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Corporate Sustainability and Cost of Equity Capital: Do Managerial Abilities Matter?

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Abstract: This paper investigates whether a firm's managerial ability affects the link between a firm's cost of equity capital and corporate sustainability. We test our predictions by using a large U.S. sample of 17,389 firm-year observations. Our findings show that only when managerial ability is high, corporate sustainability significantly reduces a firm's implied cost of equity capital. An important implication of our findings is that firms with high managerial abilities and limited sustainability commitment are encouraged to pursue or initiate more sustainability activities owing to their negative effect on a firm's cost of equity capital.

Keywords: corporate sustainability; managerial abilities; implied cost of equity capital; CSR strengths; financial crisis

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1. Introduction

Does corporate sustainability affect the firm's cost of equity capital (CoE)? How does corporate sustainability jointly with managerial abilities impact the firm's CoE? In this paper, we provide evidence that managerial abilities can significantly influence the firm's CoE—corporate sustainability link.

Theoretical literature provides two competing views regarding the impact of corporate sustainability on the firm's CoE. The overinvestment view predicts a positive effect of corporate sustainability on CoE since it considers sustainability investments as a diversion of the firm's scarce resources that would put the firm at an economic disadvantage [1]. In contrast, the risk mitigation view suggests a negative effect of corporate sustainability on a firm's CoE either through a reduction in investor perceived risk and/or by attracting a broader shareholders base.

The empirical literature on the firm's CoE-corporate sustainability link shows mixed results. The first stream of this literature provides support to the risk mitigation view. For instance, Sharfman and Fernando [2] and Chava [3] find that a better environmental performance decreases the firm's CoE. Similarly, El Ghouli et al. [4] provide evidence that firms with higher CSR scores have lower CoE. In contrast, the second stream of this literature finds that such relationship is insignificant. For example, Ng and Rezaee [5] do not find a significant relationship between social performance and the CoE.

An important implicit assumption in the literature on the relationship between corporate sustainability and the CoE is the homogeneous managerial abilities across firms and years. This assumption implies that managers have no or limited influence on corporate sustainability decisions. Nevertheless, different previous studies provide consistent evidence of the significant effect of managers' abilities on a firm's performance and

decisions (e.g., [6–8]). Therefore, we argue that managerial abilities could help to explain the mixed results obtained when linking corporate sustainability and the CoE.

Given their broad and deep knowledge about the firm, the market, the technology and the human capital, managers with higher abilities are in the best position to influence corporate decisions [6–8]. They are expected to accept corporate expenditures and investments, including those related to sustainability, on the basis of their positive contribution to shareholders' wealth. Thus, it is expected that the negative effect of sustainability activities on firm's CoE will prevail only when managerial abilities are high.

To test our predictions, we merge the MSCI ESG STATS for corporate sustainability data, CRSP for stocks information, I/B/E/S for analysts' earnings forecasts, COMPUSTAT for financial and accounting data and managerial ability scores data from Demerjian et al., [7]. Our final sample consists of 17,389 U.S. firm-year observations covering the period from 1991 to 2012.

Consistent with our predictions, our findings show that corporate sustainability as reflected by CSR engagement (CSR concerns) significantly reduces (increases) a firm's cost of equity capital. When we split our sample into firms with high versus low managerial ability, we find evidence that CSR engagement significantly reduce firm's CoE only when managerial ability is high. We confirm such an effect by using the 2008 financial crisis as an exogenous shock to CSR value and by running a difference-in-differences regression analysis.

This study makes three important contributions to the literature. First, it contributes to the literature on the effect of corporate sustainability on firm's CoE (e.g., [2–5,9–11]) and in particular to the recent stream of studies suggesting that corporate sustainability can affect financial performance under certain conditions (e.g., [11–14]) by considering the moderating role of the managerial abilities when linking a firm's CoE to corporate sustainability.

Second, we add to the literature which investigate how financial markets shape corporate sustainability and its value implications (e.g., [2–4,9,15,16]) by providing new evidence that shareholders integrate corporate sustainability in their equity valuation.

Third, we complement the literature on the effects of corporate sustainability during the 2008 financial crisis. Whereas Lins et al., [17] show that firms with high social capital experienced higher stock returns relative to firms with low social capital, we show that the negative effect of corporate sustainability on a firm's cost of equity capital prevails only for firms with high managerial abilities.

The remainder of this paper is organized as follows. In Section 2, we provide a literature review and we develop our hypotheses. In the Section 3, we describe our data and methodology. In the Section 4, we present our findings. We conclude in the Section 5.

2. Literature Review and Hypotheses Development

2.1. Sustainability and Corporate Cost of Equity Capital

A firm's cost of equity capital is the investors' required rate of return for holding the stock of this firm and bearing the risk associated with it. It depends on how risky firm's future cash flows are perceived by the investors. The higher (lower) such risk is, the higher (lower) the investors' required return and thereby the CoE are.

Any firm behavior that can affect the investors' perceived risk will also affect the company's CoE. In this respect, corporate sustainability is relevant as a determinant of the CoE. Corporate sustainability refers to a firm's activities integrating social and environmental issues in its business operations, when interacting with its stakeholders [18] and in a way to be able to provide for current and future generations [19]. For instance, such activities include actions targeting greenhouse gas emissions' reduction and programs aiming to improve the diversity in the workplace [20].

If corporate sustainability affects a firm's risk, then we can directly link corporate sustainability to the CoE. Theoretically, there are two competing alternative views on how

corporate sustainability can affect the CoE, namely the overinvestment view and the risk mitigation view.

The overinvestment view predicts a positive impact of corporate sustainability on firm's CoE since it considers sustainability investments as a waste of firm's limited resources. This view is based on the agency theory [21] which suggests that asymmetric information between managers and shareholders can lead to managerial entrenchment. Consequently, managers are tempted to pursue their own interest, even at the expense of the shareholders. For instance, managers can overinvest in sustainability activities to increase their own reputation and to gain private benefits, particularly when the firm generates higher slack resources [22].

From the shareholders' perspective, these investments are discretionary and therefore unnecessary and will also increase monitoring costs to align managers decisions to the shareholders' interest [23]. Overall, overinvestment in sustainability activities will increase costs, which would put the firm at an economic disadvantage [1]. Investors will negatively perceive such diversion of firm' resources and, therefore, will require a higher premium to hold the firm' stock. Therefore, our first hypothesis is:

Hypothesis 1-a. *Corporate sustainability activities positively affect the firm's cost of equity capital.*

In contrast, according to the risk mitigation view, we would expect a negative effect of corporate sustainability on a firm's CoE. Two arguments support this view. The first argument suggests that corporate sustainability activities reduce the investor's perceived risk. Firms with high corporate sustainability behave in a relatively more responsible way and are less likely to be involved in social and/or environmental misconducts such as unsafe working conditions for employees. By doing so, they reduce the probability of bearing future negative cash flows and thereby they reduce their exposure to risk [24,4]. Ultimately, this risk reduction translates into a decrease in the firm's cost of equity capital.

The second argument supporting the risk mitigation view is the firm's investor base. If corporate sustainability can affect the size of the firm's investor base, then it can impact the risk sharing opportunities and consequently the CoE. According to the theoretical work of Merton [25], firms differ in their shareholder base so that those with smaller base have lower risk-sharing opportunities which lead to higher expected returns. With regard to corporate sustainability, Heinkel et al. [26] developed a model suggesting that investors require a higher premium for holding more shares of polluting firms in order to compensate for lower risk-sharing opportunities. Additionally, Hong and Kaspersky's [27] study shows that firms in controversial industries, which are boycotted by the socially norm-constrained investors, have smaller shareholder base leading to lower risk sharing opportunities and therefore higher CoE financing.

Overall, the risk mitigation view predicts a negative effect of corporate sustainability on a firm's CoE either through a reduction in investor perceived risk and/or a broader shareholders base. Thus, our second hypothesis is:

Hypothesis 1-b. *Corporate sustainability activities negatively affect the firm's cost of equity capital.*

2.2. Managerial Abilities and Corporate Sustainability-Cost of Equity Link

The empirical literature that examines the impact of corporate sustainability on firm's CoE financing is relatively scarce and the findings are mixed. While some studies provide evidence of a negative link, others find that such relationship is insignificant.

The first literature stream shows that corporate sustainability reduces the CoE financing. For instance, Sharfman and Fernando [2] find that enhanced environmental risk management leads to a reduction in CoE. El Ghouli et al., [4] provide evidence that firms with better CSR performance have lower CoE, whereas firms belonging to the nuclear power

and tobacco industries have a significantly higher CoE. Additionally, Chava [3] provides evidence that the environmental profile of a firm significantly affects its CoE. He also shows that investors require higher returns on stocks of firms with environmental concerns related to chemical hazards, emissions, and climate change.

The second stream of studies in this literature finds mixed or insignificant link between sustainability and the CoE capital. For instance, although Ng and Rezaee [5] find that environmental and governance performance are negatively associated with the CoE capital, they do not find a significant link between social performance and the CoE. Similarly, Breuer et al., [11] show that higher corporate sustainability reduces (increases) the CoE in countries with strong (weak) investor protection. In sum, the empirical literature provides mixed findings and therefore the link between corporate sustainability and the firm's CoE capital is still an ongoing debate.

One important explanation of such mixed results is that the effect exists under certain conditions. In other words, there are some factors that moderate the studied relationship. For instance, there is evidence that corporate sustainability-firm value link is moderated by firm size and age [12] political risk [13] managerial ability [14]. Hmaittane et al., [28] show the role of lender's CSR in the link between borrower's CSR and firm's cost of bank loans.

We build on this explanation and extend this literature by considering the moderating effect of managerial abilities when linking the firm's CoE to corporate sustainability. Consistent with Demerjian et al., [7]'s definition, managerial ability refers to the managers efficiency in converting corporate resources to revenues relative to their peers in the same industry. For a given level of resources, managers with higher ability generate more revenues, or for a given level of revenues, they use fewer resources [29].

In this study, we argue that the literature on the relationship between corporate sustainability and the CoE lies on a key implicit assumption of homogeneous managers abilities across firms and years. This assumption implies that managers have no or limited influence on corporate sustainability decisions. However, different studies provide consistent evidence of the significant role of managers' abilities as a determinant of a firm's performance and decisions (e.g., [8,29–33]). For instance, these studies reveal that firms with high managerial ability generate higher stock returns and returns on assets [7], better long-term buy-and-hold returns for the acquiring firms and lower premiums paid for acquisitions [34], improved firm's investment efficiency [31,35], higher tax efficiency [36], increased earnings quality [8,37] and more successful innovations [38].

Based on the empirical evidence of their impact in shaping corporate decisions and performance and given their broad and deep knowledge about the firm, the market, the technology and the human capital, managers with higher abilities are in the best position to influence corporate decisions [6–8,29] compared to managers with lower abilities. They are expected to accept corporate expenditures and investments, including those related to sustainability, on the basis of their positive contribution to shareholders' wealth. From an external perspective, a high level of managerial abilities could act as a value certification for the firm to outsiders, in particular to investors. It could enhance firm's social capital and reduce asymmetric information problems [14] which facilitate access to external financing including equity.

In sum, based on the aforementioned literature and discussion, it is expected that the negative impact of sustainability activities on firm's CoE financing will prevail only when managerial abilities are high. Therefore, our third hypothesis is:

Hypothesis 2. *Sustainability activities negatively affect the firm's cost of equity capital when managerial ability is high.*

3. Data and Methodology

3.1. Data

Our sample selection starts with firms having CSR ratings included in the MSCI ESG STATS database. We match these firms with CRSP to obtain information on stocks including prices, returns, shares outstanding and trading volumes. Then, we merge the matched firms with Thomson Reuters I/B/E/S for analysts' earnings forecasts, COMPUSTAT for financial and accounting data, and managerial ability scores data of Demerjian et al., [7]. Following previous literature, we exclude financial firms (SIC codes 6000–6999) and utilities (SIC codes 4900–4999) from our final sample.

3.2. Methodology

Following prior literature (e.g., [4,9–40]) we specify two models linking a firm's CSR engagement to its implied cost of equity capital (ICC) as follows:

$$ICC_{i,t} = \alpha_0 + \alpha_1 CSR_{i,t} + \sum_i \sum_t CV_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$ICC_{i,t} = \alpha_0 + \alpha_1 CSR_{d_{i,t}} + \alpha_2 MA_{d_{i,t}} + \alpha_3 CSR_{d_{i,t}} * MA_{d_{i,t}} + \sum_i \sum_t CV_{i,t} + \varepsilon_{i,t} \quad (2)$$

where $ICC_{i,t}$: implied cost of equity capital of firm i in year t ; $CSR_{d_{i,t}}$: dummy variable indicating firm-year observations with positive CSR engagement and 0 otherwise; $MA_{d_{i,t}}$: dummy variable that equals to 1 (0) for firm-year observations with high (low) managerial ability scores; $CV_{i,t}$: set of control variables of firm i in year t . Below, we define all these variables in more detail.

Equation (2) allows us to capture the incremental impact of CSR engagement on ICC when the firm has high managerial ability scores.

3.2.1. Measures of Firm's Cost of Equity Capital

Our dependent variable is measured as the ex-ante CoE capital implied in the analyst's earnings forecasts and the current stock prices (e.g., [39,41–44]). Specifically, we follow prior literature (e.g., [4,39,45]) to estimate the ex-ante CoE using five models which rely either on the residual income model or the dividend discount model but assume different forecasting horizons and future growth rates [41–44].

We compute the implied CoE for each observation using the following variables: current stock price, book value per share, payout ratio, one-year and two-year-ahead means of analysts' earnings forecasts, short-term growth estimated by the five-year annualized mean (median) growth rate, and an estimate for long-term growth rate. We require that one- and two-years earnings forecasts, long-term growth forecast as well as book value per share to be positive as in [4,9]. Since we have two versions of Easton [42] model (MPEG or PEG ratio), we compute our ICC measure as the arithmetic average of four estimates of implied CoE. Therefore, the first measure includes the estimate of MPEG ratio model and the second alternative measure includes the estimate of PEG ratio model.

3.2.2. Measures of Corporate Sustainability

We follow previous literature and use CSR scores as indicators of corporate sustainability. We obtain these CSR scores from the MSCI ESG STATS database. This database provides binary data (one or zero) on annual basis and on a set of different attributes for U.S. public firms. The ratings cover seven qualitative dimensions with strength and concern scores namely community, employee relations, diversity, environment, product, governance and human rights.

Following prior research (e.g., [46–48]), we calculate for each observation and for each of the seven qualitative dimensions an average score for the strengths (STR_index) and another one for the concerns (CON_index). The average score STR_index (CON_index) is computed as the firm total number of strengths (concerns) divided by the total

number of possible strengths (concerns) in that year. Additionally, we compute an aggregate CSR score, *CSR_index*, as the difference between the firm's strengths (*STR_index*) and concerns (*CON_index*) scores in a given year.

In sum, we define three measures of corporate sustainability: an aggregated score (*CSR_index*) and two disaggregated scores representing CSR strengths and concerns. For convenience and ease in the interpretation of the findings, we transform these scores to dummy variables. Specifically, we compute *CSR_d* as a dummy variable indicating firm-year observations with positive *CSR_index* and 0 otherwise. Additionally, we compute *STR_d* (*CON_d*) as a dummy variable indicating firm-year observations with CSR strengths (concerns) and 0 otherwise.

Finally, since CSR engagement is composed of CSR actions that are potentially doing good (i.e., CSR strengths) and actions that are potentially doing harm (i.e., concerns), a socially responsible firm will seek to maximize the former and minimize the latter. With regard to our hypotheses, this implies that an increase in CSR activities as reflected in an aggregated CSR measure or in CSR strengths is expected to affect negatively the firm's cost of equity capital but an increase in CSR concerns is expected to impact positively a firm's ICC.

3.2.3. Measure of Managerial Abilities

Our measure of managerial abilities is developed by Demerjian et al., [7]. In the first step of their methodology, Demerjian et al. [7] use data envelopment analysis (DEA) to compute the firm efficiency relative to its industry. Such measure captures how efficient a firm is in generating more revenues (revenue, income, etc.) from a given set of inputs (labor, capital, etc.). However, the obtained efficiency measure from DEA is attributable to both the firm and its managers. Therefore, the second step of the methodology aims to separate these two components by performing a Tobit regression of the total firm efficiency score on a set of firm characteristics such as age, size, cash availability, operational complexity and life cycle. The residuals of this regression represent the Demerjian et al., [7] estimate of a firm's managerial ability.

To test our hypotheses and for ease of interpretation of our results, we transform managerial ability scores of [7] to a dummy variable (*MA_d*) which equals to 1 (0) for firm-year observations with high (low) managerial ability scores. Managerial ability scores are high (low) if they are above (below) the industry median for the given year.

3.2.4. Control Variables

We control for a set of variables that determine the CoE capital based on previous literature (e.g., [4,9,39]). These variables are: firm's beta (*BETA*), computed using the market model; firm's size (*SIZE*), calculated as the natural logarithm of firm's total assets; the book-to-market ratio (*BTM*); firm's leverage (*LEV*), computed as the total debt divided by the market value of equity; forecasted dispersion (*DISP*), computed as the coefficient of variation in one-year-ahead analysts' earnings forecasts; long-term growth (*LTG*) and firm's profitability measured by the return on assets (*ROA*). Additionally, we control for year and industry fixed effects in all our regressions. We define firm industry belonging using the Fama–French 48 industry classification [49].

4. Empirical Results

4.1. Descriptive Statistics

Table 1 reports descriptive statistics for the implied CoE capital, CSR score, managerial ability score and control variables. The whole sample consists of 17,389 firm-year observations and covers the period from 1991 to 2012. The mean of the ICC (*CSR_index*) is 9% (−0.02) and ranges from 0.4% to 27% (−0.464 to 0.749). Additionally, the mean of the managerial ability score is 0.027 and ranges from −0.304 to 0.684.

Table 1. Summary statistics.

| | N | Mean | Median | Std. Dev. | min | max |
|-----------|----------|-------------|---------------|------------------|------------|------------|
| ICC | 17389 | 0.09 | 0.086 | 0.034 | 0.004 | 0.276 |
| CSR_index | 17389 | −0.02 | −0.024 | 0.092 | −0.464 | 0.749 |
| STR_index | 17389 | 0.051 | 0.024 | 0.084 | 0 | 0.843 |
| CON_index | 17389 | 0.071 | 0.048 | 0.07 | 0 | 0.681 |
| MA_score | 17389 | 0.027 | −0.013 | 0.152 | −0.304 | 0.684 |
| BETA | 17389 | 1.131 | 1.075 | 0.480 | 0.131 | 2.679 |
| BTM | 17389 | 0.441 | 0.372 | 0.325 | 0 | 4.652 |
| SIZE | 17389 | 7.787 | 7.670 | 1.505 | 2.420 | 13.348 |
| LEV | 17389 | 0.247 | 0.127 | 0.327 | 0 | 1.343 |
| LTG | 17389 | 0.152 | 0.14 | 0.073 | −0.020 | 1.367 |
| DISP | 17389 | 0.045 | 0.032 | 0.056 | 0 | 1.642 |
| ROA | 17389 | 0.123 | 0.113 | 0.107 | −0.672 | 0.489 |

This table presents the descriptive statistics for the whole sample covering the period from 1991 to 2012. Mean, median, standard deviation, minimum and maximum values are reported. CSR_index is the MSCI' corporate social responsibility score; STR_index is the MSCI' corporate social responsibility strengths score; CON_index is the MSCI' corporate social responsibility concerns score. MA_score is the managerial ability score developed by Demerjian et al., (2012). The CSR_index, STR_index, CON_index and MA_score are computed as described in the methodology section. BETA is beta estimated using the market model; SIZE is the firm' size measured as the natural logarithm of total assets; BTM is the firm' book-to-market ratio; LEV is the leverage and computed as the ratio of total debt to the market value of equity; DISP is the forecast dispersion measured as the coefficient of variation in one-year-ahead earnings forecasts; and LTG is the consensus long-term growth forecast. ROA is the firm's earning before interests and taxes on lagged total assets. All the continuous variables are winsorized at the first and the 99th percentile.

Table 2 provides the Pearson correlation coefficients among all our variables. ICC and the aggregated CSR score, CSR_index, are negatively correlated. ICC and the disaggregated CSR measures, STR_index and CON_index are negatively and positively correlated, respectively. Together, these correlations support our first hypothesis H1-a which predicts that CSR commitment affect negatively the ICC.

Table 2 also shows that MA_score and the three CSR measures are positively correlated. In addition, all correlations between the ICC and the control variables are significant at the 1% level and have the expected signs according to previous literature (negative for SIZE and ROA; and positive for BETA, BTM, LEV, DISP and LTG). All correlations between the independent variables are relatively low and therefore multicollinearity cannot be an issue in our data sample.

In Table 3, we provide means and mean differences of our variables using different subsamples. The results for our outcome variable ICC are reported in the first line. When the two subsamples are divided based on the aggregated CSR and on CSR strengths (concerns) the mean difference is significantly negative (positive) at 1% level. Therefore, the implied CoE is lower (higher) for firms with high (low) CSR activities. These results are consistent with our first hypothesis H1-a. Additionally, when the two subsamples are divided based on managerial ability scores, the mean difference is negative and significant at the 1% level. Thus, the implied CoE is lower (higher) for firms with high (low) managerial abilities.

These results indicate that high (low) CSR activities and managerial abilities are both associated with low (high) ICC. Although, these findings are consistent with our hypotheses H1-a and H2, a multivariate framework is needed for appropriate tests of these hypotheses.

Table 2. Correlations matrix.

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|-------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|-----------------------|
| 1 ICC | 1.000 | | | | | | | | | | |
| 2 CSR_index | −0.082 *** (0.000) | 1.000 | | | | | | | | | |
| 3 STR_index | −0.052 *** (0.000) | 0.691 *** (0.000) | 1.000 | | | | | | | | |
| 4 CON_index | 0.047 *** (0.000) | −0.493 *** (0.000) | 0.288 *** (0.000) | 1.000 | | | | | | | |
| 5 MA_score | −0.106 *** (0.000) | 0.056 *** (0.000) | 0.143 *** (0.000) | 0.098 *** (0.000) | 1.000 | | | | | | |
| 6 BETA | 0.107 *** (0.000) | −0.075 *** (0.000) | −0.113 *** (0.000) | −0.037 *** (0.000) | −0.018 ** (0.017) | 1.000 | | | | | |
| 7 BTM | 0.215 *** (0.000) | −0.084 *** (0.000) | −0.074 *** (0.000) | 0.023 *** (0.003) | −0.195 *** (0.000) | 0.039 *** (0.000) | 1.000 | | | | |
| 8 SIZE | −0.178 *** (0.000) | 0.104 *** (0.000) | 0.461 *** (0.000) | 0.418 *** (0.000) | 0.314 *** (0.000) | −0.182 *** (0.000) | −0.323 *** (0.000) | 1.000 | | | |
| 9 LEV | 0.262 *** (0.000) | −0.106 *** (0.000) | −0.010 (0.184) | 0.129 *** (0.000) | −0.205 *** (0.000) | −0.012 (0.113) | 0.390 *** (0.000) | −0.105 *** (0.000) | 1.000 | | |
| 10 LTG | 0.076 *** (0.000) | −0.040 *** (0.000) | −0.174 *** (0.000) | −0.157 *** (0.000) | 0.075 *** (0.000) | 0.278 *** (0.000) | −0.210 *** (0.000) | −0.163 *** (0.000) | −0.264 *** (0.000) | 1.000 | |
| 11 DISP | 0.085 *** (0.000) | −0.057 *** (0.000) | −0.048 *** (0.000) | 0.018 ** (0.019) | 0.003 (0.644) | 0.191 *** (0.000) | 0.045 *** (0.000) | −0.074 *** (0.000) | 0.028 *** (0.000) | 0.356 *** (0.000) | 1.000 |
| 12 ROA | −0.114 *** (0.000) | 0.084 *** (0.000) | 0.049 *** (0.000) | −0.052 *** (0.000) | 0.254 *** (0.000) | −0.128 *** (0.000) | −0.374 *** (0.000) | 0.234 *** (0.000) | −0.263 *** (0.000) | 0.011 (0.151) | −0.142 *** (0.000) |

This table reports the Pearson correlation coefficients among our main variables. All variables are as defined in the notes to Table 1. All the continuous variables are winsorized at the first and the 99th percentile. *p*-values are reported in parentheses. ***, ** indicate significance at the 1% and 5% levels, respectively.

Table 3. Mean differences.

| Variables | CSR_Index | | | STR_Index | | | CON_Index | | | MA_Score | | |
|-----------|-----------|-----------|------------|-----------|-----------|------------|-----------|-----------|------------|----------|----------|------------|
| | CSR_d = 1 | CSR_d = 0 | MeanDiff | STR_d = 1 | STR_d = 0 | MeanDiff | CON_d = 1 | CON_d = 0 | MeanDiff | MA_d = 1 | MA_d = 0 | MeanDiff |
| ICC | 0.086 | 0.092 | −0.006 *** | 0.088 | 0.092 | −0.004 *** | 0.091 | 0.087 | 0.004 *** | 0.087 | 0.093 | −0.006 *** |
| MA_score | 0.046 | 0.018 | 0.028 *** | 0.041 | 0.003 | 0.038 *** | 0.028 | 0.021 | 0.008 *** | 0.118 | −0.082 | 0.200 *** |
| CSR_index | 0.075 | −0.061 | 0.136 *** | 0.006 | −0.061 | 0.067 *** | −0.035 | 0.039 | −0.074 *** | −0.016 | −0.025 | 0.009 *** |
| STR_index | 0.117 | 0.022 | 0.095 *** | 0.083 | 0.000 | 0.083 *** | 0.054 | 0.039 | 0.016 *** | 0.058 | 0.042 | 0.016 *** |
| CON_index | 0.042 | 0.083 | −0.042 *** | 0.077 | 0.061 | 0.016 *** | 0.090 | 0.000 | 0.090 *** | 0.074 | 0.067 | 0.007 *** |
| BETA | 1.061 | 1.162 | −0.101 *** | 1.088 | 1.201 | −0.114 *** | 1.137 | 1.108 | 0.029 *** | 1.121 | 1.143 | −0.023 *** |
| BTM | 0.407 | 0.455 | −0.048 *** | 0.425 | 0.465 | −0.040 *** | 0.443 | 0.431 | 0.012 ** | 0.387 | 0.505 | −0.118 *** |
| SIZE | 8.119 | 7.644 | 0.476 *** | 8.163 | 7.185 | 0.978 *** | 7.939 | 7.218 | 0.721 *** | 8.056 | 7.468 | 0.588 *** |
| LEV | 0.206 | 0.264 | −0.058 *** | 0.236 | 0.264 | −0.028 *** | 0.258 | 0.206 | 0.052 *** | 0.198 | 0.305 | −0.107 *** |
| LTG | 0.143 | 0.155 | −0.012 *** | 0.144 | 0.164 | −0.019 *** | 0.150 | 0.158 | −0.008 *** | 0.155 | 0.147 | 0.008 *** |
| DISP | 0.040 | 0.048 | −0.008 *** | 0.043 | 0.049 | −0.006 *** | 0.046 | 0.043 | 0.003 ** | 0.045 | 0.045 | −0.000 |
| ROA | 0.136 | 0.117 | 0.019 *** | 0.128 | 0.115 | 0.013 *** | 0.121 | 0.131 | −0.010 *** | 0.144 | 0.098 | 0.046 *** |

This table provides means and mean difference comparisons of our variables between different subsamples. CSR_d is a dummy variable indicating firm-year observations with positive CSR_index and 0 otherwise. STR_d (CON_d) is a dummy variable indicating firm-year observations with CSR strengths (concerns) and 0 otherwise. MA_d is a dummy variable equals to 1 (0) for firm-year observations with high (low) managerial ability scores. High versus low scores are performed based on the industry median for each given year (above versus below). All variables are as defined in the notes to Table 1. All the continuous variables are winsorized at the first and the 99th percentile. ***, ** indicate significance at the 1% and 5% levels, respectively.

4.2. Multivariate Regressions

In this study we investigate whether firm managerial abilities affect CoE-CSR relationship using our Equations (1) and (2). For this, we run fixed effects OLS regressions of our dependent variable ICC on CSR score and the explanatory variables: beta; size; the book-to-market ratio; leverage; forecast dispersion and the consensus long-term growth forecast. All the regressions control for year and industry fixed effects. The findings are reported in Table 4.

In model 1, we regress ICC on CSR variable for the whole sample. The coefficient associated with the CSR score variable, α_1 in Equation (1), is negative and significant at the 5% level. This result provides support to our first hypothesis H1-a.

In model 2 (3), we perform the same regression but only on the sample of firms with low (high) managerial abilities. Interestingly, while the estimated coefficient of interest, α_1 in Equation (1), is insignificant for the sample of firms with low managerial abilities, it is negative and significant at the 5% level for the sample of firms with high managerial abilities. These results provide support to our third hypothesis H2.

In model 4, we use Equation (2) and regress ICC on CSR variable using indicators for differentiated subsamples of firms with high and those with low managerial ability. Our coefficient of interest is the interaction term (α_3). It captures the incremental effect of CSR on ICC for firms with high managerial abilities. The coefficient of the interaction term (α_3) is insignificant. Therefore, this result does not support our third hypothesis.

Table 4. Fixed effects regressions.

| | (1) | (2) | (3) | (4) |
|--------------|-----------------------|-----------------------|----------------------|-----------------------|
| Variables | Whole Sample | Low MA | High MA | High-Low MA |
| CSR_d | -0.002 ** (0.033) | -0.002 (0.186) | -0.002 ** (0.033) | -0.002 ** (0.030) |
| MA_d | | | | -0.001 * (0.064) |
| CSR_d*MA_d | | | | -0.000 (0.903) |
| BETA | 0.002 * (0.054) | 0.004 ** (0.020) | 0.002 * (0.086) | 0.002 *** (0.008) |
| SIZE | -0.001 *** (0.005) | -0.002 *** (0.002) | -0.001 (0.136) | -0.001 *** (0.000) |
| BTM | 0.015 *** (0.000) | 0.012 ** (0.020) | 0.018 *** (0.000) | 0.014 *** (0.000) |
| LEV | 0.026 *** (0.000) | 0.029 *** (0.000) | 0.023 *** (0.000) | 0.026 *** (0.000) |
| LTG | 0.071 *** (0.000) | 0.108 *** (0.000) | 0.046 *** (0.000) | 0.071 *** (0.000) |
| DISP | 0.021 (0.102) | 0.018 (0.350) | 0.023 (0.149) | 0.021 * (0.100) |
| ROA | 0.014 ** (0.036) | 0.017 (0.222) | 0.017 *** (0.003) | 0.015 ** (0.012) |
| Constant | 0.057 *** (0.000) | 0.064 *** (0.000) | 0.054 *** (0.000) | 0.057 *** (0.000) |
| Observations | 17,389 | 7939 | 9450 | 17,389 |
| R-squared | 0.129 | 0.152 | 0.119 | 0.129 |
| Industry FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |

This table reports fixed effects OLS regressions results. The dependent variable is the average implied cost of equity (ICC). *CSR_d* is a dummy variable indicating firm-year observations with positive *CSR_index* and 0 otherwise. *MA_d* is a dummy variable equals to 1 (0) for firm-year observations with high (low) managerial ability scores. High versus low scores are performed based on the industry median for each given year (above versus below). All variables are as defined in the notes to Table 1. All specifications control for industry fixed effects and year fixed effects. Heteroskedasticity-consistent standard errors are clustered at the firm level. All the continuous variables are winsorized at the first and the 99th percentile. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively.

For further insight about the effect of firm managerial ability on ICC-CSR relationship, we consider the two components of CSR (i.e., strengths and concerns) and rerun the same four regression models in Table 4. Table 5 presents the findings for CSR strengths (model 1 to 4) and CSR concerns (model 5 to 8).

In model 1, the ICC variable is regressed on CSR strengths variable for the whole sample. The estimated coefficient of interest, α_1 in Equation (1), is insignificant. In model 2 (3), the regression is performed on the subsample of firms with low (high) managerial abilities. Similar to aggregated CSR results, the estimated coefficient of interest, α_1 in Equation (1), is insignificant for the sample of firms with low managerial abilities, while it is negative and marginally significant (at the 10% level) for the sample of firms with high managerial abilities. These results provide support to our third hypothesis H2.

In model 4, we use the whole sample with indicators for differentiated subsamples of firms with high and low managerial ability. We regress ICC on CSR strengths using Equation (2). The coefficient estimate for the interaction term (α_3) captures the differential impact of CSR on ICC for firms with high managerial abilities. The coefficient associated with the interaction term (α_3) is negative and marginally significant (at the 10% level). Therefore, this result provides support to our third hypothesis.

In model 5, we use the whole undifferentiated sample and we regress the ICC on CSR concerns. The estimated coefficient of interest (α_1 in Equation (1)) is positive and marginally significant (at the 10% level). Consistent with our first hypothesis H1-a, this finding suggests that CSR concerns increase firm's ICC.

In model 6 (7), the subsample of firms with low (high) managerial ability is used. Consistent with the result obtained when the aggregated CSR is used, the estimated coefficient of interest (α_1 in Equation (1)) is positive and significant for the sample of firms with low managerial abilities, whereas it is insignificant for the sample of firms with high managerial abilities.

In model 8, we use the whole sample with indicators for the differentiated subsamples of firms with high and low managerial abilities. Using Equation (2), we regress ICC on CSR concerns. The estimated coefficient of the interaction term (α_3) is insignificant. Thus, this result does not support our third hypothesis H2.

With regard to our main prediction, our findings in Table 4 and Table 5 show that CSR engagement affect negatively the firm's CoE capital only when CSR engagement is captured by CSR strengths and when firm managerial ability is high.

| Year FE | Yes |
|--|-----|-----|-----|-----|-----|-----|-----|-----|
| <p>This table reports fixed effects OLS regressions results. The dependent variable is the average implied cost of equity (ICC). STR_d (CON_d) is a dummy variable indicating firm-year observations with CSR strengths (concerns) and 0 otherwise. MA_d is a dummy variable equals to 1 (0) for firm-year observations with high (low) managerial ability scores. High versus low scores are performed based on the industry median for each given year (above versus below). Interaction is MA_d*STR_d (MA_d*CON_d) for CSR strengths (concerns) models. All variables are as defined in the notes to Table 1. All specifications control for industry fixed effects and year fixed effects. Heteroskedasticity-consistent standard errors are clustered at the firm level. All the continuous variables are winsorized at the first and the 99th percentile. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively.</p> | | | | | | | | |

4.3. Robustness Checks

In this section, we perform additional tests in order to check the robustness of our earlier findings. First, we use alternative measures of our key variable ICC and second, we conduct difference-in-differences regressions to deal with endogeneity issues.

4.3.1. Alternative Measure of ICC Variable

Following previous studies (e.g., [4,39,45]), we estimate the implied CoE using five models [41–44]). Since we have two versions of Easton model (MPEG or PEG ratio), we compute our first ICC measure as the average of four estimates of implied CoE including the estimate of MPEG ratio model of Easton. As an alternative measure of ICC, we compute a second variable as the average of four ICC estimates including ICC estimate of the PEG ratio instead of the ICC estimate of the MPEG ratio.

We rerun all our regressions in Table 4 and Table 5 using this alternative measure of ICC. The findings are reported in Table 6 and Table 7. These results are qualitatively similar to those reported in Tables 4 and 5. Therefore, all our inferences remain unchanged.

Table 6. Fixed effects regressions with alternative measure of ICC.

| | (1) | (2) | (3) | (4) |
|--------------|----------------------|-----------------------|----------------------|-----------------------|
| Variables | Whole sample | Low MA | High MA | High-Low MA |
| CSR_d | −0.002 ** (0.043) | −0.002 (0.196) | −0.002 ** (0.042) | −0.002 ** (0.033) |
| MA_d | | | | −0.001 * (0.082) |
| CSR_d*MA_d | | | | −0.000 (0.980) |
| BETA | 0.002 (0.178) | 0.003 ** (0.041) | 0.002 (0.262) | 0.002 * (0.061) |
| SIZE | −0.001 ** (0.011) | −0.002 *** (0.005) | −0.001 (0.196) | −0.001 *** (0.000) |
| BTM | 0.015 *** (0.000) | 0.012 ** (0.025) | 0.018 *** (0.000) | 0.015 *** (0.000) |
| LEV | 0.027 *** (0.000) | 0.029 *** (0.000) | 0.025 *** (0.000) | 0.026 *** (0.000) |
| LTG | 0.067 *** (0.000) | 0.104 *** (0.000) | 0.042 *** (0.000) | 0.067 *** (0.000) |
| DISP | 0.025 (0.106) | 0.021 (0.331) | 0.029 (0.180) | 0.025 (0.104) |
| ROA | 0.014 ** (0.030) | 0.018 (0.214) | 0.018 *** (0.003) | 0.015 *** (0.010) |
| Constant | 0.057 *** (0.000) | 0.065 *** (0.000) | 0.055 *** (0.000) | 0.057 *** (0.000) |
| Observations | 17,379 | 7933 | 9446 | 17,379 |
| R-squared | 0.122 | 0.142 | 0.116 | 0.122 |
| Industry FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |

This table reports fixed effects OLS regressions results. The dependent variable is a second alternative average of the implied cost of equity (ICC). CSR_d is a dummy variable indicating firm-year observations with positive CSR_index and 0 otherwise. MA_d is a dummy variable equals to 1 (0) for firm-year observations with high (low) managerial ability scores. High versus low scores are performed based on the industry median for each given year (above versus below). All variables are as defined in the notes to Table 1. All specifications control for industry fixed effects and year fixed effects. Heteroskedasticity-consistent standard errors are clustered at the firm level. All the continuous variables are winsorized at the first and the 99th percentile. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively.

| Year FE | Yes |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|
|---------|-----|-----|-----|-----|-----|-----|-----|-----|

This table reports fixed effects OLS regressions results. The dependent variable is a second alternative average of the implied cost of equity (ICC). STR_d (CON_d) is a dummy variable indicating firm-year observations with CSR strengths (concerns) and 0 otherwise. MA_d is a dummy variable equals to 1 (0) for firm-year observations with high (low) managerial ability scores. High versus low scores are performed based on the industry median for each given year (above versus below). Interaction is MA_d*STR_d (MA_d*CON_d) for CSR strengths (concerns) models. All variables are as defined in the notes to Table 1. All specifications control for industry fixed effects and year fixed effects. Heteroskedasticity-consistent standard errors are clustered at the firm level. All the continuous variables are winsorized at the first and the 99th percentile. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively.

4.3.2. Difference-In-Differences Regressions

Our findings might be affected by endogeneity issues, e.g., simultaneity bias between CSR engagement and a firm's CoE. Waddock and Graves [50] find a positive synergy between corporate social performance and financial performance.

One important way to deal with such reverse causality issue is to use difference-in-differences (DiD) regressions. This approach allows to test how an external variation in the value of CSR activities affects firm's CoE financing. This is important because without an exogenous change, it is difficult to attribute variations in ICC to CSR activities.

To implement our DiD regressions, we follow previous literature and exploit the 2008 financial crisis as an exogenous shock to a firm CSR activities' value. The goal of the DiD design is to compare the difference in firm's ICC before and after the treatment for treated firms (i.e., those with CSR strengths) with the corresponding difference for control firms (i.e., those without CSR strengths). For this, the following regression equation is estimated:

$$ICC_{i,t} = \beta_0 + \beta_1 Treated_i * Crisis_t + \beta_2 Treated_i + \beta_3 Crisis_t + \sum_i \sum_t CV_{i,t} + \varepsilon_{i,t} \quad (3)$$

where subscripts i and t indicate firm and period (pre and during the 2008 financial crisis), respectively. $Treated$ is a dummy variable which equals one if a firm belongs to the treated group with CSR strengths. $Treated$ equals zero if a firm belongs to the control group without CSR strengths. $Crisis$ is a dummy variable indicating the 2008 financial crisis period. $Crisis$ equals one for years 2008 and 2009. It equals zero for years 2005 and 2006. We follow [17] and define our treated and control groups (with and without CSR strengths, respectively) at the end of 2006. $CV_{i,t}$ is the vector of control variables.

The DiD coefficient β_1 captures the average differential change in firm ICC from the pre-crisis to the crisis-period of the treated group relative to the control group. If CSR strengths drive a firm's ICC, then the gap (β_1) between the treated and the controls firms will be higher during the 2008 financial crisis relative to the pre-crisis period. Thus, the DiD coefficient β_1 is expected to be significant and positive.

We run our difference-in-differences regressions using Equation (3) and three samples: the whole sample and the two subsamples of firms with high versus low managerial abilities. The findings are reported in Table 8. The DiD coefficient (β_1) is positive and significant when the subsample of firms with high managerial abilities is used. This result confirm that our findings cannot be affected by endogeneity issue. Therefore, our inferences remain unchanged.

Table 8. Difference-in-differences regressions with CSR strengths.

| Variables | All Firms | Firms with Low MA Score | Firms with High MA Score |
|-------------------------|-----------------------|-------------------------|--------------------------|
| <i>Treated * Crisis</i> | 0.0166 (0.137) | 0.0010 (0.968) | 0.0320 *** (0.000) |
| <i>Treated</i> | 0.0067 *** (0.003) | 0.0110 *** (0.001) | 0.0017 (0.633) |
| <i>Crisis</i> | -0.0210 ** (0.047) | -0.0097 (0.694) | -0.0333 *** (0.000) |
| BETA | 0.0058 * (0.060) | 0.0016 (0.671) | 0.0079* (0.073) |
| BTM | 0.0139 * (0.079) | 0.0131 (0.159) | 0.0202 (0.155) |
| SIZE | -0.0008 (0.495) | -0.0009 (0.655) | -0.0006 (0.668) |
| LEV | 0.0263 *** (0.000) | 0.0258 *** (0.000) | 0.0341 *** (0.000) |

| | | | |
|--------------|----------------------|----------------------|----------------------|
| LTG | 0.0715*** (0.002) | 0.1028*** (0.002) | 0.0402 (0.176) |
| DISP | 0.0518 (0.146) | 0.0394 (0.382) | 0.0411 (0.406) |
| ROA | 0.0369*** (0.009) | 0.0594*** (0.004) | 0.0094 (0.636) |
| Constant | 0.0481*** (0.003) | 0.0459* (0.055) | 0.0919*** (0.000) |
| Observations | 848 | 444 | 404 |
| R-squared | 0.211 | 0.286 | 0.256 |
| Industry FE | Yes | Yes | Yes |

The table reports coefficients estimated from the difference-in-differences regressions of implied cost of equity (ICC) on Treated, Crisis, interaction term (Treated * Crisis) and control variables. Treated is a dummy variable indicating firm-year observations with CSR strengths and 0 otherwise. Crisis is a dummy variable indicating the financial crisis period (2008–2009). All regressions control for firm industry membership. All continuous variables are winsorized at the 1st and 99th percentile. *p*-values are reported in the parentheses. Heteroskedasticity-consistent standard errors are clustered at the firm level. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively.

5. Discussion and Conclusions

In this paper, we examine whether a firm's managerial ability moderates the link between a firm's cost of equity capital and corporate sustainability activities. Based on the prior theoretical and empirical literature, we argue that corporate sustainability, as reflected in CSR ratings, negatively impact the cost of equity but only when the firm's managerial ability is high.

We test our hypotheses by using a large U.S. sample of 17,389 firm-year observations. In a first step, our findings reveal that corporate sustainability measured by CSR engagement (CSR concerns) scores significantly reduces (increases) a firm's CoE. These results support the prediction of the risk mitigation effect of sustainability activities. Additionally, they are consistent with the results of prior studies such as Ng and Rezaee [5].

In the second step, when we split our sample into firms with high versus low managerial abilities, we find that CSR strengths significantly reduce a firm's CoE only when managerial abilities are high. We confirm this result using the 2008 financial crisis as an exogenous shock to CSR and running a difference-in-differences regression analysis.

This result clearly shows the importance of the heterogeneity in managerial abilities when linking a firm's CoE to corporate sustainability. Thus, we add to the stream of studies on different factors that moderate the relationship between a firm's financial performance and corporate sustainability (e.g., [5,13,14,30]).

Additionally, this finding is particularly consistent with those of Ng and Rezaee [5], Gong et al., [14] and Cho and Lee [51]. Ng and Rezaee [5] find that firms with both better "economic" and "ESG" sustainability performance exhibit lower CoE. Instead of considering "economic" sustainability, we use managerial abilities which reflect the economic efficiency in transforming a firm's resources to financial outcomes.

Gong et al., [14] find that only the managerial ability-associated component of CSR has a positive impact on a firm's return on assets and return on sales in a sample of firms in the energy industry. Cho and Lee [51] show that efficient managers are more likely to engage in the product-related CSR that directly connects to corporate financial performance as measured by Total Q of Peters and Taylor [52]. The findings of these last two studies suggest that the CSR–firm performance relationship depends on managerial abilities.

Our results have important implications. For firms with high managerial abilities and limited sustainability commitment, these findings should encourage their managers to pursue or initiate more sustainability activities owing to their negative effect on a firm's cost of equity capital. Additionally, our findings provide evidence that managerial ability

is a moderator that future research needs to consider when studying the relationship between corporate sustainability and a firm's cost of equity capital.

Although we performed some robustness checks in order to assess the validity of our results, this study has some limitations that open the door for future research avenues. For instance, we used three aggregated measures of CSR that could hide important heterogeneity needed to explain more variations in the CoE. Thus, future research could examine the individual CSR dimensions such as community, employees, environment, diversity, product, governance and human rights.

Moreover, future research could explore CSR structures [53], i.e., how managers combine different CSR activities to define a firm's CSR commitment, instead of using only the level of CSR engagement. Additionally, it might be interesting to use other corporate sustainability measures than the MSCI ESG ratings and to extend the investigation to non-US firms and to more recent data.

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