SUSTAINABILITY INFORMATION AND THE COST OF CAPITAL

AN AUSTRALIAN, UNITED KINGDOM AND HONG KONG LISTED COMPANY STUDY

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1. BACKGROUND

This report examines the relationship between various types of sustainability information and a firm's cost of capital. A firm's cost of equity capital can be defined as the 'minimum risk adjusted return an investment in the firm must earn in order to be acceptable to investors or shareholders.' (Indjejikian, 2007). The relationship between accounting disclosure and cost of capital has attracted considerable attention in the literature (Bertomeu and Cheynel, 2016; Johnstone, 2016). One reason is that standard setters and regulators are interested in the capital market consequences of new accounting disclosures. Capital market consequences include stock price reactions and impacts on the cost of capital. As noted by Bertomeu and Cheynel (2016): 'Several regulators have presented the reduction of the cost of capital one of the primary objective of financial transparency. As Arthur Levitt, then chairman of the U.S. Securities and Exchange Commission, puts it in his September 29, 1997 speech: "The truth is, high standards lower the cost of capital. And that's a goal we all share." (p.1). Most prior studies suggest that greater voluntary disclosure should lower information asymmetry and consequently lower the cost of capital (Diamond and Verrecchia, 1991). The reasoning is provided in Christensen et al., (2010, p.817):

> *"The intuition is straightforward. A firm's cost of capital is the riskless interest rate plus a risk premium. Releasing more information and, in particular, more public information throvugh financial reports and other public disclosures by firms reduces the uncertainty about the size and the timing of future cash flows and, therefore, also the risk premium."*

The empirical literature has grown significantly, with many studies exploring the relationships between a firm's disclosures and/or information quality with the cost of capital. For instance, a large number of studies have found that features of a firm's disclosure attributes, such as voluntary disclosure, accrual quality and earnings predictability impact on the cost of capital (see Johnstone, 2016 and Bertomeu and Cheynal, 2016 for a review of some of this literature).

While there have been a very large number of studies looking at the relationship between various aspects of sustainability and performance, including capital market performance, relatively few have examined this relationship in the context of the cost of capital. However, many of the available studies have documented a significant relationship between various aspects of sustainability disclosure/performance and the cost of capital, suggesting that sustainability information is potentially economically important to investor decision making by reducing information uncertainty and improving the accuracy of forecasted cash flows. As stated in Clark et al (2015):

> *"Case studies and academic literature are clear that environmental externalities impose particular risks on corporations – reputational, financial, and litigation related – which can have direct implications for the cost of financing, especially for a firm's cost of debt. Evidence suggests that by implementing reasonable environmental, social and governance (ESG) policies to mitigate such risks, companies can benefit in terms of lower cost of debt (i.e. credit spreads)…Studies show that good corporate governance influences the cost of equity by reducing the firm's cost of equity. This is not surprising, as good corporate governance translates into lower risk for corporations, reduces information asymmetries through better disclosure, and limits the likelihood of management entrenchment." (pp.20-22).*

This report provides a review of the relevant literature in this field, which is followed by an empirical study of the relationship between sustainability ratings information and the cost of capital. The study's findings are based on a sample of 385 public companies drawn from the UK, Australia and Hong Kong. The study uses the capital asset pricing model (CAPM) to estimate cost of capital of sampled firms. We also use *Vigeo-Eiris* sustainability ratings as the main independent variable for the analysis and several control variables that are expected to have an impact on the cost of capital relationship. The study provides the results on four different empirical models based on the *Vigeo-Eiris* sustainability ratings, including (at the time this report was written): (1) the total sustainability rating (based on 330 ESG metrics used by *Vigeo-Eiris*), and the components of this rating which include: (2) total environmental ratings, (3) total social ratings and (4) total governance ratings. After controlling for size, leverage, risk, financial performance and market returns, the study documents a significant negative relationship between cost of capital on most of the sustainability metrics used in the study. In other words, higher sustainability ratings appear to be associated with lower cost capital and vice versa. The findings of the study add to the growing body of literature which is finding a strong association between sustainability (however defined) and the firm's cost of capital.

The remainder of this report is structured as follows. Section 2 provides a literature summary and Section 3 sets out the methodology for the study. Section 4 discusses the empirical finding which is followed by summary and conclusions.

2. LITERATURE REVIEW

A summary of the extant literature is provided in the Appendix to this report. While this literature review is not intended to be exhaustive, it is broadly representative of much of the research to date. The Appendix shows that the sustainability information modelled across different studies varies widely. For instance, six studies use some type of corporate governance metric or index, while seven studies use a broader ESG measures. The remaining studies use an environmental measure of sustainability or some other measure, such as a social indicator of some kind. It is also noteworthy from the Appendix that variety of cost of capital concepts have been employed across studies, including cost of equity and cost of debt financing, and they are measured in different ways across studies. Likewise, a variety of statistical models have been used to test the relationships between cost of capital and sustainability, however most used some form of multivariate regression modelling including panel regressions, pooled regressions and quantile regression. Notwithstanding methodological and sampling characteristic differences across studies, most studies document significant findings. As can be seen from the Appendix, of the 17 studies reviewed, 14 studies show a significant and negative association between various sustainability metrics and the cost of capital. That is, higher sustainability disclosures are associated with lower cost of capital and vice versa. Only three studies in the Appendix show either mixed results or no relationships between sustainability and the cost of capital.

We now provide a brief review of selected studies shown in the Appendix.

Klock, Mansi, and Maxwell (2005) examine the relationship between the cost of debt financing and a governance index made up of various anti-takeover and shareholder protection provisions. The study is based on four databases: (1) Lehman Brothers Fixed Income (LBFI) database, (2) Investor Responsibility Research Center (IRRC) corporate governance database, (3) Compustat database, and (4) Thomson Financial Institutional Ownership database. The authors stated they manually collected traded bond data from Mergent's Bond Record for the year 2000 and 1,877 firm-year observations for 678 firms over the following years: 1990, 1993, 1995, 1998, and 2000. The study uses a corporate governance (GIndex) index as the study's independent variable and yield spread (the cost of debt proxy) as the dependent variable. In addition, the study controls for a number of factors including size, leverage, profitability, implied volatility, sales growth and other factors. The study finds that anti-takeover governance provisions have a tendency to lower the cost of debt financing. Also, stronger anti-takeover provisions are associated with a lower cost of debt financing and vice versa for weak anti-takeover provisions.

Derwall and Verwijmeren (2007) examined the link between financial markets and corporate governance. The study is based on a sample taken between 2003 and 2005 and the governance ratings provided by Governance Metrics International (GMI), which includes metrics such as quality of the board and their independence, executive compensation, remuneration, anti-takeover provisions, shareholder rights, and the quality of information. Using the Fama-French three-factor CAPM model the authors conclude that firms attributed with better corporate governance ratings tend to attain lower cost of capital. Moreover, the authors also find a significant negative relation between corporate governance ratings and systematic risks, measured by beta, including idiosyncratic risks estimated from the Fama-French model.

Sharfman and Fernando (2008) conclude that improved environmental risk management is associated with a lower cost of capital. The study's findings provide an alternative perspective on the environmental economic performance relationship, which has been dominated by the view that improvements in economic performance stem from better resource utilisation. The authors further conclude that firms also benefit from improved environmental risk management through a reduction in their cost of equity capital, a shift from equity to debt financing, and higher tax benefits associated with the ability to add debt.

Baur et al. (2009) investigated whether strong employee relations has a statistical impact on the cost of debt financing, credit ratings, and firm-specific risk. The authors develop an Employee Relations Index (ERI) based on the firm's employment policies and practices, and find that firms with strong employee relations tend to have lower cost of debt, relative to firms with weaker employee relations. From their analysis of 2,141 quoted yield spreads from mergent fixed income securities database over the period of 1995-2006 for U.S. firms, the results indicate, inter alia, that a one point increase in the ERI has a negative association with the annual yield spread of up to four basis points.

Chen et al. (2009) utilised two sets of survey data collected by Credit Lyonnais Securities Asia that were published in 2001 and 2002. The surveys coverered 276 and 283 firms, respectively, in 17 emerging markets. Using this survey data, the authors investigated the effect of firm-level corporate governance on the cost of equity, which was estimated from stock prices and analysts' earnings forecasts. They find evidence that firm-level corporate governance is significant and negatively associated with the cost of equity (i.e. higher corporate governance lowers cost of equity), after controlling for traditional risk factors, including book-to-market, inflation, and analysts' forecast biases. The relationship was especially strong for countries where the legal protection of investors is found to be relatively weak.

Schauten and van Dijk (2010) examined the effects of four corporate governance mechanisms, namely (1) shareholder rights, (2) takeover defences, (3) board structure and functioning and (4) disclosure, on the cost of debt for large European firms. The authors also focused on the potential interaction effects between the different governance mechanisms. They document a significant and negative relationship between the quality of disclosure and the cost of debt. In addition, the study also concludes that higher shareholder rights lowers the possibility of agency conflicts between management and the providers of capital. However, if shareholder rights are low then information risk increases, resulting in providers of debt financing rewarding firms with a lower cost of debt if they provide them more insight into the firm's financial position. However, the study does not find evidence of a relationship between takeover defences nor board structure on the cost of debt financing.

Bauer and Hann (2010) examined the credit risk implications of corporate environmental management for bond investors. The authors contend that environmental practices affect the solvency of borrowing firms, by determining their exposure to potentially costly legal, reputational and regulatory risks. To this end, the authors construct aggregate measures for the environmental strengths and concerns of firms, and test their association with the yield spread of newly issued bonds, bond ratings and long-term issuer ratings. Using information on the environmental profiles of 582 public corporations in the US between 1995 and 2006, they document the following two major findings: (1) environmental concerns are associated with a higher cost of debt financing and lower credit ratings and (2) proactive environmental practices are associated with a lower cost of debt.

El Ghoul et al. (2011) examined whether corporate social responsibility affects firms' ex-ante cost of equity implied in stock prices and analysts' earnings forecasts. Using a sample of 12,915 US firm-year observations over the period 1992 to 2007 and controlling for other firm-specific determinants as well as industry and year fixed effects, the authors find that firms with higher CSR scores enjoy a significantly lower cost of equity capital. However, they find that not all six dimensions of CSR (community, diversity, employee relations, the environment, human rights, and product characteristics), as well as controversial business issues, are related to the cost of equity. While CSR investment in employee relations, environmental policies, and product strategies seem to contribute to lowering firms' cost of equity, CSR-related actions in the areas of community relations, diversity, and human rights do not appear to be related. The authors also find, consistent with Hong and Kacperczyk (2009), that firms related to the tobacco and nuclear power industries have higher equity financing costs.

Chen, Chen, and Wei (2011) examined the effect of shareholder rights on implied cost of equity as well as the impact of agency problems on a firm's free cash flow. Using a sample of 13,140 firm-year observations from U.S. listed firms over the period 1990 to 2004, the study suggests a significant positive association between anti-takeover provisions and cost of equity, especially for firms that have greater agency problems from free cash flows. Measuring shareholder's rights by the G-index (number of anti-takeover provisions), the authors report that reducing G-index by 10 points reduces the cost of equity decreases by 34 basis points. The authors also suggest that the association between corporate governance and share valuation is driven by the cash flow (numerator) and discount rate (denominator) effect.

Cajias, Fuerst, and Bienert (2014) examined the effect of corporate social responsibility (CSR) ratings on the ex-ante cost of capital of more than 2,300 listed US firms for a panel sample taken between 2003 and 2010. More specifically, the authors examined whether financial markets value continuous investment in CSR activities through higher market capitalisation and lower cost of capital. Among other results, the authors show that firms' CSR strategies differ significantly across industry sectors. Customer-orientated companies such as telecommunications and automobile companies outperformed asset-driven sectors such as real estate or chemical companies. Further, the authors find a 10 basis point positive effect for one standard deviation of firms' intensive allocation of resources in sustainable activities.

El Ghoul, Guedhami, Kim, and Park (2014) examined the effect of corporate environmental responsibility (CER) on the cost of equity capital of 2,107 manufacturing firms from 30 countries. The study uses a sample of 7,122 firm-year observations over the period 2002 and 2011. In order to examine explanatory linkages between CER and equity financing cost across all sample countries the sample was subdivided according to the legal settings, economic conditions, and geographic regions. Using a residual valuation model, the authors find a significant and persistent positive link between CER and cost of equity within all subsample groups. After controlling for industry effects, firm-specific characteristics and country effects, the multivariate regression analysis indicates that the perceived risk of high CER firms is less than for lower rated CER firms. In other words, high CER firms that are focused on environmental responsibility are able to reduce their equity financing costs.

Albuquerque et al. (2014) investigated theoretically and empirically a mechanism by which CSR affects firms' systematic risk and valuation. The study is based on a sample of 23,803 firm-year observations covering the period 2003 to 2011. The study finds that systematic risk is significantly lower (in both a statistical and economic sense) for firms with higher CSR scores. They find that a one standard deviation increase in a firm's CSR score reduces firm beta, on average, by 0.034, representing a decline in systematic risk of about 4% relative to the beta's sample mean. They also find evidence that the effect of CSR on beta is stronger in industries with greater product differentiation and industries with a larger expenditure share on CSR have a weaker CSR-risk relation.

Ng and Rezaee (2015) examined whether and how different components of economic sustainability disclosure (ECON), as well as environmental, social, and governance (ESG) dimensions of sustainability performance affect a firm's cost of equity. The cost of equity is estimated from the industry-adjusted earnings–price ratio and implied cost of capital, calculated using a finite-horizon expected return model. Economic sustainability performance (ECON) is a multi-dimensional construct, and the authors use three proxies to represent ECON which are applied to eight different proxies of economic performance. These eight factors are related to the firm's growth opportunities, operational efficiency, and research effort. Using a sample of more than 3,000 firms between 1990–2013, they find that ECON (ESG) is negatively associated with cost of equity, but only growth and research (environmental and governance) sustainability performance dimensions contribute to this relationship. Operation efficiency is positively related, while social sustainability performance is only marginally related to cost of equity. The authors also find that ECON and ESG sustainability performance interactively affect cost of equity. In general, the relationship between ECON (ESG) and cost of capital is strengthened when ESG (ECON) performance is strong.

Overall, the extant literature appears to be finding some strong evidence that sustainability (broadly defined and measured in various ways) is related to cost of capital, whether this term is defined as cost of equity or cost of debt financing. Having reviewed some of the published studies in this field, we now turn to the empirical context of our own study. As much of the previous literature has focused on US samples, this study takes a more international cross-country perspective and uses a sample taken from Australia, the United Kingdom and Hong Kong. As pointed out by Beck, Frost and Jones (2017) this sample provides an interesting contrast between countries which are considered to be in different stages of their sustainability reporting practices; the UK (mature), Australia (emerging) and Hong Kong (preliminary stage).

3. METHODOLOGY FOR THE STUDY

3.1 SAMPLE CHARACTERISTICS

For the purposes of this study, we sampled a total of 385 public companies drawn from the UK, Australia and Hong Kong. This includes 215 public companies from the UK; 81 Australian companies and 89 Hong Kong companies. The UK sample comprises firms from the following industry groups: consumer discretionary (n=50); consumer staples (n=10); energy (n=8); financials (n=37); healthcare (n=11); industrials (n=39); information technology (n=20); materials (n=14); telecommunication services (n= 3) and utilities (n=6).

The Australian sample is also drawn from a variety of sectors including: consumer discretionary companies (n=10); consumer staples (n=4); energy (n=7); financials (n=17); healthcare (n=6); industrials (n=13); information technology (n=1); materials (n=17); telecommunication services (n= 2) and utilities (n=3). The Hong Kong sample is drawn from the following sectors: consumer discretionary (n=9); consumer staples (n=9); energy (n=1); financials (n=24); healthcare (n=3); industrials (n=21); information technology (n=7); materials (n=4); telecommunication services (n= 5) and utilities (n=6).

The sample is generally made up of large companies. The mean market capitalization of the UK sample is 3.9B (US). The average market capitalisation of the Australian sample is 9.8B (US) while the average market capitalization for the Hong Kong sample is 12.7B (US).

Sampled firms across different countries tend to have comparable financial performance and risk characteristics. For instance, the median debt to equity is respectively 54.50% (Australia), 51.99% (UK) and 34.03% (Hong Kong). Short term liquidity (measured by the quick ratio) is also comparable across sampled firms. The quick ratio is respectively .95, .90 and 1.1 for the Australian, UK and Hong Kong samples. Likewise, return on assets is comparable across firms, respectively 4.7% (Australia), 5.66% (UK) and 3.06% (Hong Kong). Stock price volatility measure (beta) is also fairly comparable, respectively 1.05 (Australia), .64 (UK) and .99 (Hong Kong). In summary, the firms across country samples appear to be conservatively leveraged, have reasonably strong short term liquidity, have positive rates of return and evidence average to low stock price volatility.

3.2 DEFINITION OF KEY VARIABLES

The following provides a definition of the key variables used in the analysis.

3.2.1 Cost of capital metric

We use a standard measure of cost of capital derived from the Capital Asset Pricing Model (CAPM), which is specified as follows:

$$\bar{r}_i = r_f + \beta_{iM}(\bar{r}_M - r_f)$$

Where $\bar{r}_i$ is the expected return on security i, r_f is the equilibrium risk free rate of return, β_{iM} is the quantity of risk for asset i (the beta of the security) and $\bar{r}_M - r_f$ is the risk premium.

3.2.2 Sustainability ratings

Vigeo-Eiris ratings are deemed to be the most appropriate sustainability construct for this study. *Vigeo-Eiris* is a leading provider of independent research into the environmental, social, governance (ESG) and ethical performance of public companies. At the time of writing this report, the *Vigeo-Eiris's* database covers around 3,260 companies globally. The dataset consists of over 330 qualitative sustainability performance measures covering the following specific areas: governance; human rights; employees; customers and suppliers; and products.

The *Vigeo-Eiris* ratings methodology involves surveying each company directly based on their sustainability performance. *Vigeo-Eiris* then assesses each company against a set of global criteria. In addition to the information the firm provides in this survey, *Vigeo-Eiris* also uses publicly available information provided by the company (e.g. website, annual report, CSR report and so on); information from independent regulatory and other industry sources; and searches of the press and NGO publications.

The *Vigeo-Eiris* scoring system ranges from -3 to +3. *Vigeo-Eiris* provides ratings categories ranging from A-E based on their own unique scoring methodology. Using this scheme, 'A' represents the best CSR performance rating possible and roughly equates to a firm being in the top 15% of CSR performers (based on the raw scores).

While an 'E' rating represents the worst CSR rating and roughly equates to a firm being in the bottom 15% of CSR performers. *Vigeo-Eiris* explains that their ratings incorporate two key factors: (1) a company's actual risk exposure; and (2) how well a company discloses the management of this risk. This process typically results in a 'negative' skew in the *Vigeo-Eiris* ratings: *Vigeo-Eiris* will initially assign a firm a negative rating which is based on their overall risk exposure. *Vigeo-Eiris* then provides companies the chance to respond to this risk in order to 'neutralise' the negative risk exposure. For example, an energy company will initially receive a high negative rating from *Vigeo-Eiris* because of its high environmental risk exposure. If the firm cannot adequately respond to the negative risk exposure concerns, the resulting *Vigeo-Eiris* rating will remain negative overall. The poorer management's response to the perceived risk, the worse the CSR rating will be. Firms with greater than zero sustainability scores will typically have good *Vigeo-Eiris* ratings because they are able to deal more effectively with their sustainability risks (see Jones and Wright, 2017).

For the purposes of this study, we use four key ratings from the *Vigeo-Eiris* database: (1) total sustainability ratings (2) total social ratings (3) total environmental ratings and (4) total governance ratings.

3.2.3 Other financial and market variables

Financial and market metrics were extracted from the Thomson-Reuters database, a leading global provider of corporate financial and market data. A broad cross-section of financial and market variables were extracted to test the relationship between various aspects of cost of capital and sustainability ratings. Importantly, we need to control for firm size, financial performance, financial risk, growth and other factors, as these attributes may be associated with higher/lower beta risk and hence higher/lower cost of capital. For instance, growth firms are often small with strong earnings growth and stock price momentum which leads to higher beta and higher cost of capital. Likewise, companies with high distress risk tend to have higher cost of capital. Larger firms are usually associated with lower distress risk and lower earnings growth, and to have lower betas, therefore lower cost of capital.

4. EMPIRICAL RESULTS

For the purposes of this report, we use a linear mixed effects (LME) model to examine the sustainability/ cost of capital relationship. The main dependent variable for the study is the cost of capital and main independent variable is the total sustainability ratings score provided by *Vigeo-Eiris*. As a robustness test, we also ran additional regression models on three components of the *Vigeo-Eiris* sustainability rating, namely Total Environmental Score, Total Social Score and Total Governance Score. Note that LME models combine fixed and random parameters and are an important improvement on standard form OLS[1] regression models because this model form is designed to handle correlated error structures arising from common statistical problems (such as multicollinearity) arising in the dataset.

Table 1 shows LME regression results estimated on cost of capital where the main independent variable is overall sustainability rating from *Vigeo-Eiris*. Control variables for firm size, distress risk, financial performance and growth are included. These variables are respectively market capitalisation, debt to equity (leverage), annual investment returns, EPS momentum (1 year), a risk metric indicating financial distress of the company, free cash flow per share, return on equity, dividends per share and cash flow returns. Note that EPS momentum is defined relative to analyst projected EPS in the next period. The risk metric is from a financial distress prediction model. Also shown are country level fixed effects to control for differences across sampled countries.

While Table 1 displays the same LME analysis where Total Sustainability Score is specified as the dependent variable, Tables 2-4 show the same analysis for Total Environmental Score, Total Social Score and Total Governance Score. As noted by Kim et al., (2012) and Beck et al., (2017), corporate governance is often perceived as a distinct construct from CSR and its impacts on financial reporting have been widely examined in previous literature. Environmental CSR is also considered an important element of CSR particularly for resource intensive sectors, whose activities are considered especially high in environmental pollution, such as extractive industries. The study's main findings are reported in Tables 1-4 below.

[1] Ordinary least squares

Table 1: Parameter estimates, t-values and significance levels for linear mixed effects model (cost of capital[a] and total sustainability scores)

PARAMETER	ESTIMATE	STD. ERROR	T	SIG.	95% CONFIDENCE INTERVAL	
					LOWER BOUND	UPPER BOUND
Sustainability Score (Total)	-.000151	7.14E-5	-2.119	.035	-.000292	-1.057E-5
Market Capitalisation	-9.98E-8	2.94E-6	-.034	.973	-5.916E-6	5.710E-6
Leverage	.000329	.000107	3.069	.002	.000118	.000540
Annual Investment Returns	.005305	.001153	4.600	.000	.003032	.007578
EPS Momentum	-8.91E-5	.000227	-.394	.694	-.000536	.000357
Risk Metric	-.003493	.002185	-1.599	.111	-.007800	.000814
Free Cash Flow per Share	-.004567	.001042	-4.382	.000	-.006621	-.002513
ROE	.000281	.000222	1.267	.207	-.000156	.000719
Dividends per Share	.001806	.001957	.923	.357	-.002052	.005663
Australia	1.049084	.156158	6.718	.000	.741295	1.356874
Hong Kong	.822900	.206057	3.994	.000	.416759	1.229040
United Kingdom	.977589	.152288	6.419	.000	.677429	1.277749

[a] Dependent Variable: Cost of Capital.

Table 1 documents a number of significant parameters indicating that lower sustainability scores (comprising the aggregate of all environmental, social and governance scores provided by *Vigeo-Eiris*) are statistically associated with higher cost of capital (t=-2.119, p=.001), even after controlling for size (market capitalization), leverage, annual investment returns, a distress risk metric, free cash flow and ROE. Table 1 shows that higher leverage is positively associated with higher cost of capital (t= 3.069, p=.002), and lower free cash flow is also associated with higher cost of capital (t= -4.382, p=.000). These results make intuitive sense because higher leverage exposes firms to potentially more distress risk, hence we expect firms with higher distress risk to have higher cost of capital. Firms with lower free cash flows are likely to have diminished growth prospects and higher distress risk, which consequently leads to higher cost of capital. The only other significant variable in Table 1 is annual investment returns which appear to be positively associated with cost of capital (t=4.6, p=.000). This result also makes some intuitive sense because rising stock prices are more volatile and higher volatility implies higher cost of capital.

Table 1 is based on the overall sustainability ratings score. The overall rating provide by *Vigeo-Eiris* is based on three underlying component ratings: (1) total environmental rating (2) total social rating and (3) total governance rating. It is useful to breakdown the Table 1 results to see if any component of the total sustainability score is more strongly associated with the cost of capital than others.

Table 2: Parameter estimates, t-values and significance levels for linear mixed effects model (cost of capital[a] and total environmental scores)

PARAMETER	ESTIMATE	STD. ERROR	T	SIG.	95% CONFIDENCE INTERVAL	
					LOWER BOUND	UPPER BOUND
Sustainability Score (Environmental)	-.000260	.000113	-2.302	.022	-.000483	-3.745591E-5
Market Capitalisation	-3.045235E-7	2.917180E-6	-.104	.917	-6.054307E-6	5.445259E-6
Leverage	.000327	.000107	3.061	.002	.000117	.000538
Annual Investment Returns	.005371	.001146	4.686	.000	.003112	.007631
EPS Momentum	-.000122	.000228	-.534	.594	-.000571	.000327
Risk Metric	-.003653	.002181	-1.675	.095	-.007953	.000646
Free Cash Flow per Share	-.004553	.001040	-4.377	.000	-.006604	-.002503
ROE	.000292	.000222	1.318	.189	-.000145	.000730
Dividends per Share	.001573	.001932	.814	.417	-.002236	.005381
Australia	1.038479	.156323	6.643	.000	.730366	1.346593
Hong Kong	.902302	.195302	4.620	.000	.517360	1.287244
United Kingdom	.981091	.151113	6.492	.000	.683245	1.278937

[a] Dependent Variable: Cost of Capital.

Table 2 shows regression results run on cost of capital where the main independent variable is the total environmental rating extracted from the *Vigeo-Eiris* database. The same control variables specified in Table 1 are also used for Table 2. Similar to the results in Table 1, Table 2 documents a negative and statistically significant relationship between total environmental ratings and cost of capital (*t*-value=-2.30, p=.022). This implies that companies with higher (or better) environmental ratings have lower cost of capital (and vice versa). This is after controlling for numerous factors expected to be associated with the cost of capital, such as firm size, distress risk, momentum in returns and financial performance. The other significant variables in the model include leverage (*t*-value=3.061, p=.002), the distress risk metric (*t*-value=-1.67, p=.095), free cash flow (*t*-value=-4.377, p=.000) and annual investment returns (*t*-value=4.68, p=.000). Once again, the signs of the parameters appear to be logical and make intuitive sense. For instance, higher leverage, indicating higher distress risk, is associated with higher cost of capital. As expected, lower free cash flow is also associated with higher cost of capital. The distress risk metric is the only anomaly which shows a negative parameter which is somewhat counter intuitive. We would expect lower distress risk to be associated with lower cost of capital (a positive relationship) whereas the parameter in Table 2 is negative. However, it should be noted that the parameter estimate for the risk metric is not significant at the critical value of .05.

Table 3: Parameter estimates, t-values and significance levels for linear mixed effects model (cost of capital[a] and total social scores)

PARAMETER	ESTIMATE	STD. ERROR	T	SIG.	95% CONFIDENCE INTERVAL	
					LOWER BOUND	UPPER BOUND
Sustainability Score (Social)	-.000308	.000153	-2.008	.046	-.000609	-5.70E-6
Market Capitalisation	-8.69E-7	2.89E-6	-.300	.764	-6.58E-6	4.84E-6
Leverage	.000325	.000107	3.026	.003	.000113	.000536
Annual Investment Returns	.005233	.001161	4.507	.000	.002944	.007522
EPS Momentum	-3.26E-5	.000225	-.145	.885	-.000477	.000412
Risk Metric	-.003127	.002197	-1.423	.156	-.007459	.001204
Free Cash Flow per Share	-.004643	.001042	-4.457	.000	-.006697	-.002590
ROE	.000266	.000222	1.195	.234	-.000173	.000704
Dividends per Share	.001720	.001955	.880	.380	-.002133	.005573
Australia	1.047691	.156822	6.681	.000	.738593	1.356789
Hong Kong	.791792	.213831	3.703	.000	.370330	1.213254
United Kingdom	.968290	.154048	6.286	.000	.664660	1.271921

[a] Dependent Variable: Cost of Capital.

Table 3 shows regression results run on cost of capital where the main independent variable is the total social rating score extracted from the *Vigeo-Eiris* database. One again, the same control variables are used for Tables 2 and 3. Table 3 indicates that there is significant negative relationship between total social rating and cost of capital (*t*-value=-2.008, p=.046). This implies that companies with higher social ratings have lower cost of capital (and vice versa). This is after controlling for many factors expected to be associated with the cost of capital, such as firm size, distress risk, momentum in returns and financial performance. Similar to Tables 1 and 2, the other significant variables include leverage (*t*-value=-3.026, p=.003), free cash flow (*t*-value =-4.45, p=.000) and annual investment returns (*t*-value = 4.507, p=.000).

Table 4: Parameter estimates, t-values and significance levels for linear mixed effects model (cost of capital[a] and total governance scores)

PARAMETER	ESTIMATE	STD. ERROR	T	SIG.	95% CONFIDENCE INTERVAL	
					LOWER BOUND	UPPER BOUND
Sustainability Score (Governance)	.000483	.000360	1.342	.181	-.000226	.001193
Market Capitalisation	-2.70E-6	3.049554E-6	-.888	.375	-8.719223E-6	3.302165E-6
Leverage	.000326	.000108	3.018	.003	.000113	.000539
Annual Investment Returns	.005567	.001151	4.838	.000	.003299	.007835
EPS Momentum	-2.08E-5	.000227	-.092	.927	-.000468	.000426
Risk Metric	-.003260	.002209	-1.476	.141	-.007615	.001094
Free Cash Flow per Share	-.004754	.001048	-4.536	.000	-.006820	-.002688
ROE	.000268	.000223	1.200	.232	-.000172	.000708
Dividends per Share	.000621	.001952	.318	.751	-.003226	.004467
Australia	1.078116	.156435	6.892	.000	.769782	1.386450
Hong Kong	1.037966	.199701	5.198	.000	.644355	1.431578
United Kingdom	1.025253	.150442	6.815	.000	.728730	1.321776

[a] Dependent Variable: Cost of Capital.

Finally, Table 4 shows regression results run on cost of capital where the main independent variables is the total governance rating extracted from the *Vigeo-Eiris* database using the same control variables defined previously. The main result in Table 4 is that there no significant relationship between the governance rating and cost of capital (*t*-value=1.342, p=.181). This is after controlling for several factors expected to be associated with the cost of capital, such as firm size, distress risk, momentum in returns and financial performance. This result is somewhat anomalous with the literature which has tended to find a positive relationship between governance and cost of capital. Governance is only significant in this study in Table 1 insofar as the total sustainability rating includes a number of governance variables. One potential reason for this result is that *Vigeo-Eiris* ratings tend to cover common governance variables such as Board of directors; audit and internal controls, shareholders and executive remunerations. Given the large amount of attention corporate governance has attracted in recent years, particularly from high profile corporate scandals and business failures, corporate disclosure practice, at least on paper, may have improved quite significantly, particularly for larger companies.

As stated in the KPMG report (2013) "The KPMG Survey of Corporate Responsibility Reporting", the trend in corporate responsibility disclosure is generally on the increase across the world. They state "alongside government regulation, new guidelines and standards from stock exchanges and other organizations are also having an impact." (p.24). This may be particularly true for corporate governance practices. If companies have generally improved their governance practices, and good corporate governance is becoming more the "norm" rather than the exception to the rule, this could explain the lack of statistical significance on the governance variable in the Table 4 results.

Finally, while it would be interesting to see how the LME regression results would look if estimated on each individual country, the sample sizes for Australia and Hong Kong are not sufficiently large to provide robust results or draw meaningful conclusions from the analysis. However, country-level fixed effects are specifically controlled for in the regression models and suggest that the main empirical results are not impacted by which country the sample is drawn from.

5. CONCLUSIONS

While the literature has given much attention to attributes of accounting information (such as accrual quality and earnings persistence) on cost of capital there have been comparatively few studies which have explored the relationship between different types of sustainability information and a firm's cost of capital. This empirical study is based on 385 firms drawn from the UK, Australia and Hong Kong. The study uses the CAPM to estimate the cost of capital of sampled firms and *Vigeo-Eiris* sustainability ratings as the main independent variable for the analysis. The study reports the findings on four different empirical models estimated on different dimensions of the *Vigeo-Eiris* sustainability ratings, including: (1) the total sustainability rating, based on 150 ESG metrics used by *Vigeo-Eiris*, (2) total environmental ratings, (3) total social ratings and (4) total governance ratings. After controlling for firm size, leverage, risk, financial performance and market returns, the study reports that higher sustainability ratings are strongly associated with lower cost capital (and vice versa) on three of the sustainability metrics: total sustainability ratings, total environmental ratings, and total social ratings. However, the results were not significant when the model was estimated on the total governance ratings. While the results on governance is anomalous with previous literature, the main empirical results appear to confirm previous literature findings of a strong link between sustainability information and cost of capital. Future studies could consider using different types of cost of capital constructs (such as weighted average cost of capital or multi-factor CAPM models to estimate cost of equity) and/or alternative sustainability performance indicators.

REFERENCES

Albuquerque, R.A., Durnev, A. and Koskinen, Y., 2014. Corporate social responsibility and firm risk: Theory and empirical evidence.

Ashbaugh, H., Collins, D.W. and LaFond, R., 2004. Corporate governance and the cost of equity capital. *Emory, University of Iowa. Retrieved on January, 26,* p.2006.

Ashbaugh-Skaife, H., Collins, D.W. and LaFond, R., 2006. The effects of corporate governance on firms' credit ratings. *Journal of accounting and economics, 42*(1), pp.203-243.

Attig, N., El Ghoul, S., Guedhami, O. and Suh, J., 2013. Corporate social responsibility and credit ratings. *Journal of Business Ethics, 117*(4), pp.679-694.

Barth, M.E., Konchitchki, Y. and Landsman, W.R., 2013. Cost of capital and earnings transparency. *Journal of Accounting and Economics, 55*(2), pp.206-224.

Bauer, R. and Hann, D., 2010. Corporate environmental management and credit risk.

Bauer, R., Derwall, J. and Hann, D., 2009. Employee relations and credit risk.

Beck, C., Frost., F and S. Jones. 2017. CSR Disclosure and Financial Performance Revisited: A Cross Country Analysis, Working Paper, University of Sydney.

Bertomeu, J and E. Cheynel, 2016. Disclosure and the Cost of Capital: A Survey of the Theoretical Literature, Volume 52, Issue 2 pp.221–258.

Bhojraj, S. and Sengupta, P., 2003. Effect of corporate governance on bond ratings and yields: The role of institutional investors and outside directors. *The Journal of Business, 76*(3), pp.455-475.

Bradley, M., Dallas, G.S., Snyderwine, E. and Chen, D., 2008. The effects of corporate governance attributes on credit ratings and bond yields.

Cajias, M., Fuerst, F. and Bienert, S., 2014. Can investing in corporate social responsibility lower a company's cost of capital?. *Studies in Economics and Finance, 31*(2), pp.202-222.

Chava, S., Livdan, D. and Purnanandam, A., 2009. Do shareholder rights affect the cost of bank loans?. *Review of Financial Studies, 22*(8), pp.2973-3004.

Chen, K.C., Chen, Z. and Wei, K.J., 2009. Legal protection of investors, corporate governance, and the cost of equity capital. *Journal of Corporate Finance, 15*(3), pp.273-289.

Chen, K.C., Chen, Z. and Wei, K.J., 2011. Agency costs of free cash flow and the effect of shareholder rights on the implied cost of equity capital. *Journal of Financial and Quantitative Analysis, 46*(01), pp.171-207.

Clark, G.L., Feiner, A and M. Viehs. 2015. From the Stockholder to the Stakeholder: How Sustainability can Drive Financial Outperformance. University of Oxford/Arabesque Partners.

Christensen, P. O., L. E. de la Rosa, and G. A. Feltham. 2010. Information and the cost of capital: An ex ante perspective. The Accounting Review 85 (3): 817–48.

Cremers, K.M., Nair, V.B. and Wei, C., 2007. Governance mechanisms and bond prices. *Review of Financial Studies, 20*(5), pp.1359-1388.

Johnstone D 2016 'The Effect of Information on Uncertainty and the Cost of Capital', *Contemporary Accounting Research*, vol.33:2, pp. 752-74.

Derwall, J. and Verwijmeren, P., 2007. Corporate governance and the cost of equity capital: Evidence from gmi's governance rating. *European Centre for Corporate Engagement Research Note*, pp.06-01.

Diamond, D., and R. Verrecchia, 1991. Disclosure, Liquidity and the Cost of Capital. *Journal of Finance 46* (1991): 1325–59.

El Ghoul, S., Guedhami, O., Kim, H. and Park, K., 2014. Corporate environmental responsibility and the cost of capital: International evidence. *Journal of Business Ethics*, pp.1-27.

El Ghoul, S., Guedhami, O., Kwok, C.C. and Mishra, D.R., 2011. Does corporate social responsibility affect the cost of capital?. *Journal of Banking & Finance, 35*(9), pp.2388-2406.

Goss, A. and Roberts, G.S., 2011. The impact of corporate social responsibility on the cost of bank loans. *Journal of Banking & Finance, 35*(7), pp.1794-1810.

Indjejikian, R. 2007. Discussion of Accounting Information, Disclosure, and the Cost of Capital, *Journal of Accounting Research*, Vol. 45 No. 2 May 2007.

Jiraporn, P., Jiraporn, N., Boeprasert, A. and Chang, K., 2014. Does corporate social responsibility (CSR) improve credit ratings? Evidence from geographic identification. *Financial Management, 43*(3), pp.505-531.

Jones S and Wright C 2017 Forthcoming 'Fashion or Future: Does Creating Shared Value Pay?', *Accounting and Finance.*

Klock, M.S., Mansi, S.A. and Maxwell, W.F., 2005. Does corporate governance matter to bondholders?. *Journal of Financial and Quantitative Analysis,* pp.693-719.

Lima, B.F. and Sanvicente, A.Z., 2013. Quality of corporate governance and cost of equity in Brazil. *Journal of Applied Corporate Finance, 25*(1), pp.72-80.

Lins, K.V., Servaes, H. and Tamayo, A., 2017. Social capital, trust, and firm performance: The value of corporate social responsibility during the financial crisis. *The Journal of Finance.*

Matthiesen, M.L. and Salzmann, A.J., 2017. Corporate social responsibility and firms' cost of equity: How does culture matter?. *Cross Cultural & Strategic Management, 24*(1).

Menz, K.M., 2010. Corporate social responsibility: Is it rewarded by the corporate bond market? A critical note. *Journal of Business Ethics, 96*(1), pp.117-134.

Ng, A.C. and Rezaee, Z., 2015. Business sustainability performance and cost of equity capital. *Journal of Corporate Finance, 34*, pp.128-149.

Reverte, C., 2012. The impact of better corporate social responsibility disclosure on the cost of equity capital. *Corporate Social Responsibility and Environmental Management, 19*(5), pp.253-272.

Schauten, M. and van Dijk, D.J., 2010. Corporate Governance and the Cost of Debt of Large European Firms.

Schneider, T.E., 2011. Is environmental performance a determinant of bond pricing? Evidence from the US pulp and paper and chemical industries. *Contemporary Accounting Research, 28*(5), pp.1537-1561.

Sharfman, M.P. and Fernando, C.S., 2008. Environmental risk management and the cost of capital. *Strategic management journal, 29*(6), pp.569-592.

Verwijmeren, P. and Derwall, J., 2010. Employee well-being, firm leverage, and bankruptcy risk. *Journal of Banking & Finance, 34*(5), pp.956-964.

APPENDIX: LITERATURE SURVEY

AUTHOR/S	SAMPLE CHARACTERISTICS	SAMPLE JURISDICTION	ESG METRIC USED FOR STUDY	DIRECTION OF OVERALL RELATIONSHIP	COST OF CAPITAL MEASURE	MODEL TYPE	DEPENDENT AND INDEPENDENT VARIABLES OF STUDY
Albuquerque, Durnev, and Koskinen (2014).	2003 to 2011 with a total of 23,803 firm-year observations	U.S.	ESG	Negative	Cost of capital was not measured	Panel regressions	*Dependent variable:* CSR *Independent variables:* aggregate CSR, community, diversity, employee, environment, product, governance, Tobin's Q, beta, ratio of CSR firm profits to non-CSR firm profits, profitability, operating leverage, RandD, advertising, leverage, CAPEX, cash, sales growth, market value of equity to total assets, size, dividend yield, age, earnings variability, diversification, state tax, Hoberg & Phillips product, similarity, differentiated good industry, industry top-CSR market, capitalization, GDP growth rate, president vote, democrats, congress, state government, disasters, product recalls
Baur, Derwall, and Hann (2009).	Based on a sample of 2,265 bonds issued by 568 firms over the period of 1995-2006	U. S.	Social	Negative	Firm's cost of debt financing is defined as the market quoted yield spread of newly issued bonds. The yield spread equals the difference between the offering yield to maturity of a bond issue and the yield to maturity of a corresponding treasury bond.	Pooled OLS regressions, Multivariate regression	*Dependent variables:* cost of debt financing (spread), credit rating, issuer rating *Independent variables:* Employee Relations Index (Employee Relations and Diversity Management from Kinder, Lydenberg and Domini Research & Analytics dataset), leverage, size, capital intensity, interest coverage, ROA, loss, time-to-maturity of a bond, issue size, subordinate, speculative, modified bond rating
Bauer and Hann (2010).	A sample of 2,242 bonds that were issued by 582 firms in the period from 1995 to 2006.	U.S.	Environmental	Negative	Firm's cost of debt financing is defined as the market quoted yield spread of newly issued bonds. The yield spread equals the difference between the offering yield to maturity of a bond issue and the yield to maturity of a corresponding treasury bond.	Pooled OLS regressions, Multivariate regression	*Dependent variables:* cost of debt financing (spread), credit rating, issuer rating *Independent variables:* Environmental index, if a firm displays a related environmental strength or concern, KLD assigns a value of zero or one to the corresponding indicator, where zero denotes "no concern/strength" and one denotes a "concern/ strength" (ENVStrengths: Beneficial Products and Services, Pollution Prevention, Recycling, Clean Energy, and ENVConcerns: Hazardous Waste, Regulatory Problems, Substantial Emissions, Agricultural Chemicals, Climate Change), leverage, size, capital intensity, interest coverage, ROA, loss, time-to-maturity of a bond, issue size, subordinate, speculative, modified bond rating
Cajias, Fuerst, and Bienert (2014).	2,300 listed US companies in a panel from 2003 to 2010	U.S.	ESG	Mixed	Firm's cost of capital estimated from the three-factor Fama-French model with varying factor Loadings	Panel and quantile regressions	*Dependent variables:* cost of equity capital, CSR strength, CSR concern *Independent variables:* CSR index (from KLD MSCI Database), market to book value, market value, leverage, total return

AUTHOR/S	SAMPLE CHARACTERISTICS	SAMPLE JURISDICTION	ESG METRIC USED FOR STUDY	DIRECTION OF OVERALL RELATIONSHIP	COST OF CAPITAL MEASURE	MODEL TYPE	DEPENDENT AND INDEPENDENT VARIABLES OF STUDY
Chava, Livdan, and Purnanandam (2009).	Sample of more than 6000 bank loans issued to U.S. firms between 1990 and 2004	U.S.	Governance	Negative	Spreads on bank loans	Multivariate regression	*Dependent variables:* the logarithm of the drawn all-in-spread, log(aisd) *Independent variables:* market capitalization, ratio of EBITDA of the firm to the sales of the firm, Leverage, Altman z score, modified version of Altman without the leverage, maturity of the loan, the number of lenders, perfprice (dummy), ltterm (dummy), credit spread, term spread, takeover
Chen, Chen, and Wei (2011)	Sample of 13,140 firm-year observations for 2,161 firms across 44 industries between 1990 and 2004.	U.S.	Governance	Negative	This study estimate the ex-ante cost of equity that is implied in the analysts' earnings forecasts and the stock prices based on four different models, i.e., those constructed by Claus and Thomas (2001), Gebhardt, Lee and Swaminathan (2001), Ohlson and Juettner Nauroth (2005), and Easton (2004). They are based on either the dividend discount model or the residual income model and differ in their assumptions of future growth patterns and forecasting horizons.	Correlations Analysis, Regression analysis	*Dependent variables:* the cost of equity *Independent Variables:* Governance index (the number of anti-takeover provisions and restrictions of shareholder rights), beta, idiosyncratic standard deviation, log of equity market value, log of book-to-market ratio, leverage, analysts' earnings forecast error, analysts' forecast of the long-term earnings growth rate.
Derwall and Verwijmeren (2007)	Using the governance ratings provided by Governance Metrics International (GMI) dataset that covers 3,800 U.S. companies, over a period of 2003 to 2005	U.S.	Governance	Negative	Abnormal earnings growth valuation model of Easton (2004).	Pooled regression model	*Dependent variables:* implied cost of equity computed using the Easton (2004) model *Independent variables:* Governance ratings provided by Governance Metrics International (GMI), beta, size, the book debt-to-assets ratio, the price-to-book ratio

AUTHOR/S	SAMPLE CHARACTERISTICS	SAMPLE JURISDICTION	ESG METRIC USED FOR STUDY	DIRECTION OF OVERALL RELATIONSHIP	COST OF CAPITAL MEASURE	MODEL TYPE	DEPENDENT AND INDEPENDENT VARIABLES OF STUDY
El Ghoul, Guedhami, Kwok and Mishra (2011).	Using a sample of 12,915 US firm-year observations from 1992 to 2007	U.S.	ES	Negative	Following Hail and Leuz (2006), this study estimates the cost of equity using four different models: the Claus and Thomas model (2001), the Gebhardt et al. model (2001), the Ohlson and Juettner-Nauroth model (2005), and the Easton model (2004).	Multivariate regression analysis Univariate analysis	*Dependent variable:* implied cost of equity premium derived from the Claus and Thomas (2001) model, the Gebhardt et al. (2001) model, Ohlson and Juettner-Nauroth (2005) model, and the Easton (2004) model *Independent variables:* CSR index (community, diversity, employee relations, environment, human rights, and product characteristics), beta, size, the book-to-market ratio, and leverage, analyst forecast dispersion, and the consensus long-term growth forecast, year and industry effects, Compound stock returns over the past 3, 6 & 12 months, number of institutional investors, Fraction of the CEO's total compensation arising from a 1% increase in the firm's stock price, Bebchuk et al. (2009) index of six anti-takeover provisions, number of analysts following the firm, Kaplan and Zingales' (1997) index of financial constraints as implemented by Lamont et al. (2001)
El Ghoul, Guedhami, Kim, and Park (2014)	Sample of 2107 manufacturing firms from 30 countries, comprising a sample of 7122 firm-year observations over the period of 2002 to 2011	International evidence, 30 countries	Environmental	Negative	Following Hail and Leuz (2006), this study estimate the cost of equity using four different models: the Claus and Thomas model (2001), the Gebhardt et al. model (2001), the Ohlson and Juettner-Nauroth model (2005), and the Easton model (2004).	Multivariate regression analysis Univariate analysis	*Dependent variable:* implied cost of equity premium derived from the Claus and Thomas (2001) model, the Gebhardt et al. (2001) model, Ohlson and Juettner-Nauroth (2005) model, and the Easton (2004) model *Independent variables:* ratio of (external) environmental costs–total assets (external environmental costs are based on six areas of direct and indirect emissions: greenhouse gases (GHGs), water, waste, land and water pollutants, air pollutants, and natural resource use, covering across operations, supply chains, and investment portfolios), volatility of stock returns, book to market value of equity, leverage, realized inflation rate, size, analyst forecasts' error.
Klock, Mansi, and Maxwell (2005).	1,877 firm-year observations on 678 firms for the years 1990, 1993, 1995, 1998, and 2000.	U.S.	Governance	Negative	Yield spread (Spread), is the difference between the weighted average yield to maturity on the firm's outstanding traded debt and the yield to maturity on a Treasury security with similar duration.	Correlations Changes regression.	*Dependent variable:* yield spread *Independent variables:* Corporate governance index (using the Gompers et al. (2003) 24 anti-takeover provisions), firm-specific measures- size, leverage, profitability, firm implied volatility, sales growth for the last three years, and institutional ownership, information relevant to the traded debt such as credit ratings, duration, convexity, and bond age
Lima and Sanvicente (2013).	Sample of 67 companies, comprising 310 firm-year observations from 1998-2008	Brazil	Governance	Negative	Dividend discount model The Gordon model	The panel data methodology with fixed effects	*Dependent variable:* Firm's Cost of equity *Independent variables:* the quality of corporate governance index(IGOV), disclosure (DISCL); composition of the board of directors (BOARD); ownership and control structure (O&C), Shareholder rights and investor relations (SR&I), financial leverage; operating leverage; book-to-market ratio; firm size; and the year

AUTHOR/S	SAMPLE CHARACTERISTICS	SAMPLE JURISDICTION	ESG METRIC USED FOR STUDY	DIRECTION OF OVERALL RELATIONSHIP	COST OF CAPITAL MEASURE	MODEL TYPE	DEPENDENT AND INDEPENDENT VARIABLES OF STUDY
Matthiesen and Salzmann (2017)	Dataset covers the period from 2002 to 2013, and contains 3,439 firms	International evidence, 42 countries	ES	Negative	They use the average of four different models (Claus and Thomas, 2001; Easton, 2004; Gebhardt et al., 2001; Ohlson and Juettner-Nauroth, 2005), whereby the first two use residual income valuation models and the latter two abnormal growth models.	Regression analyses	*Dependent variable:* cost of equity *Independent variables:* CSR index (environmental and social index integrating them one composite score using equal weights from Thomson Reuters ASSET4 database), book-to-market ratio; stock market capitalization; GDP per capita; institutional collectivism; humane orientation; assertiveness, volatility, leverage, beta, legal origin, legal rights
Menz (2010).	498 bonds with 16,957 observations over the period of July 2004 and August 2007	European Companies	ESG	None	Cost of capital was not measured	Pooled ordinary least squares Fixed effects and random effects model	*Dependent variable:* Credit spread *Independent variables:* CSR index from SAM Group, financial development
Ng and Rezaee (2015).	More than 3000 firms during 1990–2013	U.S.	ESG	Negative	Authors use two proxies for cost of equity capital: (1) they follow Francis et al. (2005) and Liu et al. (2002) and use a variation of the price multiple – the industry-adjusted earnings–price ratio (IndEP) – as a proxy for cost of capital. In order to calculate the industry-adjusted EP ratio, they first calculate the median EP ratio for all firms with positive earnings in year t in each of the Fama–French 49 industry groups; (2) they also calculate the implied cost of capital based on the finite-horizon expected return model (Gordon and Gordon, 1997). The implied cost of capital is the internal rate of return that equates the current stock price to the present value of expected future cash flows.	Lead–lag regression	*Dependent variable:* cost of equity *Independent variables:* ESG index from KLD STATS database (strength and concern ratings using approximately 80 indictors in seven major areas: community, corporate governance, diversity, employee relations, environment, human rights, and products.) in the first stage regressions include size (log of total assets), leverage, loss (loss dummy), profitability (ROA), liquidity (current ratio), risk (beta), and growth (market to book value of equity ratio)
Reverte (2012).	35 Spanish listed firms during 2003-2008	Spain	ESG	Negative	Used the PEG estimate as the primary measure of the cost of equity capital	Regression Analysis	*Dependent variable:* cost of equity capital *Independent variables:* CSR reporting aggregate ratings from the Observatory on Corporate Social Responsibility (OCSR) reports, BETA, market value of equity divided by fiscal year-end book value of equity, natural log of fiscal year-end market value of equity.

AUTHOR/S	SAMPLE CHARACTERISTICS	SAMPLE JURISDICTION	ESG METRIC USED FOR STUDY	DIRECTION OF OVERALL RELATIONSHIP	COST OF CAPITAL MEASURE	MODEL TYPE	DEPENDENT AND INDEPENDENT VARIABLES OF STUDY
Schauten and van Dijk (2010).	A sample of 542 bond issues by 186 unique firms from 17 European countries	Austria, Belgium, Switzerland, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, United Kingdom	Governance	Negative	As proxy for the cost of debt they use the yield spread (SPREAD), defined as the yield to maturity of a newly issued corporate bond (YIELD) minus the yield to maturity of a government bond issued at the same date, in the same currency and of similar maturity. The SPREAD is measured on the first day of the bond issue.	Linear regression model Threshold regression model	*Dependent variable:* The cost of debt *Independent variables:* shareholder rights, takeover defences, board structure, disclosure
Sharfman and Fernando (2008).	267 U.S. firms	U.S.	Environmental	Mixed	Firm's overall cost of capital is estimated by the weighted average of its cost of debt and equity capital, which is known as the weighted average cost of capital.	ANOVA	*Dependent variable:* cost of capital *Independent variable:* environmental risk management two-digit SIC (the Standard Industrial Classification) codes (gathered from COMPUSTAT)