

# **Corporate Environmental Responsibility and the Cost of Capital: International Evidence**

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This Version: February 24<sup>th</sup>, 2014

## **Abstract**

This paper examines how corporate environmental responsibility (CER) affects the cost of equity capital for manufacturing firms in 30 countries. Using several approaches to estimate firms' *ex ante* equity financing costs, we find that the cost of equity capital is likely to be cheaper when firms have a higher level of CER. The results are consistent even after controlling for the endogeneity problem. Our results suggest that improving environmental responsibility would reduce firms' equity financing costs and the negative relationship between CER and financing costs is at work in around the world.

Key Words: Corporate environmental responsibility; Cost of equity capital

# Corporate Environmental Responsibility and the Cost of Capital: International Evidence

## 1. Introduction

There is extensive and growing literature on the relation between corporate social responsibility (CSR) and firm financial performance. Despite the conflicting theoretical views on this issue,<sup>1</sup> extant empirical studies broadly report that high CSR firms are associated with superior financial performance (e.g., Jiao, 2010; El Ghouli et al., 2011; Attig et al., 2013a, 2013b).<sup>2</sup> This suggests that although CSR activities incur costs, the financial benefits of such activities typically exceed the costs. The positive effect results from hiring more qualified employees, increased sales from satisfied customers and improved reputation, and better access to financing. In CSR literature, however, little cross-country evidence is provided on how environment costs affect firm performance even though these issues have become significantly important in recent years.<sup>3</sup> In particular, prior research has little to say on investors' perceptions of corporate environmental responsibility (CER) worldwide.

Our study contributes to filling this void in the literature by examining the link between CER and equity pricing for manufacturing firms in 30 countries. Our interest in the cost of equity capital is motivated by the fact that it is the required rate of return given equity investors' perception of a firm's riskiness. We contend that the perceived riskiness of firms with a high level of CER measured by environmental costs is lower than that of firms with a low level of CER. This is because in a real-world setting, CSR could be viewed as a hedging device that contributes to decreasing the riskiness of the firm by reducing the probability and impact of adverse events. In addition to the risk channel, we argue that firms with the high environmental costs to total assets have a narrower investor base, leading to higher equity financing costs (Heinkel et al., 2001).

To test our prediction, we employ the Trucost database, which provides an assessment at the firm level of external environmental costs to the society for 30 countries. Unlike other CSR databases, which provide an environmental rating (e.g., KLD, ASSET4), Trucost provides the dollar amount of environmental costs that "reflects the damage each environmental impact causes and the consequential costs borne by society". To estimate firms' cost of equity capital, we follow recent

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<sup>1</sup> From a corporate finance perspective, Jiao (2010) summarizes these views as follows. A positive effect of CSR on corporate performance is consistent with the view that CSR represents an investment in intangible assets, such as reputation and human capital that contribute to enhancing firms' competitiveness. A negative effect of CSR on performance is consistent with the view that CSR represents private benefits (e.g., respect, job security, public image) that managers extract at the expense of shareholders.

<sup>2</sup> Beurden and Gossling (2008) provide a recent survey of the literature on the CSR-financial performance relationship.

<sup>3</sup> A 2013 survey by KPMG reveals that 82 percent of Fortune Global 250 firms release corporate responsibility information either in standalone reports or integrated into annual financial reports, as opposed to 78 percent in 2011. The report indicates also (p. 13) "Most G250 CR reports (87 percent) identify at least some social and environmental changes (or 'megaforces') that affect the business. Climate change, material resource scarcity and energy and fuel are the most commonly mentioned." According to the Wall Street Journal (March 10, 2013), because of the 2010 Deepwater Horizon oil spill in the Gulf of Mexico, "BP has already spent more than \$24 billion in cleanup and restoration costs and payments on claims made by individuals, businesses and governments related to Deepwater Horizon, BP Chief Executive Bob Dudley said last week. This latest increase in the cost of the 2010 disaster, which killed 11 men and triggered the worst offshore oil spill in U.S. history, comes as the company is embroiled in a civil trial that could bring additional fines totaling as much as \$17.6 billion. BP has spent or provisioned more than \$40 billion in total for the disaster, Mr. Dudley said."

research (e.g., Hail and Leuz, 2006; El Ghoul et al., 2011) and rely on four models to infer the *ex-ante* cost of capital implied by share prices and analyst forecasts obtained from Thompson Institutional Brokers Earnings Services.<sup>4</sup> The implied cost of capital approach presents two main advantages. First, it circumvents the use of noisy realized returns and does not require historical stock returns as traditional capital asset pricing models. Second, this approach allows an estimation of the impact of environmental costs on a firm's cost of equity capital while controlling for their effects on cash flows.

Our sample consists of 7,122 firm-year observations representing 2,107 firms over the 2002-2011 period. Using a multivariate regression framework that controls for firm-level characteristics as well as industry, year and country effects, we find that the cost of equity capital is cheaper for firms with a high level of CER. These findings are robust to address endogeneity using the instrumental variables approach, and to use alternative specifications and proxies for the cost of equity capital, to account for noise in analyst forecasts, and to adjust sample composition. Collectively, our results suggest that improving environmental responsibility would reduce firms' equity financing costs.

This paper contributes to the literature in two ways. First, previous research has primarily focused on the outcomes of CSR measured using wide-ranging indices that rate firms according to different dimensions including community and employee relations, product quality, and diversity. In this paper, we study the outcomes of corporate environmental responsibility, arguably one of the most important dimensions of CSR. For instance, our proxy of corporate environmental responsibility captures emissions that are major contributors to global warming. Second, previous research has mostly focused on the outcomes of CSR in a single country, namely the U.S. In contrast, in this paper we employ a cross-country sample. This allows us to conclude whether the negative relationship between CSR and financing costs holds in outside the U.S.

The remainder of this paper is organized as follows. In Section 2, we discuss previous studies that examine the relation between CER and the cost of equity capital. We also review the literature on environmental costs and firm borrowing costs, and develop two mutually exclusive hypotheses. In Section 3, we describe our sample data and discuss the empirical methodology employed to test our hypotheses. In Section 4, we provide our empirical results. In the last Section, we draw our conclusions.

## **2. Literature review and developed hypotheses**

### **2.1. Related Literature**

The existing literature on the relation between CER and firm performance is at an embryonic stage. Based on an analysis of 50 chemical bleached paper pulp firms in eight countries, Nehrt (1996) shows that firms which invest earlier in pollution-reducing technologies can gain financial advantage. He argues that pollution-reducing technologies may enable firms to reduce unit production costs and to enhance sales in the long term. Miles and Covin (2000) further examine the interrelations between environmental performance, company reputation, and financial performance. They find that corporate

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<sup>4</sup> These models are the residual income valuation models implemented by Gebhardt et al. (2001) and Claus and Thomas (2001), and the abnormal growth models discussed in Easton (2004) and Ohlson and Juettner-Nauroth (2005).

reputation is one of the most important intangible assets that is nonetheless related to marketing and Firm performance. They conclude that good environmental management generates reputational advantage for a firm that leads to improved marketing and financial performance. In addition, Konar and Cohen (2001) show that poor environmental performance has a negative effect on intangible asset value such as the reputation of manufacturing firms in the S&P 500. They argue that good environmental management may lead to an improvement in the firm's reputation and thereby enhance the firm's performance.

Using environmental ratings on compliance and prevention efforts, Russo and Fouts (1997) test the relation between environmental performance and economic performance with an analysis of 243 firms over two years. Their results indicate that firms with environment-friendly management tend to achieve higher economic performance. Hart and Ahuja (1996) examine the relation between emissions reduction and firm performance by using data drawn from the corporate environmental profile of the Investor Responsibility Research Center (IRRC). They provide a summary of the reported emissions of selected pollutants from U.S. manufacturing facilities, and use ROA as a measure of the firm's financial performance variables. The result indicates that reducing emissions increases efficiency, saves money, and gives firms a cost advantage. Kim and Statman (2012) suggest that the behavior of U.S. corporations is consistent with the claim that they act in the interest of shareholders, increasing or decreasing their investment in environmental responsibility as necessary to improve their firm performance. Although their focus is not on firm performance, Walls et al. (2012) analyze the possible interactions between the firm's owners, managers, and directors, to explore how corporate governance affects environmental performance. In the next Section, we briefly review the literature on environmental costs and firm performance.

The literature on the effect of environmental costs on firm performance is scarce and is yet to be fully established. Using the Trucost database only for 33 U.S. electric power companies on environmental costs for the year 2004, Thomas et al. (2007) investigate the difference between economic value-added (EVA) and environmental costs adjusted EVA (i.e. TruEVA). They find that the majority of firms experience a positive EVA turning into a negative TruEVA after environmental costs taken into account. However, Dawkins and Fraas (2011) investigate the relation between environmental performance and voluntary climate change disclosure by using the Trucost data of S&P 500 companies. They find a positive relation between environmental performance and environmental disclosure. Their study also identifies an important role for media visibility in the types of disclosure and recognizes other factors that interact with environmental performance to influence corporate responses. However, to the best of our knowledge, there are still no cross-country studies that investigate the effect of environmental costs on equity financing.

## **2.2. Hypothesis**

The premise in this paper is that corporate environmental responsibility is related to firms' cost of equity capital. We focus on two channels underlying this relationship: environmentally irresponsible firms have 1) higher risk, and 2) narrower investor base.

**Risk channel.** CSR could be viewed as a hedging device that contributes to reducing the riskiness of the firm. In a perfect Modigliani and Miller world corporate hedging is irrelevant since shareholders could reduce risk on their own. However, in the presence of financial market frictions such as financial distress and bankruptcy costs hedging could increase firm value (Smith and Stulz, 1985).

CSR could serve as a hedging tool by reducing the *probability* and *costs* of adverse events. First, socially responsible firms reduce conflicts with their stakeholders resulting in fewer adverse events such as strikes, product recalls, environmental scandals, etc. Chatterji et al. (2009) find that firms with poor KLD CSR scores commit significantly more pollution and regulatory compliance violations than other firms. Hong and Kacperczyk (2009) argue that “sin” stocks (i.e., tobacco, alcohol, and gaming firms) face higher litigation risk than other firms. Shane and Spicer (1983) contend that disclosure of socially oriented information affects the public perception of the firm’s level of compliance.

Second, socially responsible firms face fewer adverse events and relieve the shock when adverse events do occur. Godfrey (2005) makes the case that corporate philanthropy produces moral capital among stakeholders and communities. This moral capital, in turn, could serve as insurance against events that jeopardize relational wealth. The underlying idea is that stakeholders reduce their sanctions of a firm facing an adverse event when this firm is socially responsible. Godfrey et al. (2009) test this idea in a sample of negative legal/regulatory actions against firms. They find that abnormal stock returns around announcements of negative legal/regulatory actions against firms were higher for socially responsible firms compared to other firms. Minor and Morgan (2011) report similar results for S&P 500 firms around announcements of product recalls. A related stream of research explores the link between CSR and firm risk. For instance, Boutin-Dufresne and Savaria (2004) and Lee and Faff (2009) document that low CSR firms exhibit significantly higher idiosyncratic risk while Albuquerque et al. (2013) document that low CSR firms have higher systematic risk. Feldman et al. (1997, p. 89) show that firms that adopt an “environmentally proactive posture” significantly reduce their perceived risk. Attig et al. (2013a) show that high CSR firms exhibit higher credit ratings consistent with the idea that these firms have lower risk.

***Investor base channel.*** Besides the risk channel, we argue that firms with high environmental costs have a narrower investor base, leading to higher equity financing costs. Heinkel et al. (2001) propose a model that explains how CSR affects a firm’s investor base and, in turn, its cost of capital. The model assumes there are two types of investors (neutral and green), and that firms could choose between two production technologies: clean and polluting. Neutral investors will hold shares of polluting and clean firms. However, green investors will only hold shares of clean firms. This exclusionary investing by green investors will lead to fewer investors willing to hold polluting firms’ shares. This lack of risk sharing (Merton, 1987) leads, in turn, to lower share prices and higher cost of capital for firms with high environmental costs. Empirically, Hong and Kacperczyk (2009) examine ‘sin’ stocks, i.e., publicly listed firms operating in the alcohol, tobacco, and gaming industries, and find that norm-constrained institutional investors (e.g., pension plans) include fewer ‘sin’ stocks in their portfolios compared to arbitrageurs (e.g., mutual or hedge funds). Providing support to Hong and Kacperczyk (2009), El Ghoul et al. (2011) show that among the ‘sin’ stocks in the U.S., firms related to the tobacco and nuclear power industries have a significantly higher cost of equity capital.

### **3. Research design**

#### **3.1 Sample construction**

To investigate the relation between CER and the cost of equity financing, we employ the following databases: (a) Trucost, which provides external environmental cost for listed firms from 30 countries; (b) Thompson Institutional Brokers Earnings Services (I/B/E/S) database, which we use to

obtain analyst consensus earnings forecasts and stock prices, and (c) Compustat,<sup>5</sup> which we use to collect financial data such as dividends and book values. Since estimate firms' implied cost of equity capital, we follow prior research and exclude firm-year observations which do not show positive one-year and two-year-ahead forecasts and neither a positive three-year-ahead nor long-term growth forecasts. These restrictions are imposed in order to calculate all four individual cost of equity estimates outlined in the next Section. The unbalanced panel data used in our paper consists of 7,122 firm-year observations over the 2002-2011 period.

Table 1 provides descriptive statistics of variables used in our empirical tests with univariate analysis and multivariate regression analysis. Panel A of Table 1 reports information on the sample composition, descriptive statistics on the cost of equity capital, external environmental costs, and control variables by country. Panel B of Table 1 presents mean, median, standard deviation, minimum value, 25th percentile value, 75th percentile value, and maximum value. Table 2 reports the Pearson correlations between dependent variable (i.e., *ex ante* cost of equity capital) and independent variables including external environmental costs to total assets.

### 3.2 Cost of equity estimates

The benchmark model for the estimation of the *ex ante* cost of equity capital is the dividend discount model (DDM) where current stock price ( $P_t$ ) equals the expected stream of dividends ( $D_{t+\tau}$ ) discounted at the cost of equity capital ( $K$ ):

$$P_t = \sum_{\tau=1}^{\infty} \frac{D_{t+\tau}}{(1+K)^\tau} \quad (1)$$

Regrettably, market expectations of dividends are unavailable, preventing us from relying on the DDM to gauge the cost of equity capital. However, financial analysts provide forecasts of accounting earnings, typically for a five-year horizon. In our study, we follow prior research in accounting and finance by using analysts' earnings forecasts and stock prices to compute the *ex ante* cost of equity. The implied cost of capital under this approach is the internal rate of return (discount rate) at which the current market price equates the present value of expected future residual incomes or abnormal earnings. More specifically, we follow Hail and Leuz (2006), Dhaliwal et al. (2006), and Chen et al. (2011) by adopting four approaches to estimating the implied cost of equity capital, namely those developed by Ohlson and Juettner-Nauroth (2005,  $K_{OJ}$ ), Gebhardt et al. (2001,  $K_{GLS}$ ), Claus and Thomas (2001,  $K_{CT}$ ), and Easton (2004,  $K_{ES}$ ).

To reduce concerns that our empirical evidence is driven by the unique characteristics of any particular model, we specify our dependent variable as the average estimate obtained from the four models. These models, which we summarize in Appendix A, present a practical alternative to the failure of asset pricing models to proxy for the cost of equity (Elton, 1999; Fama and French, 1997; Pástor et al., 2008). In fact, Pástor et al. (2008) show analytically that the implied cost of capital is useful in capturing time-varying expected returns. Additionally, this accounting-based approach benefits from not requiring a long time series of past returns or a priori assumptions about market integration, and, importantly, makes an explicit attempt to separate the cash flow and growth effects from the cost of equity effects (Hail and Leuz, 2009; Chen et al., 2011).

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<sup>5</sup> Canadian and U.S. firms' financial statement data are from the Compustat North America file, while the data for the firms from the rest of the world are obtained by the Compustat Global file.

### 3.3 External environmental costs

To evaluate the level of CER, we employ unique external environmental costs data from Trucost. To our knowledge, Trucost environmental cost data is currently the only data source that provides the dollar amounts of external environmental costs of firms worldwide. Trucost has analyzed more than 4,000 companies' environmental performance around the world. The database applies a uniform methodology to calculate the external environmental costs for all firms in the database.<sup>6</sup> Their methodology is based on an input-output model to conduct firms' environmental impacts across operations, supply chains and investment portfolios.<sup>7</sup> Their advanced environmental profiling model accounts for 464 industries worldwide, tracks over 100 environmental impacts, and examines the interactions and cash flows between sectors in order to map each sector's supply chain. They convert the quantity data into financial values. The price applied to each impact is its damage costs to society and derived from prior environmental economics literature.

The external environmental costs are comprised of six different external environmental costs such as Greenhouse Gases (GHGs) External Environmental Costs, Water External Environmental Costs, Waste External Environmental Costs, Land and Water Pollutants External Environmental Costs, Air Pollutants External Environmental Costs, and Natural Resource Use External Environmental Costs.<sup>8</sup> Additionally, Trucost database provides firms' external environmental costs which measure how a company efficiently manages its resources for better environmental performance. Jo et al. (2013) argue that the reduction of the external environmental costs is achieved at the expense of corporate investment in environmental responsibility such as clean technology and environmental R&D expenditures. Therefore, the external environmental cost data reflects a level of the consequence for firms' investment in environmental responsibility.<sup>9</sup>

Earlier studies usually employ the environmental data with ratings or binary figures. Russo and Fouts (1997) use the environmental ratings of firms by Franklin Research and Development Corporation (FRDC) that are based on a number of environmental criteria.<sup>10</sup> Recently, KLD Research and Analytics database is employed to calculate CSR (or CER) scores in corporate finance literature such as Kim and Statman (2012), Deng, Kang, and Low (2013), and Di Giuli and Kostovetsky (2014). However, KLD database has two limitations. First, it examines CSR (or CER) characteristics of firms with qualitative approach by only reporting binary figures. Second, since KLD has been adding and eliminating evaluation items over time, the CSR (or CER) scores cannot be comparable between

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<sup>6</sup> External costs typically mean that the costs affect a party who did not choose to incur that costs (Buchanan, 1962). Thus, the external environmental costs are not related to accounting costs (Jo et al., 2013). Jo et al. (2013) find insignificant negative correlation between external environmental costs and accounting costs in manufacturing industry.

<sup>7</sup> Input-output modelling has been a branch of economics for over 50 years, and earned Wassily Leontief the 1973 Nobel Prize for Economics and show the amount of resources required to produce a unit of output and where this output is sold. Trucost employs the standard model by integrating the use and emissions of over 700 environmental resources. The database uses a global input-output model based on detailed government census and survey data on resource use and pollutant releases, industry data and statistics and national economic accounts.

<sup>8</sup> See Appendix B for detailed Trucost data explanation.

<sup>9</sup> In other words, for high CER firms, the external environmental costs will be lower.

<sup>10</sup> The environmental criteria include compliance records, expenditure, and other initiatives to meet new demands and reduce waste.

different time periods. On the other hand, our Trucost environmental cost data more accurately estimate CER than the FRDC and KLD data because it provides the dollar amount of environmental costs. Thus, unlike environmental performance data from earlier studies, our data is unique for evaluating firms' environmental responsibility.

### 3.4 Empirical model and variables

To test our main prediction on the relation between CER and the cost of equity financing, we estimate the following model:

$$K_{AVG} = \beta_0 + \beta_1 ENV_{COST} + \beta_2 RVAR + \beta_3 BTM + \beta_4 LEV + \beta_5 INFL + \beta_6 SIZE + \beta_7 FBIAS + \beta_8 DISP + \beta_9 LGDPC + \text{Year, Industry, \& Country fixed effects} + \varepsilon, \quad (1)$$

where  $K_{AVG}$  is the cost of equity capital implied from contemporaneous stock prices and analysts' forecasts based on four different models following Hail and Leuz (2006);  $ENV_{COST}$  refers to external environmental costs to total assets, and reflects a level of firms' environmental responsibility because firms could lower external environmental costs by increase in CER investment (Jo et al., 2013). Prior literature finds evidence that CSR activities can lower regulatory risk and reduce the cost of capital (Heinkel and Zechner, 2001; Bassen, Meyer, and Schlange 2006; El Ghouli, Guedhami, Kwok, and Mishra, 2011). CER is one of the most important dimensions of CSR. Thus, we predict a significant positive (negative) relation between the external environmental costs (CER) and the cost of equity capital.

Following prior research, we include the following control variables:  $RVAR$  that is volatility of stock returns over the previous 12 months;  $BTM$  that is book value to the market value of equity;  $LEV$  that is leverage ratio defined as the ratio of long-term debt to total assets;  $INFL$  that is realized inflation rate over the next year;  $SIZE$  that is natural logarithm of total assets;  $FBIAS$  that is signed forecast error defined as the difference between the one-year-ahead consensus earnings forecast and realized earnings deflated by beginning of period assets per share. In addition, we control  $DISP$  that is dispersion of analyst forecasts defined as the coefficient of variation of one-year-ahead analyst forecasts of earnings per share and  $LGDPC$  that is natural logarithm of real GDP per capita. Finally, we control year, industry, and country fixed effects in all regressions with robust standard errors clustered at the firm-level following Hail and Leuz (2006).<sup>11</sup>

### 4. Empirical results

Although CER is receiving significant attention from academia, industry, and government around the world, there is little international evidence on the significance or economic magnitude of the relation between CER and cost of equity financing.<sup>12</sup> Thus, we empirically examine the impacts of CER on the cost of equity capital. In Section 4.1, to compare the equity financing costs of firms with low external environmental costs and firms with high external environmental costs, we conduct

<sup>11</sup> Since firm fixed effects would be perfectly correlated with the industry and country fixed effects, we do not adopt firm fixed effects in our regressions following Khurana and Raman (2004) and Lawrence et al. (2011).

<sup>12</sup> Chen (2001) argues that environmental issue is receiving significant attention from consumers, industries, and governments around the world.

univariate tests. In Section 4.2, we perform multivariate regression analysis for examining the impacts of CER on firms' costs of equity financing. Finally, we report the results of robustness tests in Section 4.3.

#### 4.1. Univariate tests

The goal of this research is to examine how cost of equity capital is affected when CER is taken into account. As a first step, we compare the mean and median of the cost of equity capital ( $K_{AVG}$ ) of firms with low ENVCOST and firms with high ENVCOST in Table 3.<sup>13</sup> In Equations 1 and 2 of Table 3, we report the difference in mean for full-sample firms. The mean equity financing costs of firms with low ENVCOST is 12.16%, while it is 12.55% for firms with high ENVCOST. Therefore, our result shows that the mean equity financing costs difference of firms with low ENVCOST (i.e., high CER) is 39 basis points lower than that of firms with high ENVCOST (i.e., low CER). The difference is statistically significant at the 1% level, thus our finding supports our prediction that firms worldwide with high CER benefit from lower cost of equity capital. For robustness tests, we explore differences in means using four individual cost of equity estimates. Our results support the aforementioned idea because the individual cost of equity is higher in the firms with high ENVCOST. In Equations 3 and 4 of Table 3, the median equity financing cost differences are reported. We consistently find similar evidence when we employ the cost of equity capital ( $K_{AVG}$ ) and its four individual cost of equity estimates.

#### 4.2. Multivariate regression analysis

To examine the association between cost of equity capital and CER, we regress the equity financing costs ( $K_{AVG}$ ) on the external environmental costs to total assets (ENVCOST) and other control variables.<sup>14</sup> We use a panel structure from our dataset and employ year, industry, and country fixed effects in all regressions with robust standard errors clustered at the firm-level. In Equation 1 of Table 4, we examine the impact of CER on the equity financing costs and find that the coefficient on ENVCOST is positive and statistically significant at the 1% level. The result indicates that firms with better environmental responsibility have significantly lower cost of equity capital. Our result remains the significance when we further control additional firm and country specific variables such as RVAR, BTM, LEV, INFL, SIZE, FBIAS, DISP, and LGDPC discussed in Section 3.4. Our findings also support arguments of Chatterji et al. (2009) and Heinkel and Zechner (2001) which argue that CER reduce the probability of adverse events and induce green investors' investments.

In Equations 3 through 6 of Table 4, we examine whether the documented relation between CER and the equity financing costs is robust during the non-global financial crisis period and global financial crisis period. We estimate the same regressions after partitioning the full sample period into three sub-sample periods surrounding the global financial crisis period: pre-crisis (2002-2006), crisis (2007-2008), post-crisis (2009-2011). In the pre- and post-crisis period, we find a significant positive

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<sup>13</sup> This table reports mean (Panel A) and median (Panel B) difference tests of the regression variables across the Low-ENVCOST and High-ENVCOST subsamples. The Low-ENVCOST is in the bottom 50th percentile and High-ENVCOST is in the top 50th percentile of external environmental costs.

<sup>14</sup> Our main variable of interest, ENVCOST, reflects a level of CER because firms may lower external environmental costs by increase in CER investment.

relation between ENVCOST and equity financing costs ( $K_{AVG}$ ). In contrast, we show that the coefficient for ENVCOST is positive but statistically insignificant during the crisis period. Our results imply that at times of non-crisis, CER could be a hedging tool by reducing the probability and costs of adverse events such as strikes, product recalls, environmental scandals, etc., while, in times of crisis, CER could not serve as a hedging tool. It appears that, during the crisis period, coping with financial distress and bankruptcy costs become more important than decreasing the probability of adverse environmental events. In addition, short-termism of investors may increase during the crisis period. Thus, they seem to consider more of firms with short-term performance rather than firms with long-term vitality with investment in CER.

### 4.3. Robustness tests

We perform a rich set of robustness tests for our primary results. In Table 5-9, we consider individual and alternative cost of equity capital estimates, noise in analyst forecasts, endogeneity, alternative assumptions and model specifications, and sample composition adjustment. Overall, our results support the arguments in our main hypothesis that CER decreases the cost of equity.

#### 4.3.1. Individual and alternative cost of equity capital estimates

To explore whether our core evidence is robust, we use individual and alternative cost of equity capital estimates as dependent variable in Table 5. In Model 1-4 of Table 5, we use individual cost of equity estimates: the Claus and Thomas (2001,  $K_{CT}$ ), the Gebhardt et al. (2001,  $K_{GLS}$ ), the Ohlson and Juettner-Nauroth (2005,  $K_{OJ}$ ), and the Easton (2004,  $K_{ES}$ ).<sup>15</sup> As detailed in Appendix A, the implied cost of equity models applies various assumptions about earnings growth rates and forecast horizons. Thus, one could argue that the assumptions underlying the four cost of equity models are driving our results. We re-estimate our baseline model after using alternative cost of equity capital estimates in Model 5-6 of Table 5. In Model 5, we employ the forward Earnings-Price (EP) ratio which is defined as  $FEPS_{t+\tau}$  divided by  $P_t$  to measure the cost of equity (Easton, 2004).<sup>16</sup> In Model 6, we use the Price-Earnings-Growth (PEG) model which assumes no dividend payments to estimate the equity premium using short-term earnings forecasts. Finally, in Model 7, we apply the Trailing Earnings yield (TEYD) which is defined as current EPS divided by  $P_t$ . In Model 1-7, we find the significant positive relation between ENVCOST and equity financing costs ( $K_{AVG}$ ). Our results support the prediction that firms with low ENVCOST (i.e., high CER) benefit from lower cost of equity capital.

#### 4.3.2. Robustness to analyst forecast optimism

One of main concerns in using analysts' earnings forecast data for estimating the equity financing costs is accuracy of market's expectations of future earnings.<sup>17</sup> First, to mitigate this concern, we

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<sup>15</sup> We explain four individual cost of equity estimates in Appendix A.

<sup>16</sup>  $FEPS_{t+\tau}$  and  $P_t$  are forecasted earnings for year  $t+\tau$  and stock price measured ten months after the fiscal year end.

<sup>17</sup> Easton (2004) finds upward bias of analyst forecasts.

exclude the top 5%, 10%, and 25% of the firm-year observations in the forecast optimism bias (FBIAS) distribution, respectively.<sup>18</sup> The results of Model 1-3 of Table 6 strongly support our earlier conclusions. Second, we eliminate the top 5%, 10%, and 25% of the firm-year observations in the long-term growth forecast (LTG) distribution, respectively. In Model 4-6 of Table 6, we find the significant positive relation between ENVCOST and cost of equity capital. Third, to control analyst forecast accuracy, we run weighted least squares regressions where the weight equals the inverse of the forecast error in Model 7.<sup>19</sup> The result of Model 7 shows that ENVCOST is significantly and positively related to the cost of equity. Fourth, we further consider analysts' sluggishness because it can lead to biased estimates of the cost of capital.<sup>20</sup> In Model 8-9, we address this concern in two ways: (a) re-estimating the implied cost of equity capital using January-end prices instead of June-end prices following Guay et al. (2005) and Hail and Leuz (2006), and (b) controlling price momentum estimated as compound stock returns over the past six months following Guay et al. (2005) and Chen et al. (2009). The result reported in Model 8-9 strongly corroborates our earlier evidence. Overall, the results in Table 6 show that our main hypothesis (i.e., firms with high CER benefit from lower cost of equity) is supported after mitigating concern that noise in analyst forecasts.

#### **4.3.3. Two-stage least squares (2SLS) analysis**

One concern of the analysis is the potential endogeneity problem caused by reverse causality which may be able to the interpretation of the causal relation between CER and the cost of equity capital. We alleviate the potential endogeneity problem using the two-stage least squares estimator (2SLS) and the generalized methods of moment (GMM) in Table 7.<sup>21</sup> We include the initial external environmental costs to total assets recorded when the firm enters the sample as instrument, which can be viewed as exogenous with respect to the contemporaneous cost of equity following El Ghouli et al. (2011).<sup>22</sup> Consistent with our earlier empirical regression results, we still find a significant positive relation between ENVCOST and equity financing costs after mitigating endogeneity concern.

#### **4.3.4. Alternative Specifications and Assumptions**

In Table 8, we exploit whether our main hypothesis is robust when we specify alternative specifications and assumptions for the cost of equity estimates. To consider alternative specifications, we use the median and the first principal component in place of the average of the four individual cost of equity models in Model 1-2. In Model 3, we further employ "real" cost of equity by subtracting the inflation rate from the cost of capital. The results applying alternative specifications support our earlier conclusions. In Model 4-5, we re-estimate the baseline regressions after employing alternative growth assumptions because the cost of equity estimates is sensitive to the assumptions (Easton, 2012). Thus, we successively consider two growth assumptions: (a) a constant long-run growth 3%

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<sup>18</sup> In other words, we exclude highly optimistic earnings forecasts firm-year observations in Table 6.

<sup>19</sup> We use absolute value one-year-assigns less (more) weight to inaccurate (precise) forecasts.

<sup>20</sup> Ali et al. (1992) argue that analysts have tendency to react gradually to publicly available information.

<sup>21</sup> We employ prior ENVCOST data as instrumental variables.

<sup>22</sup> In untabulated robustness tests for further ruling out endogeneity, we employ the industry average external environmental costs to total assets and a dummy variable for whether the previous year's earnings is loss as instrument variables for the external environmental costs following prior literature.

and (b) a perpetual growth rate equal to the annual real GDP growth plus long-run inflation rate following Hail and Leuz (2006) to compute the cost of equity using the Claus and Thomas (2001) and Ohlson and Juettner-Nauroth (2005).<sup>23</sup> In Model 4-5, our results applying these alternative growth assumptions also show that ENVCOST is positively associated with costs of equity. Thus, the results of Table 8 also support our main hypothesis that firms with high CER benefit from lower cost of equity.

#### **4.3.5. Adjusting Sample Composition**

One could argue that the heterogeneity of the number of firm-year observations across countries can seriously influence our results. Thus, we address this concern in three ways. First, we run a weighted least squares regression where the weight is the inverse of the number of firm-year observations per country in Model 1 of Table 9. Second, we exclude the U.S. firms which are the largest number of observations in our sample. Third, we eliminate the U.S., U.K., and Japan samples with the top three largest number of firm-year observations. In Model 1-3 of Table 9, we find that our primary results are strongly robust when we adjust sample composition.

### **5. Concluding Remarks**

This paper examines how corporate environmental responsibility (CER) affects the cost of equity capital for manufacturing firms in 30 countries. Our sample consists of 7,122 firm-year observations representing 2,107 firms over the 2002-2011 period. Using a multivariate regression framework that controls for firm-level characteristics as well as industry, year and country effects, we find that the cost of equity capital is cheaper for firms with a high level of environmental responsibility. These findings are robust to address endogeneity using the instrumental variables approach, and to use alternative specifications and proxies for the cost of equity capital, to account for noise in analyst forecasts and alternative samples. Collectively, our results suggest that improving environmental responsibility would reduce firms' equity financing costs.

This paper contributes to the literature in two ways. First, previous research has primarily focused on the outcomes of CSR measured using wide-ranging indices that rate firms according to different dimensions including community and employee relations, product quality, and diversity. In this paper we study the outcomes of corporate environmental responsibility, arguably one of the most important dimensions of CSR. For instance, our proxy of corporate environmental responsibility captures emissions that are major contributors to global warming. Second, previous research has mostly focused on the outcomes of CSR in a single country, namely the U.S. In contrast, in this paper we employ a cross-country sample. This allows us to conclude whether the negative relationship between CSR and financing costs holds in outside the U.S.

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<sup>23</sup> We assumed that the perpetual growth rate is equal to the future inflation rate when we estimate the cost of equity applying the Claus and Thomas (2001) and Ohlson and Juettner-Nauroth (2005).

## APPENDIX A

### Models of cost of equity capital

In this appendix, we describe the cost of equity models used in this paper. We start by defining variables and specifying assumptions common to all models. We then successively cover each model and its assumptions.

#### *Common variables and assumptions*

$P_t$  = stock price in June of year  $t$ ,  
 $DPS_0$  = actual dividend per share in year  $t-1$ ,  
 $EPS_0$  = actual earnings per share in year  $t-1$ ,  
 $LTG$  = long-term growth forecast in June of year  $t$ ,  
 $FEPS_{t+\tau}$  = forecasted earnings per share for year  $t + \tau$  recorded in June of year  $t$ ,  
 $B_t$  = book value per share at the beginning of year  $t$ ,  
 $r_f$  = yield on a 10-year Treasury note in June of year  $t$ .

As explained in the text, we require firms to have positive 1-year-ahead ( $FEPS_{t+1}$ ) and 2-year-ahead ( $FEPS_{t+2}$ ) earnings forecasts as well as a long-term growth forecast ( $LTG$ ). However, two models call for the use of earnings forecasts beyond year two. If a forecast is not available in I/B/E/S, we impute it from the previous year's forecast and the long-term growth forecast as  $FEPS_{t+\tau} = FEPS_{t+\tau-1}(1+LTG)$ .

#### *Model 1: Claus and Thomas (2001)*

This model assumes clean surplus accounting (Ohlson, 1995), allowing share price to be expressed in terms of forecasted residual earnings and book values. The explicit forecast horizon is set to 5 years, beyond which forecasted residual earnings grow at the expected inflation rate, and dividend payout is assumed to be constant at 50%. The valuation equation is given by:

$$P_t = B_t + \sum_{\tau=1}^5 \frac{ae_{t+\tau}}{(1+K_{CT})^\tau} + \frac{ae_{t+5}(1+g)}{(K_{CT}-g)(1+K_{CT})^5} \quad (A.1)$$

where  $ae_{t+\tau} = FEPS_{t+\tau} - K_{CT} \cdot B_{t+\tau-1}$   
 $B_{t+\tau} = B_{t+\tau-1} + FEPS_{t+\tau}(1 - DPS_{t+\tau})$   
 $DPS_{t+\tau} = 0.5$   
 $g = r_f - 0.5$

#### *Model 2: Gebhardt, Lee, and Swaminathan (2001)*

This model also assumes clean surplus accounting, allowing share price to be expressed in terms of forecasted returns on equity (ROE) and book values. The explicit forecast horizon is set to 3 years, beyond which forecasted ROE decays to the median industry ROE by the 12th year, and remains constant thereafter. Dividend payout is again assumed to be constant. The valuation equation is given by:

$$P_t = B_t + \sum_{\tau=1}^{11} \frac{FROE_{t+\tau} - K_{GLS}}{(1+K_{GLS})^\tau} B_{t+\tau-1} + \frac{FROE_{t+12} - K_{GLS}}{K_{GLS}(1+K_{GLS})^{11}} B_{t+11} \quad (A.2)$$

where  $FROE_{t+\tau}$  = forecasted return on equity for year  $t + \tau$ ,  $B_{t+\tau} = B_{t+\tau-1} + FEPS_{t+\tau}(1 - DPS_{t+\tau})$ , and  $DPR_{t+\tau}$  = expected dividend payout ratio in year  $t + \tau$ .

For the first 3 years,  $FROE_{t+\tau}$  is set equal to  $FEPS_{t+\tau} / B_{t+\tau-1}$ . Beyond the third year,  $FROE$  fades linearly to the industry median ROE by the 12th year. Industries are defined according to the Fama and French (1997) classification and the median industry ROE is calculated over the past 10 years excluding loss firms. The expected dividend payout ratio  $DPR_{t+\tau}$  is set equal to  $DPS_0/EPS_0$ . If  $EPS_0$  is negative, it is replaced by the value implied by a 6% return on assets (the long-run return on assets in the US). We winsorize payout ratios at zero and one.

#### *Model 3: Ohlson and Juettner-Nauroth (2005)*

The model is a generalization of the Gordon constant growth model. It allows share price to be expressed in terms of the 1-year-ahead earnings forecast, the near-term and perpetual growth forecasts. The explicit forecast horizon is set to 1 year, after which forecasted earnings grow at a near-term rate that decays to a perpetual rate. We follow Gode and Mohanram's (2003) implementation of the model. The near-term earnings growth rate is the

average of: (i) the percentage difference between 2-year-ahead and 1-year-ahead earnings forecasts, and (ii) the I/B/E/S long-term growth forecast. The perpetual growth rate is the expected inflation rate. Dividend per share is assumed to be constant. The model requires positive 1-year-ahead and 2-year-ahead earnings forecasts. The valuation equation is given by:

$$K_{OJ} = A + \sqrt{A^2 + \frac{FEPS_{t+1}}{P_t}(g_2 - (\gamma - 1))} \quad (A.3)$$

where

$$A = \frac{1}{2} \left( (\gamma - 1) + \frac{DPS_{t+1}}{P_t} \right)$$

$$DPS_{t+1} = DPS_0, \\ STG + LTG$$

$$g_2 = \frac{2}{2}$$

$$STG = \frac{FEPS_{t+2} - FEPS_{t+1}}{FEPS_{t+1}}, \text{ and } (\gamma - 1) = r_f - 0.03.$$

#### **Model 4: Easton (2004)**

This model is a generalization of the Price–Earnings–Growth (PEG) model and is based on Ohlson and Juettner-Nauroth (2005). It allows share price to be expressed in terms of 1-year-ahead expected dividend per share, plus 1-year-ahead and 2-year-ahead earnings forecasts. The explicit forecast horizon is set to 2 years, after which forecasted abnormal earnings grow in perpetuity at a constant rate. The model requires positive 1-year-ahead and 2-year-ahead earnings forecasts as well as positive change in earnings forecast. The valuation equation is given by:

$$P_t = \frac{FEPS_{t+2} + K_{ES}DPS_{t+1} - FEPS_{t+1}}{K_{ES}^2} \quad (A.4)$$

where

$$DPS_{t+1} = DPS_0,$$

#### **Alternative models**

We also consider alternative models of the cost of equity. These are used in Table 6.

#### **Earnings–price (EP) ratio**

This is a special case of the Easton (2004) model assuming that abnormal earnings growth is set to zero. The EP ratio is given by:

$$EPR = \frac{FEPS_{t+1}}{P_t} \quad (A.5)$$

#### **Price–Earnings–Growth (PEG) ratio**

This is a special case of the Easton (2004) model assuming no dividend payments. There are two versions of the model. One is based on short-term earnings forecasts and the other on long-term earnings forecasts. The valuation equations are given by:

$$P_t = \frac{FEPS_{t+2} - FEPS_{t+1}}{K_{PEG2}^2} \quad (A.6)$$

#### **Trailing Earnings (TE) ratio**

$$TE = \frac{EPS_t}{P_t} \quad (A.7)$$

## APPENDIX B

### *Trucost data explanation*

External environmental costs (i.e., Total direct external cost)	External environmental costs are called total direct external cost. Direct external environmental impacts are those impacts that a company has on the environment through their own activities (equivalent to Scope 1 of the Greenhouse Gas Protocol). For example, the water that a company uses from a river would be a direct impact, whereas water provided by a utility company would be an indirect impact. Trucost calculates these direct environmental impacts in quantity terms (i.e. tonnes, cubic metres etc), and financial terms, so that they can be ranked accordingly as direct external costs. The quantities of all direct emissions are multiplied by their respective environmental damage costs as calculated by Trucost and its academic panel.
Impact Ratio	The total direct and indirect external cost / revenue. The impact ratio represents the proportion of a company's revenue that would be at risk if it was to internalise the external environmental damage costs associated with its direct operations and that of its supply chain.
Greenhouse Gases Direct Cost	The total cost of all GHG emissions caused by the burning for fossil fuels and production processes which are owned or controlled by the company. Greenhouse gases are so called because they contribute towards the greenhouse effect. All greenhouse gases are adjusted by their respective global warming potential (GWP) to calculate their carbon dioxide equivalent. The quantity of each GHG emission is multiplied an external cost.
Water Direct Cost	This is water abstracted by the company from rivers, groundwater, lakes and seas. The water is abstracted and used in the company's own operations such as for cooling or processing. The quantity of water is then times by its associated external cost.
Waste direct cost	Hazardous and non-hazardous waste produced by the company including mining tailing, mining over burden and nuclear waste. The quantity of waste is multiplied by an associated external damage cost that is based on the type of waste and its method of disposal. Recycled waste as no associated damage cost in the Trucost model.
Land & Water Pollutants Direct Cost	The cost of pollutants that are released to water or land. These are pollutants from fertilizer and pesticides, metal emissions to land and water, acid emissions to water, and nutrient and acids pollutant. The quantities of pollutants are multiplied by their associated external damage costs.
Air Pollutants Direct Cost	Emissions released to air by the consumption of fossil fuels and production processes which are owned or controlled by the company. This includes acid rain precursors (e.g. nitrogen oxide, sulphur dioxide, sulphuric acid, and ammonia), ozone depleting substances (HFCs and CFCs), dust and particles, metal emissions, smog precursors and VOCs. The quantities of emissions are multiplied by their associated external damage cost.
Natural Resource Use Direct Cost	The direct extraction of minerals, metals, natural gas, oil, coal, forestry, agriculture and aggregates by the company. The quantity of extraction is multiplied by an external damage cost.

Source: <http://www.trucost.com>

## APPENDIX C

### *Regression Variable Definitions and Data Sources*

Variable	Definition	Source
Panel A. Dependent variables		
$K_{CT}$	Implied cost of equity capital estimated from the Claus and Thomas (2001) model ten months after the fiscal year-end.	Authors' calculations based on I/B/E/S and Compustat data
$K_{GLS}$	Implied cost of equity capital estimated from the Gebhardt, Lee, and Swaminathan (2001) model ten months after the fiscal year-end.	As above
$K_{OJ}$	Implied equity premium capital estimated from the Ohlson and Juttner-Nauroth (2005) model ten months after the fiscal year-end.	As above
$K_{ES}$	Implied cost of equity capital estimated from the Easton (2004) model ten months after the fiscal year-end.	As above
$K_{AVG}$	Average of $K_{OJ}$ , $K_{GLS}$ , $K_{CT}$ and $K_{ES}$ .	As above
Panel B. Independent variables		
ENVCOST	ENVCOST is defined as the natural log of external environmental costs. The external environmental costs called as direct external environmental costs. It is calculated by (greenhouse gases direct external costs + water direct external costs + waste direct external costs + land & water pollutants direct external costs + air pollutants direct external costs + natural resource use direct external costs).	Trucost
RVAR	Volatility of stock returns over the previous twelve months.	Authors' calculations based on Compustat, CRSP and CFRMC data.
BTM	Book value to the market value of equity.	Authors' calculations based on Compustat data.
LEV	Leverage ratio defined as the ratio of long-term debt to total assets.	As above
INFL	Realized inflation rate over the next year.	Authors' calculations based on I/B/E/S and Compustat data
SIZE	Natural logarithm of total assets in \$ million.	Compustat
FBIAS	Signed forecast error defined as the difference between the one-year-ahead consensus earnings forecast and realized earnings deflated by beginning of period assets per share.	As above
DISP	Dispersion of analyst forecasts defined as the coefficient of variation of one-year-ahead analyst forecasts of earnings per share.	Authors' calculations based on I/B/E/S data.
LGDP	Natural logarithm of real GDP per capita.	World Development Indicators
Panel C. Variables for Robustness tests		
<i>Dependent variables for Robustness tests</i>		
$K_{FEYD}$	Forward Earnings-Price ratio which is defined as $FEPS_{t+\tau}$ divided by $P_t$	Authors' calculations based on I/B/E/S and Compustat data
$K_{PEG}$	Implied cost of equity capital from Price-Earnings-Growth (PEG) model which assumes no dividend payments to estimate the equity premium using short-term earnings forecasts and longer-term forecasts.	As above

$K_{TEYD}$	Trailing Earnings yield which is defined as current EPS divided by $P_t$ .	As above
$K_{SF}$	Sluggish Forecasts (price lagged three months).	As above
$K_{MED}$	Median of $K_{CT}$ , $K_{GLS}$ , $K_{OJ}$ and $K_{ES}$ .	As above
$K_{PRC}$	Principal component of $K_{CT}$ , $K_{GLS}$ , $K_{OJ}$ and $K_{ES}$ .	As above
$K_{REA}$	“Real” COE (COE minus inflation).	As above
$K_{3P}$	COE estimate assuming a long-term growth rate = 3%.	As above
$K_{GI}$	COE estimate assuming a long-term growth = real GDP growth + inflation.	As above
<i>Independent variables for Robustness tests</i>		
LTG	Forecasted long-term earnings growth.	I/B/E/S
MMT6	Compound stock returns over the past 6 months.	Authors’ calculations based on CRSP data

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*Table 1. Descriptive Statistics**Panel A. Descriptive Statistics of Firm Characteristics by Country*

Country	Obs.	K <sub>AVG</sub>	ENVCOST	RVAR	BTM	LEV	INFL	SIZE	FBIAS	DISP	LGDP
Australia	337	14.992	0.031	2.559	0.416	0.662	0.166	7.192	0.855	0.215	10.500
Austria	51	11.264	0.022	2.322	0.318	0.843	0.173	8.503	0.177	0.177	10.574
Belgium	34	11.618	0.007	2.436	0.234	0.557	0.277	9.060	-0.212	0.110	10.510
Canada	253	12.364	0.028	1.709	0.336	0.598	0.180	8.460	0.680	0.195	10.478
Chile	181	15.230	0.046	3.249	0.397	1.633	0.125	8.896	0.339	0.173	8.075
Denmark	44	13.058	0.026	2.011	0.357	0.969	0.162	8.475	0.258	0.206	10.747
Finland	88	11.713	0.017	2.352	0.344	0.643	0.162	8.164	-0.052	0.146	10.551
France	226	12.009	0.014	1.677	0.309	0.738	0.204	9.606	0.008	0.153	10.446
Germany	211	11.937	0.012	1.748	0.343	0.638	0.159	8.758	0.212	0.193	10.498
Hong Kong	112	12.610	0.064	3.662	0.315	0.721	0.190	9.117	0.112	0.114	10.357
India	295	13.531	0.049	9.169	0.410	0.447	0.176	7.874	-0.033	0.129	6.928
Italy	106	12.238	0.021	2.158	0.301	0.883	0.251	9.487	0.246	0.208	10.279
Japan	861	10.121	0.012	0.438	0.308	0.886	0.153	9.069	0.250	0.179	10.502
Malaysia	115	9.748	0.055	2.332	0.215	0.591	0.209	7.872	0.083	0.122	8.748
Mexico	64	13.147	0.015	4.173	0.311	0.808	0.212	8.582	0.549	0.167	9.014
Netherlands	75	12.451	0.006	2.131	0.326	0.674	0.213	8.927	0.462	0.180	10.616
Norway	62	14.081	0.022	1.744	0.391	0.647	0.166	8.465	0.086	0.233	11.035
Philippines	52	12.518	0.045	3.757	0.340	0.693	0.234	7.636	0.253	0.111	7.236
Poland	75	13.793	0.067	2.993	0.366	0.864	0.109	7.795	0.200	0.254	9.222
Russia	41	17.497	0.045	6.187	0.346	0.875	0.164	9.960	0.958	0.272	8.808
Singapore	73	11.740	0.057	3.660	0.328	0.575	0.125	8.172	-0.156	0.099	10.239
South Korea	301	13.731	0.015	2.213	0.384	0.735	0.124	8.389	1.149	0.142	9.941
Spain	106	11.772	0.012	2.417	0.302	0.670	0.253	9.421	0.249	0.175	10.151
Sweden	114	12.132	0.011	1.306	0.310	0.699	0.200	8.741	-0.102	0.123	10.661
Switzerland	90	10.282	0.008	0.790	0.296	0.546	0.153	8.716	0.151	0.139	10.905
Taiwan	411	11.682	0.016	1.507	0.341	0.626	0.105	7.737	0.537	0.123	9.861
Thailand	72	12.285	0.072	3.238	0.322	0.632	0.242	8.187	0.537	0.120	8.040
Turkey	51	14.896	0.016	9.205	0.366	0.758	0.185	8.312	-0.003	0.232	8.984
United Kingdom	865	13.167	0.015	3.108	0.357	0.640	0.157	7.264	0.154	0.131	10.546
United States	1,756	11.629	0.022	2.150	0.335	0.517	0.232	8.834	-0.028	0.089	10.690
All Countries	7,122	12.234	0.023	2.460	0.341	0.676	0.181	8.440	0.236	0.142	10.159

*Panel B. Descriptive Statistics of Firm Characteristics*

	Obs.	Mean	Median	SD	Min	P25	P75	Max
K <sub>AVG</sub>	7,122	12.234	11.146	4.761	5.310	9.286	13.822	35.444
ENVCOST	7,122	0.023	0.003	0.056	0.000	0.001	0.016	0.375
RVAR	7,122	2.460	2.076	2.004	0.009	1.478	3.141	41.920
BTM	7,122	0.341	0.310	0.165	0.096	0.225	0.416	0.998
LEV	7,122	0.676	0.559	0.523	-0.012	0.344	0.860	3.625
INFL	7,122	0.181	0.163	0.144	0.000	0.061	0.268	0.627
SIZE	7,122	8.440	8.437	1.531	2.171	7.506	9.428	12.877
FBIAS	7,122	0.236	0.000	1.807	-5.069	-0.424	0.535	10.108
DISP	7,122	0.142	0.071	0.271	0.000	0.034	0.140	2.333
LGDPC	7,122	10.159	10.517	0.946	6.472	10.253	10.674	11.334

Notes: This table presents the distribution of our full sample of 7,122 firm-year observations from 30 countries over the period 2002-2011. K<sub>AVG</sub>, our dependent variable, is the average cost of equity obtained from four models developed by Gebhardt, Lee, and Swaminathan (2001), Claus and Thomas (2001), Ohlson and Juettner-Nauroth (2005), and Easton (2004). ENVCOST is external environmental costs to total assets. The external environmental costs are calculated by (greenhouse gases external costs + water external costs + waste external costs + land & water pollutants external costs + air pollutants external costs + natural resource use external costs). RVAR is volatility of stock returns over the previous twelve months. BTM is book value to the market value of equity. LEV is leverage ratio defined as the ratio of long-term debt to total assets. SIZE is defined as natural logarithm of total assets in \$ million. FBIAS is Signed forecast error defined as the difference between the one-year-ahead consensus earnings forecast and realized earnings deflated by beginning of period assets per share. DISP is Dispersion of analyst forecasts defined as the coefficient of variation of one-year-ahead analyst forecasts of earnings per share. LGDPC is Natural logarithm of real GDP per capita. The appendix C outlines definitions and data sources for all variables.

**Table 2. Pearson Correlation Coefficients**

	K <sub>AVG</sub>	ENV.	RVAR	BTM	LEV	INFL	SIZE	FBIAS	DISP
ENVCOST	<b>0.070</b>								
RVAR	<b>0.396</b>	0.004							
BTM	<b>0.229</b>	0.030	<b>0.177</b>						
LEV	<b>0.039</b>	<b>0.055</b>	<b>-0.041</b>	-0.015					
INFL	<b>0.137</b>	<b>0.089</b>	<b>0.089</b>	<b>-0.081</b>	0.020				
SIZE	<b>-0.140</b>	0.019	<b>-0.248</b>	<b>0.142</b>	<b>0.284</b>	<b>-0.132</b>			
FBIAS	<b>0.203</b>	0.028	<b>0.109</b>	-0.024	<b>-0.042</b>	<b>-0.048</b>	<b>-0.101</b>		
DISP	<b>0.258</b>	<b>0.031</b>	<b>0.205</b>	<b>0.189</b>	<b>0.054</b>	-0.011	-0.020	<b>0.116</b>	
LGDPC	<b>-0.103</b>	<b>-0.113</b>	<b>-0.074</b>	<b>-0.079</b>	<b>0.052</b>	<b>-0.641</b>	<b>0.087</b>	-0.010	-0.014

Notes: this table reports the Pearson correlation between the average cost of equity and explanatory variables. K<sub>AVG</sub> is the average cost of equity obtained from four models developed by Gebhardt, Lee, and Swaminathan (2001), Claus and Thomas (2001), Ohlson and Juettner-Nauroth (2005), and Easton (2004). ENVCOST is external environmental costs to total assets and reflects a level of firms' environmental responsibility because firms may lower external environmental costs by increase in CER investment. Correlation coefficients in boldface are significant at the 1% level.

**Table 3. Univariate Tests**

	Means			Medians		
	(1) Low-ENVCOST (Obs.=3,561)	(2) High-ENVCOST (Obs.=3,561)	(1)-(2) Difference (T-Stat)	(3) Low-ENVCOST (Obs.=3,561)	(4) High-ENVCOST (Obs.=3,561)	(3)-(4) Difference (Z-Stat)
K <sub>AVG</sub>	12.159	12.547	-0.388**	10.982	11.348	-0.366***
K <sub>CT</sub>	10.775	11.064	-0.289***	10.058	10.016	0.042
K <sub>GLS</sub>	9.791	10.774	-0.983***	9.278	10.064	-0.786***
K <sub>OJ</sub>	12.885	13.886	-1.001***	12.078	12.643	-0.565***
K <sub>ES</sub>	13.626	14.500	-0.874***	12.152	12.736	-0.584***
RVAR	0.344	0.338	0.006***	0.313	0.307	0.006**
BTM	0.637	0.715	-0.078***	0.511	0.603	-0.092***
LEV	0.170	0.191	-0.021***	0.145	0.181	-0.036***
INFL	2.326	2.594	-0.268***	2.076	2.076	0.000
SIZE	8.324	8.557	-0.233***	8.314	8.570	-0.256***
FBIAS	0.174	0.298	-0.124***	-0.026	0.006	-0.032***
DISP	0.133	0.152	-0.019***	0.064	0.078	-0.014***
LGDPC	10.237	10.080	0.157***	10.524	10.504	0.020***

Notes: Panel A reports mean and median difference tests of the regression variables across the Low-ENVCOST and High-ENVCOST group. Panel B *presents* the differences of average cost of equity *between* the Low-ENVCOST and High-ENVCOST group during the Non-Global Financial Crisis and Global Financial Crisis. The Low-ENVCOST is in the bottom 50th percentile and High-ENVCOST is in the top 50th percentile of external environmental costs to total assets. K<sub>AVG</sub> is the average cost of equity obtained from four models developed by Gebhardt, Lee, and Swaminathan (2001), Claus and Thomas (2001), Ohlson and Juettner-Nauroth (2005), and Easton (2004). ENVCOST is external environmental costs to total assets and reflects a level of firms' environmental responsibility because firms may lower external environmental costs by increase in CER investment. The superscripts asterisks \*\*\* and \*\* denote statistical significance at the 1% and 5% levels, respectively. The appendix C outlines definitions and data sources for all variables.

**Table 4. Environmental Costs and the Cost of Equity Capital**

	Full Sample		Pre-Crisis (2002-2006)	Crisis (2007-2008)	Post-Crisis (2009-2011)
	(1)	(2)	(3)	(4)	(5)
ENVCOST	5.507*** (3.43)	3.971*** (3.28)	4.970** (2.04)	2.870 (1.38)	3.791*** (2.74)
RVAR		8.042*** (13.33)	5.748*** (3.86)	5.989*** (6.28)	10.380*** (12.35)
BTM		1.753*** (10.22)	0.961* (1.96)	1.061*** (3.92)	2.185*** (10.78)
LEV		3.622*** (6.38)	4.353*** (3.31)	2.006** (2.07)	4.097*** (6.19)
INFL		-0.006 (-0.10)	-0.100 (-0.95)	-0.488* (-1.70)	-0.084 (-0.76)
SIZE		-0.186*** (-3.11)	-0.437*** (-3.75)	0.070 (0.66)	-0.209*** (-3.04)
FBIAS		0.301*** (6.56)	0.122 (1.40)	0.294*** (2.80)	0.344*** (5.77)
DISP		2.470*** (9.07)	2.734*** (3.96)	1.768*** (3.95)	2.569*** (6.39)
LGDP		-0.255 (-0.75)	0.241 (0.31)	-0.852* (-1.90)	0.008 (0.02)
INTERCEPT	14.877*** (23.01)	11.780*** (3.29)	9.776 (1.18)	22.971*** (4.79)	10.012** (2.23)
Year effects	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes
Cluster	Firm	Firm	Firm	Firm	Firm
Obs.	7,122	7,122	984	1,467	4,671
Adj. R <sup>2</sup>	0.155	0.334	0.271	0.357	0.383

Notes: This table presents estimation results from regressing the implied cost of equity capital ( $K_{AVG}$ ) on external environmental costs to total assets (ENVCOST) and controls for the full sample of 9,148 firm-years from 30 countries.  $K_{AVG}$  is the average cost of equity obtained from four models developed by Gebhardt, Lee, and Swaminathan (2001), Claus and Thomas (2001), Ohlson and Juettner-Nauroth (2005), and Easton (2004). ENVCOST is external environmental costs to total assets and reflects a level of firms' environmental responsibility because firms may lower external environmental costs by increase in CER investment. All regressions include (unreported) year, industry and country fixed effects. Beneath each coefficient estimate is reported the t-statistic based on robust standard errors adjusted for clustering by firm. The superscripts asterisks \*\*\*, \*\*, and \* denote two-tailed statistical significance at the 1%, 5%, and 10% levels, respectively. The appendix C outlines definitions and data sources for the regression variables.

*Table 5. Environmental Costs and Individual and Alternative Cost of Equity Capital Estimates*

	Individual Cost of Equity Estimates				Alternative Cost of Equity Estimates		
	K <sub>CT</sub>	K <sub>GLS</sub>	K <sub>OJ</sub>	K <sub>ES</sub>	K <sub>FEYD</sub>	K <sub>PEG</sub>	K <sub>TEYD</sub>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ENVCOST	4.127*** (2.80)	4.335*** (3.88)	5.841*** (3.08)	3.564** (1.98)	5.778*** (4.03)	3.326** (2.03)	5.368*** (3.15)
RVAR	5.677*** (8.32)	5.017*** (7.35)	7.265*** (10.47)	11.619*** (11.12)	4.160*** (6.18)	10.693*** (13.21)	4.563*** (6.84)
BTM	0.859*** (2.93)	3.198*** (19.22)	1.258*** (6.54)	1.826*** (6.54)	1.072*** (6.48)	1.531*** (6.81)	1.611*** (7.46)
LEV	3.857*** (6.89)	1.063** (2.46)	2.443*** (4.13)	3.808*** (4.48)	0.976** (2.09)	2.798*** (3.88)	0.169 (0.28)
INFL	0.270** (2.17)	-0.092 (-1.26)	-0.100 (-0.81)	-0.292** (-2.07)	-0.029 (-0.53)	-0.245** (-2.16)	0.167 (1.51)
SIZE	0.024 (0.44)	0.277*** (6.45)	-0.096* (-1.68)	-0.371*** (-3.70)	0.473*** (9.55)	-0.361*** (-4.36)	0.609*** (10.13)
FBIAS	0.239*** (3.96)	0.274*** (7.66)	0.352*** (5.25)	0.444*** (5.16)	0.256*** (4.46)	0.368*** (5.09)	0.270*** (5.05)
DISP	-0.137 (-0.38)	-0.283 (-1.55)	2.570*** (7.57)	5.490*** (12.39)	-4.853*** (-19.35)	5.781*** (14.46)	-0.205 (-0.37)
LGDPC	-1.190*** (-3.62)	0.766 (1.10)	-1.236*** (-3.36)	-0.223 (-0.60)	-0.558** (-1.98)	0.163 (0.39)	-0.029 (-0.12)
INTERCEPT	0.001 (0.03)	0.001 (0.08)	-0.012 (-0.57)	-0.046** (-2.01)	0.014 (0.97)	-0.014 (-0.69)	-0.017 (-0.78)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Obs.	6,444	6,822	5,900	6,259	6,970	6,191	6,528
Adj. R <sup>2</sup>	0.200	0.518	0.257	0.299	0.270	0.339	0.200

Notes: This table presents estimation results from regressing the implied cost of equity capital ( $K_{AVG}$ ) on external environmental costs to total assets (ENVCOST) and controls for the full sample of 9,148 firm-years from 30 countries.  $K_{AVG}$  is the average cost of equity obtained from four models developed by Gebhardt, Lee, and Swaminathan (2001), Claus and Thomas (2001), Ohlson and Juettner-Nauroth (2005), and Easton (2004). ENVCOST is external environmental costs to total assets and reflects a level of firms' environmental responsibility because firms may lower external environmental costs by increase in CER investment. All regressions include (unreported) year, industry and country fixed effects. Beneath each coefficient estimate is reported the t-statistic based on robust standard errors adjusted for clustering by firm. The superscripts asterisks \*\*\*, \*\*, and \* denote two-tailed statistical significance at the 1%, 5%, and 10% levels, respectively. The appendix C outlines definitions and data sources for the regression variables.

**Table 6. Robustness to Analyst Forecast Optimism**

	Forecast Optimism Bias Less than $j$ $th$ Percentile			Long-term Growth Forecast Less than $j$ $th$ Percentile			Noise in Analyst Forecasts		
	$j = 95\%$	$j = 90\%$	$j = 75\%$	$j = 95\%$	$j = 90\%$	$j = 75\%$	Accuracy Weighted Regression	Sluggish Forecasts	Price Momentum
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ENVCOST	3.825*** (3.22)	3.732*** (3.04)	3.170** (2.49)	3.267*** (2.69)	2.301** (2.05)	2.136* (1.72)	3.264*** (3.55)	3.580*** (2.60)	2.907** (2.38)
RVAR	7.661*** (12.59)	7.759*** (12.37)	7.034*** (10.50)	6.948*** (11.22)	7.004*** (10.78)	7.185*** (9.57)	7.932*** (22.63)	8.792*** (11.36)	7.056*** (11.74)
BTM	1.791*** (10.51)	1.792*** (10.34)	1.828*** (9.92)	1.712*** (8.95)	1.667*** (8.59)	1.568*** (7.79)	1.721*** (16.72)	2.242*** (10.06)	1.915*** (10.30)
LEV	3.740*** (6.72)	3.762*** (6.76)	3.752*** (6.19)	3.187*** (5.41)	3.047*** (5.09)	3.081*** (4.80)	3.678*** (9.89)	3.571*** (5.18)	3.157*** (5.47)
INFL	0.024 (0.38)	0.009 (0.15)	0.055 (0.81)	0.084 (0.95)	0.09 (1.01)	0.055 (0.54)	-0.008 (-0.15)	-0.006 (-0.10)	0.011 (0.14)
SIZE	-0.124** (-2.12)	-0.102* (-1.73)	-0.069 (-1.15)	0.031 (0.56)	0.061 (1.09)	0.052 (0.87)	-0.224*** (-5.85)	-0.238*** (-3.26)	-0.001 (-0.01)
FBIAS	0.153** (2.44)	0.125* (1.73)	-0.152* (-1.68)	0.279*** (5.37)	0.250*** (4.77)	0.225*** (3.71)	0.155*** (5.37)	0.157** (2.51)	0.179*** (3.52)
DISP	2.439*** (8.75)	2.617*** (9.09)	2.279*** (6.70)	2.471*** (7.37)	2.606*** (7.48)	2.643*** (6.86)	2.575*** (14.30)	2.124*** (7.09)	2.248*** (6.83)
LGDPC	-0.099 (-0.23)	-0.193 (-0.47)	-0.189 (-0.46)	-0.014 (-0.04)	-0.003 (-0.01)	-0.088 (-0.23)	-0.208 (-0.62)	-0.321 (-0.75)	-0.11 (-0.30)
MMT6									-3.151*** (-12.80)
INTERCEPT	9.553** (2.12)	10.430** (2.45)	9.894** (2.29)	7.586* (1.87)	7.252* (1.83)	7.977** (2.00)	11.953*** (3.41)	12.946*** (2.89)	9.735*** (2.58)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Obs.	6,766	6,410	5,342	5,368	5,122	4,311	7,122	7,118	5,365
Adj. R <sup>2</sup>	0.322	0.327	0.313	0.341	0.340	0.339	0.314	0.279	0.377

Notes: This table presents estimation results from regressing the implied cost of equity capital ( $K_{AVG}$ ) on external environmental costs to total assets (ENVCOST) and controls for the full sample of 9,148 firm-years from 30 countries.  $K_{AVG}$  is the average cost of equity obtained from four models developed by Gebhardt, Lee, and Swaminathan (2001), Claus and Thomas (2001), Ohlson and Juettner-Nauroth (2005), and Easton (2004). ENVCOST is external environmental costs to total assets and reflects a level of firms' environmental responsibility because firms may lower external environmental costs by increase in CER investment. All regressions include (unreported) year, industry and country fixed effects. Beneath each coefficient estimate is reported the t-statistic based on robust standard errors adjusted for clustering by firm. The superscripts asterisks \*\*\*, \*\*, and \* denote two-tailed statistical significance at the 1%, 5%, and 10% levels, respectively. The appendix C outlines definitions and data sources for the regression variables.

**Table 7. Robustness to Endogeneity**

	2SLS		GMM
	1st Stage	2nd Stage	
INST. ENVCOST		4.917*** (3.49)	3.006** (2.33)
IV of ENVCOST	0.816*** (32.66)		
RVAR	-0.002 (-0.78)	8.366*** (14.90)	10.436*** (15.18)
BTM	0.001 (0.10)	1.632*** (9.71)	1.946*** (10.60)
LEV	0.007** (2.34)	2.199*** (3.99)	2.585*** (5.21)
INFL	0.001 (-0.25)	0.337*** (6.06)	0.293*** (7.29)
SIZE	-0.001** (-2.39)	-0.252*** (-4.76)	-0.178*** (-3.86)
FBIAS	0.001 (1.53)	0.421*** (9.43)	0.254*** (4.73)
DISP	0.001 (0.09)	2.473*** (8.81)	2.710*** (6.59)
LGDPC	-0.002** (-2.14)	0.203** (2.08)	0.162** (2.01)
INTERCEPT	0.024** (2.49)	6.552*** (5.41)	5.757*** (5.80)
Obs.	7,122	7,122	4,292
Adj. R <sup>2</sup>	0.798	0.258	

Notes: This table presents estimation results of two-stage least squares (2SLS). We regress the implied cost of equity capital ( $K_{AVG}$ ) on external environmental costs to total assets (ENVCOST) and controls for the full sample of 4,392 firm-years from 29 countries, and for the subsamples of non-U.S. and U.S. firms.  $K_{AVG}$  is the average cost of equity obtained from four models developed by Gebhardt, Lee, and Swaminathan (2001), Claus and Thomas (2001), Ohlson and Juettner-Nauroth (2005), and Easton (2004). ENVCOST is external environmental costs and reflects a level of firms' environmental responsibility because firms may lower external environmental costs by increase in CER investment. Therefore, a low level of ENVCOST means that firms would have a high level of CER investment (Jo et al., 2013). All regressions include (unreported) year, industry and country fixed effects. Beneath each coefficient estimate is reported the t-statistic based on robust standard errors adjusted for clustering by firm. The superscripts asterisks \*\*\*, \*\*, and \* denote two-tailed statistical significance at the 1%, 5%, and 10% levels, respectively. The appendix C outlines definitions and data sources for the regression variables.

**Table 8. Alternative Specifications and Assumptions**

	Alternative Aggregation of COE Estimates			Alternative Long-Run Growth Assumptions (Country-level)	
	Median	Principal Component	“Real” COE (COE minus inflation)	Long-Run Growth (3%)	Real GDP Growth + Long-Run Inf. Rate
	(1)	(2)	(3)	(4)	(5)
ENVCOST	3.648*** (2.73)	1.353*** (3.05)	3.985*** (2.94)	3.910*** (2.92)	3.559*** (2.66)
RVAR	9.625*** (10.67)	2.360*** (10.07)	9.656*** (10.59)	9.781*** (10.82)	9.566*** (10.68)
BTM	1.607*** (7.43)	0.724*** (10.95)	1.824*** (8.61)	1.710*** (7.95)	1.973*** (9.46)
LEV	3.940*** (5.60)	0.932*** (5.38)	3.769*** (5.37)	3.872*** (5.55)	3.400*** (4.88)
INFL	-0.054 (-0.72)	-0.034 (-0.85)	-1.037*** (-14.42)	-0.120 (-1.47)	-0.035 (-0.41)
SIZE	-0.248*** (-2.92)	0.008 (0.49)	-0.237*** (-2.78)	-0.236*** (-2.78)	-0.234*** (-2.78)
FBIAS	0.346*** (4.95)	0.119*** (6.44)	0.347*** (4.97)	0.336*** (4.85)	0.338*** (4.96)
DISP	2.106*** (7.02)	0.700*** (7.12)	2.426*** (7.84)	2.478*** (8.07)	2.428*** (8.04)
LGDPC	-0.393 (-1.15)	-0.174 (-1.39)	-0.254 (-0.66)	-0.159 (-0.43)	-0.663 (-1.25)
INTERCEPT	12.948*** (3.60)	0.449 (0.35)	11.292*** (2.79)	10.582*** (2.70)	16.717*** (3.01)
Year effects	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes
Country effects	Yes	Yes	Yes	Yes	Yes
Cluster	Firm	Firm	Firm	Firm	Firm
Obs.	7,122	5,636	7,122	7,122	7,122
Adj. R <sup>2</sup>	0.269	0.372	0.313	0.273	0.276

Notes: This table presents estimation results from regressing the implied cost of equity capital ( $K_{AVG}$ ) on external environmental costs to total assets (ENVCOST) and controls for the full sample of 9,148 firm-years from 30 countries.  $K_{AVG}$  is the average cost of equity obtained from four models developed by Gebhardt, Lee, and Swaminathan (2001), Claus and Thomas (2001), Ohlson and Juettner-Nauroth (2005), and Easton (2004). ENVCOST is external environmental costs to total assets and reflects a level of firms’ environmental responsibility because firms may lower external environmental costs by increase in CER investment. All regressions include (unreported) year, industry and country fixed effects. Beneath each coefficient estimate is reported the t-statistic based on robust standard errors adjusted for clustering by firm. The superscripts asterisks \*\*\*, \*\*, and \* denote two-tailed statistical significance at the 1%, 5%, and 10% levels, respectively. The appendix C outlines definitions and data sources for the regression variables.

*Table 9. Sample Composition*

	Weighted Least Squares	Exclude U.S. Firms	Exclude U.S., U.K. and Japanese Firms
	(1)	(2)	(3)
ENVCOST	3.960*** (3.49)	4.301*** (3.44)	3.707*** (2.85)
RVAR	9.839*** (22.46)	6.079*** (10.62)	5.519*** (8.87)
BTM	1.820*** (14.18)	1.863*** (10.39)	1.959*** (9.14)
LEV	3.824*** (8.28)	2.949*** (5.31)	1.937*** (2.89)
INFL	-0.036 (-0.51)	-0.048 (-0.75)	-0.031 (-0.46)
SIZE	-0.240*** (-5.06)	-0.190*** (-3.43)	-0.211*** (-3.00)
FBIAS	0.350*** (10.39)	0.283*** (6.90)	0.292*** (5.92)
DISP	2.416*** (10.79)	2.409*** (8.22)	2.704*** (7.30)
LGDPC	-0.246 (-0.58)	-0.529 (-1.38)	-0.415 (-1.02)
INTERCEPT	11.145** (2.53)	15.270*** (3.81)	14.103*** (3.29)
Year effects	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes
Country effects	Yes	Yes	Yes
Cluster	Firm	Firm	Firm
Obs.	7,122	5,366	3,640
Adj. R <sup>2</sup>	0.280	0.345	0.330

Notes: This table presents estimation results from regressing the implied cost of equity capital ( $K_{AVG}$ ) on external environmental costs to total assets (ENVCOST) and controls for the full sample of 9,148 firm-years from 30 countries.  $K_{AVG}$  is the average cost of equity obtained from four models developed by Gebhardt, Lee, and Swaminathan (2001), Claus and Thomas (2001), Ohlson and Juettner-Nauroth (2005), and Easton (2004). ENVCOST is external environmental costs to total assets and reflects a level of firms' environmental responsibility because firms may lower external environmental costs by increase in CER investment. All regressions include (unreported) year, industry and country fixed effects. Beneath each coefficient estimate is reported the t-statistic based on robust standard errors adjusted for clustering by firm. The superscripts asterisks \*\*\*, \*\*, and \* denote two-tailed statistical significance at the 1%, 5%, and 10% levels, respectively. The appendix C outlines definitions and data sources for the regression variables.