Equity costs and risks in emerging markets: Are ESG and Sharia principles complementary?

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ABSTRACT

By proposing a novel continuous and time-varying measure of *Sharia* compliance, we investigate whether it enhances the effects of corporate social responsibility, proxied by Environmental-Social-Governance scores, on firms' equity costs and market risks in emerging countries. We construct a large dataset of non-financial listed firms incorporated in eighteen emerging markets, both *Sharia*-compliant and conventional (4612 firm-year observations from 2002 to 2018), finding a consistent, statistically significant, and negative association between the interaction of ESG scores and the *Sharia* sensitivity with the cost of equity. Moreover, we reveal that this negative relationship is mediated by firms' market risk (risk channel).

1. Introduction

Corporate Social Responsibility (CSR) has been deeply investigated, showing how it associates with beneficial effects for firms' risks and cost of capital (Kim et al., 2014; Becchetti et al., 2015; Cheung, 2016; Sharfman and Fernando, 2008; Menz, 2010; Goss and Roberts, 2011; Dhaliwal et al., 2011). Recently, interest in CSR flourished again due to the emergence of Environmental, Social and Governance (ESG) scores as engagement proxies, both for academics and investors.

In the meantime, firms compliant with Islamic principles are growing significantly in number and performance, despite a lower academic interest (Alzahrani, 2019) and a material amount of research opportunities (Shafron, 2019; Alnori and Alqatani, 2019). Only recently research explored how *Sharia* compliance impacts firms' capital (Yildirim et al., 2018; Halim et al., 2019; Alnori and Alqatani, 2019), credit ratings (Azmat et al., 2017), stock market reactions (Godlewski et al., 2016), dividend policies (Imamah et al., 2019; Balli et al., 2020), agency costs (Azmi et al., 2019), and governance issues (Hayat and Hassan, 2017; Naz et al., 2017). In the field of CSR, positive effects depend on stakeholders' sensitivity to business ethics (Cheung, 2016): ethics and Islamic principles are linked by

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several authors (Dusuki, 2008; Williams and Zinkin, 2010; Aribi and Gao, 2012; Khan, 2016; Quttainah and Almutari, 2017).

Evidence supports the stakeholder and moral capital theories (Bouslah et al., 2018) and contrasts the portfolio and agency theories (Mansor and Bhatti, 2011): CSR and *Sharia* screenings positively impact firms' performance when they do not overlap and market participants are sensitive to them, overcoming the negative effect of increased screening costs, reduced diversification, and adverse incentives for managers. However, if CSR engaged firms operating in *Sharia* sensitive environments benefit in terms of equity costs and market risks, to the best of our knowledge, remains unanswered.

A common caveat in the identification strategy affects previous studies: the use of a time-invariant and binary firm-level measure of *Sharia* compliance, unable to capture intensity or trends. At the country-level, the literature focused on the Islamic "label" (legal system), rather than on the level of "action" of market participants (an exception, on banking, is Paltrinieri et al., 2020). The portfolio/agency and the stakeholder/moral capital theories may be not mutually exclusive if we grasp this additional dimension.

Moreover, most studies simply associate *Sharia* compliance or CSR engagement to firm-level variables. We are interested in providing a novel approach by analyzing if the risk channel provides a mediating role for this nexus, and if firms with different levels of sensitivity to Islamic principles or CSR engagement respond differently to exogenous shocks.

Our paper aims at several contributions to the literature. Firstly, we fill a literature gap by linking two theoretical backgrounds to the CSR and Islamic corporate finance contexts. Secondly, we analyze the response of the cost of equity and market risks of non-financial firms while controlling on the Islamic orientation of the incorporating country, as well as for the joint and separate effects of CSR and *Sharia* compliance. Thirdly, our evidence is built on a time-variant and non-binary country-level measure of sensitivity to Islamic principles. Fourthly, our findings support the mediating role played by risk towards the cost of equity. Lastly, by exploiting a quasi-natural experiment built on an exogenous shock, we investigate the response of CSR engaged firms in *Sharia* sensitive countries in terms of cost of equity and market risks.

We focus on emerging markets for three reasons. *Sharia* compliant non-financial firms obtain 10% greater average ESG scores, with wider differences "particularly in emerging and frontier markets" (Islamic Finance ESG Outlook – Thomson Reuters Refinitiv, 2019). Moreover, the actual level of sensitivity to *Sharia* principles varies significantly in these countries. Lastly, we reduce the potential confounding effect due to CSR-related reporting requirements of most advanced countries.

Our study relies on a strongly balanced sample of 4612 firm-year observations for the 2002–2018 period, from listed non-financial firms incorporated in eighteen emerging countries and four continents. Through panel fixed-regressions, difference-in-difference and propensity score matching settings, as well as a set of endogeneity and robustness checks, we find a strong, consistent, and novel evidence that high ESG firms in *Sharia* sensitive countries experience a lower cost of equity and market risks. We prove the existence of the mediating role of market risks in affecting the cost of equity. Finally, we show that stakeholders in more *Sharia* sensitive countries awarded firms with higher CSR engagement with lower market risks and cost of capital after the 2015–2106 oil shock.

Our findings support the complementarity hypothesis between CSR and *Sharia* compliance, with one major policy implication for firms and investors: higher ESG scores benefit the cost of capital and market risks of firms in countries more sensitive to Islamic principles.

The remainder of the paper is structured as follows. In Section 2, we review the literature on Islamic finance and CSR and develop our hypotheses. In Section 3, we describe our sample, data, and methodology. In Section 4, we present and discuss our findings. In Section 5, we address endogeneity concerns and provide several robustness checks, while in Section 6 we offer our concluding remarks.

2. Theoretical framework and hypothesis development: CSR and Islamic corporate finance

Research on CSR has an extensive history, rich of contributions that study its role from a number of alternative perspectives, despite the concept is itself not easy to be identified (Sheehy, 2015).[1] Frequently, contributions overlap with other concepts, such as social investing (Dunfee, 2003), or Socially Responsible Investments (SRI). SRI can be defined as investments that "combine investors' financial objectives with their concerns about environmental, social and governance (ESG) issues" (EUROSIF, 2010). Since measuring the "true" engagement in CSR is a difficult task, ESG scores are widely used as a proxy in both the academic research (Liang and Renneboog, 2017) and by investors to assess firms' strategies, future risks, and opportunities (Bassen and Kovacs, 2008).[2]

Theoretically, the relationship between CSR engagement and firms' risk is explained by the stakeholder theory. Stakeholders (customers, employees, citizens, etc.) exert pressure on firms to enhance their social engagement (McWilliams and Siegel, 2011). Managers are aware that this affects firms' financial performance, revenues, and risk (Hassan et al., 2021), changing their business behavior. As shown in Bouslah et al. (2018), socially responsible practices function as a "moral capital", reducing firms' financial risks and signalling a higher stability and soundness (Chiaramonte et al., 2021).

On the other side, Islamic (corporate) finance is subject to religious norms that are strongly connected with business ethics, as acknowledged within *Sharia* principles (Rice, 1999; Beekun and Badawi, 2005; Brammer et al., 2007; Dusuki and Abdullah, 2007;

[1] For the purposes of our paper, we adopt the following definition: "Responsibility of an organization for the impacts of its decisions and activities on society and the environment, through transparent and ethical behavior that contributes to sustainable development, including health and the welfare of society; takes into account the expectations of stakeholders; is in compliance with applicable law and consistent with international norms of behavior; and is integrated throughout the organization and practiced in its relationships" (ISO 26000:2010).

[2] ESG scores are conceptualized in the UN Principles for Responsible Investment (PRI). and measure a company's relative performance and engagement across different dimensions (emissions, environmental product innovation, human rights, shareholders, etc.) and is based on non-financial reporting obtained by various sources (annual reports, non-governmental organizations' websites, and media outlets).

Williams and Zinkin, 2010; Platonova, 2013) or CSR (Dusuki, 2008; Cheong and Tiga, 2019; Franzoni and Allali, 2018). Five religious pillars of *Sharia* rule the economic, social and ethical dimensions of Islamic individuals, institutions, and financial products (Iqbal and Mirakhor, 2007): (1) the prohibition of explicit interest rates (*riba*), (2) the prohibition of transactions with excessive uncertainty (*gharar*), (3) the prohibition of specific markets or products (weapons, pork, alcohol), (4) the profit and loss sharing between contractual parties, and (5) a direct link of each activity with the real economy.

As a result, Islamic funds are considered ethical funds and *Sharia*-compliant investments are among SRI due to their screening criteria (Wilson, 1997; DeLorenzo, 2002; Elgari, 2002; Forte and Miglietta, 2011; BinMahfouz and Hassan, 2013; Erragraguy and Revelli, 2015; Charfeddine et al., 2016). At the same time, *Sharia*-compliance involves screenings that are more restrictive than those of CSR, for instance on interest-bearing instruments and cash holdings (Sadeghi, 2008; Paltrinieri et al., 2019), but may not consider some CSR dimensions, such as human rights or the environment (Al-Damkhi, 2008).

To answer our research question, we need to assess the impact of both CSR engagement and *Sharia* sensitivity on the cost of equity. Focusing on CSR, we expect a negative impact of CSR on cost of equity. From a theoretical perspective, Merton (1987), in the capital market equilibrium model, shows that the larger the size of a firm's investor base, the lower the cost of capital. The same view is shared by Heinkel et al. (2001), unveiling that when a small number of investors holds a firm's stock, diversification opportunities are reduced, increasing the cost of capital.

El Ghoul et al. (2011) support the view that CSR firms tend to have a larger investor base due to their preferences and the role played by information asymmetries. SRI investors are less likely to include firms with poor CSR outcomes in their portfolios: these firms need therefore to increase their expected returns in order to attract capital, causing a spike in its costs (on "sin stocks", see Hong and Kacperczyk, 2009). Moreover, firms with a stronger focus on CSR disclose more information, thus reducing information asymmetries (Dhaliwal et al., 2006; Hong and Kacperczyk, 2009).

Empirical studies make a strong case for this CSR/cost of equity relationship. Both El Ghoul et al. (2011) and Dhaliwal et al. (2011) provide evidence that firms can benefit from CSR investments in terms of a reduction in their cost of equity, with Attig et al. (2013) supporting the lower financing costs view as a result of the better credit rating of firms engaged in CSR. Chava (2014) unveils that firms with environmental concerns pay a higher interest rate on their bank loans. The empirical literature points at a negative relationship between CSR and the cost of financing, with a notable exception: Sharfman and Fernando (2008) find a positive relationship between good environmental performance and bond yields.

Focusing on the relationship between *Sharia* compliance and the cost of equity, the level of complexity increases, since we need to consider the capital structure, including leverage, to a greater extent. As in Modigliani and Miller (1958), the cost of equity contains a financial risk premium that is positively related to leverage. Since compliance to *Sharia* limits the debt level of firms (Paltrinieri et al., 2019), they could be less leveraged and experience a higher cost of capital. Unfortunately, to the best of our knowledge, only Karimov et al. (2020) show that *Sharia* compliance initially increases the cost of equity but, with greater exposure and awareness in Islamic markets, in time it falls in time.

A benefit on the cost of equity from *Sharia* compliance can be motivated in three ways. Firstly, *Sharia* screenings may lead to the selection of more stable and financially stronger firms, by requiring scrutiny on indicators such as cash holdings and leverage, as well as by excluding controversial industries, thus improving reputation (Durand et al., 2013). Secondly, prohibiting excessive uncertainty and gambling (Hussein and Omran, 2005) may reduce the overall risk-taking. Thirdly, a "certification effect" may exist from the inclusion of a firm in a specific Islamic index (Hassan et al., 2018). Overall, we expect these factors to overcome the more direct effect of *Sharia* requirements on leverage. As for the CSR literature, the combination of *Sharia* and CSR practices is expected to be complementary in reducing firms' riskiness in a stakeholders' theory framework (Hassan et al., 2021). Moreover, as shown by Hassan et al. (2022), *Sharia* compliant firms tend to be more CSR engaged, especially after exogenous shocks worldwide. Consistently with the moral capital theory (Chiaramonte et al., 2021), since the impact of CSR practices varies across the accepted level of social responsibility, it is interesting to explore the validity of such theoretical assumptions for firms headquartered in emerging markets strongly oriented on *Sharia* principles.

However, unlike previous studies, we aim at measuring the role of *Sharia* compliance through a time-variant and continuous variable, in order to capture a greater insight on the resulting impact on firms' equity costs and market risk. The common "*Sharia* flag" of most studies, in particular, does not convey information on the strength of such compliance, as well as its variability across time, and relies on fulfilling minimum requirements or specific legal systems. Based on both the stakeholders' theory framework and previous empirical results, we expect that a greater (lower) engagement in CSR within more *Sharia*-sensitive countries amplifies (reduces) the negative effect on the cost of capital.

H1. *There is a negative association between ESG scores and* Sharia *sensitivity with the cost of equity.*

After assessing the combined impact of ESG scores and *Sharia* sensitivity on the cost of equity, we are interested in assessing the channel linking them. Previous studies, like El Ghoul et al. (2011) and Chava (2014), highlight how significant is *firm risk*. Hong and Kacperczyk (2009) show the importance of the idiosyncratic risk (and not just the systematic component) in reducing the cost of equity, in line with the Merton's model, because of either neglected or limited risk sharing. Therefore, we are interested in considering both the idiosyncratic and systematic components within the "total market risk".[3] Basically, this literature underlines a risk channel: investors perceive firms with inadequate socially responsible engagement to be riskier (Breuer et al., 2018).

[3] As a robustness check (Table 14), we redo our baseline model by decomposing the total market risk in its idiosyncratic and systematic component, testing the channel by which the cost of equity reduction is moderated.

There are several theories that could help explaining the impact of CSR and *Sharia* principles on firms' risk, with opposite results. Agency and portfolio theories predict that no benefits should be associated with multiple screenings: they increase screening and monitoring costs, reduce diversification opportunities (Mansor and Bhatti, 2011), or result from principal-agent issues (Tirole, 2002). However, sustainability and *Sharia* screenings do not show a negative influence on systematic risks of investment portfolios (Bin-Mahfouz and Hassan, 2013). Moreover, differences between the two sets of social and religious norms may justify beneficial effects (Hussein and Omran, 2005; Forte and Miglietta, 2011). Additionally, firms with fewer agency issues are found to be more engaged in CSR (Ferrell et al., 2016), consistently with the stakeholder and moral capital theories (Godfrey, 2005; Bouslah et al., 2018). The stakeholder and moral capital theories propose predictions that are closer to our main research question.

Empirically, firm activism within environmental aspects of CSR is shown to lower the perception of risk from investors (Feldman et al., 1997) and improve stakeholder engagement (Cheng et al., 2014). The effect on risk may be explained by lower compliance costs, improved reputation, and stakeholders' loyalty (Bouslah et al., 2013). The social dimension is also found to be associated with lower risks, due to better cooperation and trust (Kane et al., 2005), or higher commitment, increased loyalty, and fewer litigations (Bauer et al., 2007). Finally, governance should also be associated with reduced firm risks, creating fewer incentives to pass them to stakeholders (Kirkpatrick, 2009).

The Islamic corporate finance literature does not entirely confirm the same findings. Several authors find evidence of a stronger connection between CSR and *Sharia* compliance within the environmental and social dimensions (Hussein and Omran, 2005; Dusuki, 2008; Forte and Miglietta, 2011), whereas the association with the governance pillar is more limited (Hayat and Hassan, 2017).

There is a lack of empirical investigation on the impact of *Sharia* compliance on firm risk. Alsaadi et al. (2017) argue that *Sharia* compliance should be beneficial: more transparency fosters fewer forecast errors, fraudulent accounting, and earnings management, hence reducing firm risks. Moreover, firms may experience a positive "certification effect" on risk (Halim et al., 2019).

Therefore, within the stakeholder and moral capital frameworks, we derive the following hypotheses, to be tested separately:

H2A. *Firms with higher ESG scores in highly* Sharia-*sensitive countries show a lower market risk.*

H2B. *The negative association between ESG scores and* Sharia-*sensitivity on the cost of equity is mediated by the firm risk.*

To strengthen the evidence on the aforementioned relationships, we also exploit the quasi-natural experiment setting of an exogenous economic shock: the 2015–2016 oil shock provides an ideal setting. During a negative exogenous shock, both the cost of equity and the market risk of firms increase, allowing us to check if the behavior of firms with different characteristics differed before and after its occurrence.

As in Bouslah et al. (2018), we can refer to two main theories: the risk mitigation view and the overinvestment view. The risk mitigation view (Godfrey, 2005; Godfrey et al., 2009) is a risk management within the stakeholder theory, proposing a negative relationship between CSR and firm risk. The more a firm invests in CSR, the lower is the likelihood of negative events: firms are better prepared for shocks like recessions, financial crises, or stricter regulations. The opposite view, the overinvestment theory as an implied outcome of agency issues (Barnea and Rubin, 2010), argues a positive relationship between CSR and firm risk arising from managerial entrenchment. Managers, in order to maintain or strengthen their power, may choose to overinvest in CSR activities at the expense of shareholders to improve their reputation and obtain support from other stakeholders. The outcome is a reduced probability of their replacement; however, it also lowers the resilience of the firm during turbulent times, resulting in more risk and lower performance. These theories therefore provide opposed predictions during shocks for both CSR and *Sharia*-compliant firms.

Empirically, more contributions support the risk mitigation theory, especially focusing on the 2008–2009 subprime financial crisis. Lins et al. (2017) provide evidence that firms with high CSR intensity experienced higher stock returns, higher profitability and growth compared to the others. Bouslah et al. (2018) show that CSR reduced volatility during the subprime financial crisis.

Therefore, we derive our third hypotheses, again distinguished to be tested separately:

H3A. *An exogenous economic shock increases the magnitude of the negative association between ESG and* Sharia *sensitivity with firm risk.*

H3B. *The negative association between ESG scores and* Sharia *sensitivity on the cost of equity is mediated by the firm risk.*

In summary, confirming our hypotheses would support the complementarity between CSR and *Sharia* compliance, reconciling the stakeholder/moral capital theoretical framework with the predictions of both the portfolio and agency theories.

3. Data and methodology

3.1. Sample selection

Our sample consists of listed non-financial firms incorporated in emerging countries as classified by the International Monetary Fund Research Department (2019) and included in MSCI regional equally weighted indexes (Africa, Asia, Europe, Latin America) Data is obtained from Thomson Reuters' Refinitiv.

Financial firms are excluded consistently with previous research (e.g., Khaw et al., 2019), due to the substantial differences in their business models, risk profiles, accounting, and regulation. We also exclude firms with missing values for our target variables: the ESG score and the *Sharia* concentration ratio. Both variables are extensively described in Section 3.3.

We need to exclude firms with missing ESG scores since these may be engaged in CSR without being explicitly scrutinized in our data source, potentially biasing our results. In line with previous research (Liang and Renneboog, 2017), ESG scores are obtained from Thomson Reuters' Refinitiv.

Table 1
Sample structure by country and industry.

Panel A

Countries	Observations	%
Argentina	44	0.95
Brazil	482	10.45
Chile	189	4.10
China	1051	22.79
Colombia	55	1.19
Hungary	27	0.59
India	546	11.84
Indonesia	216	4.68
Malaysia	285	6.18
Mexico	212	4.60
Morocco	12	0.22
Peru	61	1.32
Philippines	116	2.52
Poland	129	2.80
Russia	279	6.05
South Africa	584	12.66
Thailand	192	4.16
Turkey	132	2.86
Total	4612	100

Panel B

GICS Industry	Observations	%
Communication Services	439	9
Consumer Discretionary	521	11
Consumer Staples	631	13
Energy	454	9
Health Care	235	5
Industrials	806	17
Information Technology	189	4
Materials	844	18
Utilities	493	10
Total	4612	100

This table reports the distribution of observations in our sample by country (Panel A) and industry (Panel B), in absolute as well as in relative terms. The sample period is 2002–2018. The industry classification is based on the GICS definition.

The *Sharia* concentration ratio is calculated as the sum of the squared market share of *Sharia*-compliant firms in the country, based on total assets as reported by Thomson Reuters' Refinitiv. This allows us to capture the time-varying nature of country sensitivity to *Sharia* principles, focusing on performance rather than disclosures (Cho et al., 2014 and avoiding the limitation incurred by relying only on the inclusion in an Islamic index (insufficient to ensure full *Sharia*-compliance: Alsaadi et al., 2017). We are therefore able to reduce the possible bias arising from self-reported information and to assess the strength of *Sharia* market power in a country, which plays a pivotal role in explaining the marketability of specific assets, finally determining products and services (Abbas and Arizah, 2019).

The time period spans from 2002 to 2018: in the spirit of Khaw et al. (2019), its length reduces the possible bias arising from specific time trends. Specifically, 2002 is the oldest data provided by Thomson Reuters Refinitiv' ESG data, while 2018 is the latest year available to us. Our sample includes 18 emerging countries having ESG data and classified as "emerging" by the International Monetary Fund Research Department (2019)[4].

Panel A of Table 1 illustrates the sample composition by country during the period of our analyses, whereas Panel B provides information based on the Global Industry Classification Standard (GICS).

Our sample includes eighteen countries from four continents (Latin America, Asia, Africa, and Europe). Observations are concentrated in China (23%), South Africa (13%), India (12%) and Brazil (10%). In terms of industries, observations mainly pertain to the following sectors: materials (18%), industrials (17%) and consumer staples (13%). Table 2 shows mean values and standard deviations by country of our target variables: *Sharia* concentration (Panel A) and ESG scores (Panel B).

In our sample, countries with the lowest levels of *Sharia* concentration are the Philippines (7%), Indonesia (14%) and Brazil (16%), whereas the highest values are reported for Morocco (100%), Hungary (82%) and Poland (78%). In terms of ESG scores, average values are higher for Hungary (0.58), South Africa (0.54) and India (0.53), whereas lower mean scores are reported for Argentina (0.21), Peru

[4] See IMF (2020), http://www.imf.org/external/datamapper/FMEconGroup.xlsx.

Table 2
Sample distribution of target variables: *Sharia* concentration and ESG scores.

	Sharia concentration		ESG scores	
Country	Mean	Std. Dev.	Mean	Std. Dev.
Argentina	0.1864	0.0443	0.2129	0.2324
Brazil	0.1628	0.0104	0.5000	0.2314
Chile	0.2876	0.0244	0.3775	0.2386
China	0.6106	0.0417	0.3055	0.2205
Colombia	0.5272	0.0739	0.4383	0.2800
Hungary	0.8177	0.0150	0.5765	0.2556
India	0.4136	0.0104	0.5310	0.1970
Indonesia	0.1411	0.0063	0.4499	0.2293
Malaysia	0.4007	0.0193	0.4406	0.1920
Mexico	0.2281	0.0225	0.4427	0.2452
Morocco	1	0	0.4934	0.1832
Peru	0.5643	0.0143	0.2634	0.2408
Philippines	0.0732	0.0069	0.3931	0.1939
Poland	0.7811	0.0201	0.4221	0.2018
Russia	0.7526	0.0158	0.4499	0.1956
South Africa	0.5012	0.0359	0.5428	0.1770
Thailand	0.4308	0.0341	0.5063	0.2416
Turkey	0.1829	0.0120	0.4764	0.2174

This table reports the distribution of the *Sharia* concentration measure and the ESG scores of sampled firms by country, in terms of mean values and standard deviation. The sample period is 2002–2018.

(0.26) and China (0.31). Contrary to common belief, the amount of assets held by firms compliant with Islamic law in emerging countries is not limited to those with a greater Muslim population or a closer relationship between faith and the legal system.

3.2. Research methodology

Our empirical strategy involves four steps. The first step empirically investigates if being both *Sharia*-compliant and engaged in CSR lowers the cost of equity, through a reduction in firm's market risk. Therefore, we test the relationship between CSR practices, *Sharia* concentration and the cost of equity (Coe) employing a panel regression (Khaw et al., 2019). Due to the structure of our sample, it is advisable to include industry, country, and time fixed effects to control for time varying and cross-sectional unobserved heterogeneity, as well as possible omitted unobservable factors. Thus, our first model is presented in the following equation:

$$Coe_{it} = c + \beta_2 ESG_{i,t-1} * HHISharia_{c,t-1} + \beta_2 ESG_{i,t-1} + \beta_3 HHISharia_{c,t-1} + \beta_4^{'} X_{i,t-1} + \upsilon_t + \gamma_i + \delta_i + \varepsilon_{it} \quad (1)$$

where our dependent variable is the cost of equity (*Coe*) for firm *i* at time *t*. The variables of interest are ESG scores (*ESG*), the *Sharia* concentration ratio (*HHISharia*) and their interaction. We include a vector of control variables (*X*) consistent with the previous literature. Finally, the remaining variables, also present in the subsequent models, represent time (υ_t), industry (γ_i) and country (δ_i) fixed effects, or the error term (ε_{it}). All target and control variables are lagged to alleviate endogeneity concerns. Moreover, we employ standard errors adjusted for heteroskedasticity and clustered at the firm-level (Sila et al., 2016; Anginer et al., 2018).

Our second step aims at testing the mediating role on firms' market risk played by the relationship between ESG scores, the *Sharia* concentration, and their interaction. Therefore, we separately test the following equation:

$$Risk_{it} = c + \beta_2 ESG_{i,t-1} * HHISharia_{c,t-1} + \beta_2 ESG_{i,t-1} + \beta_3 HHISharia_{c,t-1} + \beta_4^{'} X_{i,t-1} + \upsilon_t + \gamma_i + \delta_i + \varepsilon_{it} \quad (2)$$

The setting is similar to Eq. 1, except for the dependent variable: firms' market risk is proxied by a firm's annualized volatility of returns (*Risk*) for firm *i* at time *t*.

Thirdly, to investigate the mediating role of firm's risk on the relationship between ESG scores, the *Sharia* concentration, their interaction, and the cost of equity, we also test the following equation:

$$Coe_{it} = c + \beta_2 ESG_{i,t-1} * HHISharia_{c,t-1} + \beta_2 ESG_{i,t-1} + \beta_3 HHISharia_{c,t-1} + \beta_4 Risk_{i,t-1} + \beta_5^{'} X_{i,t-1} + \upsilon_t + \gamma_i + \delta_i + \varepsilon_{it} \quad (2a)$$

Finally, we analyze if an "insurance" effect arises from ESG scores in countries with a high level of *Sharia* concentration. According to recent evidence (Lins et al., 2017), firms' sustainable engagement act as insurance against market risk (Godfrey et al., 2009). Our prediction, based on the moral capital theory, supports this view, as a factor mitigating stakeholders' conflict in the event of a crisis (Bouslah et al., 2018).

Several empirical contributions underline the effects of oil prices in emerging economies. Basher et al. (2012) find a strong affiliation between oil shocks, exchange rates and stock markets. Similarly, Bittlingmayer (2005) stress that the higher the increase in oil prices, the stronger the decrease in stock prices. According to Husain et al. (2015), growth projections were drawn down for emerging and developed markets after the 2015–2016 oil shock. Additionally, the U.S.-dollar-based bond spreads for emerging oil-exporting countries after the 2015–2016 oil-shock suggest that refinancing conditions became more problematic.

Therefore, we additionally analyze the relationship between the cost of equity, market risks and CSR engagement of firms in *Sharia*-

concentrated markets during the 2015–2016 oil shock, as a quasi-natural experiment that exploits an exogenous shock. We employ a difference-in-difference regression (DID), accordingly to the following two equations:

$$Coe_{it} = c + \beta_1 D\_TREATED^{*} OIL\_SHOCK + \beta_2 OIL\_SHOCK + \beta_3 D\_TREATED + \beta_4 Risk_{i,t-1} + \beta_5^{'} X_{i,t-1} + \upsilon_t + \gamma_i + \delta_i + \varepsilon_{it} \quad (3)$$

$$Risk_{it} = c + \beta_1 D\_TREATED^{*} OIL\_SHOCK + \beta_2 OIL\_SHOCK + \beta_3 D\_TREATED + \beta_4^{'} X_{i,t-1} + \upsilon_t + \gamma_i + \delta_t + \varepsilon_{it} \quad (3a)$$

In this setting, our variables of interests are the two dummies D_TREATED, OIL_SHOCK, as well as their interaction. OIL_SHOCK takes the value of 1 for years 2015 and 2016, whereas D_TREATED takes the value 1 for firms as those with ESG scores and *Sharia* concentration values above the sample mean. In this analysis, we restrict our sample period to 2012–2018 as to reduce the potential impact of confounding unobservable factors that could arise with extended time spans.

3.3. Description of variables

In this paragraph, we describe all dependent, target and control variables used in our models. A summary of their definition, sources and expected signs is provided in Table A.2 in the Appendix.

Our dependent variables are either the cost of equity or the volatility of returns as a proxy for firm risk. Calculating the "true" cost of equity capital is not an easy task: we rely on the literature empirically demonstrating the validity of CAPM estimations after Monte Carlo simulations (Da et al., 2012). In the spirit of previous research (Harvey, 1995; Breuer et al., 2018), we calculate a firm's cost of equity through the one-factor CAPM introduced by Markowitz (1959) and Sharpe (1964).[5] The volatility of returns, used as a proxy for firm risk (*Risk*), is calculated as the standard deviation of monthly stock returns over the previous year (Cai et al., 2016).[6]

The ESG score, the *Sharia* concentration ratio, and their interaction are our target variables. ESG data are represented by time-variant scores ranging from 0 to 100 and provided by Thomson Reuters's Refinitiv[7]: our choice is motivated by the transparent and objective design associated with its calculation.[8]

To measure the *Sharia* concentration ratio, we proceed as follows. Firstly, we determine the normalized Herfindahl-Hirschman index (HHI) as in Chiaramonte et al. (2015). We start from selecting *Sharia*-compliant firms as defined by Thomson Reuters Refinitiv through a time-invariant dummy (1 for firms fulfilling the requirements of Islamic law, and 0 otherwise). For each country, we then compute the ratio (*HHISharia*) as the sum of the squared market share value, in terms of total assets, for all *Sharia*-compliant firms in the country and for each year.[9]

In terms of control variables, we include additional data consistently with previous studies (Cheng et al., 2014; Khaw et al., 2019, Khalifa et al., 2019, Breuer et al., 2018). Data is collected from Thomson Reuters' Refinitiv database and is winsorized at the 1% of each tail to mitigate the effects of outliers.

Variables that could be related to the cost of equity are the following: the natural logarithm of a firm's total assets as a proxy for size (*SIZE*); the return on assets (*ROA*) as a proxy for profitability; the ratio of cash to total assets (*CASH_TA*) to account for cash holdings; the ratio of total debt to total assets (*DEBT_TA*) as a proxy for firm leverage; the sales to total assets ratio (*SALES_TA*) to account for the turnover, and the market value of assets divided by the book value of assets (*MTB*). Additional control variables typically associated with firms' risk are the following: a proxy for investment opportunities represented by capital expenditures scaled by total assets (*CAPEX_TA*); the dividends to total assets ratio (*DIV_TA*) for the dividend policy; and the retained earnings to total assets ratio (*REAR_TA*) as a proxy for a firm's life cycle.

4. Results and discussion

4.1. Descriptive statistics and univariate analysis

Table 3 provides summary statistics for all variables, broken down between firms that are *Sharia*-compliant and those that are not, as well as the test on the difference in means between the two subsamples across all variables.

Dependent and target variables are significantly different, in a statistical sense, between the two subsamples. The cost of equity and the risk are smaller for *Sharia*-compliant firms, whereas ESG scores and the *Sharia* concentration ratio are higher. Considering control variables, there are no significant differences for size or the return on assets. Instead, we find that *Sharia*-compliant firms hold less cash and debt, distribute more dividends, have a greater turnover, more capitals expenditures, a lower market-to-book ratio, and a higher

[5] In an additional robustness check described later, we employ the PEG proxy for the cost of equity (Eston et al. 2004; Xu et al., 2020) as an alternative measure.

[6] As a robustness check described later, we also employ the idiosyncratic risk as an alternative measure.

[7] We also run our models employing the alternative ESG score measure provided by Bloomberg Professional Services.

[8] For further details on ESG scores, their taxonomy and methodology, breakdown, and aggregation strategies, see Thomson Reuters Refinitiv (2020), *Environmental, Social and Governance (ESG) scores from Refinitiv*, April, available at: https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/esg-scores-methodology.pdf

[9] To furtherly check the robustness of our results, we run our baseline analysis employing an alternative measure of Sharia concentration: a dummy (*HighSharia*) equal to 1 for firms headquartered in countries with *HHISharia* concentration above the mean value of our sample, and 0 otherwise.

Table 3
Summary statistics.

Variables	Sharia-compliant firms (I)				Conventional firms (II)				Difference in means
	Mean	St.Dev.	Min.	Max.	Mean	St.Dev.	Min.	Max.	(I)-(II)
DEPENDENT VARIABLES									
Coe	0,009	0,014	0	0,087	0,010	0,0169	0	0,1066	−0,0007*
Total Risk	0,086	0,037	0,028	0,233	0,089	0,0392	0,0284	0,2591	−0,0028**
TARGET VARIABLES									
ESG	0,513	0,162	0,082	0,913	0,495	0,1749	0,0720	0,9550	0,0175**
HHISharia	0,494	0,187	0,0636	1	0,402	0,2002	0	0,8371	0,0918***
CONTROL VARIABLES									
SIZE	18,310	2329	1262	23,466	18,3167	22,908	12,036	2,343,646	16,478
ROA	0,081	0,083	−0,559	0,368	0,0793	0,0867	−0,7359	0,3681	0,0023
CASH_TA	0,070	0,068	0,0901	0,514	0,0866	0,0968	0	0,7097	−0,0158***
DEBT_TA	0,193	0,128	0	0,663	0,3091	0,1913	0	0,9049	−0,1151***
DIV_TA	0,034	0,042	0	0,207	0,0319	0,0416	0	0,2076	0,0029**
SALES_TA	0,834	0,555	0	35,623	0,7820	0,6325	0	35,623	0,0524***
CAPEX_TA	0,068	0,046	0,0001	0,330	0,0560	0,0461	0,0001	0,3305	0,0121**
MTB	0,027	0,029	−0,070	0,226	0,0345	0,0407	−0,0703	0,2267	−0,0072***
REAR_TA	0,313	0,266	−0,223	0,949	0,2126	0,4239	−0,5788	0,9494	0,1012***

This table reports the summary statistics (mean, standard deviation, minimum and maximum values) of our dependent, target and control variables for *Sharia*-compliant firms (I) and those ("conventional") that are not (II) for the 2002–2018 period. All sampled firms received an ESG score. Control variables are winsorized at the 1% level of each tail. ***, ** and * denote statistical significance at 1%, 5% and 10% levels for tests of differences in means between *Sharia*-compliant and conventional firms. Variable definitions are provided in Table A.2 in the Appendix.

Table 4
Baseline results: panel fixed-effects regression model.

	Coe	Coe	Total Risk
Variables	(I)	(II)	(III)
ESG * HHISharia (−1)	−0.0108*	−0.0115**	−0.0438**
	(0.0035)	(0.005)	(0.0220)
ESG (−1)	0.0016	0.0021	0.0164
	(0.0027)	(0.0027)	(0.0110)
HHISharia (−1)	−0.0193**	−0.0183*	−0.0192
	(0.0094)	(0.0096)	(0.0260)
SIZE(−1)	−0.0002	−0.0001	0.0011**
	(0.0002)	(0.0002)	(0.0005)
ROA (−1)	0.0055	0.0061*	−0.0363**
	(0.0034)	(0.0034)	(0.0166)
CASH_TA (−1)	0.0070***	0.0061***	0.0207**
	(0.0022)	(0.0022)	(0.0083)
DEBT_TA (−1)	0.0006	0.0002	0.0049
	(0.0014)	(0.0014)	(0.0066)
SALES_TA (−1)	−0.0007*	−0.0008*	0.0017
	(0.0004)	(0.0004)	(0.0023)
MTB (−1)	−0.0036	−0.0014	−0.0206
	(0.0085)	(0.0085)	(0.0253)
TOTAL RISK (−1)		0.0142**	
		(0.0061)	
DIV_TA (−1)			−0.0762***
			(0.0279)
CAPEX_TA (−1)			0.0388**
			(0.0183)
REAR_TA (−1)			−0.0103***
			(0.0022)
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Cluster SE firm	Yes	Yes	Yes
Observations	4612	4612	4612
R-squared	0.41	0.50	0.52

This table reports the estimates of the panel fixed-effects regression model of Eqs. 1, 2 and 3 (2002–2018). Dependent variables are: *Coe* (I), *Coe* with *Total Risk* among controls (II), and *Total Risk* (III). Variables of interest are: the ESG score, the *HHISharia,* and their interaction. Non-binary independent variables are lagged by one year with respect to the dependent variable. Control variables are winsorized at 1% of each tail. Time, Industry, and Country fixed effects (FE) are included in all specifications. Firm clustered standard errors (SE) are in parentheses. Superscripts ***, **, and * denote coefficients statistically different from zero at the 1%, 5%, and 10% levels, in two-tailed tests.

earnings retention rate.

This preliminary result appears in the spirit of Farooq (2007); Farooq and Alahkam (2016) and Williams and Zinkin (2010), observing that *Sharia*-compliant entities are more naturally inclined towards CSR practices. However, despite the statistical significance of mean differences of dependent and target variables, this does not necessarily imply that compliance to *Sharia* reduces the cost of equity and mitigates market risks in the presence of ESG engagement, or vice versa. We therefore turn to our baseline analysis, the difference-in-difference setting and the robustness checks in the following sections.

4.2. Baseline analyses: ESG, Sharia concentration, cost of equity and total market risk

In this section, we show and discuss our baseline panel fixed-effect regression models (Eqs. 1, 2 and 2a), where we investigate the impact of ESG scores and *Sharia* market concentration on the cost of equity and the total market risk (*Total Risk*) of firms.

The first set of results is disclosed in Table 4. We use the cost of equity as our dependent variable (column I), we then add risk as a control variable (column II), and finally use risk as our dependent variable (column III). Target variables are the same across all models (*ESG*, *HHISharia* and their interaction), whereas controls are extended for the third regression to include additional variables as described in the previous section (*DIV_TA*, *CAPEX_TA* and *REAR_TA*). This design is consistent with previous studies (e.g., Cheung, 2016) on mediating variable effects (in our case, total market risks). Evidence of this effect would imply that higher ESG scores in highly *Sharia*-concentrated markets lead to a lower risk and to a lower cost of equity, with risk being positively and statistically significantly associated to the cost of equity.

We find support to our hypothesis, consistently with the stakeholder theory. We observe that the coefficient of the interaction between target variables (*ESG*HHISharia*) is negative and statistically significant for both the cost of equity (H1: without risk among covariates; H2B: with risk as moderating variable) and the total market risk (H2A). At the same time, risk is statistically significant and positively associated to the cost of equity: there is a mediating relationship between being CSR-engaged firms in highly *Sharia*-concentrated markets and the cost of equity. In other words, emerging countries with higher *Sharia* concentration ratios present a greater inherent stakeholder perception and enhance the role played by ESG scores on the cost of equity and market risks of non-financial firms.

This preliminary result extends the literature on ESG and firms' risks in Islamic entities (Cheung et al., 2016; Attig et al., 2013). This effect could be attributed to market participants acknowledging that higher ESG scores signal firms less likely to be impacted by volatility. Our finding also supports the previous evidence on the insurance effect of CSR on the cost of equity (Xu et al., 2020), explained by the risk reduction channel. In this vein, our results support the recent literature on CSR and *Sharia* research fields (Hassan et al., 2021; Hassan et al., 2022) and consistent with the stakeholders' theory framework, predicting a complementary effect of the combination of CSR and *Sharia*. Table 4 shows that CSR engagement enhances the signalling effect of *Sharia* screenings on the cost of equity, through the reduction of firms' riskiness (Hassan et al., 2021). By combining the two screenings, firms benefit from a lower cost of equity than only complying with *Sharia*. One theoretical channel is consistent with Hassan et al. (2022), which empirically rely on the superior level of CSR engagement of Islamic firms when compared to others. Therefore, being based on different but relevant ethical roots, CSR and *Sharia* principles work in a complementary way.

Considering control variables, results are consistent with the literature on firms' cost of equity and market risk. ROA is positively associated with the cost of equity, when risk is an additional control, and negatively with market risks (Xu et al., 2020; Cheung et al., 2016). As argued by Zeisberger (2018), this is attributed to investors associating higher returns with a lower probability of default. Additionally, we find that cash holdings are associated with both higher risks and a greater cost of equity: a negative association exists with firms' future performance, especially in terms of corporate governance (Harford, 1999; Harford et al., 2008). Finally, the turnover is statistically and negatively correlated to the cost of equity (Breuer et al., 2018), whereas size has a positive and significant association only with risks (Sila et al., 2016).

Controls added in the market risk regression are always significant: a positive association is found for capital expenditures (Sassen et al., 2016) and a negative one is present for the dividend payout and retained earnings, in support of the expected profitability-risk reduction linkage (Cheung, 2016; Sila et al., 2016).

4.3. Insurance effects: the oil shock and the difference-in-difference setting

Our second set of empirical analyses involves a greater depth in verifying the insurance effect for CSR-engaged firms on performance (Buchanan et al., 2018; Breuer et al., 2018, Chiaramonte et al., 2021, Hassan et al., 2021).

We run our baseline models in a setting that exploits the potential of a difference-in-difference design around an exogenous shock on firms' cost of equity and risk. As explained before, the 2015–2016 oil shock represents a suitable quasi-natural experiment to test if treated firms experience a greater benefit on the cost of equity and market risk, compared to others. Results are provided in Table 5.

The treated group is represented by firms with ESG scores and *Sharia* concentration ratios above the sample mean values (*D_TREATED* value equal to 1). The exogenous treatment is identified by another dummy (*OIL_SHOCK*), taking the value 1 for years 2015 and 2016. Following the relevant literature on the topic (Hassan et al., 2021; Hassan et al., 2022) we restrict the time period three years before and after the shock (2012–2018), to capture the effect of the selected event. Finally, we interact the dummies to test the insurance effect.

The interacted variable is statistically significant and has a negative correlation with both the cost of equity and firm market risk. We interpret this result as follows. Firstly, it confirms our baseline result in a robust econometric setting, corroborating the mediating role of market risks on the cost of equity (column II). Secondly, it confirms the insurance effect of ESG scores during exogenous shocks

Table 5
Difference-in-difference estimation: oil shock (2015–2016).

	Coe	Coe	Total Risk
Variables	(I)	(II)	(III)
D_TREATED*OIL_SHOCK	−0.0027**	−0.0025**	−0.0130***
	(0.0012)	(0.0012)	(0.0020)
OIL_SHOCK	0.0065	0.0092***	0.212***
	(0.0042)	(0.0009)	(0.0125)
D_TREATED	0.0012*	0.0011*	0.0071***
	(0.0006)	(0.0006)	(0.0021)
TOTAL RISK (−1)		0.0229***	
		(0.0073)	
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Cluster SE firm	Yes	Yes	Yes
Observations	3814	3814	3814

This table provides the results of our difference-in-difference setting designed to verify the effects of the exogenous oil shock of 2015–2016. The sample period is reduced to 2013–2018. Target variables are: OIL_SHOCK (equal to 1 for years 2015–2016, and 0 otherwise); D_TREATED (equal to 1 for firms above mean values of *ESG* and *HHISharia* after the shock, and 0 otherwise); and their interaction. Non-binary independent variables are lagged by one year with respect to the dependent variable. Control variables are winsorized at 1% of each tail. Time, Industry, and Country fixed effects (FE) are included in all specifications. Firm clustered standard errors (SE) are in parentheses. The superscripts ***, **, and * denote coefficients statistically different from zero at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

(Lins et al., 2017) and their relevance for stakeholders and a firm's value (Xu et al., 2020). Additionally, this novel result stresses the importance of CSR activities in highly *Sharia*-concentrated markets, proving their "natural" engagement (Farooq, 2007; Williams and Zinkin, 2010). In summary, being "treated" partially compensates the negative impact of the shock alone. These findings are consistent with the last set of our hypotheses (H3A and H3B, respectively).

However, our results could be biased by heterogeneity between treated and control groups: in order to address this issue, we run the same difference-in-difference setting employing a propensity score matching (PSM) procedure (Rosenbaum and Rubin, 1983), based on the set of non-binary firm-level controls, including country, time and industry fixed effects for the two year before the oil shock (2013–2014). Results are presented in Table 6.

As in Bhandari et al. (2020), we first run a logit model to identify the control group (Panel A) and calculate propensity scores using the dummy variable *D_TREATED*. We then match, without replacement, each treated firm to a control firm using a caliper 5% criteria (Cao et al., 2020): as shown in Panel B, we find no significant difference between targets and matches, suggesting the adequacy of our matching strategy in reducing the potential heterogeneity bias. Finally, Panel C shows the resulting alternative DID results: the robustness of our earlier results is confirmed.

We find again support for the insurance effect of ESG scores, especially for firms operating in highly *Sharia*-concentrated countries and in line with the moral capital theory (Bouslah et al., 2018). During the 2015–2016 oil shock, shareholders and stakeholders perceived the higher moral capital accumulated by our treated firms and attributed to it the ability to reduce uncertainty, resulting in lower market risks and a lower cost of capital.

The DID approach also allows us to show parallel trends. Fig. A.3 in the Appendix depicts how, before the oil shock, the cost of equity and the market risk are similar for both the treatment and the control groups, whereas it diverges after the shock: treated firms show lower levels for both variables.

Our main results can be summarized as follows. From our sample, we confirm that the cost of equity and market risks are smaller for *Sharia* compliant firms in emerging markets, while ESG scores are higher, consistently with the literature (Farook, 2007; Williams and Zinkin, 2010). Our baseline model shows that the combination of CSR and *Sharia* concentration is negatively associated with the cost of equity (with or without risk as covariate) and the market risk. We also prove that a mediating role of risks exists for CSR engaged firms in highly *Sharia* concentrated markets, extending the literature (Cheung et al., 2016; Attig et al., 2013), and confirming the insurance effect of CSR on the cost of equity (Xu et al., 2020) in the case of *Sharia* firms (Hassan et al., 2021; Hassan et al., 2022). Our differences-in-differences approach furtherly confirms that firms with high ESG scores in highly *Sharia* concentrated markets experience an insurance effect towards exogenous shocks, as well as the moderating role of market risks.

All these results prove robust to a number of checks, explained in the next Section. In particular, the finding that CSR and *Sharia* principles work in a complementary way holds when we distinguish the idiosyncratic and systematic components of market risks, when we use alternative measures of our main variables (cost of equity with PEG and downside approach, ESG scores from Bloomberg, *Sharia* concentration with in-sample dummy, regional instead of country fixed effects), when we control for heterogeneity in our sample (PSM), on specific subsamples (no "label" effect from OIC countries), without endogeneity issues or sample selection bias (two-step GMM, two-step Heckman model, PSM, IV-TSLS).

Table 6
Difference-in-difference with propensity score matching.

.Panel A – Logit Model: identifying propensity scores

	D_HIGH_ESG_HIGH_SHARIA
Variables	(I)
SIZE (−1)	0.546***
	(0.141)
ROA (−1)	0.460
	(0.906)
CASH_TA (−1)	−0.796
	(0.906)
DEBT_TA (−1)	0.473
	(0.867)
DIV_TA (−1)	6.858**
	(3.091)
SALES_TA (−1)	−0.118
	(0.308)
CAPEX_TA (−1)	−1.645
	(1.872)
MTB (−1)	−2.969
	(4.934)
REAR_TA (−1)	0.174
	(0.624)
Country FE	Yes
Industry FE	Yes
Time FE	Yes
Cluster SE firm	Yes
Observations	3806
R-squared	0.507

Panel B – Univariate Statistics: effectiveness of matching

	Matched Sample			
	High ESG and high HHISharia firms	Other firms	Difference in means	*p*-Value
Variables	(I)	(II)	(I)-(II)	
SIZE	17,504	17,450	0.054	0.445
ROA	0.087	0.086	0.001	0.775
CASH_TA	0.086	0.088	−0.002	0.475
DEBT_TA	0.253	0.251	0.002	0.781
DIV_TA	0.031	0.03	0.001	0.825
SALES_TA	0.92	0.922	−0.002	0.923
CAPEX_TA	0.066	0.067	−0.001	0.323
MTB	0.029	0.028	0.001	0.717
REAR_TA	0.251	0.248	0.003	0.653

Panel C – Difference-in-Difference estimation

	Coe	Coe	Total Risk
Variables	(I)	(II)	(III)
D_TREATED*OIL_SHOCK (2015–2016)	−0.0026**	−0.0023**	−0.0119***
	(0.0011)	(0.001)	(0.0022)
OIL_SHOCK (2015–2016)	0.0037***	0.0037***	0.0058***
	(0.0010)	(0.001)	(0.0020)
D_TREATED	0.0018***	0.0017***	0.0080***
	(0.0006)	(0.0006)	(0.0023)
Total Risk (−1)		0.019***	
		(0.006)	
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Cluster SE firm	Yes	Yes	Yes
Observations	3545	3545	3545

This table provides the results of the difference-in-difference setting employed around the exogenous 2015–2016 oil shock, with an

additional propensity score matching (PSM) procedure (Rosenbaum and Rubin, 1983). The sample period is reduced to 2013–2018. First (Panel A), we employ all non-binary controls to identify propensity scores in a logit model considering treated (dummy D_HIGH_ESG_HIGH_SHARIA equal to 1) those firms that show values above average for both the *ESG* scores and *HHISharia*. We then check the effectiveness of the PSM procedure (Panel B) by comparing univariate statistics between treated and control firms. Finally (Panel C), we estimate the DID. Target variables are: OIL_SHOCK (equal to 1 for years 2015–2016, and 0 otherwise); D_TREATED (equal to 1 for firms above mean values of *ESG* scores and *HHISharia* in the years of the shock and 0 otherwise); and their interaction term. Non-binary independent variables are lagged by one year with respect to the dependent variable. Control variables are winsorized at 1% of each tail. Time, Industry, and Country fixed effects (FE) are included in all specifications. Firm clustered standard errors (SE) are in parentheses. The superscripts ***, **, and * denote coefficients statistically different from zero at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

Table 7
OIC vs non-OIC countries.

	Coe	Coe	Total risk
Variables	(I)	(II)	(III)
ESG *HHI*Sharia* (−1) *OIC	−0.0114	−0.0102	−0.0111
	(0.0113)	(0.0112)	(0.0369)
ESG*HHI*Sharia* (−1)	−0.0120**	−0.0125**	−0.0448**
	(0.001)	(0.005)	(0.0223)
ESG (−1)	0.0026	0.0030	0.0174
	(0.0029)	(0.0029)	(0.0115)
HHI*Sharia* (−1)	−0.0187**	−0.0177*	−0.0185
	(0.009)	(0.010)	(0.0260)
OIC	0.0602***	0.0605***	0.006***
	(0.0130)	(0.0131)	(0.0010)
TOTAL RISK (−1)		0.0140**	
		(0.006)	
Controls (−1)	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Cluster SE firm	Yes	Yes	Yes
Observations	4612	4612	4612
R-squared	0.67	0.68	0.66

This table reports the estimates of the panel fixed-effects regression model (2002–2018) for OIC member and non-member countries. The dependent variables are: Coe (I), Coe with Total Risk among controls (II), and Total Risk (III). Variables of interest are: the interaction *ESG*HHISharia*OIC*, the interaction *ESG*HHISharia*, the *ESG* score, the *HHISharia,* and the *OIC* dummy (equal to 1 for countries members of the OIC). Non-binary independent variables are lagged by one year with respect to the dependent variable. Control variables are winsorized at 1% of each tail. Time, Industry, and Country fixed effects (FE) are included in all specifications. Firm clustered standard errors (SE) are in parentheses. The superscripts ***, **, and * denote coefficients statistically different from zero at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

5. Additional analyses, endogeneity concerns and robustness checks

In this section, we provide additional analyses and robustness checks to validate of our results.

Firstly, we empirically test if the documented relationship between ESG and *Sharia* concentration towards the cost of equity and market risks increases or decreases for the subsample of firms headquartered in countries belonging to the Organization of Islamic Cooperation (OIC), through a homonym dummy variable. We then interact this dummy with our main interacted target variables (*ESG*HHISharia*OIC*) representing the effect of the ESG score for firms simultaneously in highly *Sharia*-concentrated markets and belonging to the OIC.

Results, provided in Table 7, underline no statistically significant difference for the triple interaction, concluding that the impact of ESG scores and *Sharia* concentration is not moderated or confounded by the OIC membership.

As underlined by other empirical studies on the relationship between ESG scores and firm performance (Cheung et al. 2016), our results may be affected by sample selection bias (due to its non-random selection) and endogeneity. To overcome this bias, we check the robustness of our findings through a set of additional analyses (Xu et al., 2020; Cheung et al., 2016): (1) a two-step GMM regression; (2) the two-step Heckman model; (3) the baseline model after a PSM; (4) an instrumental variable two-stage least squares (IV-TSLS) model.

Following Wintoki et al. (2012), we run the two-step system GMM estimator with Windmeijer corrected standard errors, where the lagged non-binary explanatory variables are used to address potential endogeneity issues. Second and higher-order lags and differences of the dependent variable are used as instruments to avoid the potential bias occurring from the inclusion of the lagged

Table 8
Two-Step GMM.

	Coe	Coe	Total Risk
Variables	(I)	(II)	(III)
Dependent variable (−1)	0.4710***	0.1500***	0.1671***
	(0.0115)	(0.0375)	(0.0340)
ESG * HHISharia (−1)	−0.0156**	−0.1010**	−0.1171*
	(0.0005)	(0.0501)	(0.0606)
ESG (−1)	−0.0003	0.0384	0.0404
	(0.0033)	(0.0235)	(0.0272)
HHISharia (−1)	0.0382	−0.0450	−0.0867
	(0.366)	(0.0545)	(0.0661)
TOTAL RISK (−1)		0.0080*	
		(0.0040)	
Controls (−1)	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Cluster SE firm	Yes	Yes	Yes
AR2	0.170	0.100	0.180
Hansen	1.000	1.000	1.000
N. of Instruments	120	120	120
Observations	3472	3472	3472

This table reports the estimates of the two-step system GMM model (2002–2018). The dependent variables used in the second step are: Coe (I), Coe with Total Risk among controls (II), and Total Risk (III). Variables of interest are: the *ESG* score, the *HHISharia,* and their interaction. Non-binary independent variables are lagged by one year with respect to the dependent variable. Control variables are winsorized at 1% of each tail. Time, Industry, and Country fixed effects (FE) are included in all specifications. Firm clustered standard errors (SE) are in parentheses. The superscripts ***, **, and * denote coefficients statistically different from zero at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

dependent variable.[10]

The consistency of the two-step GMM model strictly depends on the assumption that the error term is not autocorrelated with the instruments. As reported in Table 8, we conduct two specification tests for this purpose: the Hansen test of overidentifying restrictions, as well as the test on the hypothesis of no autocorrelation in the error term. Both tests confirm the validity of our model: the statistically significant and negative correlation between our target variable (*ESG*HHISharia*) and both the cost of equity and total market risks, with the mediating role of risk (column II).

Following Xu et al. (2020), we control for the potential sample selection bias by running the Heckman (1978) two-step method (Wu and Shen, 2013; Xu et al., 2020). Results are provided in Table 9.

We estimate the decision equation (Panel A) using a multinomial probit model, whose parameters are used to calculate the Inverse Mills Ratio (IMR), where the dependent variables are dummies (*D_ESG*) equal to 1 from the year in which a firm in our sample started receiving an ESG score, and 0 in the previous years (Jo and Harjoto, 2011). Secondly (Panel B), we employ the IMR as the additional explanatory variable in the performance equation. This check furtherly confirms the robustness of our findings: a negative and significant association between the target interacted variable and both the cost of equity and the total market risk, as well as the mediating role of risk (column II).

As an additional robustness check (Table 10), we perform a PSM regression (Xu et al., 2020). We apply a logit model to the dummy variable identifying *Sharia*-compliant firms, with independent variables based on the full set of non-binary controls, including country, industry, and time fixed effects (Panel A). Then, we run the matching adopting the caliper distance of 5%. The matching procedure proves to be effective: coefficients become not significantly different between *Sharia*-compliant and conventional firms (Panel B). The baseline regression after the PSM (Panel C) provides once again a negative and significant association between the interacted target variable and both the cost of equity and total market risks, as well as the mediating role of risk in the cost of equity regression (column II).

Finally, in order to check for endogeneity issues, we perform an instrumental variable two-stage regression (IV TSLS), using the average ESG values of the country of a firm's headquarters average as instruments of our potentially endogenous target variables (*ESG*HHISharia* and *ESG*), as in the prominent related literature (Chen et al., 2020).

These represent strongly valid instruments since each firm's cost of equity and risk are unlikely to be affected by the country ESG score values. On the contrary, it is plausible that a country's ESG level affects the decision to invest in CSR by local firms (Bhandari and Javakhadze, 2017), satisfying the econometric requirement for instruments. We also confirm this assumption by showing the first stage

[10] As suggested by Roodman (2009), in all specifications the number of instruments employed by the two-step system GMM is smaller than the group under investigation.

Table 9
Two-step Heckman model.

Panel A – First step of the Heckman two-stage model

Variables	DESG = 1	
	Coe	Total risk
	(I)	(II)
SIZE (−1)	0.8210***	0.7901***
	(0.0754)	(0.0685)
ROA (−1)	−0.1570	−1.0270*
	(0.5940)	(0.6010)
CASH_TA (−1)	2.5490***	2.6920***
	(0.5161)	(0.5330)
DEBT_TA (−1)	−1.1240***	−0.7610**
	(0.3531)	(0.3821)
SALES_TA (−1)	−0.1920	−0.1190
	(0.1381)	(0.1320)
MTB (−1)	7.8920***	5.9140***
	(1.7010)	(1.9070)
DIV_TA (−1)		2.7760*
		(1.6050)
CAPEX_TA (−1)		−0.2901
		(1.1380)
REAR_TA (−1)		−0.0223
		(0.2030)
Country FE	Yes	Yes
Industry FE	Yes	Yes
Time FE	Yes	Yes
Cluster SE firm	Yes	Yes
Observations	9410	9410

Panel B – Second step of the Heckman two-stage model

	Coe	Coe	Total risk
Variables	(I)	(II)	(III)
ESG * HHISharia (−1)	−0.0100*	−0.0110**	−0.0010**
	(0.0100)	(0.0100)	(0.0002)
ESG (−1)	0.0022	0.0030	0.0187
	(0.0031)	(0.0029)	(0.0119)
HHISharia (−1)	−0.0130	−0.0130	−0.0110
	(0.0108)	(0.0108)	(0.0200)
TOTAL RISK (−1)		0.0140**	
		(0.0060)	
IMR	0.0010*	−0.0032	−0.0090*
	(0.0001)	(0.0024)	(0.0002)
Controls (−1)	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Cluster S.E firm	Yes	Yes	Yes
Observations	3965	3965	3965

This table reports the results of the Heckman two-stage model (2002–2018). The first step (Panel A) estimates the decision equation using a multinomial probit model, whose parameters are used to calculate the Inverse Mills Ratio (IMR). In this setting, the dependent variables are dummies (DESG) equal to 1 since the year in which a firm received an ESG score and 0 in previous years (Jo and Harjoto, 2011). The second step (Panel B) estimates the stability regression with the IMR generated by the first step. Dependent variables used in the second step are: Coe (I), Coe with Total Risk among controls (II), and Total Risk (III). Variables of interest are: the *ESG* score, the *HHISharia,* and their interaction. Non-binary independent variables are lagged by one year with respect to the dependent variable. Control variables are winsorized at 1% of each tail. Time, Industry, and Country fixed effects (FE) are included in all specifications. Firm clustered standard errors (SE) are in parentheses. The superscripts ***, **, and * denote coefficients statistically different from zero at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

Table 10
Baseline model with propensity score matching.

Panel A: Logit Model – identifying propensity scores

	D_SHARIA
Variables	(I)
SIZE (−1)	0.0734
	(0.0822)
ROA (−1)	−1.879***
	(0.642)
CASH_TA (−1)	−2.746***
	(0.733)
DEBT_TA (−1)	−4.171***
	(0.554)
DIV_TA (−1)	0.185
	(2.008)
SALES_TA (−1)	−0.0764
	(0.236)
CAPEX_TA (−1)	3.920***
	(1.276)
MTB (−1)	−1.138
	(2.439)
REAR_TA (−1)	−0.174
	(0.227)
Country FE	Yes
Industry FE	Yes
Time FE	Yes
Cluster SE firm	Yes
Observations	4612
R-squared	0.507

Panel B: Univariate Statistics – effectiveness of matching

	Matched Sample			
	Sharia-compliant firms	non-Sharia-compliant firms	Difference in means	p-Value
Variables	(I)	(II)	(I)-(II)	
SIZE	17.395	17.350	0.045	0.5270
ROA	0.0870	0.0880	−0.0010	0.7080
CASH_TA	0.0760	0.0750	0.0010	0.4750
DEBT_TA	0.2260	0.2240	0.0020	0.7290
DIV_TA	0.0320	0.0320	0	0.8870
SALES_TA	0.8320	0.8320	0	0.9790
CAPEX_TA	0.0630	0.0640	−0.0010	0.8220
MTB	0.0270	0.0270	0	0.6290
REAR_TA	0.2250	0.2260	−0.0010	0.9360

Panel C: Firm Coe and Total Risk

	Coe	Coe	Total Risk
Variables	(I)	(II)	(III)
ESG * HHISharia (−1)	−0.0190**	−0.0163**	−0.0610**
	(0.0010)	(0.0011)	(0.0002)
ESG (−1)	0.0066	0.0054	0.0237
	(0.0046)	(0.0038)	(0.0155)
HHISharia (−1)	−0.0080	−0.0153	−0.0384
	(0.0157)	(0.0144)	(0.0400)
TOTAL RISK (−1)		0.0244***	
		(0.0090)	
Controls (−1)	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Cluster SE firm	Yes	Yes	Yes
Observations	1647	1647	1647
R-squared	0.507	0.506	0.417

This table presents the results of the baseline model after conducting a propensity score matching (2002–2018). Panel A reports the results of the logit regression aiming at finding propensity scores, based on a dummy (*D_SHARIA*) equal to 1 if the *Sharia* dummy is equal to 1 and using all firm-level controls and country, industry, and year fixed effects. The matching, without replacement, is achieved using the caliper distance of 5%. Panel B compares mean statistics between *Sharia*-compliant firms (*D_Sharia* = 1) and others, showing the effectiveness of the matching approach. In Panel C, the dependent variables are: Coe (I), Coe with Total risk among controls (II), and Total market risk (III). Variables of interest are: the *ESG* score, the *HHISharia*, and their interaction. Non-binary independent variables are lagged by one year with respect to the dependent variable. Control variables are winsorized at 1% of each tail. Time, Industry and Country fixed effects (FE) are included in all specifications. Firm clustered standard errors (SE) are in parentheses. The superscripts ***, **, and * denote coefficients statistically different from zero at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

Table 11
IV TSLS results: average country ESG scores.

	Coe	Coe	Total risk
Variables	(I)	(II)	(III)
ESG * HHISharia (−1)	−0.0700***	−0.0701***	−0.3201***
	(0.0200)	(0.0202)	(0.0701)
ESG (−1)	−0.0076	−0.0074	0.0410
	(0.0107)	(0.0107)	(0.0314)
HHISharia (−1)	0.0100	0.0101	0.0826***
	(0.0100)	(0.0102)	(0.0287)
TOTAL RISK (−1)		0.0752***	
		(0.0267)	
Controls (−1)	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Cluster SE firm	Yes	Yes	Yes
Observations	4351	4351	4351
R-squared	0.507	0.417	0.401
Sargan's p	0.105	0.101	0.110

This table reports the second stage of the instrumental variables (IV) two-stage least squares (TSLS) estimator model (2002–2018). We replace the potentially endogenous interest variables with the results of the first stage (instruments are average country ESG scores), where the *F-test* was always greater than the critical value of 16.38 (Ferrell et al., 2016). The dependent variables used in the second step are: Coe (I), Coe with Total risk among controls (II), and Total risk (III). Variables of interest are: the *ESG* score, the *HHISharia*, and their interaction. Non-binary independent variables are lagged by one year with respect to the dependent variable. Control variables are winsorized at 1% of each tail. Time, Industry and Country fixed effects (FE) are included in all specifications. Firm clustered standard errors (SE) are in parentheses. The superscripts ***, **, and * denote coefficients statistically different from zero at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

F-test which is always greater than the critical value of 16.38 : the goodness of our instruments is confirmed. Results are presented in Table 11.

Alternatively, we employ industry and year peer values of ESG scores for each firm (Attig et al., 2013; Anginer et al., 2018) as instruments, again confirming our baseline results (see Table A.4 in the Appendix).

Once more, our baseline results are validated: a negative and significant relationship between our interacted target variable (*ESG*HHISharia*) and both the cost of equity and total market risks, as well as the mediating role of risk on the cost of equity (column II).

Lastly, we run a number of additional tests to strengthen the validity of our findings.

The first relevant test aims at reducing the impact of potential confounding factors, by running our baseline model using two alternative measures for the cost of equity: *i)* the price-earnings growth (PEG) measure (Xu et al., 2020; Easton, 2004), assuming the growth rate is always zero; *ii)* the downside risk approach (DW) as in Khalifa et al. (2019) and Estrada (2000 and 2004).

We obtain the PEG as the square root of the difference between the average forecasted earnings per share for each firm in year $t + 2$ and the average forecasted earnings per share in year $t + 1$, scaled by the close price of each firm in year t. For the cost of equity with the downside risk approach, we obtain the COE as the difference between the risk-free rate return and the market risk premium weighted for the downside risk.

Results are provided in Table 12 (Panel A and Panel B), once more confirming our findings.

Another potential concern may arise from our reliance on one source for ESG scores, with errors potentially biasing our analyses. Therefore, we substitute them with those provided by Bloomberg Professional Services (*BESG*), otherwise proceeding as in the baseline

Table 12
Alternative measure of Coe: PEG and downside risk approach.

Panel A: COE PEG approach		
	Coe_PEG	Coe_PEG
Variables	(I)	(II)
ESG * HHISharia (−1)	−0.0045**	−0.0051**
	(0.0021)	(0.0021)
ESG (−1)	0.1100	0.1430
	(0.0908)	(0.0904)
HHISharia (−1)	−0.0063**	−0.0063**
	(0.0025)	(0.0025)
TOTAL RISK (−1)		0.6800***
		(0.2420)
Controls (−1)	Yes	Yes
Country FE	Yes	Yes
Industry FE	Yes	Yes
Time FE	Yes	Yes
Cluster SE firm	Yes	Yes
Observations	2294	2294
R-squared	0.606	0.604

Panel B: COE downside risk approach (DW)			
	Coe_DW	Coe_DW	DW_RISK
Variables	(I)	(II)	(III)
ESG * HHISharia (−1)	−0.0002*	−0.0002*	−0.0164*
	(0.0001)	(0.0001)	(0.0091)
ESG (−1)	0.0099	0.0100	0.7050
	(0.0060)	(0.0061)	(0.4310)
HHISharia (−1)	−0.0010***	−0.0018***	−0.0453***
	(0.0002)	(0.0002)	(0.0138)
DW_RISK (−1)		0.0010***	
		(0.0003)	
Controls (−1)	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Cluster S.E firm	Yes	Yes	Yes
Observations	3037	3037	3037

This table reports the estimates of the panel fixed-effects regression model (2002–2018) using the price-earnings growth (PEG) ratio and the Downside risk (DW) approach as alternative measures of the cost of equity (Xu et al., 2020; Khalifa et al., 2019). The dependent variables are: Coe_PEG (I) and Coe_PEG with Total Risk among controls (II) panel A; Coe_DW (I), Coe_DW with DW_RISK among controls (II), and DW_RISK (III) panel B. Variables of interest are: the *ESG* score, the *HHISharia,* and their interaction. Non-binary independent variables are lagged by one year with respect to the dependent variable. Control variables are winsorized at 1% of each tail. Time, Industry, and Country fixed effects (FE) are included in all specifications. Firm clustered standard errors (SE) are in parentheses. The superscripts ***, **, and * denote coefficients statistically different from zero at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

model. Interestingly, Bloomberg's scores also differ in the aggregation methodology, since they focus on the level of firm's transparency of sustainability practices disclosed by reporting entities.[11] Results are provided in Table 13 and keep the recurring signs of coefficients, their statistical significance, and their interpretation.

Since we are interested in the mediating role of firm's riskiness in the negative relationship between ESG scores and *Sharia* concentration towards the cost of equity, we additionally test which component of the total risk acts as a channel (either systematic or idiosyncratic). We use the market model and monthly stock returns of the previous year to compute both components (Cheung et al., 2016; Sila et al., 2016). More precisely, we run an OLS regression between stock returns and a stock market index[12] to calculate the *beta*

[11] Further details on the methodology adopted by Bloomberg's for ESG scores can be found at the following link: https://data.bloomberglp.com/professional/sites/10/ESG-Brochure2.pdf

[12] We use MSCI regional equally weighted indexes for Africa, Asia, Europe, and Latin America.

Table 13
Alternative measure of ESG score: Bloomberg Professional Services.

	Coe	Coe	Total risk
Variables	(I)	(II)	(III)
BESG * HHISharia (−1)	−0.0318***	−0.0310***	−0.0249*
	(0.0097)	(0.0097)	(0.0149)
BESG (−1)	0.0002	0.0003	0.0137
	(0.0016)	(0.0016)	(0.0122)
HHISharia (−1)	−0.0237***	−0.0236***	−0.0003
	(0.0090)	(0.0090)	(0.0002)
Total Risk (−1)		0.0130**	
		(0.0060)	
Controls (−1)	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Cluster SE firm	Yes	Yes	Yes
Observations	4612	4612	4612
R-squared	0.670	0.681	0.661

This table reports the estimates of the panel fixed-effects regression model (2002–2018), using the Bloomberg ESG score as an alternative ESG score (BESG). The dependent variables are: Coe (I), Coe with Total Risk among controls (II), and Total Risk (III). Variables of interest are: the *BESG* score, the *HHISharia,* and their interaction. Non-binary independent variables are lagged by one year with respect to the dependent variable. Control variables are winsorized at 1% of each tail. Time, Industry, and Country fixed effects (FE) are included in all specifications. Firm clustered standard errors (SE) are in parentheses. The superscripts ***, **, and * denote coefficients statistically different from zero at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

Table 14
Alternative measure of market risk: idiosyncratic and systematic risks.

	Coe	Idiosyncratic risk	Coe	Systematic risk
Variables	(I)	(II)	(III)	(IV)
ESG * HHISharia (−1)	−0.0115**	−0.0512**	−0.0006	−0.0005
	(0.005)	(0.0256)	(0.0005)	(0.0034)
ESG (−1)	0.0021	0.0182	0.0010	0.0015
	(0.0027)	(0.0125)	(0.0026)	(0.0016)
HHISharia (−1)	−0.0182*	−0.0430	−0.0015*	−0.0277***
	(0.009)	(0.0302)	(0.0001)	(0.0058)
IDIOSYNCRATIC RISK (−1)	0.0104**			
	(0.0052)			
SYSTEMATIC RISK (−1)			0.0080**	
			(0.0033)	
Controls (−1)	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Cluster SE firm	Yes	Yes	Yes	Yes
Observations	4612	4612	4612	4612
R-squared	0.521	0.430	0.290	0.250

This table reports the panel fixed-effects regression model (2002–2018), by splitting the market risk in its idiosyncratic and systematic components. The dependent variables are: Coe with Idiosyncratic Risk among controls (I), idiosyncratic risk (II), Coe with Systematic risk among controls (III), and Systematic risk (IV). Variables of interest are: the *ESG* score, the *HHISharia,* and their interaction. Non-binary independent variables are lagged by one year with respect to the dependent variable. Control variables are winsorized at 1% of each tail. Time, Industry, and Country fixed effects (FE) are included in all specifications. Firm clustered standard errors (SE) are in parentheses. The superscripts ***, **, and * denote coefficients statistically different from zero at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

(typical for the systematic risk), and the root mean squared error of the CAPM regression (idiosyncratic risk).

As shown in Table 14, we find that the risk-mitigating effect of *ESG*HHISharia* occurs through the idiosyncratic channel, without affecting the systematic component. This result is in line with previous literature showing the materiality of idiosyncratic risk in determining the cost of firms' financing (Hong and Kacperczyk, 2009). CSR-engaged firms benefit from a decrease of litigation risks

and experience a reduction in expected returns required from investors. In other words, we find that the integration of ESG scores in highly concentrated *Sharia* markets reduces the diversifiable portion of market risks and lowers the cost of equity.

Finally, we run the following set of additional tests (available in the Appendix): 1) we employ an alternative measure of *Sharia* compliance by creating a dummy variable taking the value of 1 for firms located in countries with values for *HHISharia* above the sample mean values, and 0 otherwise (*HighSharia*) running our baseline model (A.5); 2) we check if an alternative measure for fixed effects impacts our results, by substituting country with regional fixed effects (Africa, Asia, Europe, Latin America) (A.6). All results are confirmed.

6. Conclusions

The aim of this paper is to investigate how ESG scores (as a proxy for CSR engagement) and *Sharia* market concentration interact in impacting the cost of equity and market risks of non-financial firms incorporated in emerging markets. Moreover, we are also interested in measuring if a mediating effect of market risk on the cost of equity exists. Additionally, we test if this mediating role holds, and eventually gets stronger, as a result of an exogenous shock acting as a quasi-natural experiment, such as the 2015–2016 oil shock.

Using a strongly balanced sample of 4612 firm-year observations in the 2002–2018 period, we contribute to the literature by linking the CSR and Islamic corporate finance research in emerging markets. Our sample comprises eighteen countries from Africa, Asia, Europe, and Latin America. To the best of our knowledge, this is the first paper to document the role played by ESG scores in highly *Sharia*-concentrated emerging markets. Our results are consistent with, and extend, the CSR research streams on the stakeholder theory and the moral capital theory.

We find that the interaction between ESG scores and the *Sharia* concentration of countries is always statistically significantly and negatively associated with the cost of equity and market risks. Moreover, we also obtain robust evidence on the mediating role of market risks on the cost of equity of firms. Finally, we prove the existence of an "insurance" effect of ESG scores in highly *Sharia*-concentrated emerging markets around the exogenous 2015–2016 oil shock.

Instead, we do not find any statistically significant difference in our target relationship between firms headquartered in OIC countries and those which are not. In spite of a potentially more favorable environment in these countries for *Sharia*-compliant firms, this result reinforces our main finding by stressing the importance of the substance (i.e., investments in *Sharia*-compliant assets) over form (i.e., the typical binary and time-invariant *Sharia*-compliance dummy). In this sense, we propose an alternative measure that avoids the previous literature's measurement bias and to capture the strength of sensitivity to socially responsible economic activities across countries.

We conduct an extended set of additional analyses and robustness checks to control for endogeneity issues, as well as the reliability of different measures of our dependent and target variables.

In terms of policy implications, our results suggest that achieving higher ESG scores provides benefits to firms in terms of the cost of equity and risks in countries more sensitive to CSR, proxied by the *Sharia* concentration ratio of related markets. Moreover, these benefits are strengthened during exogenous economic shocks, which typically produce greater adverse consequences in less resilient emerging countries.

Nevertheless, our paper is subjected to limitations. We use, as a source for alternative ESG measures, only one additional provider: as data availability becomes a lesser issue, others can be tested. We also focus on non-financial firms, and their cost of equity and market risks: future research may consider other profitability or risk metrics such as systemic or contagion, as well as include firms such as banks or insurers. Our sample spans from 2002 to 2018: further research, testing the consistency of our findings during the COVID-19 shock, would add precious contributions to the literature.

Compliance with ethical standards

We confirm that we have complied with ethical standards.

Declaration of Competing Interest

We confirm that we do not have any conflict of interest.

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Appendix

A.1. Correlation matrix

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1	ESG	1												
2	Coe	−0.2143*	1											
3	Total Risk	−0.2032	0.0217*	1										
4	HHISharia	−0.1717	−0.1619*	0.1176*	1									
5	SIZE	0.3218*	−0.0318*	−0.1563	−0.2372	1								
6	ROA	−0.0452*	0.0314*	−0.1278*	−0.0269*	−0.0563	1							
7	CASH_TA	−0.0420*	−0.1309*	0.0844	0.2643	−0.2165	0.0915	1						
8	DEBT_TA	0.0649	0.0214*	0.0728	−0.1490*	0.1827	−0.3126	−0.2454*	1					
9	DIV_TA	0.0810*	−0.0094*	−0.2330*	−0.0621	−0.0020*	0.4989*	0.0202*	−0.2373*	1				
10	SALES_TA	−0.0230	−0.0278	−0.0668	0.0362*	−0.1579	0.2026*	0.0980*	−0.2311*	0.2268*	1			
11	CAPEX_TA	−0.0458*	0.0185*	0.0245	0.0955	0.0137	0.1171*	−0.0922*	0.0747*	0.0592*	0.0048*	1		
12	MTB	0.0485	−0.0739	−0.0789	0.0144*	−0.0940	0.3822*	0.0829*	−0.0801	0.4519	0.2505*	0.0889*	1	
13	REAR_TA	0.1442	−0.0891*	−0.2171*	0.0286	0.1721	0.3819	0.0357	−0.3000	0.2070	0.0769*	0.0313*	0.0507*	1

This table shows the correlation matrix across our variables (2002–2018). Variable definitions are provided in Table A.2. All control variables (SIZE, ROA, CASH_TA, DEBT_TA, DIV_TA, SALES_TA, CAPEX_TA, MTB, REAR_TA) are winsorized at the 1% of each tail. The symbol * indicates statistical significance at the 5% level.

A.2. Variables description

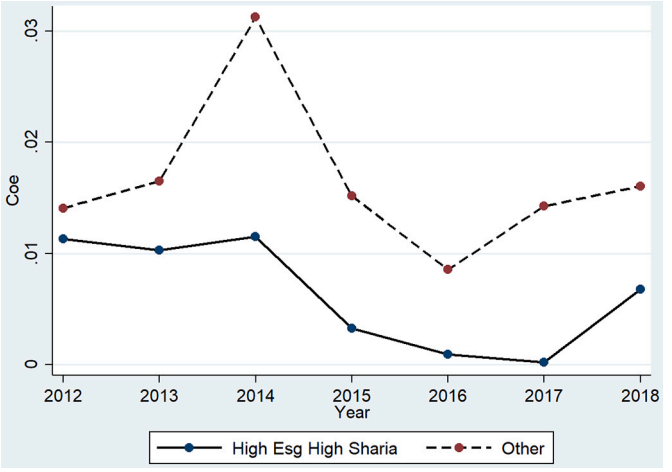
Variable name	Definition	Source	Expected sign
DEPENDENT VARIABLES			
Coe	Annualized monthly cost of equity from CAPM regression	Authors' calculation on Thomson Reuters' Refinitiv data	/
Total market risk	Annualized monthly return standard deviation of the previous twelve months		/
Idiosyncratic risk	Annualized residual standard deviation of the market model using monthly stock returns of the previous twelve months		/
Systematic risk	Beta coefficient of the market model using monthly stock returns of the previous twelve months.		/
TARGET VARIABLES			
ESG	Environmental Social Governance (ESG) score	Authors' calculation on Thomson Reuters' Refinitiv data	Negative
HHISharia	The *Sharia* market concentration calculated as the sum of the squared market share value (in terms of total asset) of *Sharia*-compliant firms in the country.		Positive/ Negative
ESG*HHISharia	Interaction variable		Negative
CONTROL VARIABLES			
SIZE	Natural logarithm of total assets		Positive/ Negative
ROA	Earnings before interest, tax, depreciation, and amortization (EBITDA) to total assets		Negative
CASH_TA	Cash to total assets		Positive
DEBT_TA	Total debt to total assets		Positive
DIV_TA	Dividends to total assets		Positive
SALES_TA	Sales to total assets		Positive/ Negative
CAPEX_TA	Capital expenditures to total assets		Positive/ Negative
MTB	Market to book value		Positive/ Negative
REAR_TA	Retained earnings to total assets		Positive/ Negative

This table defines all variables and summarizes their hypothesized relationships with dependent variables.

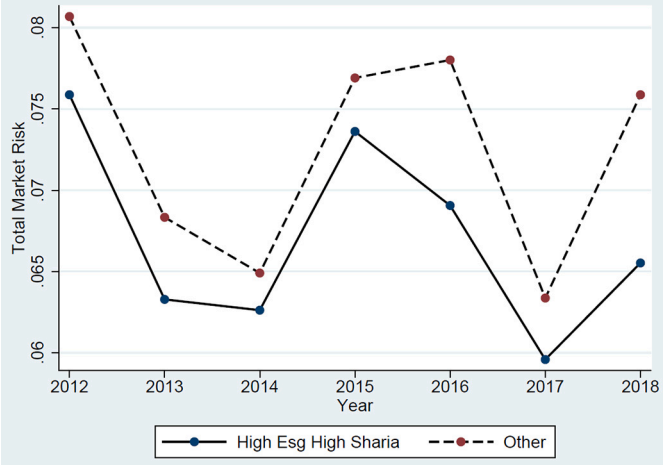
A.3. Parallel trends

These figures provide a graphical representation of parallel trends on the evolution of Coe (Panel A) and Total risks (Panel B) for High ESG and High *Sharia* firms (treated) and others (control) in our difference-in-difference setting. The shock years are 2015 and 2016. For this analysis, the sample period is restricted to the 2012–2018 period.

Panel A: Coe



Panel B: Total Market Risk



A.4. Alternative IV TSLS regression: industry and year peer values of ESG scores as instruments

	Coe	Coe	Total risk
Variables	(I)	(II)	(III)
ESG * HHISharia (−1)	−0.0379**	−0.0499**	−0.0177***
	(0.0170)	(0.0020)	(0.0061)
ESG (−1)	0.0101	0.0128	0.0080
	(0.0071)	(0.0091)	(0.0269)
HHISharia (−1)	0.0282***	0.0245***	0.0082***
	(0.0077)	(0.0090)	(0.0028)
TOTAL RISK (−1)		0.0150**	
		(0.0060)	
Controls (−1)	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Cluster SE firm	Yes	Yes	Yes
Observations	4351	4351	4351
R-squared	0.507	0.417	0.401
Sargan's p	0.111	0.100	0.105

This table reports the second stage of the instrumental variables (IV) two-stage least squares (TSLS) estimator model (2002–2018). We replace the potentially endogenous interest variables with the results of the first stage,

where the *F-test* was always greater than the critical value of 16.38 (Liang et al., 2016). The dependent variables used in the second step are: Coe (I), Coe with Total risk among controls (II), and Total risk (III). The variables of interest are: the *ESG* score, the *HHISharia*, and their interaction. Non-binary independent variables are lagged by one year with respect to the dependent variable. Control variables are winsorized at 1% of each tail. Time, Industry and Country fixed effects (FE) are included in all specifications. Firm clustered standard errors (SE) are in parentheses. The superscripts ***, **, and * denote coefficients statistically different from zero at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

A.5. Alternative measure of HHISharia: above or below mean values of Sharia concentration

	Coe	Coe	Total risk
Variables	(I)	(II)	(III)
ESG * HighSharia (−1)	−0.0048**	−0.0049**	−0.0438**
	(0.0019)	(0.0019)	(0.0220)
ESG (−1)	0.0013	0.0015	0.0164
	(0.0016)	(0.0016)	(0.0110)
HighSharia (−1)	0.0009	0.0007	−0.0192
	(0.0012)	(0.0012)	(0.0260)
TOTAL RISK (−1)		0.0149**	
		(0.0061)	
Controls (−1)	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Cluster S.E firm	Yes	Yes	Yes
Observations	4612	4612	4612
R-squared	0.671	0.680	0.660

This table reports the estimates of the panel fixed-effects regression model (2002–2018) using an alternative measure of *Sharia* concentration: a dummy variable (*HighSharia*) equal to 1 if *HHISharia* is above mean sample-wide values. The dependent variables are: Coe (I), Coe with Total Risk among controls (II), and Total Risk (III). Variables of interest are: the *ESG* score, the dummy *HighSharia,* and their interaction. Non-binary independent variables are lagged by one year with respect to the dependent variable. Control variables are winsorized at 1% of each tail. Time, Industry, and Country fixed effects (FE) are included in all specifications. Firm clustered standard errors (SE) are in parentheses. The superscripts ***, **, and * denote coefficients statistically different from zero at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

A.6. Alternative fixed effects: regional fixed effects

	Coe	Coe	Total risk
Variables	(I)	(II)	(III)
ESG * HHISharia (−1)	−0.0101*	−0.0104*	−0.0439**
	(0.0056)	(0.0056)	(0.0223)
ESG (−1)	0.0001	0.0006	0.0054
	(0.0026)	(0.0026)	(0.0108)
HHISharia (−1)	0.0038	0.0042	0.0001
	(0.0029)	(0.0028)	(0.0131)
Total Risk (−1)		0.0118**	
		(0.0059)	
Controls (−1)	Yes	Yes	Yes
Regional FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Cluster SE firm	Yes	Yes	Yes
Observations	4612	4612	4612
R-squared	0.670	0.681	0.661

This table reports the estimates of the panel fixed-effects regression model (2002–2018), using regional (Africa, Asia, Europe, Latin America) instead of country fixed-effects. The dependent variables are: Coe (I), Coe with Total Risk among controls (II), and Total Risk (III). Variables of interest are: the *ESG* score, the *HHISharia,* and their interaction. Non-binary independent variables are lagged by one year with respect to the dependent variable. Control variables are winsorized at 1% of each tail. Time, Industry, and Region fixed effects (FE) are included in all specifications. Firm clustered standard errors (SE) are in parentheses. The superscripts ***, **, and * denote coefficients statistically different from zero at the 1%, 5%, and 10% levels, respectively, in two-tailed tests.

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