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The value of a firm's engagement in ESG practices: Are we looking at the right side?

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ABSTRACT

Firms allocate many resources to environmental, social, and governance (ESG) issues and to growth options as if they were independent sources of value. Challenging this view, this paper explores the interplay of a firm's engagement in ESG practices and growth options in determining its total value. We draw upon real options reasoning to explain how ESG practices can carry two opposite (trust-enhancing and risk-reducing) forces, driving an inverted U-form relationship between ESG performance and growth options value. Moreover, we argue that ESG performance and growth options are likely to build substitutive insurance mechanisms which might exert a negative moderating effect of growth options on the relationship between ESG performance and a firm's total value. Empirical analyses of ESG scores and growth options values on a panel of U.S. firms from 2009 to 2018 provide substantial support for our hypotheses. Our results show that the inverted U-form relationship between ESG performance and growth options value becomes stronger for the environmental and social pillars. Our evidence on the moderating effect of growth option values also provides valuable insights for interpreting prior conflicting empirical evidence on the association between ESG performance and a firm's total value.

1. Introduction

Sustainable investments have exploded over the last few years, having grown by over 269% worldwide since 2016 (GSIA , 2018). Financial markets clearly reflect how investors collectively take positive account of environmental, social and governance (ESG) scores in their capital allocation decisions (Hartzmark and Sussman, 2019). However, such a favourable appraisal by investors contrasts with an as yet unresolved scholarly debate concerning the impact that a firm's engagement in ESG practices has on its total value. The most recent research advocates strengthening theoretical efforts directed toward providing a fine-grained understanding of the insurance mechanisms which underlie this sort of corporate strategy and their link to firm value (Wang et al., 2020). Puzzling evidence ranges from a positive relationship (Awaysheh et al., 2020; Cochran and Wood, 1984; Li et al., 2018; Lo and Sheu, 2007; Orlitzky et al., 2003) to a non-linear one (Barnett and Salomon, 2012; Sun et al., 2019; Wang et al., 2008). Moreover, other works find no statistically significant relation (Garcia-Castro et al., 2010) or even evidence of financial underperformance (Lee and Faff, 2009) due to the incurred costs to implement socially responsible actions. Accordingly, the latest research encourages exploring the moderating factors which shape this relationship differently across companies (Magrizos et al., 2021).

This mixed evidence reveals that the relationship between ESG performance and a firm's total value is not as simple as merely comparing direct costs and benefits. In fact, ESG performance may interact in a complex way with other value sources in determining a

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firm's total value. One such source of value is growth options (Alessandri et al., 2007; Kester, 1984; Tong and Reuer, 2006). In this vein, Hart and Milstein (2003) note that creating value from ESG practices urges considering both present and future outcomes. Furthermore, we could reasonably assume ESG practices to be related to growth options (GO, hereinafter), since both are *per se* intrinsically associated to the long-term. However, prior mainstream research has only focused on the impact of ESG performance on a firm's total value (or financial performance) and has failed to draw any distinction between current businesses and GO. The present study aims to overcome this limitation, and builds on the real options approach in order to further conceptualize the underexplored underlying-value mechanisms of ESG practices.

In particular, our central question revolves around what impact ESG performance has on a firm's GO value and how ESG performance might interact with GO in shaping a firm's total value. More specifically, our paper addresses the following questions: What are the channels through which ESG performance might affect a firm's GO portfolio? Does the effect of ESG practices on GO value differ across individual ESG pillars? How does the interplay between the insurance mechanisms powered by GO and ESG performance determine a firm's ability to create value? To the best of our knowledge, there is still no evidence on the relationship between ESG performance and GO value, despite their theoretical connections (Cassimon et al., 2016; Husted, 2005; Pohle and Hittner, 2008).

We start by investigating the relationship between ESG performance and a firm's GO. Here, two opposite forces as drivers of GO value might emerge from the strategic insurance-like properties of ESG performance. We argue that this strategy might have a positive effect on GO value since the accumulation of social capital and trust boosts stakeholder firm-specific investments (Barnett and Salomon, 2012; Cuypers et al., 2016; Godfrey, 2005; Shiu and Yang, 2017), which are critical for the optimal management of a firm's GO throughout their lifetime and their subsequent value (Klingebiel, 2012). We also claim that such a richer pool of moral capital derived from ESG performance and the subsequent mitigation of firm risk might have a negative impact on GO value. Similar to the well-known negative effect that a risk reduction in a call option's underlying asset has on such an option value, the risk-reducing effect from ESG performance is likely to decrease a firm's GO value (Kester, 1984). Taking these two countervailing effects together, we contend that the relationship between ESG performance and GO value should have an inverted U-form. In a second step, we consider the three ESG pillars individually. Since the environmental and social pillars (in contrast to the governance pillar) are linked to a broader range of stakeholders (beyond the primary ones), they enhance a firm's legitimacy and sincerity of engagement in ESG practices (Cuypers et al., 2016). This might strengthen the trust-enhancing and risk-reducing effects of ESG performance, and thus make the inverted U-relation of these pillars with GO value more pronounced.

Finally, we study the joint impact of ESG performance and GO on a firm's total value. We hypothesize that the relative importance of GO within each firm might negatively moderate the ESG performance-firm value linkage. Since GO and ESG performance are likely to build substitutive insurance mechanisms, combining them might prove to be value-detrimental for companies. Such a subadditive effect from simultaneously combining ESG practices and GO might also arise from the fact that these strategies are likely to be counteractive forces since the former focuses on current stakeholders' interests, whereas the latter is often designed to seek out and reel in new stakeholders who might want to get a piece of the current stakeholders' cake. Investing in GO which do not involve current stakeholders is likely to require extra effort in ESG practices to make up for their jeopardized expectations.[1]

We empirically test our hypotheses on a sample of U.S. publicly listed firms during 2009–2018. Our empirical findings support the predicted inverted U-shaped relationship between ESG performance and GO value. We find evidence that such a non-linear relation remains in the environmental and social pillars, but that the governance one has no statistically significant impact on GO value. Our results suggest that a higher value of GO reduces the value-enhancing effects of ESG performance on a firm's total value.

The remainder of the paper is structured as follows. Section 2 develops our theoretical background and hypotheses. Section 3 describes our data, variables, and empirical strategy. Section 4 presents our results and robustness checks. Section 5 discusses and concludes.

2. Hypotheses

2.1. Overall ESG performance and GO value

Many works advocate endowing ESG practices with a strategic approach when assessing its value outcomes in order to account for its vital role in supporting core business activities (Burke and Logsdon, 1996) and granting firms a platform for growth (Hart and Milstein, 2003; Pohle and Hittner, 2008). However, previous literature has so far mainly focused on the outcomes of ESG performance in a firm's current businesses, but has failed to explicitly consider how they might impact the firm's other value component: its GO. Many studies support the notion that a substantial part of the value of many major strategies relies on such a value component (Alessandri et al., 2012; Andrés et al., 2017a, 2017b; Estrada et al., 2010; Tong et al., 2008).

The real options perspective provides a major conceptual bridge between the strategic and the financial analyses of corporate decisions, such as the ESG practices, in terms of promoting a better understanding of its underlying value creation mechanisms (Trigeorgis and Reuer, 2017). GO are cornerstone to the managerial decision-making process because most long-term value strategies consist of portfolios of options that are sequentially acquired and exercised in response to how uncertainty evolves (Andrés et al., 2021; Andries and Hünermund, 2020; Bowman and Hurry, 1993; Hurry et al., 1992; Laamanen and Keil, 2008; Luehrman, 1998; Smit and

[1] Despite being substitutive mechanisms in granting insurance for companies, it should be noted that ESG performance still requires considering market opportunities and a fair balance of stakeholder expectations vis-à-vis feasibility and convenience assessments. We thank an anonymous reviewer for pointing this out.

Moraitis, 2010). A firm's ability to make flexible decisions under uncertainty is thus given by the nature of its options portfolio over time (Bowman and Hurry, 1993) with the value of such options depending on the firm's managerial capabilities and organizational mechanisms to create, maintain, exercise and govern them (Klingebiel, 2012).

Some works have provided theoretical insights into the value of ESG practices in terms of real options (e.g. Cassimon et al., 2016; Figge, 2005; Fombrun et al., 2000; Husted, 2005; Kim et al., 2021). These practices offer firms flexibility under uncertainty and limit their risk exposure. For example, Figge (2005) claims that a firm's environmental management through eco-efficiency policies can create option value and protect the firm from future social and environmental shocks. Similarly, Cassimon et al. (2016) and Fombrun et al. (2000) offer a twofold perspective of CSR as a real option: either as a way to mitigate downside reputational risk or as a means of GO building. Despite this clear connection between such practices and GO, and its promising potential to better understand the sources of value from ESG strategies, such a relationship remains an important yet still unexplored question.

To elaborate on the ESG performance-GO relationship, we follow Haans et al. (2016) to identify its underlying mechanisms. Fig. 1, in which the horizontal value represents a firm's ESG performance, shows two main counteracting mechanisms driving GO value. The first force captures a firm's stakeholder specific investments and the "trust-enhancing effect" of ESG practices. GO are platforms for future growth, whose value critically depends on human intervention and how they are managed over their lifetime and ultimately exercised (Klingebiel, 2012). One key element in the optimal management of a firm's GO stems from sequential investments made by a wide range of stakeholders. Such commitments are mostly specific investments that are connected to intangible outcomes (e.g. knowledge, brand image). Stakeholders' specific investments cannot be redeployed to other companies (and when they can, they suffer a substantial loss in value).

For this reason, stakeholder willingness to engage them depends on their trust in the firm (Wang et al., 2003), with ESG performance likely to be of paramount importance. Wang and Lim (2008) illustrate this issue through the relevance of employee incentives linked to the likelihood of continuing options-based projects which require their specific human capital investment. ESG practices can enhance stakeholders' trust by accumulating social capital and strengthening their attachment to the firm (Barnett and Salomon, 2012; Fombrun et al., 2000; Godfrey, 2005; Husted, 2005; Lins et al., 2017). As a consequence, the higher a firm's ESG performance, the higher its GO value.

Yet in this first force, ESG performance is likely to display diminishing marginal increases in GO value for several reasons. First, because the advantages of social capital are higher at less developed stages of ESG performance, when becoming trustworthy is likely to carry a greater impact (Lins et al., 2017). Second, since there are limits to the amount and type of specific resources that stakeholders can offer the firm, the trust-enhancing effect on GO value might slow down beyond a certain limit (Wang et al., 2008).

The second force is given by the effect of risk on option values (the "risk-reducing" effect). Many studies support the idea of ESG performance as a means to mitigate risk within companies and provide a safety net to preserve financial performance against potential shocks (Figge, 2005; Fombrun et al., 2000; Godfrey et al., 2009; Husted, 2005; Jia et al., 2020; Jo and Na, 2012; Lins et al., 2017; Shiu and Yang, 2017). For instance, Shiu and Yang (2017) report evidence of the risk-reducing effect associated with ESG performance. They find that companies with a greater and long-term commitment to ESG issues experience less pronounced volatility in their stock and bond prices. Such a risk-reducing effect is likely to decrease a firm's GO value for the same reason that lower volatility in its underlying asset decreases the value of a financial option (Kester, 1984; Trigeorgis and Lambertides, 2014). As a consequence, the higher a firm's ESG performance, the lower its GO value.

However, in contrast to the stakeholder specific investment force, this risk-reducing effect on GO value displays increasing marginal reductions due to the well-known concave relationship between the volatility of a call option's underlying asset and such an option value. The riskier its underlying asset is, the higher the probability that a call option will be profitably exercised, with this effect proving to be more powerful at lower levels of risk. Given the inverse relationship between ESG performance and risk, we can expect that at lower levels of ESG performance, a one percentage point increase in such levels leads to a decrease in GO value, with such a reduction being greater if it occurs at higher levels of ESG performance.

Considering these two counteracting underlying mechanisms jointly, Fig. 1 shows how the subsequent added effect results in an inverted U-shaped relationship between a firm's ESG performance and its GO value. Based on this discussion, we hypothesize:

H1. ESG performance has an inverted U-shaped relationship with a firm's GO value.

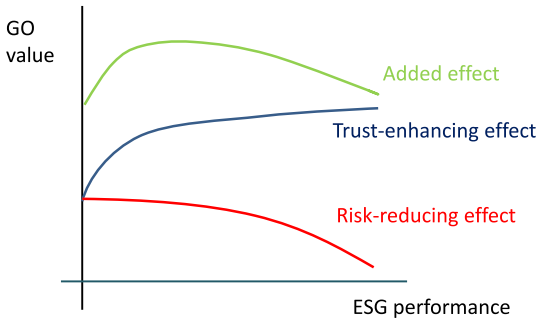

Fig. 1. ESG performance and GO value.

2.2. Individual ESG pillars and GO value

Some works differentiate between primary stakeholders (those who are at the core of business activity) and secondary stakeholders (those who can influence primary stakeholders) within the firm (Godfrey et al., 2009; Jia et al., 2020). Likewise, they carry out separate analyses by pillars (Fuente and Velasco, 2021; Li et al., 2018). Governance issues are mainly related with those interests that primary stakeholders hold in the firm. However, a firm's environmental and social actions deal with other concerns of primary stakeholders, which do not necessarily stem from their business relationship with the firm, but from the interests of secondary stakeholders. Since a firm's commitments with secondary stakeholders are less driven by power-exchange goals, they are seen to have greater potential to signal a non-self-serving orientation by the firm (Fuente and Velasco, 2021; Godfrey et al., 2009). In addition, the environmental and social pillars entail a broader scope of operation and demand greater company involvement. This qualitative aspect of these pillars enhances their legitimacy and favours stakeholders' perception of the sincerity of ESG practices, leading them to perceive such initiatives in these domains as more substantial rather than merely symbolic (Cuypers et al., 2016). Together with these arguments, Godfrey et al. (2009) empirically support the idea that the insurance benefit is more relevant in CSR activities aimed at secondary stakeholders. Overall, both the trust-enhancing and risk-reducing effects of ESG performance might be intensified, thereby causing the inverted-U relation between ESG performance and GO value to become more pronounced in the environmental and social pillars.

In contrast, the governance pillar is likely to paint a different picture. As this pillar lies at the core of the firm and encompasses its primary stakeholders, it presents a narrower scope by nature, which can convey an image of less commitment by the firm to ESG practices and reduce the perception of sincerity (Cuypers et al., 2016). This dimension is also more subject to being driven by exchanges of power between the firm and core stakeholders, in a more self-serving manner. This might weaken its potential to build stakeholders' trust and their willingness to make specific investments within the firm, which might lead GO value to increase at a slower pace. Moreover, some studies, such as Godfrey et al. (2009), find that ESG practices with a major focus on primary stakeholders (such as the governance pillar) provide a lower risk-reducing effect. Based on these arguments, we hypothesize:

H2. The inverted U-shaped relationship between ESG performance and a firm's GO value is more pronounced for the environmental and social pillars than for the governance pillar.

2.3. ESG performance and a firm's total value: the moderating role of the GO base

According to the real options approach, a firm's total value is the sum of the value of its current businesses (assets-in-place) and the value of its GO. Therefore, our previous hypothesis on the relationship between ESG performance and GO value would seem to suggest that it might play a role in the impact that a firm's engagement in ESG practices has on its total value. ESG performance and GO value might interact in a complex manner when shaping a firm's total value. We identify two mechanisms that could cause this interaction: (i) the potential subadditivity of the insurance effect of ESG performance, and (ii) conflicting interests between current and new stakeholders.

As regards the first channel, Miller (1998) acknowledges that firms have a wide range of corporate strategies to limit downside risk and serve as a source of GO, such as internationalization (Tong et al., 2008), equity alliances (Vassolo et al., 2004), and diversification (Andrés et al., 2017a, 2017b). As a consequence, the insurance benefits granted by ESG performance might become less relevant, or even redundant, in the presence of a rich GO portfolio which already provides the firm with a hedge against its risk exposures. For companies that have a higher GO value, ESG practices might overlap with other insurance investments, which can lessen its positive trust-enhancing effect. Additionally, the higher the GO value, the greater the risk-reducing effects of ESG performance (Godfrey et al., 2009; Jia et al., 2020). These harmful effects in high growth-options firms are likely to downgrade the positive impact of ESG performance on a firm's total value.

As far as the second channel is concerned, we expect ESG performance and GO to act as counteractive forces, since ESG practices aims to satisfy current stakeholders without compromising the ability to create value for future stakeholders (Galbreath, 2011), whereas GO usually incorporate new stakeholders (Snoeren, 2015) who might get a piece of the cake at the expense of current stakeholders. Should GO involve the prioritization of new stakeholders at the expense of current stakeholders' interests, GO would be seen as a threat by the latter. As a result, firms with a higher GO value will need to invest far more in ESG practices than their counterparts that have a lower GO value to attain the same trust-enhancing outcomes. Otherwise, GO will cast doubt on a firm's engagement to ESG performance and reduce the feeling of these practices' sincerity and, thereby, its value.

Based on these arguments, we expect that the more important GO are in a firm's portfolio of assets, the less positive the impact of ESG performance on a firm's value will be. Hence, we posit the following hypothesis:

H3. GO relevance on a firm's portfolio of assets negatively moderates the impact of ESG performance on a firm's value.

3. Data and empirical design

3.1. Sample construction

Our hypotheses are tested on an unbalanced panel data sample of U.S. publicly traded firms during 2009–2018. The sample comprises both active and non-active firms to mitigate survivorship bias problems. We use both *Worldscope* and *Datastream* databases in the *Eikon* platform by Refinitiv as our premier source of data. In addition to annual financial data (*Worldscope*) and market data

(*Datastream*) at firm level, *Eikon* contains the ESG scores. Refinitiv Eikon (formerly, Thomson Reuters ASSET4 ESG) is seen to offer objective, relevant, auditable, and systematic ESG data, which has been validated empirically (Cheng et al., 2014; Flammer, 2021; Fuente and Velasco, 2021; Kim et al., 2021). Companies are ranked along three dimensions (namely, ESG pillars): environment rating, social rating and governance rating (Flammer, 2021). We also use the *ORBIS* database by Bureau van Dijk to complete data on the foundation year of each firm when it is missing in *Refinitiv*.

We apply the following filters to our initial sample. First, we limit our sample to non-financial companies, excluding firms which operate in the finance, insurance, and real estate sector (SIC codes 6000–6999). Second, we require firms to have no missing data on fundamental financial variables such as total assets and total debt, as well as in the ESG scores. Firm-year observations with non-positive total assets or total sales are treated as missing. Third, we delete firm-year observations with negative or zero common equity. Finally, we remove outliers at the top and bottom 5% level in both tails of the distribution for each variable (except for ESG variables). Together with the requirement of ESG data availability, all of these sample requirements restrict our sample size to 10,046 firm-year observations (corresponding to 1939 firms).

Table 1 presents a detailed distribution of firm-year observations across years and major industry groups. Around 61% of firm-year observations correspond to between 2015 and 2018 due to the increasing ESG coverage in the more recent years. The dominant industry divisions in our sample are D-manufacturing (45.93%), I-services (21.46%), and E-transportation, communications, electric, gas and sanitary services (12.64%).

3.2. Variables

3.2.1. Dependent variables

A firm's total value. We measure a firm's total value by Tobin's Q based on the ratio of the market value of assets to the book value of total assets (Awaysheh et al., 2020; Flammer, 2015). We calculate *Tobin's Q* as the sum of the book value of total assets minus the book value of common equity plus the market value of equity, divided by the book value of total assets.

GO value. We use two alternative proxies for a firm's GO value. First, we define the GO ratio (*GOR*) as the quotient of the GO value attributable to equity over market capitalization, where GO value is computed by the difference between a firm's market capitalization and the value of its assets-in-place attributable to equity (Andrés et al., 2006; Kester, 1984; Tong and Reuer, 2006). We compute a firm's assets-in-place value attributable to equity in year *t* by the present value of year-*t* earnings (net income) treated as a perpetuity and discounted at the cost of equity (*Ke*):

$$\text{Assets} - \text{in} - \text{place value attributable to equity}_{i,\,t} = \frac{\text{Net Income}_{i,t}}{\text{ke}_{i,t}} \quad [1]$$

Using net income instead of equity cash flow is appropriate under the reasonable assumption that replacement investments belonging to assets-in-place are equivalent to accounting depreciation. The discount rate (*Ke*) is estimated by using the Capital Asset Pricing Model (CAPM). CAPM's beta is computed for each firm *i* and each year *t* based on the previous 60 months' stock returns (from year *t*-4 to *t*) and taking the S&P500 index as the market portfolio. The risk-free return is computed every year *t* by the yield to maturity on U.S. 10-year treasury bonds as obtained from the St Louis Federal Reserve.[2] The market risk premium is computed for each year *t* by the implied equity risk premium (Damodaran, 2015) as obtained from Damodaran's website.[3]

Second, for robustness, we rely on expected idiosyncratic skewness (*SKEWNESS*) as an alternative proxy for GO value. Given their unlimited upside gains and limited downside losses, GO produce the asymmetrical distribution of a firm's stock returns (Andrés et al., 2017a; Trigeorgis and Lambertides, 2014). Del Viva et al. (2017) empirically find a significant positive relation between idiosyncratic skewness and GO values. Due to its instability over time and the subsequent difficulty involved in effectively measuring expected skewness, we follow Boyer et al. (2010) and use idiosyncratic volatility as a predictor of expected idiosyncratic skewness. Idiosyncratic volatility for each year *t* and each firm *i* is computed by the standard deviation of daily residuals in year *t*. Daily residuals are obtained from the CAPM predicted returns, which are estimated for all business days in each year *t* using the prior 252 daily returns.

3.2.2. Explanatory variable: ESG performance

Following prior research (Cheng et al., 2014; Flammer, 2021; Kim et al., 2021), a firm's ESG performance is approximated by the ESG metrics from *Refinitiv Eikon*. As Berg et al. (2020) note, these ESG ratings measure a firm's ESG quality by quantifying how well a firm performs according to ESG criteria. ESG data is based on ten categories which are grouped into three pillars: environmental (resource use, emissions, innovation), social (workforce, human rights, community and product responsibility), and governance (management, shareholders, and CSR strategy). We obtain a firm's overall ESG performance (*ESGindex*) as the equally-weighted average of the scores of those three pillars for each firm (Cheng et al., 2014). We also take the scores by individual pillars: environmental (*ENVIRON*), social (*SOCIAL*), and governance (*GOVERN*). All ESG scores are defined over a maximum of 10 to avoid heteroscedasticity problems (Cheng et al., 2014).

3.2.3. Control variables

We control for a number of characteristics that are thought to influence a firm's GO value and its total value. As far as the GO value

[2] https://fred.stlouisfed.org/series/DGS10.
[3] http://pages.stern.nyu.edu/~adamodar/.

Table 1
Sample distribution by year and major sectors.

Panel A: Distribution of firm-year observations by year		
Year	No. of observations	% Obs.
2009	601	5.98
2010	638	6.35
2011	650	6.47
2012	652	6.49
2013	668	6.65
2014	685	6.82
2015	1,116	11.11
2016	1,621	16.14
2017	1,767	17.59
2018	1,648	16.40
Total	10,046	100%

Panel B: Distribution of firm-year observations by major sector		
Sector (division)	**No. of observations**	**% Obs.**
A: Agriculture, Forestry and Fishing	9	0.09
B: Mining	671	6.68
C: Construction	202	2.01
D: Manufacturing	4,614	45.9
E: Transportation, Communications, Electric, Gas and Sanitary Services	1,270	12.64
F: Wholesale Trade	319	3.18
G: Retail Trade	805	8.01
H: Financial, Insurance and Real Estate	0	0
I: Services	2,156	21.46
J: Public Administration	0	0
Total	10,046	100%

This table presents the distribution of firm-year observations by year (Panel A) and by major sector (Panel B). The SIC Division Structure by the U.S. Department of Labor is applied (https://www.osha.gov/pls/imis/sic_manual.html).

model is concerned, we control for firm size, financial leverage, firm age, and rivalry in the firm's core industry (Alessandri et al., 2012; Andrés et al., 2017b; Trigeorgis and Lambertides, 2014). Larger firms and older firms display fewer unexercised options available and are thus more likely to have a greater portion of their value materialized into assets-in-place (Bernardo and Chowdhry, 2002). Financial leverage may have a twofold effect on GO value: on the one hand, it may have a negative effect as a result of underinvestment agency problems from debt (Myers, 1977); on the other hand, it may carry a positive effect as a result of the disciplinary ability of debt to deter managers from overinvesting (Jensen, 1986), and encourage them to optimally manage a firm's GO (Alessandri et al., 2012). As far as rivalry is concerned, it is usually considered to prompt the pre-emptive exercise of GO and, therefore, to have a negative effect on GO value (Kulatilaka and Perotti, 1998). However, rivalry is also a powerful government mechanism (Shleifer and Vishny, 1997) that can improve the optimal exercise and value of a firm's GO. Moreover, a positive effect may also be expected as a result of imitation benefits (Cottrell and Sick, 2002) and the sharing of costs to develop market opportunities or technology (Tong and Reuer, 2006).

With regard to a firm's total value, we control for firm size, leverage, asset tangibility, capital investments, profitability, cash holdings and rivalry in the firm's core industry (Buchanan et al., 2018; Li et al., 2018; Lo and Sheu, 2007). Larger companies are likely to have greater economies of scale and better access to financial resources that are not available to smaller firms. However, larger firms are also less flexible, incur higher bureaucratic costs (Williamson, 1967), and are prone to suffer greater agency conflicts (Jensen, 1986). Financial leverage generates both profits and costs from tax shields and also exacerbates financial distress and agency problems, leading the relative importance of those benefits versus costs to either a positive or negative effect on a firm's total value (Graham and Harvey, 2001). Intangible assets are considered to be a key factor in gaining competitive advantage in today's economy, either by helping to differentiate products or lower costs, and accordingly are expected to enhance a firm's total value (Gardberg and Fombrun, 2006). Profitability is expected to have a positive impact on a firm's value, since value is created when a firm's strategy generates a higher return than its opportunity cost (Varaiya et al., 1987). Moreover, depending on the positive or negative sign of such a spread between return and opportunity cost, capital investment would cause, respectively, a positive or negative impact on a firm's total value (Varaiya et al., 1987). Cash alleviates operational costs and underinvestment problems from financial restrictions (Opler et al., 1999), yet it also produces low returns and increases overinvestment problems (Jensen, 1986). Finally, rivalry provides additional incentives to improve a firm's efficiency and total value (Giroud and Mueller, 2011).

Firm size (*ASSETS*) is measured by the natural logarithm of the book value of assets, leverage (*DEBT*) is obtained as the ratio of total financial debt to the book value of total assets, a firm's age (*AGE*) is calculated as the natural logarithm of the difference between the corresponding year and the firm's foundation year, rivalry in the firm's core industry (*RIVAL*) is approximated by one minus the Herfindahl-Hirschman index (which is the sum of the squares of the market shares of all firms in each 2-digit SIC code industry),[4] assets tangibility (*TANG*) is computed by the ratio of net property, plant and equipment to total assets, capital investments (*INVEST*) is

[4] In further robustness analyses, we compute *RIVAL* by using 3-digit SIC codes. Results remain similar and are available upon request.

measured by the ratio of capital expenditures to total sales, profitability (*PROFITABILITY*) is calculated as the ratio of earnings before interest and taxes to total sales, and cash holdings (*CASH*) is computed by the ratio of total cash to total assets. Additionally, we control for industry-specific and time-specific effects in all models by including dummies. To build industry dummies, we rely on the SIC division structure by the U.S. Department of Labor, which groups two-digit SIC codes into 10 divisions[5] (Andrés et al., 2017b).

3.3. Empirical models

The baseline model to test the inverse U-shaped relationship between ESG performance and a firm's GO value, predicted in Hypothesis 1, is specified as follows:

$$GOR_{i,t}=\alpha+\beta_1 ESGindex_{i,t}+\beta_2 ESGindex_{i,t}^2+\beta_3 ASSETS_{i,t}+\beta_4 DEBT_{i,t}+\beta_5 AGE_{i,t}+\beta_6 RIVAL_{i,t}+\beta_7 dumINDUSTRY_{i,t}+\beta_8 dumYEAR_{i,t}+\varepsilon_{it} \quad [2]$$

where subscript i denotes each firm, t indicates the year of observation (from 1 to 10) and ε_{it} is the random disturbance for each observation.

To test Hypothesis 2, we redefine equation [2] by substituting overall ESG performance (*ESGindex*) by the scores of each individual pillar (*ENVIRON*, *SOCIAL*, and *GOVERN*):

$$GOR_{i,t}=\alpha+\beta_1 ENVIRON_{i,t}+\beta_2 ENVIRON_{i,t}^2+\beta_3 ASSETS_{i,t}+\beta_4 DEBT_{i,t}+\beta_5 AGE_{i,t}+\beta_6 RIVAL_{i,t}+\beta_7 dumINDUSTRY_{i,t}+\beta_8 dumYEAR_{i,t}+\varepsilon_{it} \quad [3]$$

$$GOR_{i,t}=\alpha+\beta_1 SOCIAL_{i,t}+\beta_2 SOCIAL_{i,t}^2+\beta_3 ASSETS_{i,t}+\beta_4 DEBT_{i,t}+\beta_5 AGE_{i,t}+\beta_6 RIVAL_{i,t}+\beta_7 dumINDUSTRY_{i,t}+\beta_8 dumYEAR_{i,t}+\varepsilon_{it} \quad [4]$$

$$GOR_{i,t}=\alpha+\beta_1 GOVERN_{i,t}+\beta_2 GOVERN_{i,t}^2+\beta_3 ASSETS_{i,t}+\beta_4 DEBT_{i,t}+\beta_5 AGE_{i,t}+\beta_6 RIVAL_{i,t}+\beta_7 dumINDUSTRY_{i,t}+\beta_8 dumYEAR_{i,t}+\varepsilon_{it} \quad [5]$$

The robustness of our previous models is verified by using *SKEWNESS* as an alternative proxy for a firm's GO value.

To assess the relationship between ESG performance and a firm's total value (Hypothesis 3), and so analyse whether a firm's GO relevance moderates it, we specify this equation:

$$Tobin^{'}s\ Q_{i,t}=\alpha+\beta_1 ESGindex_{i,t}+\beta_2 ESGindex\times GOR_{i,t}+\beta_3 GOR_{i,t}+\beta_4 ASSETS_{i,t}+\beta_5 DEBT_{i,t}++\beta_6 TANG_{i,t}+\beta_7 INVEST_{i,t}+\beta_8 PROFIT_{i,t}+\beta_9 CASH_{i,t}+\beta_{10} RIVAL_{i,t}+\beta_{11} dumINDUSTRY_{i,t}+\beta_{12} dumYEAR_{i,t}+\varepsilon_{i,t} \quad [6]$$

The interaction term *ESGindex* × *GOR* captures whether the effect of ESG performance on a firm's total value is different depending on the importance of GO within a firm's portfolio of assets (*GOR)*. Alternatively, we also define the interaction as *ESGindex* × *dumGOR*, where *dumGOR* is a dummy variable which equals 1 if a firm's *GOR* is above or equal to the yearly sample mean, and zero otherwise. We test the robustness of our results to alternative measures of GO value; namely *SKEWNESS* and *dumSKEWNESS* (equal to 1 if firm *SKEWNESS* is above or equal to the yearly sample mean, and zero otherwise).

3.4. Estimation method

To estimate our models, we develop this empirical strategy. First, we conduct ordinary least squares (OLS) regressions with standard errors clustered by firm to account for the residual dependence from the same firm over time (Petersen, 2009) and to make our results comparable to previous studies (Cuypers et al., 2016; Servaes and Tamayo, 2013).

Second, we use a two-stage least-squares approach (2SLS) with instrumental variables to correct for potential endogeneity of ESG performance (Awaysheh et al., 2020; Ferrell et al., 2016; Garcia-Castro et al., 2010). The OLS methodology is grounded on the assumption of no correlation between the explanatory variables and the error term (*i.e.* the exogeneity assumption) (Bascle, 2008). However, many studies have voiced concerns about the presence of endogeneity in the relationship between ESG performance and a firm's total value, which would make the OLS estimator biased and inconsistent. Endogeneity might come from two main sources: omitted variables, such as unobservable firm characteristics which encourage companies to self-select into ESG practices (Flammer, 2015; Garcia-Castro et al., 2010); and simultaneous causality (Flammer, 2015; Orlitzky et al., 2003), given by the fact that ESG performance can have a positive effect on financial performance as a result of improving relationships with stakeholders (the good management theory), although prior successful financial performance might also foster ESG practices by generating a slack of financial resources to invest in it.

Among the instrumental variable methods, the 2SLS estimator is widely applied to address endogeneity (Andrés et al., 2017a; Awaysheh et al., 2020; Bascle, 2008; Ferrell et al., 2016). The chosen instruments must fulfil these conditions (Bascle, 2008): first, to be

[5] The SIC Division Structure is available at the U.S. Department of Labor official website: https://www.osha.gov/pls/imis/sic_manual.html.

correlated with the endogenous variable (instrument relevance); and second, to be uncorrelated with the error term (instrument exogeneity). The 2SLS approach proceeds in two steps. In the first, instrumental variables and all the independent variables are used to predict the endogenous variable (either *ESGindex, ENVIRON, SOCIAL or GOVERN*), whose fitted values from the first regression are then entered into the main outcome equation (eq. [2] to [6]) of the subsequent estimation stage. For the outcome equations [2] to [5], the first-stage equation is given by:

$$ESG_{i,t} = \pi_0 + \pi_1 ESGindustry_{i,t} + \pi_2 dumESGCOMPENS_{i,t} + \pi_3 ASSETS_{i,t} + \pi_4 DEBT_{i,t} + \pi_5 AGE_{i,t} + \pi_6 RIVAL_{i,t} + \pi_7 dumINDUSTRY_{i,t} + \pi_8 dumYEAR_t + \nu_{i,t} \quad [7]$$

where $v_{i,t}$ is the error term, and *ESG* is replaced by either *ESGindex*, *ENVIRON, SOCIAL* or *GOVERN* depending on the endogenous variable used in the subsequent stage. ESG measures are instrumented by two variables: the yearly industry (2-digit SIC) median ESG performance in terms of *ESGindex* (*ESGindustry*); and an indicator variable concerning the existence of managerial incentives to ESG practices (*dumESGCOMPENS*, which equals 1 if part of a firm's managerial compensation is linked to ESG performance, and zero otherwise).[6] Both devices are likely to encourage companies to engage in ESG practices (Eccles et al., 2014), while at the same time being determined exogenously with respect to a firm's GO value.

For equation [6], we define the following first-stage equation:

$$ESGindex_{i,t} = \pi_0 + \pi_1 ESGindustry_{i,t} + \pi_2 dumESGREPORT_{i,t} + \pi_3 ASSETS_{i,t} + \pi_4 DEBT_{i,t} + \pi_5 RIVAL_{i,t} + \pi_6 TANG_{i,t} + \pi_7 INVEST_{i,t} + \pi_8 PROFIT_{i,t} + \pi_9 CASH_{i,t} + \pi_{10} dumINDUSTRY_{i,t} + \pi_{11} dumYEAR_t + \nu_{i,t} \quad [8]$$

In this latter case, we use two instruments for *ESGindex*: the *ESGindustry* previously defined, and an indicator variable about ESG reporting practices (*dumESGREPORT*, which equals 1 if the firm conducts ESG information reporting, and zero otherwise).[7]

In the 2SLS estimations, we evaluate the presence of endogeneity by the Durbin-Wu-Hausman test. The p-values lead to the null hypothesis of exogeneity of ESG regressors being rejected. 2SLS results are thus more efficient and consistent than OLS estimates (Bhagat and Bolton, 2019). In addition, we conduct a set of diagnostic tests for the relevance and validity of our instruments for ESG. The first-stage Cragg-Donald F-statistic tests for the relevance of the instrumental variables. P-values are below 10%, which supports the strength of our instruments. The Sargan test of overidentifying restrictions (Sargan, 1958) evaluates instrument validity. P-values do not reject the null hypothesis of instrument validity.

4. Empirical findings

4.1. Univariate analyses

Table 2 presents summary statistics for the final sample. Our sample firms have an average *ESGindex* of 4.93, and display a wider range of variation in *ENVIRON* and *GOVERN*. The highest level of ESG performance is reached in *ENVIRON* (9.92). About 33% of firm-year observations conduct ESG reporting, a percentage that drops to about 22% in the case of managerial compensation linked to ESG performance.

Table A.1 in the Appendix presents the correlation matrix of our variables. *ESGindex* has a negative correlation with the two GO proxies: *GOR* (−0.1236, p-value = 0.0000) or *SKEWNESS* (−0.3025, p-value = 0.0000). This negative correlation also occurs across *ENVIRON*, *SOCIAL* and *GOVERN*. *ESGindex* is also negatively correlated with *Tobin's Q* (−0.0412, p-value = 0.0001). There is no concern about high correlations between the independent variables, thereby ruling out multicollinearity problems in our estimations.[8]

Before formally testing our hypotheses, we carry out a number of difference-of-means tests to determine whether firms exhibit GO value depending on relative ESG performance. Table 3 shows the results of these univariate analyses. Panel A compares the mean GO values of the subsamples of companies with ESG performance (either *ESGindex, ENVIRON, SOCIAL* or *GOVERN*) above and below the yearly sample median. The first two columns report the mean GO value in each subsample and the last column displays the difference between them. Our evidence reveals that above-median ESG firms show a lower mean value of GO. The difference in mean GO values between subsamples is more pronounced with the *GOR* as well as with the overall ESG measure *ESGindex*. Panel B recalculates the difference-of-means tests by comparing the bottom and top yearly quartile firm-year observations according to ESG performance. Results are robust and the differences become larger, suggesting that ESG performance has an impact on GO value.

4.2. ESG performance and GO value

Table 4 reports the OLS results for the effect of ESG performance on GO value as measured by *GOR*. Columns (1) to (4) show the

[6] In the estimations with the social and governance pillars, we replace the instrument *dumESGCOMPENS* by *dumESGREPORT* (an indicator variable equal to 1 if the firm has ESG information reporting, and zero otherwise), and *dumESGCOMMIT* (an indicator variable equal to 1 if the firm has an ESG committee, and zero otherwise), respectively, so that the Sargan test performs better and supports the validity of such dummy instruments.

[7] In this case, we declined to use *dumESGCOMPENS* since the Sargan test of our 2SLS estimation failed to support the validity of this instrument.

[8] The variance inflation factor (VIF) of our estimated models ranges between 1.32 and 3.85.

Table 2
Descriptive statistics.

	PANEL A: Main variables of our models					
	No. of obs.	Mean	Median	Standard deviation	Min.	Max.
Tobin's Q	9,564	2.0685	1.7158	1.0909	0.7015	7.2294
GO value						
GOR	7,395	0.8941	0.6139	0.9178	0.1137	8.5618
SKEWNESS	9,902	0.3027	0.2633	0.1640	0.0578	3.7383
ESG performance						
ESGindex	10,046	4.9301	4.6790	1.7724	0.7400	9.7640
ENVIRON	10,046	4.6837	4.2790	2.2525	0.2890	9.9160
SOCIAL	10,046	4.9817	4.7660	2.0089	0.3760	9.8770
GOVERN	10,046	5.1247	5.1175	2.1618	0.172	9.9050
Control variables						
ASSETS	8,544	14.667	14.806	1.2583	8.6497	17.055
DEBT	9,604	0.2401	0.2446	0.1626	0	0.6110
AGE	7,068	3.0113	3.0910	0.7972	0	4.4426
TANG	9,556	0.5662	0.1972	0.8859	0.0083	5.8996
INVEST	9,521	0.0791	0.0378	0.1159	0.0006	1.0083
PROFIT	9,182	0.0472	0.0979	0.3705	−4.9226	0.4032
CASH	8,985	0.1175	0.0828	0.1157	0.0010	0.7097
RIVAL	10,044	0.9184	0.9486	0.0727	0.1573	0.9774
Instrumental variable						
ESGindustry	10,046	4.7544	4.6025	0.6854	2.0057	7.3423

	PANEL B: Instrumental (dummy) variables			
	No. of obs. equal to 1	**% Obs. equal to 1**	**No. of obs. equal to 0**	**% Obs. equal to 0**
dumESGCOMMIT	3,481	34.65%	6,565	65.35%
dumESGCOMPENS	2,249	22.39%	7,797	77.61%
dumESGREPORT	3,290	32.75%	6,756	67.25%

This table presents the summary statistics for the full sample (2009–2018). Panel A shows the descriptives for the main variables. *Tobin's Q* measures a firm's total value. GO value is approximated by *GOR* (the ratio of GO value attributable to equity over market capitalization) and *SKEWNESS* (expected idiosyncratic skewness). *ESGindex* (overall ESG score as the equally-weighted average of the three pillars), *ENVIRON* (the score in the environmental pillar), *SOCIAL* (the score in the social pillar) and *GOVERN* (the score in the governance pillar) are the alternative measures of ESG performance. Control variables are: *SIZE* (firm size as the natural logarithm of total assets), *LEVERAGE* (the ratio of total financial debt to the book value of total assets), AGE (natural logarithm of a firm age), *TANGIBILITY* (the ratio of tangible assets over total assets), *INVESTMENT* (the ratio of CAPEX to total sales), *PROFITABILITY* (the ratio of *EBIT* to total sales), and *CASH* (the ratio of cash to total assets). *ESGindustry* is used as one of the instrumental variables and denotes the yearly industry (2-digit SIC) median ESG performance (in terms of *ESGindex*). Panel B displays the distribution of the values of the instrumental variables: *dumESGCOMMIT* (coded 1 if the firm has an ESG committee, and 0 otherwise), *dumESGCOMPENS* (coded 1 if managers' compensation is linked to ESG, and 0 otherwise), and *dumESGREPORT* (coded 1 if the firm conducts ESG information reporting, and 0 otherwise).

baseline results without quadratic effects. The impact of *ESGindex* on *GOR* is positive and statistically significant ($\beta_1 = 0.0302$, p-value = 0.004): if *ESGindex* increases by one standard deviation, *GOR* increases by 5.35 percentage points. This result reveals that ESG performance enriches the value of a firm's GO portfolio. Next, we perform the estimations using pillar scores as a base. Only *ENVIRON* ($\beta_1 = 0.0253$, p-value = 0.002) and *SOCIAL* ($\beta_1 = 0.0246$, p-value = 0.014) display statistical significance, whereas the effect of *GOVERN* on *GOR* can be considered to be no different from zero ($\beta_1 = 0.0029$, p-value = 0.728). Both *ENVIRON* and *SOCIAL* have a positive impact on *GOR,* which is consistent with our prediction that they enhance GO values to a greater extent than *GOVERN*. One plausible explanation is that environmental and social pillars are external dimensions which generate greater credibility among stakeholders. Our results agree with a strand of literature which does not consider corporate governance to be a component of ESG performance (Lins et al., 2017; Servaes and Tamayo, 2013).

Columns (5) to (8) of Table 4 add the quadratic term of ESG performance (equations [2] to [5]). Our empirical findings confirm an inverse U-relationship between overall ESG performance and GO value, which strongly supports our Hypothesis 1. The linear term *ESGindex* is positive ($\beta_1 = 0.1767$, p-value = 0.000) and the quadratic term is negative ($\beta_2 = -0.0149$, p-value = 0.002).

We then consider the quadratic term of each pillar. Hypothesis 2 receives strong support. Our results suggest a U-shaped relationship between the environmental/social pillars and GO value, which loses statistical significance in the case of governance. Economic significance is greater for *ENVIRON*, which concurs with existing literature discussing the option-like value of the flexibility granted by environmental management (Figge, 2005). The linear term *ENVIRON* is positive ($\beta_1 = 0.1159$, p-value = 0.000) and its squared term is negative ($\beta_2 = -0.0093$, p-value = 0.002), with both being statistically significant.

To verify the robustness of the previous nonlinear relationships, the last two rows of Table 4 display Sasabuchi's (1980) *t*-test for curvilinear relationships (H_0: monotone or U shaped; H_1: inverse U shape) and the estimated extreme point of the curve. Our results are robust and Sasabuchi's test is rejected (except for *GOVERN*), thereby offering further evidence to support an inverse U-form association between *ESGindex* (and *ENVIRON* and *SOCIAL*) and GO value. The maximum of the curve is reached at $ESGindex^* = 5.9079$, which is within the range of our data. This maximum surpasses the sample median *ESGindex*, which is line with our evidence in the earlier difference-of-means tests: companies with above-median levels of ESG performance exhibit a lower mean GO value.

Table 3
Difference-of-means tests.

PANEL A: GO value by above/below sample median ESG performance		
Firm-year obs. with *ESGindex* below the yearly sample median (1)	Firm-year obs. with *ESGindex* above the yearly sample median (2)	Difference (1)–(2)
GOR = 0.9576	*GOR* = 0.8269	0.1307***
		(6.1357)
SKEWNESS=0.3394	*SKEWNESS*=0.2668	0.0726***
		(22.5819)
Firm-year obs. with *ENVIRON* below the yearly sample median (1)	Firm-year obs. with *ENVIRON* above the yearly sample median (2)	Difference (1)–(2)
GOR=0.9413	*GOR*=0.8441	0.0972***
		(4.5607)
SKEWNESS=0.3283	*SKEWNESS*=0.2774	0.0509***
		(15.6416)
Firm-year obs. with *SOCIAL* below the yearly sample median (1)	Firm-year obs. with *SOCIAL* above the yearly sample median (2)	Difference (1)–(2)
GOR=0.9426	*GOR* = 0.8444	0.0982***
		(4.6087)
SKEWNESS=0.3335	*SKEWNESS*=0.2723	0.0612***
		(18.8829)
Firm-year obs. with *GOVERN* below the yearly sample median (1)	Firm-year obs. with *GOVERN* above the yearly sample median (2)	Difference (1)–(2)
GOR=0.9558	*GOR*=0.8287	0.1271***
		(5.9658)
SKEWNESS=0.3326	*SKEWNESS*=0.2735	0.0591***
		(18.2409)
PANEL B: GO value by bottom/top sample quartiles of ESG performance		
Firm-year obs. with *ESGindex* in the bottom yearly quartile of the sample (1)	Firm-year obs. with *ESGindex* in the top yearly quartile of the sample (2)	Difference (1)–(2)
GOR = 0.9281	*GOR* = 0.6985	0.2296***
		(8.3883)
SKEWNESS=0.3419	*SKEWNESS*=0.2316	0.1103***
		(26.4185)
Firm-year obs. with *ENVIRON* in the bottom yearly quartile of the sample (1)	Firm-year obs. with *ENVIRON* in the top yearly quartile of the sample (2)	Difference (1)–(2)
GOR = 0.8947	*GOR* = 0.7254	0.1693***
		(6.0958)
SKEWNESS=0.3247	*SKEWNESS*=0.2376	0.0871***
		(22.3222)
Firm-year obs. with *SOCIAL* in the bottom yearly quartile of the sample (1)	Firm-year obs. with *SOCIAL* in the top yearly quartile of the sample (2)	Difference (1)–(2)
GOR = 0.9436	*GOR* = 0.7562	0.1874***
		(6.6023)
SKEWNESS=0.3415	*SKEWNESS*=0.2437	0.0978***
		(22.0339)
Firm-year obs. with *GOVERN* in the bottom yearly quartile of the sample (1)	Firm-year obs. with *GOVERN* in the top yearly quartile of the sample (2)	Difference (1)–(2)
GOR = 0.9949	*GOR* = 0.7634	0.2315***
		(7.5361)
SKEWNESS=0.3488	*SKEWNESS*=0.2533	0.0955***
		(20.5433)

This table shows the difference-of-means tests of the average GO value between firm-year observations with ESG performance below the yearly sample median, and those above or equal to the yearly sample median (Panel A). Panel B compares the average GO value between firm-year observations in the bottom and top yearly quartile firm-year observations according to ESG performance. t-statistics are in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Additionally, we re-estimate previous models (eq. [2] to [5]) by 2SLS in order to account for potential endogeneity of ESG performance.[9] Table 5 shows the second-stage estimations. The Durbin-Wu-Hausman test supports the need to control for endogeneity. Again, Hypotheses 1 and 2 are strongly supported. *ESGindex*, *ENVIRON* and *SOCIAL* display an inverted U-shaped relationship with GO value. In contrast, *GOVERN* exhibits the opposite pattern: a U-shaped relationship, which ties in with the idea that this latter pillar *per se* enjoys a lower degree of legitimacy and is unable to positively contribute to GO value until greater *GOVERN* levels. Broadly speaking, our evidence suggests that overall ESG performance has a positive impact on a firm's GO value but that after a certain

[9] First-stage results are reported in Panel A of Table A.2 in the Appendix. The alternative instruments linked in some way to ESG performance (either *ESGindustry*, *dumESGCOMPENS, dumESGREPORT* and *dumCOMMIT*) are positively associated with all ESG proxies, with the results being economically and statistically significant.

Table 4
ESG performance and GO value – OLS estimations.

	Dependent variable: *GOR*							
	Panel A: Baseline linear model				Panel B: Baseline model including quadratic terms			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	3.3552***	3.3694***	3.3005***	3.1969***	2.9875***	3.1526***	3.0947***	3.2322***
	(0.3340)	(0.3321)	(0.3303)	(0.3234)	(0.3550)	(0.3330)	(0.3370)	(0.3352)
ESGindex	0.0302***				0.1767***			
	(0.0104)				(0.0499)			
(ESGindex)^2					−0.0149***			
					(0.0047)			
Pillars								
ENVIRON		0.0253***				0.1159***		
		(0.0082)				(0.0303)		
SOCIAL			0.0246**				0.1066***	
			(0.0099)				(0.0396)	
GOVERN				0.0029				−0.0119
				(0.0083)				(0.0361)
(ENVIRON)^2						−0.0093***		
						(0.0030)		
(SOCIAL)^2							−0.0082**	
							(0.0035)	
(GOVERN)^2								0.0015
								(0.0035)
Control variables								
ASSETS	−0.2173***	−0.2166***	−0.2139***	−0.1986***	−0.2126***	−0.2128***	−0.2116***	−0.1994***
	(0.0201)	(0.0192)	(0.0203)	(0.0180)	(0.0201)	(0.0192)	(0.0202)	(0.0179)
DEBT	0.4967***	0.5074***	0.5013***	0.4798***	0.4839***	0.5063***	0.4969***	0.4810***
	(0.1096)	(0.1101)	(0.1102)	(0.1084)	(0.1092)	(0.1102)	(0.1102)	(0.1084)
AGE	−0.1601***	−0.1572***	−0.1559***	−0.1562***	−0.1606***	−0.1551***	−0.1547***	−0.1556***
	(0.0226)	(0.0225)	(0.0226)	(0.0226)	(0.0225)	(0.0224)	(0.0224)	(0.0224)
RIVAL	1.1206***	1.1150***	1.1394***	1.1328***	1.1035***	1.0940***	1.1368***	1.1361***
	(0.2459)	(0.2472)	(0.2459)	(0.2430)	(0.2449)	(0.2442)	(0.2460)	(0.2427)
INDUSTRY	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YEAR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	4,578	4,578	4,578	4,578	4,578	4,578	4,578	4,578
F-statistic	19.05***	19.05***	19.09***	18.78***	18.35***	18.32***	18.66***	17.93***
Sasabuchi-test of U-form in ESG performance	–	–	–	–	2.56***	2.21**	1.67**	0.33
Estimated extreme point	–	–	–	–	5.9079	6.2255	6.4917	3.8931

This table reports the results of the ordinary least squares (OLS) regressions of equations [2] to [5] with clustered standard errors by firm. GO value is regressed on ESG performance. Panel A shows the results of the linear model, and Panel B contains the results considering the curvilinear effects of ESG performance (equations [2] to [5]). The dependent variable is *GOR*, which is the ratio of a firm's GO value attributable to equity over its market capitalization. ESG performance is measured by *ESGindex* (overall ESG score as the equally-weighted average of the three pillars), *ENVIRON* (the score in the environmental pillar), *SOCIAL* (the score in the social pillar), and *GOVERN* (the score in the governance pillar). Firm size (*ASSETS*), firm leverage (*DEBT*), firm age (*AGE*), industry effects (*INDUSTRY*), and time effects (*YEAR*) are control variables in all the estimations. The F-statistic contrasts the null hypothesis of no joint significance of the explanatory variables. The adjusted R-square shows the goodness-of-fit. The last two rows of Panel B display the Sasabuchi *t*-test (H_0: Monotone or U shape; H_1: Inverse U shape) and the estimated extreme point of the curve. Standard errors are shown in parentheses under coefficients. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

breakpoint the effect reverses and becomes negative. The inflection point from which the value-destroying effects of *ESGindex* become more prevalent is reached at 5.17 (5.25 and 5.35 for *ENVIRON* and *SOCIAL*, respectively). The higher value of this maximum in the case of *ENVIRON* and *SOCIAL* is consistent with the idea that these dimensions are able to stimulate stakeholder trust to a greater extent, such that the trust-enhancing effect is likely to endure over a longer range of scores to counteract the risk-reducing effect on GO value.[10] Results also hold when using *SKEWNESS* as an alternative proxy for GO value (Panel B).

[10] OLS and 2SLS estimations are also repeated when excluding outliers at the 1st and 99th percentiles. Results remain qualitatively similar although the statistical significance for the interaction term drops in some interaction effects estimations. This can be attributed to artificially extreme outcomes like those obtained from proxies such as *GOR* and *SKEWNESS*.

Table 5
ESG performance and GO value – curvilinear effects accounting for potential endogeneity (2SLS).

	Panel A: Dependent variable: *GOR*				Panel B: Dependent variable: *SKEWNESS*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	−3.0742	0.9753	−0.1706	7.1878***	0.1359	0.8351***	0.6427***	1.7578***
	(2.8557)	(1.0782)	(1.1117)	(1.8440)	(0.4041)	(0.1260)	(0.1592)	(0.2114)
ESGindex	3.0250**				0.5123***			
	(1.3292)				(0.1944)			
(ESGindex)^2	−0.2923**				−0.0500***			
	(0.1294)				(0.0190)			
Pillars								
ENVIRON		1.3209**				0.2374***		
		(0.5682)				(0.0758)		
SOCIAL			1.6573***				0.2674***	
			(0.5034)				(0.0753)	
GOVERN				−2.0148**				−0.2866***
				(0.9122)				(0.1014)
(ENVIRON)^2		−0.1257**				−0.0229***		
		(0.0548)				(0.0074)		
(SOCIAL)^2			−0.1550***				−0.0255***	
			(0.0476)				(0.0072)	
(GOVERN)^2				0.1972**				0.0277***
				(0.0891)				(0.0098)
Control variables								
ASSETS	−0.2153***	−0.2212***	−0.2304***	−0.2317***	−0.0544***	−0.0589***	−0.0566***	−0.0572***
	(0.0190)	(0.0161)	(0.0171)	(0.0234)	(0.0028)	(0.0026)	(0.0024)	(0.0028)
DEBT	0.3177**	0.5687***	0.4897***	0.6680***	0.0177	0.0554***	0.0380***	0.0439***
	(0.1395)	(0.1032)	(0.1012)	(0.1463)	(0.0183)	(0.0163)	(0.0148)	(0.0168)
AGE	−0.1907***	−0.1351***	−0.1352***	−0.0359	−0.0391***	−0.0296***	−0.0297***	−0.0152**
	(0.0277)	(0.0224)	(0.0217)	(0.0598)	(0.0042)	(0.0031)	(0.0030)	(0.0069)
RIVAL	0.7214**	0.7733***	1.1064***	1.6468***	−0.0705	−0.0669	0.0044	0.0803*
	(0.3490)	(0.2973)	(0.2621)	(0.3866)	(0.0584)	(0.0480)	(0.0371)	(0.0436)
INDUSTRY	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YEAR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	4,578	4,578	4,578	4,578	5,794	5,794	5,794	5,794
F-statistic	17.68***	24.29***	23.41***	16.58***	52.98***	75.57***	76.15***	61.61***
Weak identification test (Cragg-Donald statistic)	4.62***	7.30***	14.098***	9.251***	6.03***	11.38***	33.436***	16.390***
Sargan overidentification test p-value	0.6023	0.1587	0.3120	0.2227	0.5653	0.7400	0.5302	0.6693
Durbin-Wu-Hausman test p-value	0.0025	0.0107	0.0001	0.0015	0.0002	0.0005	0.0000	0.0002
Sasabuchi-test of U-form in ESG performance	2.24**	2.25**	3.20***	2.21**	2.63***	3.09***	3.55***	2.80***
Estimated extreme point	5.1750	5.2545	5.3473	5.1094	5.1180	5.1825	5.2476	5.1735

This table reports the results of the two-stage least squares (2SLS) regressions of equations [2] to [5]. GO value is regressed on ESG performance and its square term. In Panel A, we approximate GO value by *GOR* (the ratio of GO value attributable to equity over market capitalization). In Panel B, GO value is approximated by *SKEWNESS* (expected idiosyncratic skewness). ESG performance is measured by *ESGindex* (overall ESG score as the equally-weighted average of the three pillars), *ENVIRON* (the score in the environmental pillar), *SOCIAL* (the score in the social pillar), and *GOVERN* (the score in the governance pillar). Firm size (*ASSETS*), firm leverage (*DEBT*), firm age (*AGE*), industry effects (*INDUSTRY*) and time effects (*YEAR*) are control variables in all estimations. The F-statistic contrasts the null hypothesis of no joint significance of the explanatory variables. The Cragg-Donald F-statistic evaluates instrument relevance. The Sargan test of overidentifying restrictions evaluates instrument validity. The Durbin-Wu-Hausman statistic tests for exogeneity of ESG variables. The last two rows display the Sasabuchi *t*-test (H_0: Monotone or U shape; H_1: Inverse U shape) and the estimated extreme point of the curve. Standard errors are shown in parentheses under coefficients. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

4.3. ESG performance and a firm's total value: the moderating role of GO value

Table 6 presents the estimation results of equation [6] (OLS and 2SLS).[11] Columns (1) and (6) estimate the baseline model without the moderating effect of GO to compare our results to previous studies. Consistent with the bulk of the literature, our findings reveal the existence of a ESG premium (Awaysheh et al., 2020; Cochran and Wood, 1984; Li et al., 2018; Lo and Sheu, 2007; Orlitzky et al., 2003).

[11] First-stage results are reported in Panel B of Table A.2 in the Appendix. They confirm the relevance of all our alternative instruments, which are positively associated with *ESGindex*.

Table 6
ESG performance and a firm's total value – the moderating effect of GO value (OLS and 2SLS estimates).

	Panel A: OLS estimations					Panel B: 2SLS estimations				
	Dependent variable: *Tobin's Q*					Dependent variable: *Tobin's Q*				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Constant	4.7076***	5.2263***	5.3084***	5.3157***	5.7701***	4.9976***	5.3463***	5.2451***	5.5758***	5.9330***
	(0.6210)	(0.7319)	(0.6281)	(0.7312)	(0.6335)	(0.2945)	(0.3390)	(0.2911)	(0.3491)	(0.2955)
ESGindex	0.0989***	0.1134***	0.2311***	0.0965***	0.0931***	0.1354***	0.1724***	0.2892***	0.1345***	0.1188***
	(0.0167)	(0.1134)	(0.0345)	(0.0191)	(0.0168)	(0.0157)	(0.0288)	(0.0467)	(0.0191)	(0.0159)
Interaction effects										
ESGindex × GOR		−0.0247**					−0.0579***			
		(0.0128)					(0.0186)			
ESGindex × dumGOR				−0.0077					−0.0128	
				(0.0115)					(0.0090)	
ESGindex × SKEWNESS			−0.5446***					−0.7089***		
			(0.1045)					(0.1349)		
ESGindex × dumSKEWNESS					−0.0343***					−0.0385***
					(0.0113)					(0.0076)
GOR		−0.0471		−0.1462***			0.1027		−0.1357***	
		(0.0601)		(0.0224)			(0.0860)		(0.0242)	
SKEWNESS			0.7225		−1.1623***			1.4163**		−1.0892***
			(0.4593)		(0.2448)			(0.5762)		(0.1320)
Control variables										
ASSETS	−0.2308***	−0.2160***	−0.2730***	−0.2174***	−0.2728***	−0.2601***	−0.2420***	−0.2846***	−0.2468***	−0.2920***
	(0.0277)	(0.0313)	(0.0276)	(0.0315)	(0.0283)	(0.0179)	(0.0206)	(0.0170)	(0.0212)	(0.0177)
DEBT	−0.5589***	−0.6066***	−0.3982**	−0.6049***	−0.4251***	−0.5402***	−0.5909***	−0.3823***	−0.5895***	−0.4141***
	(0.1599)	(0.1792)	(0.1557)	(0.1799)	(0.1571)	(0.0876)	(0.1053)	(0.0869)	(0.1054)	(0.0867)
TANG	−0.3970***	−0.4296***	−0.3699***	−0.4344***	−0.3844***	−0.4025***	−0.4225***	−0.3685***	−0.4356***	−0.3887***
	(0.0427)	(0.0570)	(0.0442)	(0.0573)	(0.0442)	(0.0346)	(0.0445)	(0.0342)	(0.0443)	(0.0344)
INVEST	1.9407***	2.1187***	1.8866***	2.1413***	1.9626***	2.0096***	2.1302***	1.8966***	2.1913***	2.0109***
	(0.3376)	(0.4048)	(0.3447)	(0.4083)	(0.3458)	(0.2276)	(0.2805)	(0.2271)	(0.2809)	(0.2295)
PROFIT	0.2927***	0.1465*	0.1024*	0.1416*	0.1272**	0.3026***	0.1595***	0.0977**	0.1522***	0.1358***
	(0.0634)	(0.0801)	(0.0591)	(0.0791)	(0.0596)	(0.0398)	(0.0540)	(0.0405)	(0.0542)	(0.0407)

(*continued on next page*)

Table 6 (*continued*)

	Panel A: OLS estimations					Panel B: 2SLS estimations				
	Dependent variable: *Tobin's Q*					Dependent variable: *Tobin's Q*				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CASH	2.0128***	2.1057***	2.2508***	2.1209***	2.2595***	1.9899***	2.0696***	2.2369***	2.0994***	2.2396***
	(0.2141)	(0.2375)	(0.2080)	(0.2374)	(0.2093)	(0.1278)	(0.1516)	(0.1263)	(0.1512)	(0.1270)
RIVAL	0.2910	−0.2602	0.1511	−0.2527	0.2119	0.2521	−0.2857	0.1179	−0.2714	0.1866
	(0.5438)	(0.6716)	(0.5125)	(0.6729)	(0.5179)	(0.2058)	(0.2545)	(0.2027)	(0.2544)	(0.2026)
INDUSTRY	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YEAR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	6,076	4,659	6,010	4,659	6,010	6,076	4,659	6,010	4,659	6,010
F-statistic	43.52***	28.94***	39.62***	29.02***	40.32***	70.47***	49.51***	75.18***	49.39***	74.78***
Weak identification test (Cragg-Donald statistic)	–	–	–	–	–	1438.02***	698.41***	510.94***	1072.41***	1392.82***
Sargan overidentification test p-value	–	–	–	–	–	0.4433	0.3751	0.2200	0.4189	0.3223
Durbin-Wu-Hausman test p-value	–	–	–	–	–	0.0046	0.0194	0.1775	0.0161	0.0505

This table reports the estimation results of the effect of ESG performance on a firm's value. Panel A summarizes the OLS results and Panel B reports the 2SLS results. Columns (1) and (6) report the baseline model in which a firm's total value (*Tobin's Q*) is regressed on ESG performance, and the remaining columns incorporate the interaction effects of GO and ESG performance (equation [6]). ESG performance is measured by *ESGindex* (overall ESG score as the equally-weighted average of the three pillars). GO value is measured by: *GOR* (the ratio of a GO value attributable to equity over market capitalization), *SKEWNESS* (expected idiosyncratic skewness), *dumGOR* (a dummy variable which equals 1 if a firm's *GOR* is above or equal to the yearly sample median, and zero otherwise), and *dumSKEWNESS* (equal to 1 if *SKEWNESS* is above or equal to the yearly sample median, and zero otherwise). Firm size (*ASSETS*), firm leverage (*DEBT*), assets tangibility (*TANG*), investment activity (*INVEST*), firm profitability (*PROFITABILITY*), cash holdings (*CASH*), industry effects (*INDUSTRY*), and time effects (*YEAR*) are control variables in all estimations. The F-statistic contrasts the null hypothesis of no joint significance of the explanatory variables. The Cragg-Donald F-statistic evaluates instrument relevance. The Sargan test of overidentifying restrictions evaluates instrument validity. The Durbin-Wu-Hausman statistic tests for exogeneity of ESG variables. Standard errors are shown in parentheses under coefficients. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

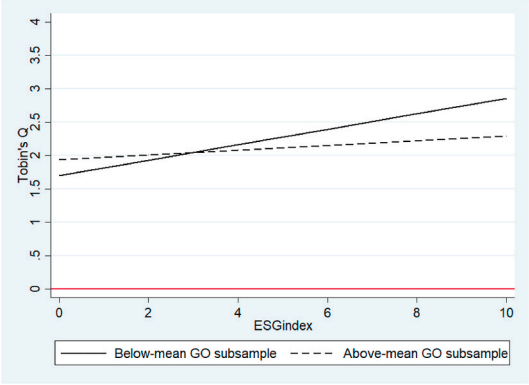

Fig. 2. The effect of ESG performance on a firm's total value by subsamples of below-mean and above-mean GO value.

A one standard deviation increase in *ESGindex* increases *Tobin's Q* by about 17.53–24 percentage points.

In the remaining columns of Table 6, we add interaction effects of GO value and ESG performance. The last two columns of each panel apply dummies (*dumGOR* or *dumSKEWNESS*) to identify firm-year observations with an above-mean and below-mean GO value. Again the Durbin-Wu-Hausman test confirms the presence of endogeneity. The interaction term of ESG performance and GO value proxies has a negative sign and is statistically significant at the 1% level in most cases, which supports our Hypothesis 3. These findings suggest that a higher GO value reduces the overall value-enhancing effects associated with ESG performance. For instance, if the interaction term is computed by applying *dumSKEWNESS* (column (10)), a one standard deviation rise in *ESGindex* increases *Tobin's Q* by 21.06 percentage points in low GO firms ($\beta_1 = 0.1188$, p-value $= 0.000$) and by 14.23 percentage points in high GO firms ($\sum = \beta_{1+} \beta_2 = 0.0803$, p-value $= 0.000$).[12]

Complementarily, Fig. 2 illustrates the predicted marginal effects of *ESGindex* on *Tobin's Q* for firms with below-mean and above-mean GO value. Control variables are kept constant at their mean level. As observed, ESG performance has a more value-enhancing effect in the subsample of below-mean GO value, with this effect weakening in the other subsample in which GO value is more prominent.

4.4. Additional robustness analyses

4.4.1. Analyses by litigation risk in the industry

As a robustness analysis, we consider whether the firm belongs to an industry characterized by high litigation risk which increases a firm's exposure to experiencing negative events. Following Koh et al. (2014), we define a dummy variable which equals 1 if a firm operates in a high-litigation risk industry (SIC codes 2833–2836 (biotechnology), 3570–3577 and 7370–7374 (computers), 3600–3674 (electronics), and 5200–5961 (retailing)), and zero otherwise. Table A.3 of the Appendix contains the results, which suggest that the negative moderating impact of GO value on the relationship between ESG performance and a firm's value lessens if the firm is in a litigious industry.[13] This evidence agrees with the idea that firms in industries with higher litigation risk have a greater need for insurance protection, which restricts the value-destroying effects arising from potential redundancies between GO and ESG performance as insurance mechanisms. This result ties in with Koh et al. (2014), who demonstrate that corporate social performance becomes more value-enhancing in industries with higher litigation risk.

4.4.2. Analyses controlling for sample selection bias[14]

In addition, we repeat our analyses by alternatively applying the Heckman two-step estimation procedure to control for potential sample selection bias (Heckman, 1979).[15] Sample selection bias might appear because not all companies have ESG data coverage (i.e. ESG missing data) (Certo et al., 2016). The first stage of Heckman (i.e. selection equation) models the likelihood of a firm disclosing ESG information. For example, certain firm-level characteristics, such as the influence of firm size, may make firms more likely to be considered by ESG data providers (Kang, 2013). The Heckman approach requires the existence of exclusion restrictions; namely, at least one explanatory variable of the selection equation not appearing in the outcome equation of the second stage (Certo et al., 2016).

[12] Most results are robust when excluding outliers at the 1st and 99th percentiles. Only one of the interaction effects loses its statistical significance. These results are available upon request.

[13] Results also hold when dropping outliers at the 1st and 99th percentiles. These results are available upon request.

[14] Most results remain similar when dropping outliers at the 1st and 99th percentiles. They are available upon request.

[15] We thank the Associate Editor for this suggestion.

We choose the yearly median *ESGindex* in each firm's core industry (at the 2 digit SIC code level) as the exclusion restriction in our estimations. In the first stage,[16] the dependent variable is *dumESGcoverage*, which takes the value of 1 if the firm covers ESG information, and 0 otherwise. This first estimation allows us to obtain the inverse of Mills' ratio (λ) which is added in the subsequent stage to correct for sample selectivity (Heckman, 1979; Certo et al., 2016).

Results of the Heckman estimations of Hypotheses 1 and 2 are reported in Table A.4 in the Appendix. As observed, our previously described results prove to be robust, although *GOVERN* displays no statistical significance in these regressions.

Table A.5 provides the results for the interaction effects of Hypothesis 3. All interactions except for the last one shown in column (4) display the expected negative sign, therefore supporting the idea that ESG performance is more value-enhancing in companies with lower GO value. In order to delve deeper into these results, we estimate the effect of ESG performance on a firm's value by adopting a sample-split approach based on the level of GO value. Table A.6 summarizes these complementary robustness analyses. Interestingly, *ESGindex* is positive and statistically significant in the subsample of companies with below-mean GO, whereas it has no significant impact in the subsample of companies with above-mean GO.

5. Discussion and conclusions

This research puts forward a fresh theoretical and empirical approach on the relationship between ESG performance and a firm's total value through the real options lens. Most research so far has primarily been concerned with the impact of ESG performance on a firm's financial performance or measures related to a firm's total value. However, the former constrains to short-term consequences whereas the second one overlooks the two-fold nature of a firm's total value (Myers, 1977), which is defined by the sum of the value of current businesses (assets-in-place value) plus the value of GO. This has resulted in mixed evidence and an insufficient understanding of the mechanisms through which ESG performance affects a firm's total value (Wang et al., 2020). This still narrow focus has blurred the brightest side of ESG performance, namely the value component in which it mostly materializes. In this vein, many studies emphasize that the value advantage of ESG practices mainly stems from intangibles outcomes (Edmans, 2011; Fombrun et al., 2000).

According to this idea, looking at the "right" side in the value of ESG practices imposes the need to shift attention to one source of a large portion of a firm's total value, namely GO value. By looking at this so far unexplored side of GO value we can understand not only whether ESG practices create or destroy value, but also how this value process takes place. We provide empirical evidence that ESG performance has an inverse U-form relationship with a firm's GO value. ESG practices accumulate social capital and enhances stakeholder trust, which might increase stakeholder willingness to make firm-specific investments that are crucial for optimally managing GO. However, this positive effect of ESG performance on GO value reverses from a certain breakpoint due to the risk-reducing effect of ESG performance. Moreover, not every ESG component carries the same impact on GO value. Such a U-form relation is found to be stronger for the environmental and social pillars. This finding agrees with prior literature attributing higher trust-enhancing benefits to those pillars as a result of their greater sincerity, as perceived by stakeholders (Cuypers et al., 2016; Godfrey et al., 2009).

Overall, this evidence urges the need to promote a close examination of the role played by GO in the impact of ESG performance on a firm's total value. We make a first attempt to tackle this challenge and we find that GO negatively moderate the ESG-value relationship, thereby making these practices less valuable in companies with higher GO. This result can be explained by the subadditive effects from insurance overlapping between ESG performance and GO as well as by the need to cover a wider (and many times, conflicting) range of stakeholder demands (both current stakeholders already engaged in ESG practices and new stakeholders brought in by GO). This provides a valuable insight for interpreting the thus far ambiguous empirical evidence on the ESG-value relationship basing on heterogeneity among firms (Orlitzky et al., 2003).

Moreover, these latter findings indirectly reveal that the value of ESG performance is mainly leveraged by its assets-in-place. ESG practices expand the future of a firm's current businesses, (re)adapting them to stakeholders' changing needs and preferences. In contrast, ESG performance is found to interact negatively with a GO. GO are already sustainable by nature because they have value, provided that the owner firm is capable of bringing up new products/services in a way that can satisfy new stakeholders' needs or beat current competitors in matching stakeholders' changing preferences. As a consequence, GO can relieve the firm of the need to incur additional effort in ESG practices which can be competitive in resource allocation and which can detract resources from the optimal maintenance and future exercise of a firm's GO.

5.1. Contributions

Our paper advances the strands of literature on both ESG performance and real options in different ways. As regards the former, this research takes a crucial step towards reconciling the mixed evidence on the impact of ESG performance of a firm's total value. The overly broad nature of the latter could lead to a blurred insight should we fail to consider its components individually (assets-in-place versus GO). Instead, we unveil an alternative source of value of ESG practices beyond profits; namely, through enriching a firm's GO portfolio. In contrast to assets-in-place value, which mainly builds on tangible assets, GO value mostly derives from intangible resources and specific capabilities which are themselves difficult to replicate by competitors

[16] First stage results are available upon request.

(Andrés et al., 2017b; Myers, 1977). The unique nature of this latter component can explain why ESG practices endow some firms with a value advantage when this strategy is primarily targeted at enhancing GO. This ties in with some works which have shown that the main benefits of ESG practices stem from developing intangible assets (e.g. reputational capital, culture, employee satisfaction) (Fombrun et al., 2000; Edmans, 2011). By drawing on the real options approach, we embed our arguments in a solid conceptual grounding which offers an ideal matching to appraise the forward-looking nature of ESG practices and the firm-specific drivers of value creation.

Complementarily, our approach to ESG performance through the real options lenses is a step forward vis-à-vis achieving an integrative knowledge of the longer-term implications of ESG performance for a firm's total value and its insurance-like properties (Husted, 2005). We do so by shifting our focus to the GO component of a firm's value, which is largely seen to provide firms with a buffer against downside risk (Bowman and Hurry, 1993; Fombrun et al., 2000; Myers, 1977). The real options approach brings together in a unifying framework the ability of ESG performance to serve as insurance protection, encourage stakeholder firm-specific investment, and foster corporate flexibility under uncertainty. This is likely to stimulate a more comprehensive understanding of ESG performance as an insurance strategy under an integrative framework aimed at long-term value. We show that ESG practices can serve as a source of GO value, especially if the firm invests in more trustworthy pillars (environmental and social) which have a greater ability to signal an 'other-considering' disposition (Godfrey et al., 2009). Complementarily, we confirm the relationship between underlying risk (*i.e.* inversely proxied by ESG performance) and option pricing to find an explanation for the negative effects of ESG performance on GO value. Combining the two effects (the trust-enhancing and risk-reducing effects) helps us to offer a logical explanation for the nonlinear relationship between ESG performance and GO value.

Additionally, we delve into the joint role of ESG performance and GO in the overall value creation process within companies. We provide a sound explanation for the ESG-value relationship not being universal across companies, which ties in with the latest evidence advocating further research into the moderating factors involved in such a relationship (Magrizos et al., 2021). Our explanation is grounded on the fact that GO and ESG performance build substitutive insurance mechanisms and are likely to fuel the conflict between former and new stakeholders involved in current and prospective businesses. Furthering the analysis of the interplay between ESG practices and GO (both theoretically and empirically) could bring a closer alignment between the long-term value of its strategy and the basis of its research.

As far as contributions to real options literature are concerned, we advance the study of the heterogeneous mechanisms that may influence a firm's GO value, a portion of which is firm specific (Tong and Reuer, 2006). This offers fertile ground for real options scholars in order to explore the boundaries of this theory, test its validity to explain numerous strategic phenomena (Cuervo-Cazurra and Un, 2010), and enrich this theoretical approach (which is overfocused on managers as single actors) by adopting a multiple-stakeholder view that has thus far remained absent (Adner and Levinthal, 2004). To the best of our knowledge, this is the first study to focus on the effect of ESG performance on a firm's GO value as well as the importance which such a GO portfolio has in shaping the impact of ESG performance on a firm's total value. In doing so, our study answers recent calls, such as Mackey et al. (2017) that urge going beyond the study of the average relationship between a strategy and firm performance and carry contingency studies in order to explain the conditions under which such a relationship can be dissimilar across firms and so reconcile prior mixed empirical evidence. In doing so, and encouraged by a number of studies, we make headway along the research path of a contingent view of real options reasoning in order to account for firm heterogeneity in an effort to reach a more comprehensive integration of the real options theory and strategic management (Andrés et al., 2017b; Andries and Hünermund, 2020; Tong and Reuer, 2006).

5.2. *Managerial implications*

This study also has significant and timely implications which can help managers to better design and manage ESG practices in their companies, an issue which is expected to increase in importance in the wake of the COVID-19 pandemic (Crane and Matten, 2021; He and Harris, 2020). Managers should devote more attention not only to the strategic insurance-like properties of ESG performance but also to the potential it has to strengthen future GO for their companies. The usefulness of ESG performance as a source of GO value has so far been underestimated. In this regard, one key challenge for managers is to build ESG performance which signals legitimacy and credibility for stakeholders and to decide the optimal allocation of investment efforts across the three ESG pillars in an effort to stimulate stakeholder trust. Otherwise, a non-credible ESG performance will lead firms to forego taking advantage of GO.

Equally importantly, managers should harmonize the wide range of demands to satisfy both current stakeholders and prospective stakeholders, whose conflict of interest could give rise to harmful effects in the firm's GO portfolio. Another relevant issue for practitioners emerges from appropriately combining and handling two insurance mechanisms such as GO and ESG performance. They should be able to reach an optimal mix of both, since they can be substitutive and drive mutually counterbalancing forces which can lead to subadditive value effects.

5.3. Opportunities for future research

This investigation leaves room for improvement and further research. First, a natural extension of our research could tackle the implications of ESG practices for the different types of corporate risk. This might also refine our understanding of the sources of value that can be derived from ESG performance. Complementarily, it might be insightful to explore the interrelationships between ESG practices and other risk management mechanisms, such as diversification strategy and derivatives (Kim et al., 2021). This could prove helpful vis-à-vis understanding whether they are substitutive or complementary, and in designing optimal hedging strategies accordingly. Second, future research could investigate how ESG performance might affect the implementation of other corporate strategies within the same firm. Since ESG practices consume a firm's attention and resources, it may trigger a trade-off with other strategic alternatives (Mithani, 2017), which might be positive or negative depending on the complementarities between the two strategic alternatives. In this regard, given the close relationship between GO and innovation strategies (Andries and Hünermund, 2020; Estrada et al., 2010), it may be interesting to delve into the interaction between ESG practices and R&D: does ESG performance leverage the commitment of key stakeholders in the success of innovation or do ESG practices divert the resources needed for already costly R&D investments? One opportunity for further research might be to explore in greater depth the role of ESG performance in R&D and the joint value of both.

Third, our study is based on a single country (the U.S.), which comprises a narrow institutional context. Cross-country studies are a clear opportunity for the future to consider several institutional contexts which offer dissimilar degrees of investor protection and different support for ESG practices. This might provide interesting insights since the importance that each country's institutions attach to ESG performance is likely to affect stakeholder perception of its legitimacy. Fourth, our ESG measures focus on the individual and aggregate performance of the three pillars (environmental, social, and governance). Future studies could explore in greater depth each of these dimensions separately, and could undertake a more fine-grained disaggregation of them. For instance, in the environmental pillar (which we find to have a greater impact on GO), it might be advisable to delve into the different nature of some of its components, such as emissions and innovation, since they entail dissimilar consequences for stakeholders. Relatedly, as a result of the coronavirus outbreak, the most recent works emphasize the vital need to reassess the value generated by each stakeholder group and to advance toward better stakeholder identification and prioritization within companies (Crane and Matten, 2021).

CRediT authorship contribution statement

Gabriel de la Fuente: Conceptualization, Data curation, Formal analysis, and interpretation of the results, Writing – original draft, Writing – review & editing, Funding acquisition. **Margarita Ortiz:** Conceptualization, Data curation, Formal analysis, and interpretation of the results, Writing – original draft, Writing – review & editing. **Pilar Velasco:** Conceptualization, Data curation, Formal analysis, and interpretation of the results, Writing – original draft, Writing – review & editing.

Declaration of competing interest

None.

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APPENDIX

Table A.1
Correlation matrix

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. *Tobin's Q*	1.0000														
2. *GOR*	−0.0663***	1.0000													
3. *SKEWNESS*	−0.0112	0.4984***	1.0000												
4. *ESGindex*	−0.0412***	−0.1236***	−0.3025***	1.0000											
5. *ENVIRON*	−0.0135	−0.1049***	−0.2556***	0.8767***	1.0000										
6. *SOCIAL*	0.0069	−0.1150***	−0.2819***	0.8573***	0.7300***	1.0000									
7. *GOVERN*	−0.0938***	−0.0833***	−0.2153***	0.7495***	0.4360***	0.4188***	1.0000								
8. *ASSETS*	−0.3278***	−0.2393***	−0.4184***	0.4400***	0.3642***	0.3899***	0.3078***	1.0000							
9. *DEBT*	−0.2869***	0.0237**	−0.1302***	0.1331***	0.0941***	0.0929***	0.1432***	0.3996***	1.0000						
10. *AGE*	−0.0525***	−0.1652***	−0.2162***	0.1978***	0.1430***	0.1339***	0.2095***	0.1417***	−0.0335***	1.0000					
11. *TANG*	−0.2561***	0.1779***	0.0416***	0.0546***	0.0184*	−0.0099	0.1248***	0.1726***	0.2100***	−0.0353***	1.0000				
12. *INVEST*	−0.1560***	0.1378***	0.0573***	0.0124	−0.0081	−0.0222**	0.0599***	0.0917***	0.1169***	−0.0422***	0.7925***	1.0000			
13. *PROFIT*	−0.0193*	−0.4778***	−0.3742***	0.1016***	0.0751***	0.0938***	0.0848***	0.2448***	0.0704***	0.1272***	−0.0255**	−0.0641***	1.0000		
14. *CASH*	0.3680***	0.1211***	0.2363***	−0.1514***	−0.1085***	−0.1148***	−0.1538***	−0.3717***	−0.3609***	−0.0869***	−0.2445***	−0.1614***	−0.1380***	1.0000	
15. *RIVAL*	0.0602***	0.0978***	0.0301***	−0.0444***	−0.0497***	−0.0664***	0.0043	−0.0995***	−0.0320***	−0.0600***	0.0405***	0.0678***	−0.0588***	0.1422***	1.0000

This table summarizes the pairwise correlations of the variables of our models. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A.2
First-stage estimation results of 2SLS regressions

	PANEL A: First-stage 2SLS (eq. [7])				PANEL B: First-stage 2SLS (eq. [8])	
	Dependent variable: *ESGindex*	Dependent variable: *ENVIRON*	Dependent variable: *SOCIAL*	Dependent variable: *GOVERN*		Dependent variable: *ESGindex*
Constant	−7.4416***	−9.8608***	−1.8292***	−4.2269***	**Constant**	−4.7648***
	(0.4877)	(0.6904)	(0.5530)	(0.6754)		(0.3651)
ESGindustry	0.3408***	0.4633***	0.0729 (0.0475)	0.2196***	**ESGindustry**	0.2297***
	(0.0429)	(0.0608)		(0.0586)		(0.0286)
dumESGCOMPENS	0.7015***	0.4845***			**dumESGREPORT**	1.9197***
	(0.7015)	(0.0789)				(0.0377)
dumESGREPORT			1.9949***		**ASSETS**	0.4640***
			(0.0593)			(0.0165)
dumESGCOMMIT				1.3905***	**DEBT**	−0.3368***
				(0.0700)		(0.1040)
ASSETS	0.6328***	0.7429***	0.4054***	0.3755***	**TANG**	−0.0352 (0.0420)
	(0.0190)	(0.7429)	(0.0223)	(0.0270)		
DEBT	−0.5893***	−1.1113***	−0.6654***	0.3043*	**INVEST**	−0.9093***
	(0.1299)	(0.1839)	(0.1435)	(0.1759)		(0.2703)
AGE	0.1803***	0.0937**	0.0304 (0.0294)	0.3846***	**PROFIT**	−0.2271***
	(0.0267)	(0.0378)		(0.0361)		(0.0472)
RIVAL	1.2532***	1.7155***	0.2253 (0.3804)	1.5749***	**CASH**	0.4800***
	(0.3448)	(1.7155)		(0.4668)		(0.1527)
					RIVAL	0.1526***
						(0.2479)
INDUSTRY	Yes	Yes	Yes	Yes	**INDUSTRY**	Yes
YEAR	Yes	Yes	Yes	Yes	**YEAR**	Yes
No. of obs.	4,578	4,578	4,578	4,578	**No. of obs.**	6,076

This table presents the results of the first stage of the 2SLS regressions (equation [7] in Panel A and equation [8] in Panel B). The instrumental variables in Panel A are: *ESGindustry* (the yearly 2-digit industry median ESG performance), *dumESGCOMPENS* (which equals 1 if part of the firm's managerial compensation is linked to ESG performance, and zero otherwise), *dumESGREPORT* (which equals 1 if the firm conducts ESG information reporting, and zero otherwise) and *dumESGCOMMIT* (which equals 1 if the firm has an ESG committee, and zero otherwise). The instrumental variables in Panel B are: *dumESGREPORT* and *dumESGCOMMIT*. Standard errors are shown in parentheses under coefficients. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively. Note: Cragg-Donald F-statistic for the first-stage regression is shown at the bottom of the tables of the second-stage estimations of 2SLS together with the other test for instrument validity (the Sargan test).

Table A.3
ESG performance and a firm's total value – the moderating effect of GO by industry litigation risk (OLS and 2SLS estimates)

	Panel A: OLS estimations				Panel B: 2SLS estimations			
	Dependent variable: Tobin's Q				Dependent variable: Tobin's Q			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	5.2917***	5.6260***	5.4290***	5.9219***	5.4278***	5.5615***	5.7049***	6.0859***
	(0.7305)	(0.6343)	(0.7300)	(0.6352)	(0.3390)	(0.2904)	(0.3487)	(0.2970)
ESGindex	0.1192***	0.2483***	0.0954***	0.0924***	0.1838***	0.3244***	0.1359***	0.1186***
	(0.0231)	(0.0349)	(0.0191)	(0.0169)	(0.0291)	(0.0474)	(0.0190)	(0.0159)
Interaction effects								
ESGindex × GOR	−0.0437***				−0.0814***			
	(0.0145)				(0.0196)			
ESGindex × dumGOR			−0.0363***				−0.0413***	
			(0.0104)				(0.0105)	
ESGindex × SKEWNESS		−0.6704***				−0.8897***		
		(0.1056)				(0.1398)		
ESGindex × dumSKEWNESS				−0.0509***				−0.0549***
				(0.0116)				(0.0085)
ESGindex × GOR × dumLITIGATION	0.0276***				0.0301***			
	(0.0088)				(0.0060)			
ESGindex × dumGOR × dumLITIGATION			0.0657***				0.0647***	
			(0.0206)				(0.0127)	

(*continued on next page*)

Table A.3 (*continued*)

	Panel A: OLS estimations				Panel B: 2SLS estimations			
	Dependent variable: Tobin's Q				Dependent variable: Tobin's Q			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ESGindex × SKEWNESS × dumLITIGATION		0.1725***				0.1820***		
		(0.0394)				(0.0206)		
ESGindex × dumSKEWNESS × dumLITIGATION				0.0420**				0.0415***
				(0.0170)				(0.0099)
GOR	−0.0089		−0.1366***		0.1572*		−0.1255***	
	(0.0641)		(0.0225)		(0.0875)		(0.0243)	
SKEWNESS		0.9500**		−1.1595***		1.8596***		−1.0851***
		(0.4737)		(0.2446)		(0.5854)		(0.1318)
Control variables								
ASSETS	−0.2159***	−0.2782***	−0.2172***	−0.2759***	−0.2441***	−0.2934***	−0.2487***	−0.2954***
	(0.0312)	(0.0276)	(0.0314)	(0.0282)	(0.0206)	(0.0170)	(0.0212)	(0.0177)
DEBT	−0.5925***	−0.3439**	−0.5849***	−0.3955**	−0.5743***	−0.3204***	−0.5688***	−0.3846***
	(0.1789)	(0.1552)	(0.1797)	(0.1579)	(0.1052)	(0.0869)	(0.1052)	(0.0868)
TANG	−0.4088***	−0.3427***	−0.4148***	−0.3780***	−0.3993***	−0.3393***	−0.4163***	−0.3824***
	(0.0573)	(0.0444)	(0.0574)	(0.0444)	(0.0447)	(0.0342)	(0.0443)	(0.0344)
INVEST	2.0590***	1.7719***	2.0837***	1.9409***	2.0662***	1.7785***	2.1379***	1.9903***
	(0.4048)	(0.3503)	(0.4081)	(0.3474)	(0.2802)	(0.2261)	(0.2804)	(0.2292)
PROFIT	0.1697**	0.1209**	0.1663**	0.1373**	0.1859***	0.1160***	0.1772***	0.1459***
	(0.0818)	(0.0588)	(0.0801)	(0.0593)	(0.0542)	(0.0403)	(0.0542)	(0.0407)
CASH	2.0284***	2.1169***	2.0565***	2.2211***	1.9824***	2.0920***	2.0345***	2.2013***
	(0.2380)	(0.2082)	(0.2366)	(0.2099)	(0.1526)	(0.1269)	(0.1513)	(0.1270)
RIVAL	−0.3664	−0.1752	−0.3920	0.0972	−0.4035	-.2360	−0.4099	0.0727
	(0.6704)	(0.5121)	(0.6740)	(0.5201)	(0.2552)	(0.2066)	(0.2551)	(0.2040)
INDUSTRY	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YEAR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	4,659	6,010	4,659	6,010	4,659	6,010	4,659	6,010
F-statistic	27.70***	38.44***	28.70***	40.13***	48.56***	75.37***	48.89***	72.94***
Weak identification test (Cragg-Donald statistic)	–	–	–	–	685.02***	493.09***	1074.86***	1392.79***
Sargan overidentification test p-value	–	–	–	–	0.3458	0.0841	0.4057	0.2556
Durbin-Wu-Hausman test p-value	–	–	–	–	0.0114	0.0829	0.0099	0.0463

This table reports robustness analyses of the effect of ESG performance on a firm's total value (equation [6]) by considering whether the firm belongs to a sector with high risk of litigation. Panel A presents the OLS regression results and Panel B reports the 2SLS results. A firm's total value (*Tobin's Q*) is regressed on ESG performance, the interaction effect of GO and ESG performance, and the triple interaction effect of GO, ESG performance and the litigation industry dummy. *dumLITIGATION* is a dummy variable which equals 1 if the firm belongs to an industry with high litigation risk as defined by Koh et al. (2014) (industry SIC codes 2833–2836 (biotechnology), 3570–3577 and 7370–7374 (computers), 3600–3674 (electronics), and 5200–5961 (retailing)), and zero otherwise. ESG performance is measured by *ESGindex* (overall ESG score as the equally-weighted average of the three individual pillars). GO value is measured by: *GOR* (the ratio of a GO value attributable to equity over market capitalization), *SKEWNESS* (expected idiosyncratic skewness), *dumGOR* (a dummy variable which equals 1 if a firm's *GOR* is above or equal to the yearly sample median, and zero otherwise), and *dumSKEWNESS* (equal to 1 if *SKEWNESS* is above or equal to the yearly sample median, and zero otherwise). Firm size (*ASSETS*), firm leverage (*DEBT*), assets tangibility (*TANG*), investment activity (*INVEST*), firm profitability (*PROFITABILITY*), cash holdings (*CASH*), industry effects (*INDUSTRY*) and time effects (*YEAR*) are control variables in all estimations. The F-statistic contrasts the null hypothesis of no joint significance of the explanatory variables. The Cragg-Donald F-statistic evaluates instrument relevance. The Sargan test of overidentifying restrictions evaluates instrument validity. The Durbin-Wu-Hausman statistic tests for exogeneity of ESG performance. Standard errors are shown in parentheses under coefficients. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Table A.4
ESG performance and GO value – curvilinear effects accounting for sample selection bias (Heckman second stage estimates)

	Panel A: Dependent variable: *GOR*				Panel B: Dependent variable: *SKEWNESS*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	−6.1424***	−5.4372***	−5.3971***	−5.1077***	−0.0588	0.0114	−0.0087	0.1036
	(1.1566)	(1.1236)	(1.1132)	(1.0908)	(0.1448)	(0.1401)	(0.1398)	(0.1363)
ESGindex	0.2319***				0.0237***			
	(0.0438)				(0.0061)			
(ESGindex)^2	−0.0221***				−0.0026***			
	(0.0045)				(0.0006)			
Pillars								
ENVIRON		0.1350***				0.0265***		
		(0.0269)				(0.0038)		
SOCIAL			0.1269***				0.0166***	
			(0.0321)				(0.0046)	
GOVERN				0.0046				−0.0039
				(0.0286)				(0.0040)
(ENVIRON)^2		−0.0124***				−0.0026***		
		(0.0028)				(0.0004)		
(SOCIAL)^2			−0.0113***				−0.0018***	
			(0.0032)				(0.0004)	
(GOVERN)^2				−0.0005				0.0002
				(0.0029)				(0.0004)
Control variables								
ASSETS	0.2463***	0.2218***	0.2177***	0.2203***	0.0101	0.0059	0.0081	0.0041
	(0.0580)	(0.0567)	(0.0561)	(0.0547)	(0.0076)	(0.0074)	(0.0074)	(0.0072)
DEBT	−0.2298*	−0.1713	−0.1735	−0.1727	−0.0647***	−0.0567***	−0.0617***	−0.0541***
	(0.1307)	(0.1287)	(0.1279)	(0.1262)	(0.0175)	(0.0172)	(0.0173)	(0.0168)
AGE	−0.0814***	−0.0804***	−0.0814***	−0.0835***	−0.0253***	−0.0253***	−0.0254***	−0.0252***
	(0.0217)	(0.0214)	(0.0213)	(0.0214)	(0.0028)	(0.0027)	(0.0027)	(0.0027)
RIVAL	2.7529***	2.6661***	2.6907***	2.6748***	0.2078***	0.1930***	0.2048***	0.1981***
	(0.3139)	(0.3102)	(0.3084)	(0.3067)	(0.0385)	(0.0381)	(0.0381)	(0.0376)
INDUSTRY	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YEAR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Inverse Mills Ratio (λ_i)	1.0962***	1.0431***	1.0338***	1.0231***	0.1605***	0.1543***	0.1561***	0.1470***
	(0.1278)	(0.1262)	(0.1252)	(0.1234)	(0.0175)	(0.0172)	(0.0172)	(0.0169)
No. of obs.	17,727	17,727	17,727	17,727	18,943	18,943	18,943	18,943
No. of Censored Obs.	13,149	13,149	13,149	13,149	13,149	13,149	13,149	13,149
No. of Uncensored Obs.	4,578	4,578	4,578	4,578	5,794	5,794	5,794	5,794
Wald Chi2	304.72***	306.92***	297.12***	279.90***	698.30***	736.29***	700.66***	697.00***

This table reports the results of the Heckman regressions of equations [2] to [5]. GO value is regressed on ESG performance and its square term. In Panel A, we approximate GO value by *GOR* (the ratio of GO value attributable to equity over market capitalization). In Panel B, GO value is approximated by *SKEWNESS* (expected idiosyncratic skewness). ESG performance is measured by *ESGindex* (overall ESG score as the equally-weighted average of the three pillars), *ENVIRON* (the score in the environmental pillar), *SOCIAL* (the score in the social pillar), and *GOVERN* (the score in the governance pillar). Firm size (*ASSETS*), firm leverage (*DEBT*), firm age (*AGE*), industry effects (*INDUSTRY*) and time effects (*YEAR*) are control variables in all estimations. The Inverse Mills Ratio (λi) (estimated in the first stage, and available upon request) is included as an additional regressor to correct potential self-selection bias in the sample. The Wald contrasts the null hypothesis of no joint significance of the explanatory variables. Standard errors are shown in parentheses under coefficients. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Table A.5
ESG performance and firm value – the moderating effect of GO value (Heckman second stage estimates)

	Dependent variable: Tobin's Q			
	(1)	(2)	(3)	(4)
Constant	0.4364	1.4055	0.5069	0.7843
	(1.2095)	(0.8866)	(1.2047)	(0.9002)
ESGindex	0.1057***	0.2149***	0.0968***	0.0773***
	(0.0141)	(0.0182)	(0.0107)	(0.0090)
Interaction effects				

(*continued on next page*)

Table A.5 (*continued*)

	Dependent variable: Tobin's Q			
	(1)	(2)	(3)	(4)
ESGindex × GOR	−0.0215*			
	(0.0120)			
ESGindex × dumGOR			−0.0877***	
			(0.0152)	
ESGindex × SKEWNESS		−0.5003***		
		(0.0584)		
ESGindex × dumSKEWNESS				0.0228
				(0.0143)
GOR	−0.0656		−0.0569**	
	(0.0562)		(0.0270)	
SKEWNESS		0.5182**		−1.6502***
		(0.2582)		(0.1179)
Control variables				
ASSETS	0.0464	−0.0476	0.0406	0.0207
	(0.0661)	(0.0506)	(0.0657)	(0.0510)
DEBT	−0.7566***	−0.5207***	−0.7312***	−0.5887***
	(0.1151)	(0.0930)	(0.1148)	(0.0953)
TANG	−0.5383***	−0.4516***	−0.5225***	−0.4891***
	(0.0524)	(0.0391)	(0.0522)	(0.0398)
INVEST	2.1931***	1.9309***	2.1185***	2.0050***
	(0.2871)	(0.2322)	(0.2863)	(0.2373)
PROFIT	0.1121**	0.0814**	0.0659 (0.0550)	0.1150***
	(0.0546)	(0.0411)		(0.0421)
CASH	2.3176***	2.4181***	2.3181***	2.4749***
	(0.1624)	(0.1334)	(0.1617)	(0.1359)
RIVAL	0.3793	0.5325**	0.3841	0.6957***
	(0.3036)	(0.2220)	(0.3023)	(0.2262)
INDUSTRY	Yes	Yes	Yes	Yes
YEAR	Yes	Yes	Yes	Yes
Inverse Mills Ratio (λ_i)	0.6234***	0.5682***	0.6196***	0.7324***
	(0.1496)	(0.1204)	(0.1486)	(0.1202)
No. of obs.	14,578	15,929	14,578	15,929
No. of Censored Obs.	9,918	9,918	9,918	9,918
No. of Uncensored Obs.	4,660	6,011	4,660	6,011
Wald Chi2	1125.91***	1741.51***	1162.73***	1622.97***

This table reports the Heckman estimation results of the effect of ESG performance and the interaction effects of GO and ESG performance on a firm's value. ESG performance is measured by *ESGindex* (overall ESG score as the equally-weighted average of the three pillars). GO value is measured by: *GOR* (the ratio of a GO value attributable to equity over market capitalization), *SKEWNESS* (expected idiosyncratic skewness), *dumGOR* (a dummy variable which equals 1 if a firm's *GOR* is above or equal to the yearly sample median, and zero otherwise), and *dumSKEWNESS* (equal to 1 if *SKEWNESS* is above or equal to the yearly sample median, and zero otherwise). Firm size (*ASSETS*), firm leverage (*DEBT*), assets tangibility (*TANG*), investment activity (*INVEST*), firm profitability (*PROFITABILITY*), cash holdings (*CASH*), industry effects (*INDUSTRY*), and time effects (*YEAR*) are control variables in all estimations. The Inverse Mills Ratio (λi) (estimated in the first stage, and available upon request) is included as an additional regressor to correct potential self-selection bias in the sample. The Wald contrasts the null hypothesis of no joint significance of the explanatory variables. Standard errors are shown in parentheses under coefficients. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

Table A.6
ESG performance and firm value – by subsamples of below/above mean GO value (Heckman second stage estimates)

	Dependent variable: Tobin's Q			
	Above mean GO value	Below mean GO value	Above mean SKEWNESS value	Below mean SKEWNESS value
	(1)	(2)	(3)	(4)
Constant	−10.2543*	2.8298***	−12.6873	2.1778***
	(5.5127)	(0.9401)	(8.5315)	(0.8274)
ESGindex	−0.0324	0.0986***	0.0171	0.0774***
	(0.0457)	(0.0111)	(0.0640)	(0.0090)
GOR	−0.1711***	0.4292***		
	(0.0421)	(0.0600)		

(*continued on next page*)

Table A.6 (*continued*)

	Dependent variable: Tobin's Q			
	Above mean GO value	Below mean GO value	Above mean SKEWNESS value	Below mean SKEWNESS value
	(1)	(2)	(3)	(4)
SKEWNESS			−0.5935*	−2.2205***
			(0.3393)	(0.1475)
Control variables				
ASSETS	0.5332*	−0.0779	0.7276	−0.0444
	(0.2913)	(0.0529)	(0.4846)	(0.0471)
DEBT	−0.0543	−0.8136***	−1.9442**	−0.5134***
	(0.4524)	(0.1167)	(0.8517)	(0.0957)
TANG	−0.2792*	−0.6206***	−0.4174*	−0.5222***
	(0.1541)	(0.0551)	(0.2364)	(0.0409)
INVEST	1.2117	2.4218***	0.4474	2.3075***
	(0.8129)	(0.3327)	(1.1165)	(0.2509)
PROFIT	−0.5323***	1.5724***	−0.2265	0.2090***
	(0.1418)	(0.1304)	(0.1772)	(0.0571)
CASH	2.7360***	1.9798***	2.8690***	2.4247***
	(0.6708)	(0.1671)	(0.7402)	(0.1392)
RIVAL	3.3139**	−0.3697**	3.3013*	0.4948**
	(1.6462)	(0.2799)	(1.9039)	(0.2227)
INDUSTRY	Yes	Yes	Yes	Yes
YEAR	Yes	Yes	Yes	Yes
Inverse Mills Ratio (λ_i)	1.8036***	0.3383***	2.1147**	0.6006***
	(0.5707)	(0.1320)	(0.8980)	(0.1138)
No. of obs.	2,644	8,225	3,099	11,966
No. of Censored Obs.	2,117	4,093	2,701	6,353
No. of Uncensored Obs.	527	4,132	398	5,613
Wald Chi2	90.82***	1104.14***	69.43***	1542.87***

This table reports the Heckman estimation results of the effect of ESG performance on a firm's value by subsamples of above-mean and below-mean GO value. ESG performance is measured by *ESGindex* (overall ESG score as the equally-weighted average of the three pillars). GO value is measured by: *GOR* (the ratio of a GO value attributable to equity over market capitalization) and *SKEWNESS* (expected idiosyncratic skewness). Firm size (*ASSETS*), firm leverage (*DEBT*), assets tangibility (*TANG*), investment activity (*INVEST*), firm profitability (*PROFITABILITY*), cash holdings (*CASH*), industry effects (*INDUSTRY*), and time effects (*YEAR*) are control variables in all estimations. The Inverse Mills Ratio (λi) (estimated in the first stage, and available upon request) is included as an additional regressor to correct potential self-selection bias in the sample. The Wald contrasts the null hypothesis of no joint significance of the explanatory variables. Standard errors are shown in parentheses under coefficients. ***, ** and * denote statistical significance at the 1%, 5% and 10% level, respectively.

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