Voluntary Environmental Disclosure Quality and Firm Value: Further Evidence

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Abstract

This study examines the relationship between the quality of a firm's voluntary environmental disclosures and firm value by exploring the relationship between the components of firm value (expected future cash flows and cost of equity) and voluntary environmental disclosure quality. We measure voluntary environmental disclosure quality using a disclosure index consistent with the Global Reporting Initiative disclosure framework for a sample of US firms across five industries. In addition to overall disclosure quality, we consider the type (i.e., hard/soft) and the nature (i.e., positive/neutral/negative) of the disclosure in our analysis. We also include controls for both positive and negative environmental performance. Based on this analysis, we document (1) a positive association between some aspects of voluntary environmental disclosure quality and future expected cash flows, and (2) both a negative and positive association between some aspects of voluntary environmental disclosure quality and a firm's cost of equity capital. Our findings are consistent with increased voluntary environmental disclosure quality being associated with firm value through both the expected cash flow and cost of equity capital components. The results also highlight the benefit of parsing broader measures (e.g. voluntary disclosure quality) when examining complex relationships.

Keywords: voluntary environmental disclosure; cash flows; environmental performance, cost of equity capital

1. Introduction

In this study, we reexamine the relation between voluntary environmental disclosures and firm value through the disclosures' associations' with either the expected future cash flow or cost of equity capital component. Based on findings from prior research, we control for environmental performance and partition environmental disclosures by type and content. Doing so allows us to differentiate among various proposed explanations for the sometimes-contradictory findings from prior research.

Our study builds on prior and current research that provides inconsistent results surrounding the relation between corporate social responsibility (CSR) and/or environmental disclosure and the cost of equity capital. Richardson and Welker (2001) document a significant positive association between social disclosure and the cost of equity capital. Dhaliwal, Li, Tsang and Yang (2010) present evidence consistent with an inverse relation. Clarkson, Fang, Li, and Richardson (2010) fail to document a significant relation after controlling for firms' relative environmental performance. We, however, document that higher quality voluntary environmental disclosures classified as "soft" and "positive" ("soft" and "negative") are inversely (positively) related to the cost of equity capital.

Findings in Connors and Silva-Gao (2008) and Sharfman and Fernando (2008) suggest that relative environmental performance captures a dimension of firm risk that matters to investors and ultimately affects the cost of equity, so controlling for environmental performance is essential. Many other studies include a single proxy that is based on negative aspects of environmental performance. In contrast, we include two environmental performance measures – a positive and a negative one – allowing us to more carefully consider the role of environmental performance in the associations between voluntary environmental disclosure quality and firm value.

We also contribute to the somewhat limited research that focuses on the numerator rather than denominator of firm value. We predict and find a significant positive association between three

types of voluntary environmental disclosures and the cash flow component of firm value using a direct measure of expected future cash flows new to the literature. Again, we control for relative environmental performance and partition the disclosures in our analysis, which is of particular importance when considering the role of voluntary disclosures and expected future cash flows. Furthermore, our study extends prior research by parsing firm value into an "expected future cash flow" and a "cost of equity capital component" and considering the relations independent of each other. We also introduce a proxy for the expected future cash flow component of firm value.

We include United States firms drawn from five industries – some considered sensitive to environmental issues and some that are not – and measure voluntary environmental disclosure quality using the Brown, Marshall, and Plumlee self-constructed index based on disclosures made over a six year period (2000-2005). We measure relative environmental performance using intra-industry ranks based on data from KLD STATS, which provides both positive (strengths) and negative (concerns) information for a broad range of firms.[2]

We begin by documenting a positive relation between voluntary environmental disclosure quality and firm value, even after controlling for environmental performance, consistent with Clarkson et al. (2010). We then explore whether partitioning voluntary environmental disclosure quality by the *type* of disclosure (hard/soft) (e.g., Clarkson, Li, Richardson, Vasvari (2008)) and the *type_nature* of the disclosure item (whether the hard/soft disclosures is related to positive/neutral/negative environmental issues) improves our ability to discern complex relations. Our analysis suggests that partitioning the disclosures increases the informativeness of the measures and increases our understanding of the associations between voluntary environmental disclosure quality and firm value. Furthermore, we find that negative environmental performance is negatively associated with firm value, although we document no association between positive environmental performance and firm value.

[2] We provide additional details about these data in the paper.

We then consider the associations between voluntary environmental disclosure quality and the two components of firm value: expected future cash flows (the "numerator" of firm value - based on analysts' forecasts) and the expected cost of equity capital (the "denominator" of firm value - using an implied cost of equity capital measure). Consistent with our analysis of firm value, we document positive associations between voluntary environmental disclosure quality and expected future cash flows, even after controlling for relative environmental performance. When we partition the voluntary environmental disclosure quality by *type* and *type_nature*, we obtain increased explanatory power. We document that higher quality soft disclosures are positively associated with expected future cash flows and that further partitioning the disclosures adds additional explanatory power to the regression. The link between voluntary environmental disclosures and the cash flow component of firm value suggests that the *type* (hard/soft) of disclosure is incrementally informative and that, not surprisingly, the *type_nature* (e.g., hard/positive or soft/positive) matters as well.

Our findings complement and extend those provided in Clarkson et al. (2010), who find environmental disclosures to be incrementally informative over an alternative measure for environmental performance (toxic release inventory (TRI) data) in predicting firm profitability and firm value. In contrast to our study, however, they fail to document an association between voluntary environmental disclosure quality and cost of equity. We argue that these differences are most likely due to differences in our environmental performance measures and samples (they limit their analysis to environmentally sensitive industries in two years), as well as our refinements of the environmental disclosure quality.

The remainder of the paper is organized as follows. In section 2 we review the relevant literature and develop hypotheses. Section 3 provides details of research design, variable measurement, and sample selection, and presents descriptive statistics of the sample. We present our empirical results in section 4 and conclude in section 5.

2. Literature review and hypotheses development

Literature review

Clarkson et al. (2008) classify prior environmental accounting research into three broad categories: studies that examine the valuation relevance of corporate environmental performance information (environmental disclosures), studies that examine factors affecting managerial decisions to disclose potential environmental liabilities, and studies that explore the relation between environmental disclosures and environmental performance. Our study contributes most directly to the first category, although we employ findings from the other areas to motivate our analysis. In addition, we contribute to the literature that considers the relation between environmental performance and cost of equity capital. We provide a review of the most relevant literature below.

Firm value and environmental disclosures

Early studies examining the link between environmental disclosures and firm value frequently focus on the associations between specific environmental issues or events and stock price or stock price changes. For example, Barth and McNichols (1994) document that the market assessed Superfund liabilities in excess of the amounts disclosed by firms, consistent with these firms having an 'unrealized' environmental liability. Blacconiere and Patten (1994) and Blacconiere and Northcutt (1997) provide evidence of the benefits of improved environmental disclosures. Specifically, Blacconiere and Patten (1994) document that, while chemical companies experienced negative share price returns after a significant chemical leak (the Union Carbide Bhopal leak), the stock price reaction was mitigated for firms with better environmental disclosures, and Blacconiere and Northcutt (1997) find that chemical firms with more extensive environmental disclosures included in their 10-K reports had a weaker negative reaction to environmental regulation than other firms. These studies provide evidence of the link between environmental disclosures and firm value, although the focus was on mandatory disclosures and environmental

"events" or liabilities.

In a study that considered disclosures absent specific events or liabilities, Richardson and Welker (2001) examined the relation between social disclosures in annual reports (which include environmental disclosures) and the cost of equity capital for a sample of Canadian firms. They document an unexpected positive relation between social disclosures and cost of equity capital and explore whether that relation is due to "biases in social disclosures". While their findings suggest that improved social disclosures increase cost of equity capital, which would *reduce* firm value, the authors highlight that this does not "imply that social disclosure has an overall negative effect on the firm" (pg. 614) and suggest that further research consider other beneficial effects of social disclosures.

In contrast to Richardson and Welker (2001), Aerts, Cormier and Magnan (2008) and Cormier and Magnan (2007) provide evidence that improved environmental disclosure is associated with a lower cost of equity capital, in some settings. Aerts et al. (2008) show that enhanced environmental disclosures provided by European and North American companies in 2002 are associated with more precise analysts' earnings forecasts, which might reduce cost of equity capital through a reduction in information risk. The authors consider mandatory and voluntary, print and web-based environmental disclosures and find that the association varies by industry (weaker for environmentally sensitive industries), country (stronger for European than North American companies), and disclosure venue (stronger for print for North American companies and for web-based disclosures for European companies). Cormier and Magnan (2007) investigate how environmental reporting affects the association between firm earnings and stock market value, using environmental disclosures from Canada, France, and Germany from 1992-1998. Their findings suggest an association for German firms, although they fail to find a consistent relation between the disclosures and stock valuation multiples for French and Canadian firms. While these

studies provide a link between environmental disclosures and firm value, unlike our study, they included both mandatory and voluntary disclosures.

Two recent studies more directly related to this study are Dhaliwal, Li, Tsang, and Yang (2010) and Clarkson, Fang, Li, and Richardson (2010). Dhaliwal et al. (2010) examine whether the initiation of voluntary disclosure of corporate social responsibility[3] (CSR) activities via a stand-alone CSR report is associated with a firm's cost of equity capital. They find that firms with a high cost of equity capital are more likely to release a stand-alone CSR report, and firms with CSR performance above the industry mean have lower analyst forecast errors and dispersion and are more likely to issue equity. Unlike our study, the authors do not examine variance in the quality of the disclosures within the CSR nor do they consider the link with the numerator of firm value. In addition, their focus is on the issuance of a CSR, while ours is on a variance in the quality of environmental disclosures.

Clarkson et al. (2010) examine the impact of voluntary environmental disclosure on the cost of equity and firm value. They measure the voluntary environmental disclosures presented via CSRs and corporate web sites for firms within five environmentally sensitive industries and document a positive association between voluntary environmental disclosures and overall firm value, even after controlling for environmental performance measured using toxic emissions data. When they examine whether this association is through the cost of equity capital, however, they fail to document a significant relation. This study is similar to ours in its direct examination of the associations between voluntary environmental disclosure quality and firm value. The sample, related data, and findings, however, differ. For example, we consider firms that operate in environmentally sensitive and non-sensitive industries over a six-year period while Clarkson et al. focuses on firms within environmentally sensitive industries over two sample years. We also employ different measures of environmental

[3] Environmental disclosures are a subset of CSR disclosures.

disclosure quality and, using those measures, document significant associations between cost of equity capital and voluntary environmental disclosure quality. Finally, Clarkson et al. do not directly examine the association between voluntary environmental disclosure quality and the cash flow component of firm value.

In summation, prior research provides mixed results for the association between environmental disclosures and firm value. Much of the focus of this research is on the denominator of firm value (cost of equity); the association appears to be related to the type of disclosures (voluntary or mandatory/ environmental or social), the disclosure venue, or the industry or setting. Examination of the cash flow component of firm value is less frequent and is often related to potential environmental liabilities.

Environmental disclosures and environmental performance

A second area of research related to our study is the link between environmental disclosures and environmental performance (e.g. Al-Tuwaijri, Christensen, and Hughes 2004; Clarkson, Li, Richardson, and Vasari 2008; Cormier, Ledoux, and Magnan 2009; Patten 2002). The findings from this area are also mixed. Al-Tuwaijri et al. (2004) limit their analysis to environmental disclosures related to specific pollution measures and occurrences (mandatory disclosures) and document a positive association between these disclosures and environmental performance. In contrast, Clarkson et al. (2008) examine the relation between environmental performance and voluntary environmental disclosures and test competing economic-based and socio-political theories of *voluntary* disclosure.[4] Their findings suggest that environmental performance and

[4] Economics-based theories predict that voluntary environmental disclosure will be used by "high-quality" companies to differentiate themselves from "low-quality" companies to avoid an adverse selection problem (e.g. Verrecchia 1983; Wagenhofer 1990). In this setting, superior environmental performers have incentives to voluntarily disclose to inform investors of their quality, using disclosures that cannot be easily mimicked by poorer environmental performers. This leads to a *positive* association between environmental performance and voluntary environmental disclosure quality. On the other hand, socio-political theories predict a *negative* association between environmental performance and voluntary environmental disclosure quality, wherein poorer environmental performers have incentives to increase voluntary environmental disclosure quality to increase their "legitimacy". In this setting, firms have incentives to improve the perceptions that relevant stakeholders have about the firms' environmental standings and do so by providing higher quality

voluntary environmental disclosure quality are positively related, consistent with economics based theories. However, they also "show that socio-political theories explain patterns in the data ("legitimization") that cannot be explained by economic disclosure theories" (pg 303). In contrast, Cormier et al. (2009) and Cho and Patten (2007) document that high polluting firms or poorer environmental performers disclose more than low polluting/ high performers, consistent with socio-political theories.

In summation, while there appears to be a consistent relation between environmental performance and voluntary environmental disclosure quality, research suggests that the sign of the relation might vary by type of industry (e.g., Cho and Patten 2007), the nature of the disclosure (Cormier et al. 2009; Clarkson et al. 2008), and the venue within which the disclosure is provided (Aerts and Cormier 2009; Cormier et al. 2009). Thus, we control for environmental performance and consider the nature of the disclosures and the venue in our analysis.

Hypotheses development

Our goal is to gain a better understanding of how differences in the quality of firms' voluntary environmental disclosures relate to stock price. In our hypotheses development, we employ the dividend discount model, which defines firm value as the discounted value of expected future cash flows to differentiate between the numerator (expected future cash flows) and denominator (cost of equity capital) components of firm value.

Expected future cash flows

The first means by which voluntary environmental disclosure quality might be associated with firm value is through a numerator effect. Some prior research suggests that environmental disclosure quality serves as a signal of firms' environmental practices that affect financial performance and, ultimately, firm value (e.g., Al-Tuwaijri et al. 2004). These disclosures provide

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voluntary environmental to manage those perceptions (see Aerts, Cormier, and Magnan 2008; Aerts and Cormier 2009; Cho and Patten 2007 for more detailed discussions).

information about practices related to protecting the environment that could reduce government regulation and the resulting compliance costs, potential litigation, and/or pollution remediation costs. Furthermore, prior research suggest that disclosures related to these issues inform stakeholders, beyond investors, who opt to partner with, patronize or work for environmentally responsible firms, which leads to superior sales and financial performance (Lev, Petrovits, and Radhakrishnan 2008). These studies suggest a positive relation between voluntary environmental disclosure quality and expected future cash flows. In contrast, a number of studies suggest that environmental disclosures are used as a means to gain legitimacy (e.g., Cho and Patten 2007) and question the credibility of the disclosures in terms of informing stakeholders regarding firms' true environmental performance, and thus would have no link with financial performance. These findings lead to our first hypothesis.

HYPOTHESIS 1: Voluntary environmental disclosure quality is related to firm value through an association with the cash flow component (expected future cash flows).

Research that examines environmental disclosures documents systematic differences across those disclosures, based on the disclosure venue, industry, and environmental performance, which we incorporate in our research design. Furthermore, prior research suggests that the type of disclosure (e.g. monetary/non-monetary or objective/subjective), frequently classified as hard or soft (Cho and Patten 2007; Clarkson et al. 2008; Clarkson et al. 2010), will be differentially informative and/or have differential impacts (Cormier et al. 2009; Hutton, Miller, and Skinner 2003). Based on these findings, we predict that the type of disclosure – hard or soft – will moderate the association between voluntary environmental disclosure quality and expected future cash flows, as stated in the our next hypothesis.

HYPOTHESIS 1A: The association between voluntary environmental disclosure quality and expected future cash flows is moderated by the disclosure type.

Prior research (Hutton, Miller, and Skinner 2003) documents systematic differences in

managers' voluntary disclosures around good and bad news earnings. Specifically, managers provide "soft" disclosures in about equal measure for good and bad news forecasts, but provide significantly more "hard" disclosures for good news forecasts. Furthermore, Clarkson et al. (2008; 2010) provide evidence that soft and hard disclosures vary systematically with environmental performance. To examine whether these systematic differences in hard/soft disclosures are differentially associated with firm value, we further partition the hard/soft disclosures based on the nature of the environmental issue considered in the disclosures. We classify the disclosures into those that are related to positive/neutral/negative environmental issues. Doing so allows us to differentially consider the associations between firm value and *type_nature* in our analysis. We predict that the association between voluntary environmental disclosure quality and expected future cash flows is a function of the *type_nature* of those disclosures. This leads to our next hypothesis.

> **HYPOTHESIS 1B:** The association between voluntary environmental disclosure quality and expected future cash flows is moderated by the type_nature of the disclosure.

Cost of equity capital

The second means by which voluntary environmental disclosure quality might be associated with firm value is through the denominator of the firm value. Prior theoretical and empirical research provides support for either a negative or positive association between voluntary environmental disclosures and the cost of equity capital. Traditional economic theory predicts that increased voluntary disclosures will be associated with a decrease in the cost of equity capital through a reduction in information asymmetry or estimation risk (Barry and Brown 1985; Coles, Lowenstein, and Suay 1995), increased awareness of a firm's existence and enlarging the investor base (Merton 1987), or increased liquidity (Amihud and Mendelson 1986). Empirical research provides substantial support for this relation (e.g. Botosan 1997, Botosan and Plumlee 2002; Cormier, Ledoux, and Magnan 2009; Leuz and Verrecchia 2001), although much of this evidence

is associated with financial disclosures.

In contrast, Richardson and Welker (2001) and others argue that there might be a positive association between voluntary environmental disclosures and cost of equity capital. If there is a consistent bias in voluntary environmental disclosures, wherein firms that experience higher than average environmental risk or relatively poorer environmental performance disclose more information to legitimize their existence (Aerts and Cormier 2009; Cho and Patten 2007), then these disclosures might be associated with an increased cost of equity capital. There is some empirical support for this relation (e.g., Richardson and Welker 2001). Finally, some studies fail to document any association between voluntary environmental disclosures and cost of equity capital (e.g., Clarkson et al. 2010). These studies highlight the importance of considering the impact of potential selection bias in voluntary environmental disclosures when examining their associations with the cost of equity. They do not, however, suggest that the information asymmetry impact of improved disclosures is absent. This leads to our second primary hypothesis:

> **HYPOTHESIS 2:** Voluntary environmental disclosure quality is related to firm value through an association with the cost of equity capital.

As discussed earlier, prior research documents systematic differences across environmental disclosures, based on the venue employed, industry, and environmental performance, which we incorporate in our research design. We also consider the moderating influence of the type of disclosure in explaining the inconsistent results from prior research, as stated in the following hypothesis.

> **HYPOTHESIS 2A:** The association between voluntary environmental disclosure quality and cost of equity capital is moderated by the type of disclosure.

Finally, as discussed in Richardson and Welker (2001), prior theory and empirical results related to the association between voluntary environmental disclosure quality and cost equity do not consider the nature of the disclosures. Given the multiple roles suggested for voluntary

environmental disclosures and concerns with selection bias in when these disclosures are provided, however, we examine whether the *type_nature* of the disclosures moderate the predicted links between disclosure quality and cost of equity capital. This leads to our final hypothesis.

> **HYPOTHESIS 2B:** The association between voluntary environmental disclosure quality and cost of equity is moderated by the *type_nature* of the disclosures.

3. Research design, variable measurement, and sample selection

Research design

To test our hypotheses, we employ two related sets of regression models that include our independent variables of interest but differ by the dependent measures and related control variables. We begin, however, by documenting the relation between firm value (the cumulation of the expected future cash flows and cost of equity capital) and our independent variables of interest, although we do not present formal hypotheses. We then consider the associations between the components of firm value and our independent variables, which provide tests of our hypotheses.

Dependent measure - Firm value

Our first model considers the relation between overall firm value and voluntary environmental disclosure quality. We employ a modified Ohlson (1995) model found in the prior literature (e.g., Clarkson et al. 2004, 2008, 2010):

$$P = \alpha + \beta_1 BV + \beta_2 AE + \beta_3 CER + \beta_4 DScore + \beta_5 GD\_EP + \beta_6 BD\_EP + \varepsilon \quad (1)$$

P is the stock price as of the date we estimate the implied cost of equity capital. *BV* is book value per share at the beginning of the quarter that we estimate the implied cost of equity capital. *AE* is abnormal earnings per share defined as earnings per share at the end of fiscal period less the cost of equity capital (based on the implied cost of equity capital estimate) times *BV*. *CER* equals one if a firm provides its voluntary environmental disclosures through a stand-alone report

(controlling for the reporting venue) and zero otherwise. Our primary variable of interest is *DScore*, voluntary environmental disclosure quality. To test our hypotheses, we employ three related measures of voluntary environmental disclosure quality in our analysis. Finally, we include two variables to capture good (bad) environmental performance, *GD_EP* (*BD_EP*). We discuss the calculation of the *DScore* measures and *GD_EP* (*BD_EP*) in the "Variable measurement" section below.

Dependent variable – Expected future cash flows

Our second model focuses on the relation between the numerator of firm value (expected future cash flow) and voluntary environmental disclosure quality. We employ the regression model below, which is similar to the previous model in terms of the independent variables of interest:

$$EFCF = \chi + \eta_1 L\_CF + \eta_2 LSales + \eta_3 CER + \eta_4 DScore + \eta_5 GD\_EP + \eta_5 BD\_EP + \nu \qquad (2)$$

EFCF is the cash flow component of firm value. We rely on *Value Line*'s forecast of future firm price (target price) as our proxy (we discuss this measure in more detail below). To isolate the incremental effect of voluntary environmental disclosure quality, we include forecasted current period cash flows per share and the log of total sales (Doyle, Lundholm, and Soliman 2003) as control variables. Consistent with our earlier analysis, we include the disclosure venue selected by firms (*CER*), our primary variable(s) of interest (*DScore*), and variables to capture reported environmental performance (*GD_EP* and *BD_EP*).

Dependent variable – Cost of equity capital

Our final model focuses on the relation between the denominator of firm value (cost of equity capital) and voluntary environmental disclosure quality. We employ the regression model detailed below, drawn from prior research (e.g., Botosan and Plumlee 2002; Richardson and Welker 2002; Clarkson et al. 2010):

$$CoEquity = \phi + \gamma_1 BETA + \gamma_2 LSIZE + \gamma_3 BP + \gamma_4 CER + \gamma_5 DScore + \gamma_6 GD\_EP + \gamma_7 BD\_EP + \kappa \quad (3)$$

CoEquity is the implied cost of equity capital; we discuss the calculation of this in the "Variable measurement" section below. *BETA* is capital market beta from a regression of the monthly returns (with a minimum of 12 out of 60 monthly returns) and a market index return equal to the value-weighted NYSE/AMEX return with data from CRSP. The estimation period for *BETA* ends on June 30th of the year cost of equity capital is estimated. *LSIZE* is the log of the firm's market value of equity as of June 30th of the year cost of equity capital is estimated. *BP* is the *BV* scaled by *P*. The other variables are as previously defined.

Variable measurement

Dependent variables

We employ three related dependent variables in our analysis: stock price (*P*), expected future cash flows (*EFCF*), and cost of equity capital (*CoEquity*). The calculation of these variables is described below.

P is firm stock price on the *Value Line* publication date during the third calendar quarter of the year following the release of the voluntary environmental disclosures.[5]

We rely on *Value Line* forecasts made in the third calendar quarter of the year following the release of the voluntary environmental disclosures to construct proxies for the two components of firm value (*EFCF* and *CoEquity*). We employ firm-specific *Value Line* forecasts of future stock price (target price) as our explicit measure of expected future cash flows. In addition to making earnings and other types of short and long-term forecasts, *Value Line* makes forecasts of a "high" and "low" firm stock price 3-5 years in the future (we use the mean of these values). These forecasts have been used to provide long-range terminal values for use in calculating the implied

[5] All the analyst forecast data employed are drawn from *Value Line* forecasts made in the third calendar quarter of the year after the voluntary environmental disclsoures were made public.

cost of equity capital (e.g., Botosan 1997; Botosan and Plumlee 2002, 2005; Francis, Lafond, Olsson, and Schipper 2004). As our goal is to empirically parse firm value into a cash flow (numerator) and cost of equity capital (denominator) component, we rely on target prices to provide our proxy for expected future cash flows and in our calculation of implied cost of equity capital.

CoEquity is the implied cost of equity capital, calculated using *Value Line* forecasts of target prices (the target price method). This measure has been widely used in prior research (e.g., Botosan 1997; Botosan and Plumlee 2002; Francis et al. 2004). Furthermore, Botosan and Plumlee (2005) and Botosan, Plumlee, and Wen (2010) compare the validity of various proxies for the expected cost of equity and conclude that this method consistently outperforms the other proxies.[6] This method utilizes the mean *Value Line* forecasts of target prices as the terminal value along with forecasts of dividend payouts and current stock price to derive an implied cost of equity capital.

Independent variables

DScore. We form three related voluntary environmental disclosure quality measures to test our hypotheses. These measures capture variation in voluntary environmental disclosure quality across firms based on line-by-line, voluntary disclosures. To categorize and collect the necessary data we use the voluntary environmental disclosure quality index designed by and employed in Marshall, Brown, and Plumlee 2007 (similar to the index used in Clarkson et al. 2008 and Clarkson et al. 2010). The index was based on the Global Reporting Initiative framework and was designed using the advice of an industry expert, similar to Clarkson et al. 2008.[7] For each firm-

[6] For a more detailed discussion of the calculation of these proxies and evidence supporting their construct validity, please see either of these studies.

[7] The index includes 62 individual indicators, with two to eight possible aspects of each indicator, in order to capture the quality of the disclosures. For example, the index allows for differentiation as to whether the disclosed information was quantitative or qualitative, in absolute or relative amounts, etc. Each indicator and aspect was identified as either present or absent; indicators were not evaluated as being positive or negative. A more detailed discussion of the index can be found in Marshall, Brown, and Plumlee (2007) or Marshall, Brown, and Rupley (2010).

year, we complete the index using data hand-collected from firms' voluntary environmental disclosures presented within a stand-alone report (frequently labeled a corporate environmental report or a corporate sustainability report), if the firm issued one. If not, we complete the index using voluntary environmental disclosures provided within the firm's annual report. If a firm does not issue either a stand-alone environmental report or an annual report, we exclude them from the sample. Two independent coders completed the index for each firm-year observation; the initial rank correlation between the completed indices for the two coders was greater than 0.87. The completed indices were compared and differences across the coders were reconciled by a third, independent coder. The voluntary environmental disclosure measures discussed below were based on the scores obtained from the completed indices. Given the importance of industry in environmental issues and consistent with prior research, we rank each of the measures discussed below within each industry and year.

Total Disclosure. TScore is the intra-industry rank of the total score obtained from a completed index for each firm-year. These data are used to test Hypotheses 1 and 2.

Disclosure Type. To examine the impact of disclosure type in explaining the relation between voluntary environmental disclosure quality and firm value, we classify each item in our index as *Hard* or *Soft*. Objective (subjective) disclosure items are classified as *Hard* (*Soft*). Within our index, 276 of the 351 items were classified as *Hard* and the remaining as *Soft*, consistent with the Global Reporting Initiative framework and Clarkson et al. 2008.[8] To calculate the measures of *HardD* and *SoftD* employed in our analysis, we take the intra-industry ranks of the scores obtained from items included in the index classified as objective or subjective, respectively. We use these data to test Hypotheses 1A and 2A.

[8] Classification of the index items into *Hard*/*Soft* and *Positive*/*Neutral*/*Negative* was done independently by two co-authors. Differences between the two, which were minimal, were discussed and reconciled.

Disclosure Type_Nature. Our third set of voluntary environmental disclosure measures further classifies the items in the disclosure index based on the nature of the disclosure issue. Specifically, we classify the index items into positive/neutral/negative based on the nature of the environmental issues captured by those items. Our classification is similar in some respects to prior studies that classify disclosures based on the content of the information (e.g., Hutton et al. 2003; Skinner 1994). It differs, however, in that those studies typically classify disclosures as good/bad/neutral based on whether the disclosure suggests increases/decreases/no change *relative* to prior earnings. In this setting, however, it is difficult to determine whether the information disclosed should be classified without a baseline to use as comparison. Thus, we focus on the general type of environmental information not the classification of the firm response.[9] Within our index, 109 (112, 35, 63, 32) of the 351 items are classified as Hard/Positive (Hard/Neutral, Hard/Negative, Soft/Positive, Soft/Negative). To calculate the measures of *Hd_Pos (Hd_Neu, Hd_Neg, Sf_Pos, Sf_Neg)* employed in our analysis, we take the intra-industry by year ranks of the scores obtained from the relevant items included in the index. We use these data to test Hypotheses 1B and 2B.[10]

GD_EP/BD_EP. We include two proxies to capture firms' environmental performance using data from KLD Research and Analytics, Inc. Prior research typically relies on one of two sources of data to capture environmental performance: the TRI data or the KLD data. Several studies (e.g. Al-Tuwaijriei et al. 2004; Clarkson et al. 2004, 2008; Patten 2002) employ the TRI data, which is available from the US Environmental Protection Agency's toxic release inventory database and includes information on toxic chemical releases and other waste management activities reported annually by manufacturing facility. Generally, firm-specific proxies are based on summing the toxic releases or toxic waste recycled across facilities and scaling by a value that varies by firm

[9] For example, disclosures related to "Materials input into the production process from internally or externally supplied recycled materials" are classified as *Positive*; disclosures related to "Use of water" are classified as *Neutral*; and disclosures related to "Emission of green house gases" are classified as *negative*.

[10] There are only 5 classifications, as there were no neutral disclosures classified as soft.

size. The second data source used to capture environmental performance is the KLD data (e.g., Cho and Patten 2007; Cho, Roberts, and Patten 2010; Dhaliwal et al. 2010).[11] These data are based on an extensive assessment by KLD of each company's environmental management, planning and impact assessment, utilization of resources, compliance with applicable laws and regulations, and emissions. Based on these assessments, KLD provides indicators of both environmental strengths and concerns.[12] We elect to employ the KLD data over the TRI data to capture environmental performance for two reasons. First, the KLD data capture variation in a broader range of issues beyond negative environmental performance, while the TRI data focus on a single, negative aspect of environmental performance. In addition, the KLD data cover a broader range of environmental issues. *GD_EP* (*BD_EP*) is the within year, intra-industry percentile ranking of the sum of the KLD strength (concern) environmental performance measures, which allows us to assess a firm's environmental performance relative to its industry peers. Table 1 provides a detailed discussion of the variables included in our study.

Insert Table 1 About Here

Sample

Our sample includes US listed firms drawn from five industries (oil & gas, chemical, food/beverage, pharmaceutical, and electric utilities) over a six-year period (2000-2005). Unlike some studies (e.g., Clarkson et al. 2008, 2010), we include both environmentally sensitive and non-sensitive industries in our sample. Prior research documents systematic differences in

[11] KLD Research and Analytics, Inc. is an independent ratings company that evaluates and makes available through a proprietary database the social performance of over 650 companies every year, comprising mainly all firms in the S&P 500 and Domini 400 Social SMIndex. During 2001 to 2002, KLD expanded its coverage to include the largest 1,000 U.S. companies by market capitalization. Since 2003, it has covered the largest 3,000 U.S. companies based on market capitalization. One component of the social performance included in the database is related to environmental performance. This database provides a quantifiable, enhanced, independent ratings system and has been used as a proxy for environmental and social performance for a large body of research.

[12] Strength ratings are related to (1) clean energy; (2) beneficial products and services; (3) pollution prevention; (4) recycling; and (5) management systems. Concern ratings are related to (1) climate change; (2) ozone depleting or agricultural chemicals; (3) hazardous waster; (4) regulatory problems; and (5) substantial emissions. (KLD Research and Analytics, Inc., 2003).

environmental disclosure quality across industries and suggests that the role for these disclosures may also vary by the environmental sensitivity of the industry. Thus, including firms from both sensitive and non-sensitive industries has the potential to enhance our understanding of the role of voluntary environmental disclosures. We identify firms within our five industries for which we have the information required to form our proxies for cost of equity capital, expected future cash flows, and control variables, after eliminating firms that report mergers.[13] Finally, we limit our analysis to the set of firms for which we have the necessary KLD environmental performance data. Our final sample includes 490 firm-years.

Table 2 provides descriptive statistics regarding our variables. We include mean and median values for our full sample and by industry. The first column includes the full sample; the next five columns provide statistics by industry.

Insert Table 2 About Here

Consistent with prior research, we document that the use of CERs and the level of voluntary environmental disclosures vary systematically by industry. Just over a third of our sample firms use a CER to disclose their environmental information; firms within industries environmentally sensitive industries (e.g., Oil) employ them more frequently (almost 40 percent of the time), while firms within non-sensitive industries (e.g., Food) use them less often (closer to 25 percent of the time). For the full sample the average *TScore* is 8.76; the mean values across industries range from 5.45 in the Food industry to a high of 12.14 in the Electric industry. A similar pattern holds when the voluntary environmental scores are classified by *type* and by *type_nature*. Industries typically classified sensitive to environmental issues (Chem, Oil, and Elec) tend to have higher disclosures scores and to use CERs more frequently than other industries. The environmental performance rankings for both good and bad performance appear to vary systematically by industry as well,

[13] The set of firms included in our analysis is limited to firms that met our criteria during the first collection period (2000-2002). We updated our sample by collecting additional data for the set of firms included in our initial sample.

with environmentally sensitive industries having both higher good performance and bad performance scores. The firm specific variables included in the table suggest that our sample is relatively less risky than the market as a whole (mean *CoEquity* (*BETA*) is 12 percent (0.74)) and, on average, currently profitable (mean *EPS* (*CF_1*) is 2.11 (3.96)), consistent with the inclusion of larger firms in our study.

Table 3 presents Pearson correlations for the variables included in our study. The first nine variables relate to environmental disclosures. Eight of them are directly inter-related (e.g., *HardD* and *SoftD* are a result of systematically partitioning *TScore*), which is reflected in the high positive correlations across those variables. It is interesting to note, however, that even given these high correlations, the correlations between the disclosure quality variables and other variables differ. For example, *TScore* is highly correlated with *HardD* (ρ=0.98), which is in turn highly correlated with *Hd_Pos, Hd_Neu*, and *Hd_Neg* (ρ = 0.86, 0.89, and 0.89, respectively). Even so, we find the correlations between these variables and *EFCF* to be different from each other: the correlation between *TScore* and *EFCF* is 0.07, while the correlations between *Hd_Pos* and *EFCF* is 0.08, between *Hd_Neu* and *EFCF* is 0.13 and between *Hd_Neg* and *EFCF* is insignificant. Overall, we find that several of the disclosure measures are positively correlated with *EFCF*. In contrast, only one disclosure variable is significantly correlated with *CoEquity – Sf_Neg* is negatively correlated (ρ = -0.09). These differences are consistent with the partitioning of the data improving our ability to detect significant relations in the regression models.

Insert Table 3 About Here

We include two separate proxies to capture firm environmental performance, *GD_EP* and *BD_EP*. In contrast, most prior research includes a single measure that focuses on negative environmental performance. It is interesting to note that the correlation between our two variables is not statistically different from zero, although they are both consistently positively correlated

with our voluntary environmental disclosure variables.[14] Furthermore, we find that the correlations between *GD_EP* and the disclosure quality measures appear to be lower than the correlations between *BD_EP* and the same disclosure quality measures. For example, the correlations between *GD_EP* (*BD_EP*) and *HardD* and *SoftD* are 0.23 and 0.22 (0.37 and 0.36). We also document a strong positive association between the use of a *CER* and both *GD_EP* and *BD_EP*. Finally, we find that *GD_EP* is positively correlated with *EFCF* (ρ=0.10), while *BD_EP* is *negatively* correlated with *EFCF* (ρ= - 0.12). Neither measure is statistically correlated with *CoEquity*. These correlations highlight the differences between the two environmental performance measures and the potential benefit of including both measures in the model over a single proxy for environmental performance. It also suggests that environmental performance maybe more informative in the *EFCF* than the *CoEquity* model.

4. Empirical results

We use panel data in our analysis, which may result in residuals that are correlated across firms or time leading to bias in OLS standard errors (Petersen 2009). To control for this, the regression results in this paper are based on two-way clustered standard errors. In tables 4-6 we present our analysis of a "price" model (Table 4), an "expected cash flow model" (Table 5), and a "cost of equity capital" model (Table 6) using four specifications. The first specification includes our overall disclosure quality measure (*TScore*) in order to assess the impact of the voluntary environmental disclosures on the related dependent measure. In our second specification we include both *TScore* and our environmental performance measures, to demonstrate the impact of including these potentially correlated variables. These two specifications provide tests of H1 and H2. In specification three, we decompose *TScore* into *HardD* and *SoftD* to test H1A and H2A.

[14] The correlations are based on intra-industry ranks. In untabulated analysis, we document a statistically positive correlation between the raw values of *GD_EP* and *BD_EP*.

Finally, in specification four environmental disclosure quality is decomposed into *Hd_Pos*, *Hd_Neu*, *Hd_Neg*, *Sf_Pos*, and *Sf_Neg*, providing tests of hypotheses H1B and H2B.

Insert Table 4 About Here

Firm price regressions

Table 4 presents the results based on model (1) where we regress firm price on our proxies for voluntary environmental disclosures, environmental performance, and control variables. We do not propose formal hypotheses related to the link between voluntary environmental disclosure quality and firm value; we provide these analyses as a baseline and for comparison to prior research. We find that, in all the specifications, including environmental disclosure quality is incrementally informative. Controlling for environmental performance is also incrementally informative in terms of increasing overall explanatory power, although neither proxy is statistically significant in the *TScore* model. We do, however, document a negative relation between poor environmental performance and firm price in the regression models where voluntary environmental disclosures are partitioned by *type* or *type_nature*; positive environmental performance is never statistically significant. These results suggest environmental disclosure quality is positively associated and weaker environmental performance is negatively associated with firm value. Our results are similar to those presented by Clarkson et al. (2010), who find that their measure of overall environmental disclosure (negative environmental performance) is statistically positively (negatively) associated with firm value.

When we partition *TScore*, we find that the relation with firm value is based on one type of disclosure (*SoftD*) and two *type_nature* (*Hd_Pos* and *Sf_Pos*) variables. Furthermore, the overall explanatory power (R^2) increases over a single measure of environmental disclosure quality. Specifically, the R^2 of the *TScore* model is 30.0%. Partitioning *TScore* into *HardD* and *SoftD* increases the R^2 to 31.5%. Using our finest partition (*type_nature*) results in an R^2 of 35%, an increase of almost 15%. This analysis provides support for a link between voluntary

environmental disclosure quality and firm value and suggests that our means of partitioning disclosure quality is informative. Our primary analyses, however, rely on partitioning firm value (the dependent measure in Table 4) into its two components, expected future cash flows and cost of equity capital. We present results related to these models below.

Expected future cash flows regressions

Table 5 reports tests of our first set of hypotheses related to expected future cash flows. In this analysis we parse the numerator/expected future cash flow component from firm value. Similar to the results presented in Table 4, we find that voluntary environmental disclosure quality is positively related to expected future cash flows, with or without controlling for environmental performance. *TScore* continues to be positively associated with expected future cash flows (t = 2.90), even after controlling for both good and bad environmental performance. This result provides support for Hypothesis 1.

Insert Table 5 About Here

Partitioning voluntary environmental disclosure quality into *HardD* and *SoftD* increases the explanatory power of the model (from an R^2 of 7.6% to an R^2 of 9.2%) consistent with informativeness of the disclosures varying by type and Hypothesis 1A. In fact, our results suggest that the link between the expected future cash flows and disclosure quality is primarily due to disclosures classified as *SoftD*.[15] When we further partition disclosure quality into proxies that capture the *type_nature* of the disclosures, we see an even greater improvement in overall explanatory power; the R^2 increases to just over 15%. Specifically, we document that *Hd_Pos*, *Sf_Pos* and *Sf_Neg* are all positively related to *EFCF* (t = 3.38, 3.21, and 4.38 respectively) such

[15] While including our proxies for environmental performance are not statistically significant, they do increase the overall explanatory power of the model and, based on prior research and our correlations, should be included in the models. In untabulated analysis, however, we reestimate our models and substitute a single measure for environmental performance (the difference between positive and negative) in place of the *GD_EP* and *BD_EP*. This "net" measure is positively associated with the cash flow component of firm value, consistent with firms that have better overall environmental performance having higher expected cash flows than other firms.

that firms with higher voluntary environmental disclosure quality are associated with higher expected future cash flows than other firms. Again, this provides strong support for our prediction (H2A) that incorporating the *type_nature* of the disclosures is incrementally informative over a summary measure.

Cost of equity capital regressions

Table 6 reports tests of our final set of hypotheses. In this analysis we consider the denominator/ cost of equity capital component of firm value. Recall that an information risk story would predict that improved disclosure quality would reduce the cost of equity. A positive association might be attributed to a legitimacy story, due to an association between disclosure quality and environmental performance, or attributed to a link between environmental risk and environmental disclosures. In our first specification, we document a positive relation (t= 4.47) between our summary measure of voluntary environmental disclosure quality (*TScore*) and cost of equity, inconsistent with an information risk story, but consistent with prior research that examines environmental/social disclosure quality (e.g. Richardson and Welker 2002) and these disclosures being associated with legitimacy. We do, however, document a negative association between the issuance of a CER and cost of equity (t= -2.04), suggesting that firms that issue a CER have a lower cost of equity capital relative to those that do not.

Insert Table 6 About Here

In our second specification, where we include our environmental performance measures and *TScore*, we document positive relations between *CoEquity* and disclosure quality and both measures of environmental performance. As discussed earlier, some research suggests a direct link between environmental performance and cost of equity capital, as environmental performance serves as a proxy for underlying environmental (operating) risk. The positive coefficients on both positive and negative environmental performance are consistent with this link. This result is also consistent with Hypothesis 2, where we predict that voluntary environmental disclosure quality is

associated with firm value through the cost of equity. The negative coefficient on *CER* (*t*= -1.74) suggests that use of a stand-alone report is associated with a lower cost of equity capital, consistent with an information risk story. The positive coefficient on *TScore* (*t*= 2.51), even after controlling for environmental performance, suggests that firms with higher quality voluntary environmental disclosure have a higher cost of equity capital than firms with lower quality environmental disclosures, consistent with prior research and a potential reporting bias wherein the disclosure quality is associated with environmental risk.

When we partition our voluntary environmental disclosures by disclosure type, we continue to document a positive association between the cost of equity capital and one type of disclosure quality (*HardD*) and our environmental performance measures. This is consistent with the type of disclosure impacting the cost of equity capital/disclosure quality association and H2A. In our final model, we further partition our disclosure quality by the *type_nature* of the disclosures in our analysis as suggested by H2B.[16] When we include those proxies, we see a large increase (over 55%[17]) in the overall explanatory power of the model. Furthermore, we document that improved disclosure quality related to *Sf_Neg* is positively related to the cost of equity capital (*t*= 3.99), consistent with concerns that these disclosures are positively associated with operating risk. In contrast with prior research, however, we also document that firms with higher quality *Sf_Pos* disclosures have a *lower* cost of equity capital (*t*= -2.82), consistent with an information risk explanation. These findings are consistent with H2B, and, more importantly, provide evidence of a link between improved disclosure quality and reduced cost of equity capital. Prior theoretical and empirical research provides strong evidence of the role of disclosures in reducing information risk,

[16] While economic theory suggests that the nature of the disclosures do not matter in reducing information risk, controlling for the nature provides a means for assessing whether the unexpected relation between environmental/social disclosures and cost of equity could be attributed to systematic bias in the disclosures. In discussing their results, Richardson and Welker (2001) suggest that "if there were a consistent bias in social disclosures where firms that experience higher than average social costs disclose more information, then, on average, the results reported could hold" (pg. 614).

[17] The adjusted R^2 increases from 7.8 % to 12.1%. [((12.1 -7.8)/7.8) = 55%].

although evidence of such in the environmental disclosure arena is sparse. Our findings suggest that that relation does exist, when we are able to more directly capture the cost of equity capital and partition the disclosures. Finally, we document a positive relation between both positive and negative environmental performance, consistent with variation in these measures capturing operating risk.

Discussion

Our analysis examines both the relation between firm value and voluntary environmental disclosure quality and the relations between the components of firm value and voluntary environmental disclosure quality. We provide insights into results provided by prior research and economic theory surrounding voluntary environmental disclosures. Our firm value model in Table 4 documents a positive link between disclosure quality and firm value and captures the accumulation of the relations between the cash flow and cost of equity capital components of firm value and disclosure quality. However, this analysis limits our understanding of the various roles that these disclosures could play. When we analyze each of the firm value components separately, we are able to provide greater insights through consideration of the associations between both the numerator and the denominator of firm value and our proxies for disclosure quality.

We find that higher quality environmental disclosures are positively associated with expectations of future cash flows, even after controlling for environmental performance. Consistent with our expectations, we also find that the associations between the disclosure quality and expected future cash flow vary based on the *type* and the *type_nature* of the disclosure. In the cases were variation in disclosure quality is significant (*Hd_Pos*, *Sf_Pos*, and *Sf_Neg*), we find that higher quality disclosures are associated with higher expected future cash flows. When we examine the relation with the cost of equity, we document both a positive and negative relation between voluntary environmental disclosures, depending on their *type_nature*. This finding extends our understanding of these disclosures and cost of equity and supports an information risk

explanation for firms' decisions to transparently disclose for *Sf_Pos* disclosures. In contrast, our findings suggest that more transparent *Sf_Neg* disclosures are positively associated with cost of equity, inconsistent with firms' decisions to voluntarily disclose this information to reduce information risk.

The positive relations between *Sf_Neg* and both the expected cash flow and the cost of equity components of firm value, however, highlight the importance of (1) parsing firm value into it components and considering the associations with both components and (2) considering the *type_nature* of the voluntary environmental disclosures. Failing to do both limits our ability to isolate the complex relations between a firm's disclosure decision and its overall value. Our analysis also provides an explanation for puzzling findings from prior research that fail to document a decrease in cost of equity capital for firms that are more transparent. Finally, we argue that partitioning the environmental disclosures controls for the selection bias in those disclosures suggested by prior research.

5. Conclusions

In this study, we reexamine the relation between firm value and voluntary environmental disclosure quality value through its associations with both the cash flow and cost of equity component. Our study builds on prior and concurrent research that provides inconsistent results surrounding the relation between corporate social responsibility and/or environmental disclosure and the cost of equity capital. In addition, we contribute to an understanding of the link between environmental performance and cost of equity capital, discussed in Connors and Silva-Gao (2009) and Sharfman and Fernando (2008). In contrast with many other studies, we include two proxies – a positive and negative environmental performance measure - instead of a single proxy that is frequently based on negative aspects of environmental performance. Including both positive and negative environmental performance proxies enhances our ability to consider the role of environmental performance and voluntary environmental disclosures and the cost of equity

capital.

We also contribute to the research that focuses on the numerator of firm value. We document a significant positive association between three *type_nature* voluntary environmental disclosures and the cash flow component of firm value. In addition, we introduce a direct measure of expected future cash flows to the literature. In summation, our study extends prior research by parsing firm value into both the cash flow and cost of equity capital components and considering the relations independent of each other and by classifying voluntary environmental disclosures by *type* and *type_nature*.

Our findings complement and extend those provided in Clarkson et al. (2010), who find environmental disclosures to be incrementally informative over an alternative measure for environmental performance (TRI data) in predicting firm profitability and firm value but, in contrast to our study, fail to document an association with cost of equity. We argue that these differences are most likely due to differences in our environmental performance measures and samples (they limit their analysis to environmentally sensitive industries in two years), as well as our refinements of the environmental disclosures.

TABLE 1
Variable Descriptions

Price	firm stock price on the publication date of the Value Line forecasts.
CoEquity	firm specific cost of equity capital calculated as the internal rate of return that equates current stock price with the *Value Line* target price (5 years in the future) and *Value Line* forecasted dividends.
EFCF	*Value Line* forecasted target firm price, calculated as the mean of the forecasted high and low stock price 3-5 years in the future discounted back to the current period using the firm-specific cost of equity capital.
CER	1 if a firm issues a stand-alone corporate environmental report; 0 otherwise.
TScore	the intra-industry rank of the annual score from a completed voluntary environmental disclosure quality index.
HardD	the intra-industry rank of the annual score from a completed voluntary environmental disclosure quality index classified as *hard.*
SoftD	the intra-industry rank of the annual score from a completed voluntary environmental disclosure quality index classified as *soft.*
Hd_Pos	the intra-industry rank of the annual score from a completed voluntary environmental disclosure quality index classified as *hard* with *positive nature.*
Hd_Neu	the intra-industry rank of the annual score from a completed voluntary environmental disclosure quality index classified as *hard* with *neutral nature.*
Hd_Neg	the intra-industry rank of the annual score from a completed voluntary environmental disclosure quality index classified as *hard* with *negative nature.*
Sf_Pos	the intra-industry rank of the annual score from a completed voluntary environmental disclosure quality index classified as *soft* with *positive nature.*
Sf_Neg	the intra-industry rank of the annual score from a completed voluntary environmental disclosure quality index classified as *soft* with *negative nature.*
GD_EP	the sum of environmental performance strengths, from KLD.
BD_EP	the sum of environmental performance concerns, from KLD.
BV	book value per share of total common equity.
AbnE	abnormal earnings to common equity, defined as forecasted earnings to common equity less cost of equity capital times beginning-of-period book value of common equity.
LSize	log of market value.
Beta	capital market beta estimated using the market model with a minimum of 12 out of 60 monthly returns and a market index return equal to the value-weighted NYSE/AMEX return with data from CRSP.
BTM	BV scaled by stock price.
CF_1	Value Line forecasted current period firm-specific cash flows.

TABLE 2
Descriptive statistics

		Full sample	Chem	Elec	Oil	Food	Pharm
	(N)	490	79	149	79	90	93
CER	Mean	0.34	0.39	0.39	0.38	0.22	0.28
	Med	0.0	0.0	0.0	0.0	0.0	0.0
TScore	Mean	8.77	9.58	12.14	7.10	5.57	7.18
	Med	2.0	4.0	6.0	2.0	0.0	0.0
HardD	Mean	6.36	6.95	9.00	5.22	3.49	5.37
	Med	1.0	3.0	4.0	2.0	0.0	0.0
SoftD	Mean	2.41	2.63	3.14	1.89	2.08	1.82
	Med	0.0	1.0	2.0	0.0	0.0	0.0
Hd_Pos	Mean	2.05	1.85	3.42	1.47	1.24	1.31
	Med	0.0	0.0	2.0	0.0	0.0	0.0
Hd_Neu	Mean	1.82	2.27	1.93	0.89	1.46	2.41
	Med	0.0	0.0	0.0	0.0	0.0	0.0
Hd_Neg	Mean	2.49	2.84	3.65	2.86	0.79	1.65
	Med	0.0	2.0	2.0	1.0	0.0	0.0
Sf_Pos	Mean	2.12	2.53	2.54	1.58	1.97	1.69
	Med	0.0	0.0	1.0	0.0	0.0	0.0
Sf_Neg	Mean	0.29	0.10	0.60	0.30	0.11	0.13
	Med	0.0	0.0	0.0	0.0	0.0	0.0
GD_EP	Mean	0.41	0.87	0.42	0.41	0.13	0.28
	Med	0.0	1.0	0.0	0.0	0.0	0.0
BD_EP	Mean	1.35	1.48	1.84	2.24	0.72	0.31
	Med	1.0	1.0	2.0	3.0	0.0	0.0
EFCF	Mean	28.35	29.74	23.04	29.93	27.07	35.57
	Med	26.01	27.81	22.37	28.98	24.39	37.20
CoEquity	Mean	0.12	0.13	0.10	0.09	0.14	0.13
	Med	0.11	0.12	0.09	0.09	0.14	0.12
BV	Mean	15.89	13.53	20.47	26.14	8.09	9.43
	Med	13.77	13.56	20.67	24.33	7.28	8.54
EPS	Mean	2.11	1.48	1.76	4.73	1.75	1.25
	Med	1.89	1.84	2.21	4.59	1.62	1.22
Beta	Mean	0.74	1.06	0.43	0.85	0.57	1.01
	Med	0.70	0.99	0.32	0.82	0.54	0.87
BTM	Mean	0.44	0.38	0.62	0.53	0.29	0.28
	Med	0.41	0.34	0.59	0.50	0.18	0.23
Mkvl	Mean	22992.7	10269.8	8172.2	33546.7	23452.7	48133.8
	Med	8265.0	4573.0	6554.0	9402.8	11466.4	11071.1
CF_1	Mean	3.96	3.85	5.14	5.74	2.65	1.93
	Med	3.44	3.80	5.15	5.45	2.54	1.85
Sales	Mean	13487.4	7816.5	7491.8	35709.3	13349.8	9179.3
	Med	6682.35	4762.9	7715.1	8402.5	11157.0	2045.6

This table reports mean and median values for the variables used in the analysis. Column 1 provides statistics for the full sample, the next five columns report values based on industry. All variables are defined in Table 1.

TABLE 3 Pearson correlation statistics.

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1: CER	**0.62**	**0.61**	**0.54**	**0.58**	**0.51**	**0.55**	**0.50**	0.34	**0.37**	**0.30**	**0.13**	-0.06	0.06	**0.09**	**-0.16**	-0.03	**0.36**	**0.12**	**0.38**
2:TScore	--	**0.98**	**0.87**	**0.85**	**0.87**	**0.87**	**0.85**	**0.31**	**0.22**	**0.25**	0.07	-0.02	0.00	0.01	**-0.18**	-0.02	**0.21**	**0.12**	**0.23**
3:HardD		--	**0.75**	**0.86**	**0.89**	**0.89**	**0.68**	**0.29**	**0.23**	**0.37**	**0.08**	-0.04	0.02	0.03	**-0.19**	-0.03	**0.20**	**0.13**	**0.21**
4:SoftD			--	**0.66**	**0.66**	**0.67**	**0.93**	**0.36**	**0.22**	**0.36**	0.04	0.03	-0.03	-0.04	**-0.13**	-0.01	**0.19**	**0.08**	**0.22**
5:Hd_Pos				--	**0.66**	**0.66**	**0.61**	**0.37**	**0.29**	**0.31**	**0.08**	-0.07	0.06	0.03	**-0.21**	0.02	**0.17**	**0.19**	**0.19**
6:Hd_Neu					--	**0.70**	**0.40**	**0.53**	**0.26**	**0.27**	**0.13**	-0.02	-0.07	0.02	**-0.12**	**-0.12**	**0.20**	0.01	**0.13**
7: Hd_Neg						--	**0.64**	**0.15**	**0.23**	**0.35**	0.01	-0.01	0.06	0.02	**-0.16**	0.03	**0.16**	**0.17**	**0.25**
8:Sf_Pos							--	**0.12**	**0.18**	**0.31**	0.04	0.05	-0.05	-0.05	**-0.10**	-0.02	**0.18**	0.05	**0.20**
9:Sf_Neg								--	**0.12**	**0.21**	0.00	**-0.09**	**0.13**	0.06	**-0.16**	0.07	**0.13**	**0.15**	**0.17**
10:Gd_EP									--	**0.06**	**0.10**	-0.01	0.05	0.02	-0.05	-0.07	**0.21**	**0.15**	**0.24**
11:Bd_EP										--	**-0.12**	-0.03	**0.26**	**0.13**	**-0.09**	**0.22**	**0.21**	**0.36**	**0.53**
12: EFCF											--	**-0.34**	0.04	**0.20**	**0.08**	**-0.35**	**0.48**	**0.20**	**0.12**
13:CoEquity												--	**-0.27**	**-0.30**	**0.10**	0.03	**-0.09**	**-0.12**	0.01
14:BV													--	**0.56**	**-0.19**	**0.54**	**-0.11**	**0.66**	**0.11**
15:EPS														--	-0.08	**-0.10**	**0.26**	**0.32**	**0.26**
16:Beta															--	**-0.18**	**-0.11**	**-0.28**	**-0.26**
17:BTM																--	**-0.52**	**0.43**	-0.07
18:LSize																	--	-0.04	**0.74**
19:CF_1																		--	**0.21**
20:LSale																			--

All variables are defined in Table 1. Correlations significant at < 0.05 are bolded.

TABLE 4

Price model

	Disclosure only		**Disclosure & Performance**		**Disclosure type**		**Disclosure type_nature**	
Variables	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*p-value*	*Estimate*	*p-value*
BV	**0.587**	**4.18*** **	**0.577**	**4.16** **	**0.589**	**4.20** **	**0.675**	**2.75*** **
AE	**6.927**	**6.46*** **	**6.721**	**5.99*** **	**6.686**	**6.04*** **	**6.600**	**6.00*** **
CER	-2.472	-1.09	-2.572	-1.09	-3.383	-1.414	-3.753	-0.63
TScore	**13.892**	**3.24*** **	**15.152**	**4.01** **				
GD_EP			3.900	0.62	3.110	0.54	0.440	0.68
BD_EP			-4.343	-1.33	**-5.844**	**-1.91***	**-6.767**	**-1.90***
HardD					5.746	0.95		
SoftD					**18.437**	**3.44** **		
Hd_Pos							**12.164**	**5.03*** **
Hd_Neu							12.675	1.45
Hd_Neg							-2.241	-0.61
Sf_Pos							**15.649**	**3.61*** **
Sf_Neg							17.103	1.55
Adj. R^2		29.8%		30.0%		31.5%		35.0%

Dependent variable is stock price at the time cost of equity capital is measured, in the third quarter of the calendar years. All variables are defined in Table 1. N=490.
*, **, *** indicates significant at the 0.10 (0.05, 0.01) level.
The t-statistics and significance levels are based on two-way clustered standard errors (two-tailed, unless a prediction is made, then one-tailed).

TABLE 5

Cash flow model

	Disclosure only		Disclosure & Performance		Disclosure type		Disclosure type_nature	
Variables	**Estimate**	**t-stat**	**Estimate**	**t-stat**	**Estimate**	**t-stat**	**Estimate**	**t-stat**
CF_1	**1.357**	**2.25****	**1.359**	**2.65****	**1.479**	**2.95*****	**1.811**	**6.15*****
LSale	0.248	0.30	0.161	0.17	0.262	0.28	0.288	0.52
CER	-0.643	-0.38	-0.804	-0.46	-1.495	-0.89	-1.464	-0.88
TScore	**12.464**	**3.44*****	**12.758**	**2.90*****				
GD_EP			6.013	1.37	5.407	1.29	3.954	1.03
BD_EP			-2.604	-0.62	-3.614	-0.86	-4.524	-1.10
HardD					5.094	1.20		
SoftD					**14.282**	**4.36*****		
Hd_Pos							**11.769**	**3.38*****
Hd_Neu							-4.161	-0.73
Hd_Neg							-2.938	-0.95
Sf_Pos							**14.099**	**3.21*****
Sf_Neg							**30.218**	**4.38*****
		7.2%		7.6%		9.2%		15.1%

Dependent variable is EFCF - *Value Line* forecasted target discounted back to the current period using the firm-specific cost of equity capital.. All variables are defined in Table 1. N=490.

*, **, *** indicates significant at the 0.10 (0.05, 0.01) level.

The t-statistics and significance levels are based on two-way clustered standard errors (two-tailed, unless a prediction is made, then one-tailed).

TABLE 6

Cost of Equity Model

	Disclosure only		**Disclosure & Performance**		**Disclosure type**		**Disclosure type_nature**	
Variables	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*	*Estimate*	*t-stat*
BETA	**0.016**	**2.08****	**0.013**	**1.78****	**0.013**	**1.68****	**0.014**	**1.67****
LSize	-0.007	-1.60	**-0.011**	**-2.42*****	**-0.011**	**-2.41*****	**-0.010**	**-2.19****
BTM	0.009	0.45	0.005	0. 19	0.007	0.29	0.022	1.00
CER	**-0.018**	**-2.04****	**-0.015**	**-1.74***	**-0.014**	**-1.74***	-0.011	-1.53
TScore	**0.063**	**4.47*****	**0.034**	**2.51****				
GD_EP			**0.042**	**2.72****	**0.042**	**2.69****	**0.035**	**2.54****
BD_EP			**0.057**	**3.33*****	**0.057**	**3.33*****	**0.052**	**3.54*****
HardD					**0.042**	**2.05****		
SoftD					-0.010	-0.79		
Hd_Pos							0.024	1.64
Hd_Neu							0.010	0.50
Hd_Neg							0.039	1.33
Sf_Pos							**-0.032**	**-2.82****
Sf_Neg							**0.115**	**3.99*****
Adj. R^2		3.4%		7.8%		7.8%		12.1%

Dependent variable is cost of equity capital, calculated using the target price method (Botosan and Plumlee 2005). All variables are defined in Table 1. N=490.
*, **, *** indicates significant at the 0.10 (0.05, 0.01) level.
The t-statistics and significance levels are based on two-way clustered standard errors (two-tailed, unless a prediction is made, then one-tailed).

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