost of equity on disclosure and earnings quality measures. Each estimation includes year fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level, and t-statistics are in parentheses below coefficient estimates.

Variable Definitions:
COE = cost of equity, measured as in Brav et al. (2005); we multiply *COE* times 100 for exposition;
DISCL = the aggregate disclosure quality from the AIMR disclosure ratings;
AR, *OP*, and *REL* = the annual report, other publications, and investor relations components of *DISCL*, respectively;
EQ = earnings quality measured as in FNO, multiplied by −1;
LMVE = the natural logarithm of market value of equity measured on December 31 of the year preceding the AIMR report;
LBTM = the natural logarithm of book to market ratio measured on the fiscal-year end date; and
BETA = the beta coefficient from firm-specific market models or the average beta from the firm's industry for firms lacking 30 months of return data.

BETA = the beta coefficient from estimating firm-specific regressions of monthly returns on the CRSP value-weighted portfolio market return. We require at least 30 months of returns data in the five years preceding the AIMR report date. If a firm lacks 30 months of returns in the prior five years, then we use the industry average beta for that period.

We present results from estimating Equation (1) in Table 4. We first verify that our sample and data produce the same inferences as in Botosan and Plumlee (2002). Column (1) of Table 4 reports results from estimating Equation (1) including the total disclosures score (*DISCL*) but not the disclosure score components, while Column (2) reports results from including the three disclosure components (*AR*, *OP*, and *REL*) instead of the total disclosure score; we exclude *EQ* from both columns. Our results are similar to those in Botosan and Plumlee (2002) with some differences. Control variable coefficients and statistical significance are very similar to Botosan and Plumlee (2002) in both columns. In Column (1), the coefficient on *DISCL* is not significantly different from 0 ($p > 0.10$), while in Column (2) the *AR* coefficient is negative and statistically significant ($p < 0.01$). Both of these results are similar to Botosan and Plumlee (2002). However, unlike Botosan and Plumlee (2002), our coefficient on the investor relations component (*REL*; $p < 0.01$) is positive and significant while theirs is insignificantly different from 0. Further, their coefficient on the other publications component (*OP*) is positive and significant while ours is insignificantly different from 0 ($p > 0.10$). Botosan and Plumlee (2002) suggest that the positive coefficient on *OP* is because more frequent (relative to annual) disclosures may attract transient investors whose trading activity increases return volatility and, in turn, the cost of equity. A similar argument is plausible regarding investor relations. In fact, in the time period preceding Regulation Fair Disclosure, direct communication with select analysts may increase adverse selection risk for some investors and, therefore, information asymmetry. Collectively, this could increase the cost of equity. Despite these minor differences, we conclude our results bear substantial similarity to Botosan and Plumlee (2002), particularly in that both their analyses and ours point to a reduced cost of equity for firms with better annual report disclosures.

We next attempt to replicate results in FNO regarding earnings quality and the cost of equity. That is, we regress the cost of equity on earnings quality and controls, but exclude all disclosure quality variables. We present these results in Column (3) of Table 4. Like FNO, we find that earnings quality is negatively related to firms' cost of equity ($p < 0.01$). Thus, given the evidence in Table 2 (that *EQ* and *AR* are correlated) and the fact that *EQ* (absent disclosure quality) relates to *COE,* we next assess how disclosure quality and earnings quality relate to *COE* in the presence of the other in the spirit of FNO.

Columns (4) and (5) of Table 4 show results from estimating Equation (4) with both disclosure quality and earnings quality. Column (4) shows that *DISCL*'s coefficient remains insignificant with *EQ* in the equation ($p > 0.10$). Column (5) shows that the coefficient on *AR* is significantly negative ($p < 0.01$) even after including *EQ* in the equation. *EQ*'s coefficient remains significantly negative ($p < 0.01$) with either *DISCL* in the model or the three disclosure components (*AR, OP,* and *REL*). Thus, in contrast to FNO, who find that the relation between disclosure quality and the cost of equity generally disappears when conditioning on earnings quality, we find better earnings quality *and* better disclosure quality are associated with lower costs of equity. Furthermore, the economic magnitude of *AR* and *EQ* appear to be approximately equivalent. A one-standard-deviation increase in *AR* reduces the cost of equity by nearly 77 basis points (−0.001 times 7.77), whereas a one-standard-deviation improvement in *EQ* corresponds to an 84 basis-point reduction in *COE* (0.015 times −0.557). In general, our evidence suggests that the inferences in Botosan and Plumlee (2002) are robust to controls for earnings quality and that both *EQ* and *AR* provide meaningful cost of equity benefits.

Bid-Ask Spread

We next assess the effects of disclosure quality and earnings quality on bid-ask spread using the following equation:

$$SPREAD = b_0 + b_1 DISCL(\text{or } b_{1a}OP + b_{1b}AR + b_{1c}REL) + b_2 EQ + b_3 STDRET + b_4 VOL + b_5 PRC + b_6 LOW + b_7 HI + e \quad (2)$$

SPREAD is as we define in the "Primary Variables and Sample" section. We include the following additional variables and indicate the expected signs on each in Table 5, based on Welker (1995) and Heflin et al. (2005):[25]

STDRET = the standard deviation of daily returns from the calendar year prior to the AIMR report release;
VOL = the average daily dollar value of trading volume over the calendar year prior to the AIMR report release;
PRC = the average of the bid and ask prices on the last trading day of the calendar year preceding AIMR report release;
LOW = *ILOW* ∗ {*PRICE* − 12.5), where *ILOW* is an indicator variable taking on a value of 1 if the company mean share price is less than $12.50, and a value of 0 otherwise; and
HI = *IHI* ∗ {*PRICE* − 100), where *IHI* is an indicator variable taking on a value of 1 if the company mean share price is greater than $100, and a value of 0 otherwise.

Table 5 displays results from estimating Equation (2). Column (1) presents results when we estimate Equation (2) with the total disclosure score (*DISCL*) and without earnings quality (*EQ*). Consistent with Welker (1995) and Heflin et al. (2005), we find evidence that total disclosure is negatively related to the bid-ask spread, as the coefficient on *DISCL* is negative and statistically significant ($p < 0.01$). Column (3) of Table 5 reports results of estimating Equation (2) when we include earnings quality (*EQ*) and exclude all disclosure variables. Consistent with the intuition provided by FNO, earnings quality (*EQ*) is significantly and negatively related to the bid-ask spread ($p < 0.05$). Thus, our results support the notion that firms with poorer earnings quality experience higher bid-ask spreads. Column (4) of Table 5 presents results from estimating Equation (2) with both *DISCL* and *EQ*. Consistent with our *COE* analysis, we find that the total AIMR disclosure score (*DISCL*) is negatively related to the bid-ask spread ($p < 0.01$), even when we control for earnings quality (*EQ*).

[25] We use the calendar year preceding the release of the AIMR report to compute all variables requiring daily returns data.

TABLE 5

The Bid-Ask Spread and Disclosure Quality

Variables	Expected Sign	(1)	(2)	(3)	(4)	(5)
Intercept	NA	−4.446***	−4.448***	−4.740***	−4.429***	−4.441***
		(−24.73)	(−24.22)	(−30.59)	(−24.53)	(−24.28)
DISCL	−	−0.004***			−0.004***	
		(−2.99)			(−2.81)	
AR	−		−0.001			−0.001
			(−0.66)			(−0.49)
OP	−		−0.007**			−0.006**
			(−2.09)			(−2.01)
REL	−		−0.006**			−0.006**
			(−2.15)			(−2.07)
EQ	−			−0.045**	−0.036*	−0.037*
				(−1.79)	(−1.36)	(−1.32)
STDRET	+	3.674	3.987	3.146	2.502	3.090
		(1.17)	(1.23)	(0.97)	(0.79)	(0.94)
VOL	−	−0.009***	−0.008***	−0.009***	−0.009***	−0.008***
		(−5.97)	(−5.84)	(−6.04)	(−5.97)	(−5.83)
PRC	−	−0.015***	−0.014***	−0.015***	−0.015***	−0.014***
		(−15.73)	(−14.71)	(−15.27)	(−15.76)	(−14.88)
LOW	NA	−0.152***	−0.151***	−0.148***	−0.148***	−0.147***
		(−11.75)	(−12.45)	(−10.98)	(−11.03)	(−11.55)
HI	NA	0.017***	0.016***	0.017***	0.017***	0.016***
		(12.12)	(11.55)	(11.82)	(12.16)	(11.66)
Observations		626	607	626	626	607
Adjusted R^2		0.816	0.813	0.812	0.817	0.814

***, **, * Denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively. We use a one-tailed test of significance for coefficients with expected signs and two tailed otherwise.

This table presents the results of regressing bid-ask spreads on disclosure and earnings quality measures. Each estimation includes year fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level, and t-statistics are in parentheses below coefficient estimates.

Variable Definitions:

SPREAD = the natural log of the average relative effective spread across all of a firm's eligible transactions in each year; following Heflin et al. (2005), we measure a transaction's relative effective spread as twice the absolute value of the difference between the executed price and the midpoint of the bid and ask quotes, scaled by the midpoint of the bid and ask quotes at the time of the transaction;

DISCL = the total AIMR disclosure score;

AR, OP, and *REL* = the annual report, other publications, and investor relations components of *DISCL,* respectively;

EQ = earnings quality measured as in FNO, multiplied by −1;

STDRET = the standard deviation of daily returns from the calendar year prior to the AIMR report release;

VOL = the average daily dollar value of trading volume over the calendar year prior to the AIMR report release;

PRC = the average of the bid and ask prices on the last trading day of the calendar year preceding the AIMR report release;

HI = *IHI* ∗ {*PRICE* − 100), where *IHI* is an indicator variable taking on a value of 1 if the company mean share price is greater than \$100, and a value of 0 otherwise; and

LOW = *ILOW* ∗ {*PRICE* − 12.5), where *ILOW* is an indicator variable taking on a value of 1 if the company mean share price is less than \$12.50, and a value of 0 otherwise.

Interestingly, we find that the effect of earnings quality on the bid-ask spread weakens after controlling for disclosure quality. The coefficient on *EQ* in Column (4) is smaller in magnitude than the coefficient on *EQ* in Column (3), and statistical significance drops from the 0.05 to the 0.10 level (one-sided). Furthermore, a one-standard-deviation improvement in *DISCL* corresponds to a decline in spread of 4.6 percent.[26] Conversely, a one-standard-deviation improvement in *EQ* corresponds to a 2.2 percent decline in spread. The marginal effect of *EQ* should be interpreted with caution given the

[26] Given we define *SPREAD* as the natural log of the midpoint scaled bid-ask spread, we express marginal effects of dependent variables as percentage changes in *SPREAD* attributable to unit (or standard deviation) changes in independent variables (Wooldridge 2010). This is referred to as "semi-elasticity." Thus, the effect of *DISCL* is computed as −0.004 (coefficient) times 11.528 (standard deviation), which yields −0.046, or a 4.6 percent reduction in *SPREAD*.

coefficient on *EQ* is only marginally different from 0. Thus, from both an economic and statistical standpoint, *DISCL* appears to play a *more* important role than *EQ* in improving market liquidity.

Finally, and for completeness, we estimate Equation (2) after replacing *DISCL* with the three disclosure component scores, first without *EQ*. We note that, to our knowledge, prior research has not investigated the relation between bid-ask spreads and the components of the AIMR disclosure scores.[27] Column (2) of Table 5 reveals that the investor relations component (*REL*) is negatively related to bid-ask spreads ($p < 0.05$).[28] Column (2) of Table 5 also reveals that the other publications component of disclosure (*OP*) is negatively related to the bid-ask spread ($p < 0.05$). We find no significant association between the quality of annual reports (*AR*) and spreads. Column (5) shows that the relations between both investor relations (*REL*) and other publications (*OP*) and the bid-ask spread are robust to the inclusion of *EQ* ($p < 0.05$). Furthermore, like in Column (4), the coefficient on *EQ* in Column (5) is negative, implying poorer-quality earnings lead to higher bid-ask spreads, but it is only marginally significant ($p < 0.10$). From an economic standpoint, a one-standard-deviation increase in *REL* (*OP, EQ*) corresponds to a 3.8 (2.7, 2.2) percent decline in spread. As in Column (4), the marginal effect of *EQ* should be interpreted with caution given the marginality of its statistical significance.

In summary, our results suggest that inferences from prior research that better-quality disclosures are related to better market liquidity via lower bid-ask spreads are robust to controls for earnings quality. In fact, we observe some evidence that conditioning on disclosure quality considerably weakens the effect of *EQ* on bid-ask spreads, and the economic magnitude of the benefits of higher disclosure quality exceed those of earnings quality.

Cost of Debt

We next assess whether earnings quality subsumes the relation between disclosure quality and the cost of debt documented in Sengupta (1998). FNO find that *EQ* weakens, although does not fully subsume, the relation between their measure of disclosure quality and a firm's cost of debt. We re-examine this question using the following ordered logistic regression:

$$\text{Prob}(COD \geq i) = \Theta\Big(d_0 + d_1DISCL(\text{or } d_{1a}OP + d_{1b}AR + d_{1c}REL) + d_2EQ + d_3DE + d_4LASSET + d_5TIE + d_6ROA + d_7MTB + d_8RET\Big) \quad (3)$$

$\Theta(\cdot)$ represents the logistic cumulative distribution function, or $e^{\beta'X}/(1 + e^{\beta'X})$. *COD* is the firm's cost of debt, measured by its S&P long-term issuer credit rating ($i = 1, 2,\ldots,5$). We describe this rating procedure in footnote 17. We include control variables and indicate the expected signs on each in Table 6, based on prior research (Sengupta 1998; Heflin et al. 2011). These variables include:

- *DE* = the debt to equity ratio, computed as total long-term debt divided by the market value of equity at the end of the fiscal year;
- *LASSET* = the natural logarithm of total assets at the end of the fiscal year;
- *TIE* = times interest earned, computed as income before extraordinary items plus interest expense, divided by interest expense;
- *ROA* = earnings before interest, taxes, depreciation, and amortization, divided by total assets;
- *MTB* = the ratio of market value to book value of the firm's equity at the end of the fiscal year; and
- *RET* = the firm's market-adjusted stock return cumulated over the calendar year preceding the AIMR release.

Table 6 presents results from these analyses. We first attempt to replicate the inference in Sengupta (1998) that better-quality disclosures are associated with lower costs of debt. Column (1) reports results from estimating Equation (3) using the total disclosure quality score (*DISCL*) without earnings quality (*EQ*). Consistent with Sengupta (1998), we find that total

[27] The closest research is likely Brown and Hillegeist (2007), who find negative relations between the Venter and de Jongh (2004) modified version of the Easley, Kiefer, and O'Hara (1997) probability of informed trading (*PIN*) and both the annual report (*AR*) and investor relations (*REL*) AIMR disclosure components. They find a positive relation between *PIN* and the other publications (*OP*) AIMR component.

[28] The negative relation between *REL* and *SPREAD* may seem contradictory to our explanation of the positive relation between *REL* and *COE* that we find earlier in the "Results" section. However, the relation between *REL* and *SPREAD* may not be driven solely by *REL*'s effect on information asymmetry. The bid-ask spread is comprised of components related to adverse information (i.e., information asymmetry), order processing cost, and inventory holding cost (Huang and Stoll 1997). Better investor relations may increase information asymmetry and, consequently, the adverse selection component of the bid-ask spread but, at the same time, attract more investors and frequent trading, which would reduce the inventory holding and/or order processing cost components. Depending on the magnitude of each component, *REL* could be negatively related to the total bid-ask spread and positively related to the cost of equity. Evidence in Krinsky and Lee (1996) supports this conjecture in a different setting. They find that adverse selection risk increases and inventory holding costs decrease around earnings announcements. They conclude that it is possible for the bid-ask spread to decrease despite an increase in information asymmetry.

TABLE 6

Effect of Disclosure Quality and Earnings Quality on the Cost of Debt

Variables	Expected Sign	(1)	(2)	(3)	(4)	(5)
DISCL	−	−0.028***			−0.024***	
		(−3.50)			(−3.05)	
AR	−		−0.040***			−0.031**
			(−2.69)			(−2.19)
OP	−		−0.013			−0.021
			(−0.62)			(−0.99)
REL	−		−0.027*			−0.020
			(−1.54)			(−1.13)
EQ	−			−1.129***	−1.071***	−1.070***
				(−5.37)	(−5.36)	(−5.03)
DE	+	2.322***	2.555***	2.619***	2.573***	2.773***
		(5.93)	(5.73)	(6.41)	(6.26)	(5.91)
LASSET	−	−0.735***	−0.728***	−0.729***	−0.706***	−0.691***
		(−4.92)	(−4.70)	(−5.07)	(−4.99)	(−4.64)
TIE	−	−0.121***	−0.151***	−0.104***	−0.111***	−0.139***
		(−3.38)	(−3.93)	(−2.90)	(−3.11)	(−3.64)
ROA	−	−8.759***	−7.866***	−7.700***	−7.380***	−6.726***
		(−4.17)	(−3.62)	(−3.71)	(−3.57)	(−3.15)
MTB	NA	−0.053	−0.055	−0.067	−0.069	−0.069
		(−0.92)	(−0.96)	(−1.14)	(−1.20)	(−1.17)
STDRET	+	193.654***	202.225***	176.301***	179.007***	188.906***
		(7.79)	(7.78)	(7.60)	(7.71)	(7.55)
RET	NA	0.817***	0.709**	0.835***	0.894***	0.792***
		(2.94)	(2.43)	(2.99)	(3.17)	(2.66)
Observations		1,354	1,275	1,354	1,354	1,275

***, **, * Denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively. We use a one-tailed test of significance for coefficients with expected signs and two tailed otherwise.

This table presents the results of ordered logistic regressions of the cost of debt on disclosure and earnings quality measures. Intercept estimates are suppressed for ease of exposition. Each estimation includes year fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level, and z-statistics are in parentheses below coefficient estimates.

Variable Definitions:
COD = the cost of debt, measured as the S&P domestic long-term issuer credit rating, condensed into five categories;
DISCL = the aggregate disclosure quality from the AIMR disclosure ratings;
AR, *OP*, and *REL* = the annual report, other publications, and investor relations components of *DISCL*, respectively;
EQ = earnings quality measured as in FNO, multiplied by −1;
DE = total long-term debt divided by the market value of equity at the end of the fiscal year;
LASSET = the natural logarithm of total assets at the end of the fiscal year;
TIE = income before extraordinary items plus interest expense, divided by interest expense;
ROA = earnings before interest, taxes, depreciation, and amortization, divided by total assets;
MTB = the ratio of market value to book value of the firm's equity at the end of the fiscal year;
STDRET = the standard deviation of daily returns from the calendar year prior to the AIMR report release; and
RET = the firm's market-adjusted stock return cumulated over the calendar year preceding the AIMR release.

disclosure quality is negatively related to the cost of debt ($p < 0.01$). In Column (2) of Table 6, we report results from estimating Equation (3) with the three disclosure quality components instead of the total disclosure quality score (and without earnings quality). We find that annual report (*AR*) and investor relations (*REL*) disclosures are negatively related to the cost of debt ($p < 0.01$ and $p < 0.10$, respectively).[29] Thus, our results corroborate prior research finding disclosure quality is negatively associated with the cost of debt.

[29] Heflin et al. (2011) also document a relation between the annual report component of the AIMR scores and credit ratings.

We next assess the relation between earnings quality and the cost of debt. Arguments in FNO extended to the cost of debt suggest that higher earnings quality should be negatively associated with the cost of debt. Column (3) of Table 6 reports results from estimating Equation (3) with earnings quality (*EQ*), but without any of the disclosure quality variables. Consistent with expectations and results in FNO, we find a significantly negative coefficient on earnings quality ($p < 0.01$). This result suggests that firms with higher-quality earnings experience lower lending costs.

In Column (4) of Table 6, we report the results of estimating Equation (3) with both the total disclosure quality score (*DISCL*) and earnings quality (*EQ*) and in Column (5), we report results from estimating Equation (3) with the three disclosure quality components (*AR, OP,* and *REL*) and earnings quality (*EQ*). Inferences in Columns (4) and (5) are generally unchanged relative to Columns (1) and (2). Specifically, the coefficients on both *DISCL* and *AR* are negative and statistically significant ($p < 0.01$ and 0.05, respectively), although *REL* becomes insignificant. Regarding earnings quality, the coefficients on *EQ* are significantly negative in both Columns (4) and (5) ($p < 0.01$). Thus, both earnings quality (*EQ*) and disclosure quality (*DISCL* or *AR*) exhibit statistically significant relations with *COD,* suggesting each construct offers distinct benefits in terms of cost of debt.

In an ordered logistic model, marginal effects must be evaluated at each outcome ($COD = 1, 2, \ldots, 5$), yielding five distinct effect estimates for each independent variable. To facilitate presentation of these effects, we plot the percentage increase or decrease attributable to a one-standard-deviation improvement in *EQ* or *DISCL* (*EQ* or *AR*) in Panel A (Panel B) of Figure 1.[30] Panel A of Figure 1, which is derived from results reported in Column (4) of Table 6, reveals that a one-standard-deviation improvement in *EQ* and *DISCL* significantly increases the likelihood of a firm being in the highest (second-highest) credit-rating category by approximately 5 percent and 3 percent (8 percent and 4 percent), respectively. Conversely, a one-standard-deviation improvement in *EQ* (*DISCL*) *decreases* the likelihood of *COD* equaling 3, or the "BBB" class of long-term credit ratings, by 12 percent (6 percent). Neither *DISCL* nor *EQ* have meaningful economic effects on the likelihood of being rated in the lowest-two categories. Panel B of Figure 1, based on Column (5) of Table 6, reveals a similar pattern as in Panel A. That is, improvements in *AR* and *EQ* increase the likelihood of *COD* equaling 1 (2) by 2 percent and 6 percent (7 percent and 3 percent), respectively, and decrease the likelihood of *COD* equaling 3 by 12 percent and 5 percent, respectively. Thus, as with *COE,* both disclosure quality and earnings quality play nontrivial roles in determining ratings for debt rated higher than "junk."

In summary, our evidence suggests that higher-quality disclosures are associated with lower costs of debt even after controlling for earnings quality. In fact, the inclusion of *EQ* minimally affects the relation between *DISCL* and *COD*. This inference differs (largely) from FNO. They find that the relation between disclosure quality and the cost of debt weakens considerably after controlling for earnings quality (the disclosure t-statistic in their analysis drops from −2.31 to −1.56). However, like FNO, we conclude that higher-quality earnings are associated with lower costs of debt. From an economic standpoint, both earnings quality and disclosure quality appear to play meaningful roles in determining all but the worst debt rating categories, even though *EQ* appears to have a larger economic effect.

Alternative Specifications and Robustness

Alternative Measures of Cost of Equity

Like Botosan and Plumlee (2002) and FNO, we use costs of equity derived from the dividend discount model using analyst growth and target price estimates from Value Line. McInnis (2010) finds that target prices used in these estimates are systematically biased, such that earnings smoothness correlates with cost of equity estimates but not realized returns. Given that properties of earnings (such as smoothness) likely correlate with disclosure and earnings quality, we assess the sensitivity of our results to several alternative measures of the cost of equity.

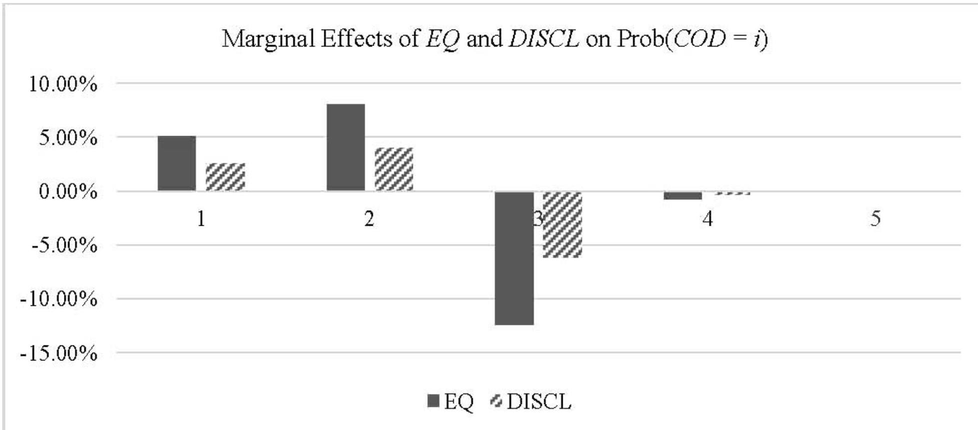
First, we estimate two measures based on the residual income model, which expresses firm value as a function of forecasted abnormal earnings (Claus and Thomas 2001; Gebhardt, Lee, and Swaminathan 2001). We also compute two measures based on Ohlson and Juettner-Nauroth (2005), who express cost of equity as a function of forecasted dividends and earnings. Specifically, we use the Gode and Mohanram (2003) implementation of the full model. We also follow Li and Mohanram (2014) and ignore future dividends, which yields an estimate of cost of equity equal to the square root of the inverse price-earnings-growth (PEG) ratio. Finally, like prior research (e.g., Cao, J. Myers, L. Myers, and Omer 2015; Hou, van Dijk, and Zhang 2012; Li and Mohanram 2014), we use the average of these four proxies as a fifth measure of cost of equity. Like Cao et al. (2015), we use I/B/E/S earnings and growth forecasts and employ the same model assumptions (i.e., payout ratios, risk-free rates, and mean convergence of future earnings) as those used in prior research (Hou et al. 2012; Cao et al. 2015; Li and Mohanram 2014).[31]

[30] We evaluate the marginal effects of *DISCL, AR,* and *EQ* at each of the five possible outcomes at the sample mean for each independent variable.

[31] We also estimate the cost of equity using cross-sectional forecasting models (see Hou et al. 2012; Li and Mohanram 2014). Using these measures, we fail to find significant relations in the predicted directions with AIMR disclosure quality or earnings quality in any specification.

FIGURE 1
Cost of Debt Marginal Effects

Panel A: Earnings Quality and Disclosure



Panel B: Earnings Quality and Annual Reporting Quality

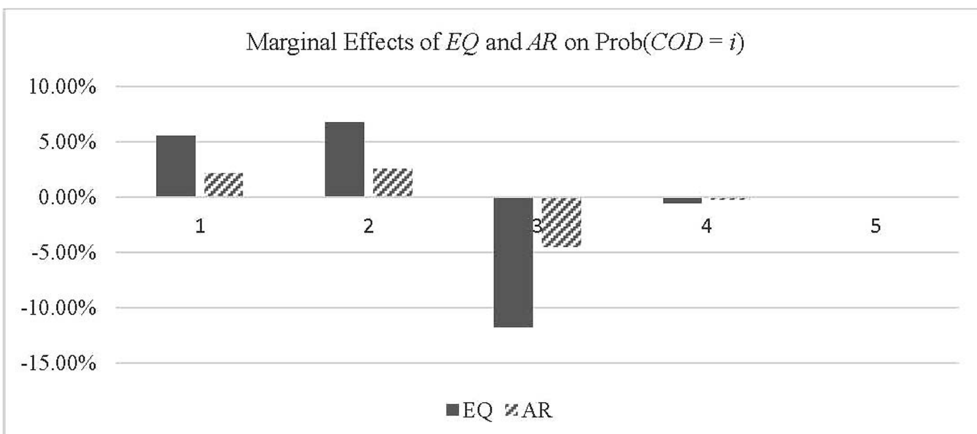


Figure 1 plots the percentage increase in the probability of *COD* equaling *i,* where *i* equals 1, 2, 3, 4, or 5, due to a one-standard-deviation improvement in *DISCL* and *EQ* (Panel A) or *AR* and *EQ* (Panel B). *COD* is the cost of debt, measured as the S&P domestic long-term issuer credit rating, condensed into five categories (see the "Primary Variables and Sample" section). *DISCL* is the aggregate disclosure quality from AIMR disclosure ratings. *AR* is the annual report component of *DISCL*. *EQ* is earnings quality measured as in FNO.

Further, like prior research, we compute these estimates as of June 30 of each year using information from the prior calendar year.

Table 7 displays the results of re-estimating our *COE* model (Equation (1)) using the five previously described alternate measures of *COE* in place of our Value Line-derived measure. We find our inferences are unchanged. Specifically, in Columns (6) through (10) we observe strong, negative relations between the cost of equity and both the annual reporting quality component of AIMR ratings (*AR*) and earnings quality (*EQ*), consistent with our main analyses. Also, note that the relation between *OP* and *COE* is significantly negative in all five columns, suggesting Botosan and Plumlee's (2002) result is

TABLE 7

Alternate Measures of the Cost of Equity in the Cost of Equity-Disclosure Quality Relation

Variables	Expected Sign	(1) COE = GM	(2) COE = PEG	(3) COE = CT	(4) COE = GLS	(5) COE = COMP	(6) COE = GM	(7) COE = PEG	(8) COE = CT	(9) COE = GLS	(10) COE = COMP
Constant	NA	14.784***	12.826***	13.249***	12.746***	13.551***	14.883***	12.795***	13.227***	12.328***	13.490***
		(11.76)	(9.71)	(9.05)	(9.40)	(10.44)	(12.12)	(10.16)	(9.07)	(10.26)	(11.12)
DISCL	−	−0.019**	−0.025***	−0.027***	−0.026***	−0.025***					
		(−1.89)	(−2.55)	(−2.40)	(−2.60)	(−2.56)					
AR	−						−0.033**	−0.044***	−0.038**	−0.034**	−0.039**
							(−2.01)	(−2.83)	(−1.81)	(−1.95)	(−2.43)
OP	−						−0.048**	−0.053**	−0.055**	−0.059***	−0.056**
							(−1.89)	(−2.10)	(−2.02)	(−2.37)	(−2.28)
REL	−						0.011	0.006	0.001	−0.015	0.003
							(0.53)	(0.28)	(0.05)	(−0.68)	(0.16)
EQ	−	−0.573*	−0.977**	−0.957**	−0.586	−0.803**	−0.810**	−1.294***	−1.194***	−0.918**	−1.100**
		(−1.52)	(−2.25)	(−2.13)	(−1.22)	(−1.80)	(−1.95)	(−2.72)	(−2.47)	(−1.71)	(−2.24)
LMVE	−	−0.709***	−0.779***	−0.757***	−0.791***	−0.758***	−0.643***	−0.678***	−0.699***	−0.621***	−0.648***
		(−5.23)	(−5.18)	(−4.58)	(−4.33)	(−4.79)	(−5.07)	(−5.01)	(−4.43)	(−3.80)	(−4.51)
LBTM	+	−0.142	0.195	−0.863#	1.501***	0.236	0.098	0.498**	−0.622	1.789***	0.562**
		(−0.55)	(0.71)	(−2.87)	(4.79)	(0.83)	(0.34)	(1.65)	(−1.85)	(5.31)	(1.79)
BETA	+	1.707***	2.305***	1.667***	2.220***	1.986***	1.595***	2.150***	1.581***	2.038***	1.819***
		(3.65)	(4.48)	(3.00)	(4.11)	(3.81)	(3.00)	(3.62)	(2.49)	(3.15)	(2.98)
Observations		1,962	1,934	1,927	1,986	1,870	1,811	1,784	1,773	1,829	1,722
Adjusted R^2		0.162	0.206	0.140	0.199	0.181	0.178	0.235	0.151	0.224	0.204

***, **, * Denote one-tailed significance at the 1 percent, 5 percent, and 10 percent levels, respectively. We use a one-tailed test of significance for coefficients with expected signs and two tailed otherwise.

# Denotes two-tailed significance at the 5 percent level or less in the opposite direction of the expected sign.

This table presents the results of regressing cost of equity on disclosure and earnings quality measures. *COE* is cost of equity, measured in five different ways using I/B/E/S earnings and long-term growth forecasts. We multiply *COE* by 100 for exposition. We compute two measures based on Ohlson and Juettner-Nauroth (2005), who express cost of equity as a function of forecasted dividends and earnings. We use the Gode and Mohanram (2003; GM) implementation of the full model (GM) and follow Li and Mohanram (2014) and ignore future dividends, which yields an estimate of cost of equity equal to the square root of the inverse PEG ratio (PEG). We use the Claus and Thomas (2001; CT) and Gebhardt et al. (2001; GLS) cost of equity estimates, which rely on the residual income model to express future firm value as a function of forecasted abnormal earnings. COMP is the average of the four previously described measures. Each estimation includes year fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level, and t-statistics are in parentheses below coefficient estimates.

Variable Definitions:
DISCL = the aggregate disclosure quality from the AIMR disclosure ratings;
AR, *OP*, and *REL* = the annual report, other publications, and investor relations components of *DISCL*, respectively;
EQ = earnings quality measured as in FNO, multiplied by −1;
LMVE = the natural logarithm of market value of equity measured on December 31 of the year preceding the AIMR report;
LBTM = the natural logarithm of book to market ratio measured on the fiscal-year end date; and
BETA = the beta coefficient from firm-specific market models or the average beta from the firm's industry for firms lacking 30 months of return data.

potentially attributable to biases in Value Line data. Furthermore, in Columns (1) through (5) we provide evidence that total disclosure quality also relates negatively to the cost of equity using these alternative proxies. We note that FNO examine one alternative measure of cost of equity, the PEG ratio, and fail to find a significant relation with disclosure quality. Overall, we conclude that our results are robust to five alternative measures of the cost of equity.[32]

Alternative AIMR Score Specifications

As discussed previously, our empirical design varied from prior studies in certain instances. We chose our design so that the approach for each of our three dependent variables (*COE, COD,* and *SPREAD*) was consistent across the dependent variables. In this section, we assess the sensitivity of our results to alternative specifications of the AIMR scores. We first repeat all analyses using un-weighted scores for disclosure components (i.e., scores that do not reflect the relative weight placed on each component by the industry analysts).[33] In untabulated analyses, we fail to find a relation between the cost of equity measured using Value Line and annual report disclosure quality, although we do find a negative relation with several of the alternative cost of equity estimates discussed in the prior section. For our *SPREAD* analysis, we continue to find a negative relation between investor relations disclosure (*REL*) and *SPREAD* ($p < 0.01$), which remains significant after controlling for earnings quality. Last, in our *COD* analysis, annual report disclosures (*AR*) remain significantly negatively related to the *COD* ($p < 0.05$) after controlling for earnings quality. In general, our inferences are largely unchanged if we use the un-weighted, raw AIMR scores as an alternative to the weighted AIMR scores.

Next, we re-estimate our regressions using industry-adjusted AIMR scores in place of weighted AIMR scores. Following prior research (i.e., Botosan and Plumlee 2002), we compute the year-industry average disclosure score for the total disclosure score and for each component and subtract this value from the un-weighted score. To compute industry-adjusted scores, we use un-weighted AIMR scores (rather than the weighted AIMR scores), since weighting essentially takes industry effects into consideration. As with the un-weighted scores, we find no evidence of a negative relation between disclosure quality and Value Line-based cost of equity estimates, although we do find significantly negative relations with several alternative *COE* measures. When using industry-adjusted AIMR scores in our *SPREAD* analysis, we find that total disclosure (*DISCL*) is negatively related to the bid-ask spread ($p < 0.10$), even after controlling for *EQ*. However, both other publications disclosure (*OP*) and investor relations disclosure (*REL*) are no longer related to *SPREAD*. We also re-estimate our cost of debt regressions using industry-adjusted AIMR scores and find that total disclosure (*DISCL*) is negatively related to the cost of debt ($p < 0.01$), even after controlling for earnings quality. We also find that annual report disclosure (*AR*) is negatively related to the cost of debt ($p < 0.05$) after controlling for earnings quality. In sum, using industry-adjusted AIMR scores in place of weighted AIMR scores yields similar conclusions, with the exception of specifications using Value Line-based estimates for cost of equity.

Botosan and Plumlee (2002) convert the disclosure scores to within-industry fractional ranks. Accordingly, we compute within-industry percentile ranks for each firm-year observation and refer to this as the fractional rank AIMR score.[34] Specifically, following Lang and Lundholm (1993), we use the rank of each observation within its industry and then convert that rank to a percentile (rank within industry − 1)/(number of firms in industry − 1). Thus, a higher fractional rank AIMR score indicates poorer disclosure quality. In an untabulated analysis, we find that the signs on our fractional rank disclosure coefficients match Botosan and Plumlee's (2002), but are not statistically different from 0. Our sample size is considerably smaller than Botosan and Plumlee's (2002), mainly due to missing earnings quality estimates. However, relaxing the earnings quality requirement fails to produce significant fractional rank disclosure quality coefficients (our sample is still smaller than Botosan and Plumlee's [2002] due to missing cost of equity estimates). Finally, we increase the sample size further by replacing missing values of cost of equity with industry-year averages, yielding a sample of nearly 3,000 observations. However, we still do not obtain fractional rank disclosure coefficients that are statistically significant using either Value Line-based or alternative cost of equity estimates. When using fractional rank AIMR scores in our *SPREAD* analysis, we continue to find a negative relation between total disclosure quality (*DISCL*) and the bid-ask spread ($p < 0.05$), and *DISCL* remains significant after controlling for earnings quality ($p < 0.10$). Investor relations disclosure (*REL*) is also negatively related to the bid-ask spread ($p < 0.05$), but only after controlling for *EQ*. In our *COD* analyses, we continue to find a negative relation between total disclosure (*DISCL*) and *COD* ($p < 0.05$), as well as a negative relation between annual report disclosures (*AR*) and *COD* ($p < 0.05$), and both remain significant after controlling for earnings quality. Thus, our results using fractional rank

[32] Our analyses of alternative measures of cost of capital are limited to the cost of equity. Compared to the cost of equity, there is much less debate over how to measure the bid-ask spread and cost of debt. Further, data availability in our sample period prevents us from employing alternative measures of *SPREAD* (i.e., quoted spreads, depth, etc.) and *COD* (i.e., bond premiums, rate spreads).

[33] Note that disclosure weights affect only component scores.

[34] We thank Christine Botosan for providing these ranks.

AIMR scores are largely consistent with our main analyses using weighted AIMR scores, except for the results involving the cost of equity.

Discussion

Overall, our results support the theory that higher disclosure quality provides first-order capital market benefits, presumably through reduced information asymmetry (Diamond and Verrecchia 1991), meaning inferences drawn by FNO (that disclosure is either of secondary importance relative to earnings quality or even irrelevant in the presence of earnings quality) do not extend to other prominent research on disclosure quality. As we discuss in the "Background Literature and Hypothesis Development" section, there are two possible reasons for our disparate results. First, the AIMR ratings may capture dimensions of disclosure quality not captured by FNO's measure. Second, changes in the information environment may have altered the relations between the cost of equity, disclosure quality, and earnings quality. In the next section, we conduct additional analyses aimed at providing evidence on which of these two explanations is more likely descriptive.

ADDITIONAL ANALYSES

In this section, we present results from two sets of analyses that attempt to differentiate between whether differences in disclosure measure or differences in sample period best explain why our results differ from those in FNO. For these analyses, we focus on the cost of equity for parsimony and because FNO find earnings quality matters most for cost of equity in terms of inferences about disclosure.

Alternative Measures of Disclosure Quality in Annual Reports

Theoretically, FNO's hypothesis (that the *COE*-disclosure quality relation diminishes in the presence of earnings quality) relies on the assumption that the quality of the signal observed by managers translates to the quality of the signal released to capital market participants. As discussed earlier, the quality of this signal has three primary attributes: *what* information is disclosed, *how* this information is disclosed, and *when* information is disclosed. The AIMR annual report measure of disclosure quality and FNO's disclosure quality measure do not likely differ on the "when" dimension because both are annual disclosure measures. As FNO argue, the quality of information observed by managers, for which earnings quality is a proxy, likely correlates relatively highly with *what* information is released to capital markets. In other words, managers with poor information quality likely have less to disclose. However, if the manner in which this information is released influences information asymmetry and/or estimation risk, then disclosure quality very likely impacts capital market costs, even after controlling for earnings quality (i.e., the information disclosed). While we cannot observe the process in which AIMR ratings were constructed, these constructs plausibly reflect some dimension of "how" information is released (i.e., more disaggregated, understandable, etc.). Further, it is at least possible that the FNO disclosure measure does not capture all of the items disclosed that analysts pay attention to when rating firms' annual disclosures (i.e., the AIMR ratings may capture some "what" that the FNO measure misses). In summary, it seems at least plausible that the AIMR annual report score captures some dimensions of disclosure quality that the FNO measure does not.

To provide some evidence regarding this conjecture, we investigate the relation between the cost of equity and five additional measures of annual report disclosure quality.[35] These five measures potentially capture some of the "how" and "what" information is disclosed that FNO's measure might not. Importantly, all five measures are available in the FNO sample period (2001) and in at least part of the AIMR sample period. If we find that the five measures are negatively related to the cost of equity and that negative relation extends to both the AIMR and FNO sample periods, then we can have greater confidence that differences in disclosure measure, not differences in sample period, explain the differences in our and FNO's results.

The five measures we use are (1) 10-K length, (2) 10-K readability, (3) balance sheet disaggregation, (4) income statement disaggregation, and (5) a composite of the previous four measures. Longer and more difficult-to-read 10-Ks are harder for investors to process, so we utilize 10-K length and readability (Li 2008). Further, prior research contends that more detailed accounting information in financial statements is easier to process, so we use the level of disaggregation in the balance sheet and the level of disaggregation in the income statement (Chen et al. 2015). Length is the total number of words in the 10-K, and readability is the average value of the standardized Fog index, Flesch, and Kincaid measures of text readability. Length and

[35] Note that FNO also consider three alternative disclosure quality proxies: management forecasts, conference calls, and press releases. They find positive relations between the cost of equity and both management forecasts and conference calls. However, Baginski and Rakow (2012) document a significantly negative relation between a very similar measure of management forecasts and the cost of equity. Because FNO's results concerning annual report quality are consistent with their predictions about earnings quality, disclosure quality, and capital costs, but results from their other measures are not, we focus our analyses in this section on annual report measures. Further, conference calls are not available for our time period.

readability measure disclosure quality inversely, so we multiply each measure by -1 so that they are increasing in quality. We obtain the length and readability measures over the period 1994 (the first year they are available) to 2006, from Feng Li's website (http://webuser.bus.umich.edu/feng/). We compute the level of disaggregation in both the balance sheet and income statement as in Chen et al. (2015) for firm-years spanning 1986 to 2006. The disaggregation measures capture the "fineness" in which financial statement information is presented. The composite score is the average of the standardized values of the other four measures.

Table 8 displays the results of re-estimating Equation (1) using alternative measures of disclosure quality (*AltDQ*). We present results for 10-K length (readability, balance sheet disaggregation, income statement disaggregation, composite score) in Panel A (B, C, D, E). Columns (1) through (3) display results from estimations using the Value Line-derived measure of *COE,* while Columns (4) through (6) display results using the composite I/B/E/S-derived *COE* measure. Columns (1) and (4) ((2) and (5); (3) and (6)) present results including only *AltDQ* (*AltDQ* and *EQ; AltDQ, EQ,* and associated time period interactions). Columns (1) and (4) in each panel of Table 8 provide consistent evidence that both higher disclosure quality (i.e., shorter and more readable 10-Ks, and finer financial statements) correspond with lower costs of equity, although results using balance sheet disaggregation (Panel C) are limited to Value Line-based estimates of cost of equity. As shown in Columns (2) and (5) of each panel, these relations are unaffected by inclusion of earnings quality (*EQ*), which also relates to the cost of equity.

While these results support our conclusion that disclosure quality matters even in the presence of earnings quality, we also use these data to explore the possibility that a difference in sample period at least partially explains the difference in our and FNO's results. If the overall importance of the annual report has changed over time, then we would likely observe differences across sample periods in relations between our five alternative measures of disclosure quality and the cost of equity. We define two time period indicators, *AIMRPER* and *FNOPER,* which equal 1 if the observation is from prior to 1997 (the sample period for the AIMR data in this study) and 2001 (the sample period in FNO), respectively. We include four interaction terms in the *COE* model using these time period indicators—$AltDQ * AIMRPER$, $AltDQ * FNOPER$, $EQ * AIMRPER$, and $EQ * FNOPER$. We are primarily interested in whether the $AltDQ * AIMRPER$ interaction is significantly more negative than the $AltDQ * FNOPER$ interaction, which would mean that disclosure quality importance in the AIMR period exceeded importance in the FNO sample period. The results of these regressions are displayed in Columns (3) and (6) in Panels A through E of Table 8, and tests of interaction equality are reported at the bottom of each panel. In all specifications, we fail to reject the null that the interactions are equal. In sum, our evidence using alternate measures of disclosure quality suggests that differences in disclosure quality measures and not differences in sample period, likely account for the contrasting conclusions drawn in our study versus FNO.

Trends over Time Suggesting Differences in the Information Environment

We next examine the relation between the cost of equity and AIMR-based disclosure quality on a year-by-year basis. Specifically, we estimate Equation (1) for each year in our sample and examine the coefficients on *AR* over time (untabulated). If disclosure quality were less important in 2001, then we would likely observe a decline in these coefficients over our sample period (1986 to 1996). We find no such trend. In fact, we observe some evidence that the relation between disclosure quality and the cost of equity strengthens (i.e., becomes more negative) over time (*Pearson* $\rho = -0.38$), although this correlation is largely driven by one year. Absent that single year, there remains a weakly negative time-trend ($\rho = -0.12$) in the relation between disclosure quality and the cost of equity. These results suggest the relation between annual report disclosure quality and the cost of equity did not weaken over time.

One limitation of the prior analysis is the fact that our sample period does not overlap with 2001. Therefore, we are unable to assess whether the relation between AIMR-based disclosure quality and cost of equity declines after 1996. To mitigate this concern, we examine trends in three factors that prior research suggests impacts disclosure importance. Botosan (1997) suggests that disclosure quality is more important for firms with low analyst following. Baginski and Rakow (2012) suggest more costly disclosures are more informative. They use two measures of industry competition, the Herfindahl index and capital intensity, to proxy for disclosure costs. We compute average values for each of these factors over the period 1986 to 2006, which fully encompasses our sample period, FNO's sample year, and several subsequent years. To avoid issues with changing sample composition and to make our sample comparable to FNO's, we restrict our analysis to a constant sample of firms that have sufficient data to compute *EQ* in 2001. Untabulated analyses reveal a decline in analyst following and the Herfindahl index (an inverse measure of disclosure costs), suggesting disclosures have become more costly and therefore more informative, which makes disclosure *more* important. However, we do observe an increase in capital intensity, which proxies for barriers to entry and corresponds with declining costs of disclosure, suggesting the opposite.

In sum, we do not find compelling evidence that disclosure quality has become less important over time, which would make it more susceptible to be subsumed by earnings quality in the FNO sample period than in the AIMR sample period. In fact, much of our admittedly suggestive evidence supports the opposite—the importance of disclosure has increased over time.

TABLE 8

Alternate Measures of Disclosure Quality in the Cost of Equity-Disclosure Quality Relation

Panel A: Alternate DQ (*AltDQ*) Measure = −1 × 10-K Length

Variables	Exp. Sign	*COE* Measured Using Value Line (1)	(2)	(3)	*COE* Measured Using Composite I/B/E/S (4)	(5)	(6)
Intercept	NA	15.305***	15.190***	15.174***	7.737***	7.578***	7.573***
		(7.84)	(7.78)	(7.74)	(8.78)	(8.49)	(8.49)
AltDQ	−	−0.393**	−0.368**	−0.348*	−0.222***	−0.214***	−0.255***
		(−2.06)	(−1.93)	(−1.44)	(−2.83)	(−2.74)	(−3.24)
AltDQ ∗ *AIMRPER*	NA			−0.056			0.244*
				(−0.18)			(1.70)
AltDQ ∗ *FNOPER*	NA			−0.129*			0.007
				(−1.49)			(0.32)
EQ	−		−1.584***	−1.479***		−0.245**	−0.233**
			(−4.31)	(−3.41)		(−2.31)	(−2.16)
EQ ∗ *AIMRPER*	NA			−0.409			−0.265
				(−0.79)			(−1.10)
EQ ∗ *FNOPER*	NA			−0.089			0.136
				(−0.09)			(0.70)
BETA	+	2.537***	1.925***	1.922***	0.728***	0.625***	0.625***
		(8.26)	(5.70)	(5.69)	(5.62)	(4.52)	(4.51)
LBTM	+	2.533**	3.166**	3.152**	2.925***	3.161***	3.154***
		(1.99)	(2.30)	(2.29)	(6.66)	(7.02)	(7.02)
LMVE	−	−1.093***	−0.935***	−0.932***	−0.379***	−0.340***	−0.342***
		(−8.73)	(−6.70)	(−6.68)	(−7.64)	(−6.68)	(−6.71)
Observations		4,273	4,273	4,273	8,371	8,371	8,371
Adjusted R^2		0.166	0.175	0.175	0.122	0.123	0.123
AltDQ Interactions Equal?				0.819			0.100
EQ Interactions Equal?				0.749			0.197

Panel B: Alternate DQ (*AltDQ*) Measure = −1 × Readability

Variables	Exp. Sign	*COE* Measured Using Value Line (1)	(2)	(3)	*COE* Measured Using Composite I/B/E/S (4)	(5)	(6)
Intercept	NA	18.910***	18.560***	18.613***	9.722***	9.489***	9.491***
		(14.09)	(13.15)	(13.17)	(20.00)	(19.22)	(19.23)
AltDQ	−	−0.484*	−0.467*	−0.658*	−0.273**	−0.264**	−0.256*
		(−1.53)	(−1.48)	(−1.60)	(−1.72)	(−1.67)	(−1.58)
AltDQ ∗ *AIMRPER*	NA			0.503			0.008
				(0.84)			(0.03)
AltDQ ∗ *FNOPER*	NA			0.976			−0.077
				(0.62)			(−0.25)
EQ	−		−1.594***	−1.521***		−0.250***	−0.237**
			(−4.35)	(−3.51)		(−2.36)	(−2.19)
EQ ∗ *AIMRPER*	NA			−0.373			−0.276
				(−0.72)			(−1.16)
EQ ∗ *FNOPER*	NA			0.194			0.133
				(0.20)			(0.71)
BETA	+	0.025***	0.019***	0.019***	0.736***	0.631***	0.634***
		(8.25)	(5.68)	(5.69)	(5.68)	(4.56)	(4.57)
LBTM	+	0.026**	0.033***	0.032**	3.045***	3.283***	3.287***
		(2.07)	(2.37)	(2.35)	(6.92)	(7.26)	(7.28)

(continued on next page)

TABLE 8 (continued)

Variables	Exp. Sign	COE Measured Using Value Line (1)	(2)	(3)	COE Measured Using Composite I/B/E/S (4)	(5)	(6)
LMVE	–	−0.011***	−0.009***	−0.009***	−0.351***	−0.312***	−0.312***
		(−8.67)	(−6.61)	(−6.64)	(−7.05)	(−6.06)	(−6.05)
Observations		4,273	4,273	4,273	8,371	8,371	8,371
Adjusted R^2		0.165	0.175	0.174	0.121	0.122	0.122
AltDQ Interactions Equal?				0.764			0.835
EQ Interactions Equal?				0.571			0.184

Panel C: Alternate DQ (*AltDQ*) Measure = *DISAGG_BS*

Variables	Exp. Sign	COE Measured Using Value Line (1)	(2)	(3)	COE Measured Using Composite I/B/E/S (4)	(5)	(6)
Intercept	NA	20.211***	19.894***	19.779***	9.532***	9.462***	9.478***
		(14.43)	(14.04)	(13.98)	(10.42)	(10.31)	(10.50)
AltDQ	–	−2.753**	−2.740**	−2.726*	1.248	1.249	0.881
		(−2.13)	(−2.13)	(−1.30)	(1.47)	(1.47)	(0.92)
AltDQ ∗ *AIMRPER*	NA			−0.054			0.706
				(−0.02)			(0.58)
AltDQ ∗ *FNOPER*	NA			1.528			−0.105
				(1.30)			(−0.41)
EQ	–		−1.571***	−0.963**		−0.107	0.053
			(−5.65)	(−2.35)		(−0.81)	(0.39)
EQ ∗ *AIMRPER*	NA			−0.900*			−0.482**
				(−1.94)			(−2.10)
EQ ∗ *FNOPER*	NA			−1.015			−0.149
				(−0.92)			(−0.71)
BETA	+	2.134***	1.674***	1.693***	0.609***	0.572***	0.591***
		(7.97)	(5.84)	(5.89)	(4.31)	(3.78)	(3.86)
LBTM	+	2.754***	3.095***	3.085***	2.787***	2.853***	2.853***
		(3.98)	(4.29)	(4.28)	(7.12)	(7.19)	(7.21)
LMVE	–	−0.854***	−0.693***	−0.686***	−0.484***	−0.470***	−0.465***
		(−10.22)	(−7.69)	(−7.62)	(−8.76)	(−7.89)	(−7.81)
Observations		9,916	9,916	9,916	13,032	13,032	13,032
Adjusted R^2		0.150	0.158	0.159	0.124	0.124	0.125
AltDQ Interactions Equal?				0.516			0.518
EQ Interactions Equal?				0.916			0.283

Panel D: Alternate DQ (*AltDQ*) Measure = *DISAGG_IS*

Variables	Exp. Sign	COE Measured Using Value Line (1)	(2)	(3)	COE Measured Using Composite I/B/E/S (4)	(5)	(6)
Intercept	NA	20.317***	19.992***	19.948***	11.870***	11.802***	11.770***
		(21.44)	(20.73)	(20.73)	(20.60)	(20.28)	(20.26)
AltDQ	–	−5.204***	−5.516***	−5.656***	−2.577***	−2.588***	−2.476***
		(−4.73)	(−4.69)	(−3.20)	(−3.96)	(−3.96)	(−3.39)
AltDQ ∗ *AIMRPER*	NA			0.675			−0.162
				(0.33)			(−0.13)
AltDQ ∗ *FNOPER*	NA			2.244			−0.169
				(1.36)			(−0.46)

(continued on next page)

TABLE 8 (continued)

Variables	Exp. Sign	COE Measured Using Value Line (1)	(2)	(3)	COE Measured Using Composite I/B/E/S (4)	(5)	(6)
EQ	–		−1.566***	−0.927**		−0.114	0.045
			(−5.67)	(−2.30)		(−0.86)	(0.34)
EQ ∗ *AIMRPER*	NA			−0.945**			−0.468**
				(−2.08)			(−2.09)
EQ ∗ *FNOPER*	NA			−1.099			−0.148
				(−1.00)			(−0.71)
BETA	+	2.066***	1.608***	1.629***	0.639***	0.600***	0.618***
		(7.80)	(5.67)	(5.72)	(4.61)	(4.01)	(4.09)
LBTM	+	2.731***	3.072***	3.059***	2.586***	2.656***	2.661***
		(3.94)	(4.26)	(4.24)	(6.53)	(6.62)	(6.64)
LMVE	–	−0.794***	−0.634***	−0.627***	−0.484***	−0.468***	−0.464***
		(−9.92)	(−7.37)	(−7.29)	(−9.11)	(−8.10)	(−8.02)
Observations		9,916	9,916	9,916	13,032	13,032	13,032
Adjusted R^2		0.152	0.160	0.161	0.126	0.126	0.127
AltDQ Interactions Equal?				0.533			0.995
EQ Interactions Equal?				0.887			0.295

Panel E: Alternate DQ (*AltDQ*) Measure = Composite Score

Variables	Exp. Sign	COE Measured Using Value Line (1)	(2)	(3)	COE Measured Using Composite I/B/E/S (4)	(5)	(6)
Intercept	NA	20.015***	19.744***	19.841***	10.546***	10.484***	10.495***
		(14.12)	(13.43)	(13.50)	(20.58)	(20.23)	(20.26)
AltDQ	–	−1.106***	−1.099***	−1.267***	−0.440***	−0.438***	−0.457***
		(−4.48)	(−4.44)	(−4.45)	(−3.77)	(−3.78)	(−3.89)
AltDQ ∗ *AIMRPER*	NA			0.950*			0.164
				(1.71)			(0.50)
AltDQ ∗ *FNOPER*	NA			0.875			0.113
				(0.54)			(0.39)
EQ	–		−0.817**	−0.800**		−0.062	−0.039
			(−2.25)	(−1.84)		(−0.56)	(−0.34)
EQ ∗ *AIMRPER*	NA			−0.086			0.157
				(−0.15)			(0.57)
EQ ∗ *FNOPER*	NA			0.766			0.111
				(0.84)			(0.58)
BETA	+	1.415***	1.164***	1.150***	0.463***	0.440***	0.443***
		(4.33)	(3.31)	(3.27)	(3.48)	(3.12)	(3.12)
LBTM	+	3.344***	3.631***	3.585***	3.047***	3.102***	3.096***
		(2.41)	(2.49)	(2.47)	(6.24)	(6.31)	(6.32)
LMVE	–	−1.060***	−0.978***	−0.992***	−0.409***	−0.400***	−0.401***
		(−8.16)	(−6.86)	(−6.92)	(−7.84)	(−7.46)	(−7.45)
Observations		3,722	3,722	3,722	7,211	7,211	7,211
Adjusted R^2		0.173	0.175	0.175	0.133	0.133	0.133
AltDQ Interactions Equal?				0.963			0.901
EQ Interactions Equal?				0.368			0.893

***, **, * Denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively. We use a one-tailed test of significance for coefficients with expected signs and two tailed otherwise.

(continued on next page)

American Accounting Association

TABLE 8 (continued)

This table presents results from regressing cost of equity on various measures of disclosure quality (*AltDQ*). 10-K length is the natural log of the total number of words in the 10-K. Readability is the average of the standardized Fog index, Flesch, and Kincaid measures of readability obtained from Feng Li's website. *DISAGG_BS* (*DISAGG_IS*) is the Chen et al. (2015) measure of disaggregation in the balance sheet (income statement). Composite score is the average of the standardized values for (1) $-1 *$ Readability; (2) $-1 *$ 10-K Length; (3) *DISAGG_BS;* and (4) *DISAGG_IS*. Value Line cost of equity (*COE*) is as in Brav et al. (2005). I/B/E/S cost of equity is a composite index of four I/B/E/S-derived measures (GLS, CT, GM, and PEG). We multiply *COE* estimates by 100 for exposition. Each estimation includes year fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level, and t-statistics are in parentheses below coefficient estimates. Results (p-values) for tests of *AltDQ* interaction equality (*AltDQ* $*$ *FNOPER* = *AltDQ* $*$ *AIMRPER*) and *EQ* interaction equality (*EQ* $*$ *FNOPER* = *EQ* $*$ *AIMRPER*) are reported at the bottom of each panel.

Variable Definitions:
EQ = earnings quality measured as in FNO, multiplied by -1;
AIMRPER = 1 if the observation is from 1985–1996;
FNOPER = 1 if the observation is from 2001;
BETA = the market model beta;
LBTM = the natural logarithm of book to market ratio measured on the fiscal-year end date; and
LMVE = the natural logarithm of market value of equity measured on December 31 of the year preceding the cost of equity estimate.

Thus, we interpret this evidence as inconsistent with the sample period fully explaining the difference between our and FNO's results.

CONCLUSION

In this study, we re-examine the relations between disclosure quality and various measures of the cost of capital. Our analyses are motivated by results in FNO suggesting that the negative relation between disclosure quality and the cost of capital is attenuated, and can disappear completely, after controlling for earnings quality. The results in FNO raise the possibility that earnings quality is a correlated omitted variable in studies examining the association between disclosure quality and costs of capital. Given that the authors measure disclosure using one year of hand-collected annual report quality data, an important question is whether FNO's conclusion applies to the AIMR disclosure scores, a widely used measure of disclosure quality, as well as to other measures of costs of capital. Indeed, FNO themselves note, "We view the exploration of the differences found across voluntary disclosure forms as providing a rich avenue for further research" (Francis et al. 2008, 96).

Using the AIMR disclosure scores, we conclude that the inferences reached in three prominent prior studies regarding the cost of equity (Botosan and Plumlee 2002), bid-ask spreads (Welker 1995), and the cost of debt (Sengupta 1998) are all robust to controlling for earnings quality. Furthermore, we find nontrivial economic benefits of higher-quality disclosures, even though our evidence also supports the inference in FNO that earnings quality is an important determinant of the costs of equity and debt. Our results are consistent with theory suggesting reductions in information asymmetry (through improved disclosure quality or earnings quality) garner decreases in costs of capital and improved liquidity. In explaining the difference in our and FNO's results, we provide evidence favoring a difference in the disclosure quality measure over a difference in sample period. We contend that measures of disclosure quality capturing *how* information is released likely capture elements of disclosure distinct from the quality of a firm's information. We view further empirical investigation of these relations, perhaps using different disclosure venues or more recent time periods, as a fruitful area for future research.

REFERENCES

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

Ahmed, A. S., B. K. Billings, R. M. Morton, and M. Stanford-Harris. 2002. The role of accounting conservatism in mitigating bondholder-shareholder conflicts over dividend policy and in reducing debt costs. *The Accounting Review* 77 (4): 867–890.

Amihud, Y., and H. Mendelson. 1986. Asset pricing and the bid-ask spread. *Journal of Financial Economics* 17 (2): 223–249.

Baginski, S. P., and K. C. Rakow, Jr. 2012. Management earnings forecast disclosure policy and the cost of equity capital. *Review of Accounting Studies* 17 (2): 279–321.

Balakrishnan, K., M. B. Billings, B. Kelly, and A. Ljungqvist. 2014. Shaping liquidity: On the causal effects of voluntary disclosure. *The Journal of Finance* 69 (5): 2237–2278.

Barry, C. B., and S. Brown. 1985. Differential information and security market equilibrium. *Journal of Financial and Quantitative Analysis* 20 (4): 407–422.

Barth, M. E., Y. Konchitchki, and W. Landsman. 2013. Cost of capital and earnings transparency. *Journal of Accounting & Economics* 55 (2/3): 206–224.

Bhattacharya, N., F. Ecker, P. M. Olsson, and K. Schipper. 2012. Direct and mediated associations among earnings quality, information asymmetry, and the cost of equity. *The Accounting Review* 87 (2): 449–482.

Botosan, C. A. 1997. Disclosure level and the cost of equity capital. *The Accounting Review* 72 (3): 323–349.

Botosan, C. A., and M. A. Plumlee. 2002. A re-examination of disclosure level and the expected cost of equity capital. *Journal of Accounting Research* 40 (1): 21–40.

Brav, A., R. Lehavy, and R. Michaely. 2005. Using expectations to test asset pricing models. *Financial Management* 34 (3): 31–64.

Brown, S., and S. Hillegeist. 2007. How disclosure quality affects the level of information asymmetry. *Review of Accounting Studies* 12 (2/3): 443–477.

Bushee, B. J., and C. Leuz. 2005. Economic consequences of SEC disclosure regulation: Evidence from the OTC bulletin board. *Journal of Accounting & Economics* 39 (2): 233–264.

Byard, D., and K. W. Shaw. 2003. Corporate disclosure quality and the properties of analysts' information environment. *Journal of Accounting, Auditing & Finance* 18 (3): 355–378.

Callen, J. L., M. Khan, and H. Lu. 2013. Accounting quality, stock price delay, and future stock returns. *Contemporary Accounting Research* 30 (1): 269–295.

Cao, Y., J. N. Myers, L. A. Myers, and T. C. Omer. 2015. Company reputation and the cost of equity capital. *Review of Accounting Studies* 20 (1): 42–81.

Chen, K. C. W., Z. Chen, and K. C. Wei. 2011. Agency costs of free cash flow and the effect of shareholder rights on the implied cost of equity capital. *Journal of Financial and Quantitative Analysis* 46 (1): 171–207.

Chen, S., B. Miao, and T. Shevlin. 2015. A new measure of disclosure quality: The level of disaggregation of accounting data in annual reports. *Journal of Accounting Research* 53 (5): 1017–1054.

Cheng, L., S. Liao, and H. Zhang. 2013. The commitment effect versus information effect of disclosure—Evidence from smaller reporting companies. *The Accounting Review* 88 (4): 1239–1263.

Christensen, P. O., L. E. de la Rosa, and G. A. Feltham. 2010. Information and the cost of capital: An *ex ante* perspective. *The Accounting Review* 85 (3): 817–848.

Clarkson, P., J. Guedes, and R. Thompson. 1996. On the diversification, observability, and measurement of estimation risk. *Journal of Financial and Quantitative Analysis* 31 (1): 69–84.

Claus, J., and J. Thomas. 2001. Equity risk premium as low as three percent? Evidence from analysts' earnings forecasts for domestic and international stocks. *The Journal of Finance* 56 (5): 1629–1666.

Coles, J. L., U. Loewenstein, and J. Suay. 1995. On equilibrium pricing under parameter uncertainty. *Journal of Financial and Quantitative Analysis* 30 (3): 347–364.

Core, J. E., W. R. Guay, and R. Verdi. 2008. Is accruals quality a priced risk factor? *Journal of Accounting & Economics* 46 (1): 2–22.

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

Dechow, P. M., R. G. Sloan, and A. P. Sweeney. 1995. Detecting earnings management. *The Accounting Review* 70 (2): 193–225.

Dechow, P. M., W. Ge, and C. Schrand. 2010. Understanding earnings quality: A review of the proxies, their determinants and their consequences. *Journal of Accounting & Economics* 50 (2/3): 344–401.

Dhaliwal, D. S., I. K. Khurana, and R. Pereira. 2011. Firm disclosure and the choice between private and public debt. *Contemporary Accounting Research* 28 (1): 293–330.

Diamond, D. W., and R. E. Verrecchia. 1991. Disclosure, liquidity, and the cost of capital. *The Journal of Finance* 46 (4): 1325–1359.

Drake, M. S., J. N. Myers, and L. A. Myers. 2009. Disclosure quality and the mispricing of accruals and cash flows. *Journal of Accounting, Auditing & Finance* 24 (3): 357–384.

Dye, R. 1985. Disclosure of nonproprietary information. *Journal of Accounting Research* 23 (1): 123–145.

Easley, D., N. M. Kiefer, and M. O'Hara. 1997. One day in the life of a very common stock. *The Review of Financial Studies* 10 (3): 805–835.

Ederington, L. H., J. B. Yawitz, and B. E. Roberts. 1987. The informational content of bond ratings. *The Journal of Financial Research* 10 (3): 211–226.

Fama, E. F., and K. R. French. 1997. Industry costs of equity. *Journal of Financial Economics* 43 (2): 153–193.

Francis, J. R., I. K. Khurana, and R. Pereira. 2005a. Disclosure incentives and effects on cost of capital around the world. *The Accounting Review* 80 (4): 1125–1162.

Francis, J., D. Nanda, and P. Olsson. 2008. Voluntary disclosure, earnings quality, and cost of capital. *Journal of Accounting Research* 46 (1): 53–99.

Francis, J., R. LaFond, P. M. Olsson, and K. Schipper. 2004. Costs of equity and earnings attributes. *The Accounting Review* 79 (4): 967–1010.

Francis, J., R. LaFond, P. M. Olsson, and K. Schipper. 2005b. The market pricing of accruals quality. *Journal of Accounting & Economics* 39 (2): 295–327.

Gebhardt, W., C. Lee, and B. Swaminathan. 2001. Towards an implied cost of equity. *Journal of Accounting Research* 39 (1): 135–176.

Gode, D., and P. Mohanram. 2003. Inferring the cost of capital using the Ohlson-Juettner model. *Review of Accounting Studies* 8 (4): 399–431.

American Accounting Association

Hand, J. R. M., R. Holthausen, and R. Leftwich. 1992. The effect of bond rating agency announcements on bond and stock prices. *The Journal of Finance* 12 (2): 97–123.

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

Healy, P. M., A. P. Hutton, and K. G. Palepu. 1999. Stock performance and intermediation changes surrounding sustained increases in disclosure. *Contemporary Accounting Research* 16 (3): 485–520.

Heflin, F. L., K. W. Shaw, and J. J. Wild. 2005. Disclosure policy and market liquidity: Impact of depth quotes and order sizes. *Contemporary Accounting Research* 22 (4): 829–865.

Heflin, F., K. W. Shaw, and J. J. Wild. 2011. Credit ratings and disclosure channels. *Research in Accounting Regulation* 23 (1): 20–33.

Hou, K., M. van Dijk, and Y. Zhang. 2012. The implied cost of equity: A new approach. *Journal of Accounting & Economics* 53 (3): 504–526.

Huang, R., and H. Stoll. 1997. The components of the bid-ask spread: A general approach. *The Review of Financial Studies* 10 (4): 995–1034.

Huang, R., and Y. Zhang. 2012. Does enhanced disclosure really reduce agency costs? Evidence from the diversion of corporate resources. *The Accounting Review* 87 (1): 199–229.

Hughes, J. S., J. Liu, and J. Liu. 2007. Information asymmetry, diversification, and cost of capital. *The Accounting Review* 82 (3): 705–729.

Jiang, G. J., D. Xu, and T. Yao. 2009. The information content of idiosyncratic volatility. *Journal of Financial and Qualitative Analysis* 44 (1): 1–28.

Jiang, X. 2008. Beating earnings benchmarks and the cost of debt. *The Accounting Review* 83 (2): 377–416.

Jones, J. J. 1991. Earnings management during import relief investigations. *Journal of Accounting Research* 29 (2): 193–228.

Jung, W. O., and Y. K. Kwon. 1988. Disclosure when the market is unsure of information endowment of managers. *Journal of Accounting Research* 26 (1): 146–153.

Krinsky, I., and J. Lee. 1996. Earnings announcements and the components of the bid-ask spread. *The Journal of Finance* 51 (4): 1523–1535.

Lambert, R., and R. Verrecchia. 2010. *Cost of Capital in Imperfect Competition Settings*. Working paper, University of Pennsylvania.

Lambert, R. A., C. Leuz, and R. E. Verrecchia. 2007. Accounting information, disclosure, and the cost of capital. *Journal of Accounting Research* 45 (2): 385–420.

Lambert, R. A., C. Leuz, and R. E. Verrecchia. 2011. Information asymmetry, information precision, and the cost of capital. *Review of Finance* 16 (1): 1–29.

Lang, M., and R. Lundholm. 1993. Cross-sectional determinants of analyst ratings of corporate disclosures. *Journal of Accounting Research* 31 (2): 246–271.

Larcker, D. F., and T. O. Rusticus. 2010. On the use of instrumental variables in accounting research. *Journal of Accounting & Economics* 49 (3): 186–205.

Lee, Y. J. 2012. The effect of quarterly report readability on information efficiency of stock prices. *Contemporary Accounting Research* 29 (4): 1137–1170.

Leuz, C., and R. E. Verrecchia. 2000. The economic consequences of increased disclosure. *Journal of Accounting Research* 38 (1): 91–124.

Li, F. 2008. Annual report readability, current earnings, and earnings persistence. *Journal of Accounting & Economics* 45 (2): 221–247.

Li, K. K., and P. Mohanram. 2014. Evaluating cross-sectional forecasting models for implied cost of capital. *Review of Accounting Studies* 19 (3): 1152–1185.

Li, O. L., and Z. Zhuang. 2012. Management guidance and the underpricing of seasoned equity offerings. *Contemporary Accounting Research* 29 (3): 710–737.

Lin, J. C., G. C. Sanger, and G. G. Booth. 1995. Trade size and components of the bid-ask spread. *The Review of Financial Studies* 8 (4): 1153–1183.

Mansi, S. A., W. F. Maxwell, and D. P. Miller. 2011. Analyst forecast characteristics and the cost of debt. *Review of Accounting Studies* 16 (1): 116–142.

McInnis, J. 2010. Earnings smoothness, average returns, and implied cost of equity capital. *The Accounting Review* 85 (1): 315–341.

McNichols, M. F. 2002. Discussion of the quality of accruals and earnings: The role of accrual estimation errors. *The Accounting Review* 77 (4): 61–69.

Ohlson, J. A., and B. E. Juettner-Nauroth. 2005. Expected EPS and EPS growth as determinants of value. *Review of Accounting Studies* 10 (2/3): 349–365.

Petersen, M. A. 2009. Estimating standard errors in finance panel data sets: Comparing approaches. *The Review of Financial Studies* 22 (1): 435–480.

Sengupta, P. 1998. Corporate disclosure quality and the cost of debt. *The Accounting Review* 73 (4): 459–474.

Tasker, S. C. 1998. Bridging the information gap: Quarterly conference calls as a medium for voluntary disclosure. *Review of Accounting Studies* 3 (1-2): 137–167.

Thompson, S. B. 2011. Simple formulas for standard errors that cluster by both firm and time. *Journal of Financial Economics* 99 (1): 1–10.

Venter, J. H., and P. J. de Jongh. 2004. Selecting an innovation distribution for Garch models to improve efficiency of risk and volatility estimation. *Journal of Risk* 6 (3): 27–52.

Verrecchia, R. E. 1983. Discretionary disclosure. *Journal of Accounting & Economics* 5 (3): 179–194.

Welker, M. 1995. Disclosure policy, information asymmetry, and liquidity in equity markets. *Contemporary Accounting Research* 11 (2): 801–827.

Wooldridge, J. M. 2010. *Econometric Analysis of Cross Section and Panel Data*. 2nd edition. Cambridge, MA: The MIT Press.

Ziebart, D. A., and S. A. Reiter. 1992. Bond ratings, bond yields, and financial information. *Contemporary Accounting Research* 9 (1): 252–282.