

RESEARCH ARTICLE

Determinants of insurance companies' environmental, social, and governance awareness

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Abstract

Environmental, social, and governance (ESG) criteria are increasingly important in all fields of economics. However, despite increasing interest from policy makers and financial regulators, literature relating to the insurance industry is still scarce. This paper aims to fill this gap by exploring the interaction between a set of financial ratios and environmental social governance scores of 107 large, listed US insurance companies for the period 2010–2018 for the purpose of identifying the determinants of ESG awareness. Larger, more profitable, and more solvent insurance companies show the highest level of ESG awareness. Our model contributes to shed light on the unfolding of ESG practices in the insurance industry.

KEYWORDS

environmental, social, governance, insurance companies, profitability, solvency, sustainability

JEL CLASSIFICATION

G22, G34, Q50

1 | INTRODUCTION

One of the most significant trends in the financial market over the last decade is sustainability. The growth of the United Nations Global Compact (UN Global Compact), the UNs backed Principles for Responsible Investment (UN PRI), the Global Reporting Initiative (GRI), the carbon disclosure project (CDP), the Sustainability Accounting Standards Board (SASB), the American Forum for Sustainable and Responsible Investment (US SIF), and the European Sustainable Investment Forum (EUROSIF), confirm wide ranging sustainability concerns.

As risk managers, insurers and investors, the insurance industry plays an important role in promoting environmental, social, and governance (ESG). Whether in the form of investors' interest in socially responsible investing (SRI), or corporate management's focus on

corporate social responsibility (CSR), the content, focusing on sustainability and ESG issues, is the same.

Interest from the insurance sector in sustainable development, declined in different paradigms, though intensifying over the last few years, thanks to the efforts of global nonprofit associations. Among these the UNs Environment Programme Finance Initiative (UNEP FI), is the international body that aims to connect the UN with the financial sector globally. In 2012 they launched the Principles for Sustainable Insurance (PSI) to focus on embedding ESG issues in insurance decision-making. In addition to raising awareness of the ESG agenda with clients and business partners, and promoting action with governments, regulators, and key stakeholders (Scordis et al., 2014). More recently, the PSI ESG Guide for nonlife insurance (UNEP-FI PSI, 2019; 2020) represents the first insurance guide on ESG issues aimed at raising awareness of

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the potential benefits of ESG integration in the insurance business model.¹

The insurance sector is responding to sustainability challenges with strategic action across both underwriting and investment, including through the UNs backed Principles for Sustainable Insurance (UN-backed PSI). Leading insurers are incorporating environmental factors into the provision of insurance coverage and their underwriting strategies, reallocating capital towards green assets, and integrating ESG factors in asset allocation and stewardship activities. By 2014, the Principles Framework had been signed by 42 insurers representing around 15% of the global premium volume and US\$8 trillion in assets under management, as well as by 30 insurance market trade bodies. By 2017, more than 100 organizations worldwide had adopted the PSI, including insurers representing over 20% of the global premium volume and US\$14 trillion in assets under management.

A growing number of insurance supervisors and regulators are starting to incorporate sustainability into the way they oversee the sector. For example, the Prudential Regulation Authority (PRA) in the UK and the European Union's European Insurance and Occupational Pensions Authority (EIOPA) have made it explicitly clear that they expect insurance companies to model and quantify the impact of ESG factors (and climate change in particular) in their regular Solvency II stress-testing exercises and to report on the results (EIOPA, 2019; PRA, 2019). In August 2018, EIOPA and the European Securities and Markets Authority (ESMA) were asked by the European Commission (EC) to work out how the objectives of the 2015/6 Paris Agreement on climate change and the UN 2030 Agenda for Sustainable Development Goals should be incorporated into the regulatory environment for financial services (European Commission, 2018). These reflect three key objectives expressed in the EU action plan published in March 2018.²

Recent surveys conducted by both private and public organizations highlight how insurers increasingly take into account ESG considerations.

Best's Special Report, "Insurance Industry Becomes Active in the Development of the ESG Agenda" (Best, 2018), states that publicly listed multi-national insurance groups understand shareholders' expectations and try to align both long-term investment and underwriting strategies accordingly. Increasing public awareness puts pressure on financial institutions to reflect ESG factors and their potential impact on reputational and operational risks (Lagasio & Cucari, 2019). A concept reinforced by regulatory developments with an increased focus on ESG issues; for example, the inclusion of climate-related nonfinancial disclosures to facilitate informed decisions.

Despite growing attention by industry leaders and regulators, literature on ESG practices in insurance companies is still scarce. We

contribute to the literature on this subject by trying to answer the following questions:

- Is there a link between the size, profitability, and solvency of an insurance company and its ESG awareness?
- Which of the above aspects is the most relevant in implementing a specific ESG policy?
- Are there any sub-relationships that could be identified between the financial characteristics of insurance companies and the three dimensions of ESG?

We answer our questions by computing several scores representing the ESG awareness of insurance companies and by running a fractional regression model between the obtained scores and the size, profitability and solvency of insurance companies included in the sample.

Specifically, size is measured by the Total Assets of the insurance company; profitability is proxied by the Return on Assets (RoA) and solvency is measured by the Solvency Ratio. The latter measures company's eligible capital to its regulatory capital requirement. It is used to assess an insurance company's financial strength and capacity to withstand risks such as dropping in asset values or rising in its obligations. Our ESG awareness scoring model—as described in detail in Section 3.3—is based on a binary assessment of whether the insurance company has implemented a specific policy to address an area related to ESG issues as selected and collected by MSCI Inc. We rely on MSCI data of 107 large US insurance companies observed over the last 10 years.

We ascertain there is a substantial positive association between ESG factors and two of the above financial characteristics of insurance companies that is profitability and size. In almost all the regressions proposed we also find a significant link with the solvency ratio. All the findings show strong consistency in both the ESG overall score and in the sub-scores investigated (environmental score, social score, governance score, human rights strengths score, corporate governance score, diversity score, community strengths score, employee strengths score, product strengths score).

We speak to both supervisors and practitioners. The former could be interested in the current level of ESG awareness in insurance companies, to direct future activities. Practitioners, and in particular insurers, should be interested in reading our findings and considering them best practice in order to obtain more ESG oriented business.

The following section discusses related literature. Section three presents the strategy of investigation and data and methodology details. We present the results in Section four. Section five concludes.

2 | LITERATURE

There has been a great deal of research on the role played by sustainability in economic development and business success over the last decades. Although many academic studies have investigated in different ways the linkage between sustainability and financial performance (Brooks & Oikonomou, 2018; Freeman, 1984; Friede et al., 2015),

¹As defined by UNEP FI (2012), "sustainable insurance is a strategic approach where all activities in the insurance value chain, including interactions with stakeholders, are done in a responsible and forward-looking way by identifying, assessing, managing and monitoring risks and opportunities associated with environmental, social and governance issues."

²Reorienting capital flows towards sustainable investment, to achieve sustainable and inclusive growth; Managing financial risks stemming from climate change, environmental degradation, and social issues; Fostering transparency and long-termism in financial and economic activity.

results still remain inconsistent or contradictory (Orlitzky et al., 2003; Scholtens, 2008). This could depend on several factors that vary from one study to another, such as the sample, the estimation method, the variables used and the time horizon (Rost & Ehrmann, 2017).

Some studies show a neutral relationship (Aupperle et al., 1985; Cornett et al., 2014; Garcia-Castro et al., 2010; McWilliams & Siegel, 2000), some of them show a mixed one (Baron et al., 2011; Busch & Hoffmann, 2011; Jayachandran et al., 2013) and others a negative one, between ESG and financial performance of a company, in line with the framework of the shareholder theory (Friedman, 1970), under which ESG performance has limited financial benefits for companies because of the implementation cost that shareholders have to pay (Vance, 1975; Ullman, 1985; Lopez et al., 2007; Lin et al., 2009).

In contrast to the shareholder theory, the stakeholder one (Freeman, 1984), claiming that social responsibility must deliver results for inside and outside stakeholders, seems to dominate CSR literature. Indeed, most of the extant studies suggests positive effects of ESG practices on firm profitability (Clark et al., 2015; Eccles et al., 2014; Friede et al., 2015; Lo & Kwan, 2017; Orlitzky et al., 2003; Scholtens, 2008).

Furthermore, several researchers analyzed the impact on financial profitability of one of the different dimensions of ESG and tried to distinguish which factor has the strongest relation to financial performance (Brogi & Lagasio, 2019; Nollet et al., 2016; Velte, 2017). In this respect, some meta-analyses focus on the positive impact of environmental practices on corporate financial performance (Albertini, 2013; Dixon-Fowler et al., 2013; Dixon-Fowler et al., 2017; Endrikat et al., 2014). A positive relationship between the social dimension of ESG and corporate performance is supported by various studies too (Crook et al., 2008; Fatemi et al., 2015; Waddock & Graves, 1997), as well as several articles that have investigated the relationships between board composition, board leadership structure and firm performance, finding that a higher corporate governance rating indicates better financial performance (Dalton et al., 1999; Nollet et al., 2016; Martin & Herrero, 2020; Orij et al., 2021).

Studies on the association between ESG and firm profitability found less diffusion through financial intermediaries, and even less with regards to the insurance industry (Das, 2011; Jóhannsdóttir et al., 2015; Minor & Morgan, 2011; Nofsinger et al., 2019; Nogueira et al., 2018; Obalola & Adelopo, 2012).

The significant impact of financial institutions on sustainable development by directing savings from the financial system to investments (Dorasamy, 2013; Oh et al., 2013; Risi, 2018) is supported by Van den Berghe and Louche (2005), who analyze positive and negative externalities of insurance companies that, as institutional investors, can perform an important role with respect to CRS, closely linked to the concept of corporate governance.

Scordis et al. (2014), discussing CSR for the insurance sector, do not find a stakeholder orientation in Principles of Sustainable Insurance; rather, the authors argue that PSI seem to advocate governance actions likely to clarify shareholder value. In line with conceptual and empirical literature (Jiao, 2010; Loderer et al., 2010; Surroca et al., 2010) suggesting that managers maximize shareholder value by

honoring tacit claims (Zingales, 2000), Scordis et al. (2014) state the PSI by calling for consideration of ESG issues in insurance operations presents an attempt to internalize tacit claims and increase value to shareholders.

Some studies suggest theoretical and empirical findings which mainly concern the link between reputation and CSR in insurance companies. Some authors find that to develop reputation, capital and increase positive customer perception, it is worth strengthening the role of CSR (González Sánchez & Morales de Vega, 2018; Obalola & Adelopo, 2012; Yadav et al., 2016). Indeed Hsu (2012), states that policyholders' perceptions concerning the CSR initiatives of life insurance companies have positive effects on customer satisfaction, corporate reputation, and brand equity (Okhrimenko & Manaenko, 2019; Minor & Morgan, 2011; Rehman et al., 2020).

Scholtens (2011) investigated the CSR of insurance companies; while detecting significant differences between types of insurers and countries, the study suggests that social and ethical aspects of CSR are better integrated into business activities of insurers than environmental concerns.

Furthermore, in order to obtain the important status as a sustainable business in the insurance sector in Taiwan, Ho et al. (2018), show that the 'managerial practices' dimension is the most significant, followed by 'social practices' and then 'environmental practices'. In terms of the importance of criteria for sustainable development, the top five are 'information disclosure', 'corporate strategies and commitments', 'climate change', 'legal compliance', and 'environment management'.

Among the three dimensions of ESG, as far as we know, the one that has been almost exclusively investigated in academic and empirical studies is corporate governance and its link with firm performance.

With regards to the corporate governance-firm performance relationship (Armitage & Kirk, 1994; Datta, 2018; Diacon & O'Sullivan, 1995; O'Sullivan & Diacon, 2003), most research is restricted to specific sectors of activity (life or nonlife insurance) and corporate governance variables such as board size (Wang et al., 2007; Boubakri et al., 2008; Najjar & Salman, 2013; Gardachew, 2015; Elamer et al., 2018); Hsu & Petchsakulwong, 2010), board characteristics and composition (Adams & Jiang, 2016; Kramarić et al., 2018; Wanyama & Olweny, 2013), incentive schemes (Eckles et al., 2011; Mayers & Smith, 2010; Milidonis et al., 2017), ownership structures (Lambalk & de Graaf, 2017; Shaheen & Jaradat, 2019).

The impact of corporate governance is mainly assessed by financial accounting measures based on return on equity (ROE) and return on assets (ROA) or market based (Tobin's Q and stock returns) (Barrese et al., 2007; Deev & Khazalia, 2017; Adams & Jiang, 2016; He et al., 2011), while risk measures concern various meanings of corporate risk, such as underwriting risk, liquidity risk, or investment risk (Eling & Marek, 2014; Ho et al., 2009; Ho et al., 2013; Lambalk & de Graaf, 2017; Li et al., 2017; Ng et al., 2012).

Although most academic literature finds common evidence of the effectiveness of governance mechanisms variously measured (Anderloni et al., 2019) with respect to financial performance and risk taking, studies provide mixed and sometimes contrasting empirical

TABLE 1 Variables included in the scores (source: MSCI)

Environmental score		Social score		Governance score	
Clean tech	Environmental strengths	Charitable giving	Community strengths	Limited Compensation	CG strengths
Toxic emissions and waste		Innovative giving		Ownership strength	
Packaging Materials and waste		Support for housing		Reporting quality	
Climate change - carbon emissions		Support for education		Political accountability	
Environmental management systems		Non-US charitable giving		Public policy	
Natural resource use - water stress		Volunteer programs		Corruption and political instability	
Biodiversity and land use		Community engagement		Financial system instability	
Raw material sourcing		Other strengths	Other strengths		
Natural resource use - financing environmental impact		Union relations	Employees strengths	CEO	Diversity strengths
Opportunities in green building		Cash profit sharing		Representation	
Opportunities in renewable energy		Employee involvement		Board of directors-gender	
Electronic waste management		Retirement benefits strengths		Work/life benefits	
Energy efficiency		Health and safety strengths		Women and minority	
Product carbon footprint		Supply chain policies		Disabled	
Insuring climate change risk		Compensation and benefits		Gay and lesbian policies	
Environment other strengths		Employee relations		Underrepresented groups	
		Professional development		Other strength	
		Human capital development			
		Labour management			
		Controversial sourcing			
		Human capital-other strengths			
		Indigenous people relations strengths	Human		
		Labour rights strengths			
		Human rights policies and initiatives			
		Product safety and quality	Product strengths		
		R&D/innovation			
		Access to healthcare			
		Access to finance			
		Access to communications			
		Nutrition and health			
		Chemical safety			
		Financial product safety			
		Privacy and data security			
		Responsible investment			
		Product safety-insuring health and demographic risk			
		Other strengths			

results, highlighting that the independent impact of governance factors is complex, exceedingly nonlinear, and bound to the nature of the business (Diacon & O'Sullivan, 1995). Indeed Hardwick et al. (2011), in their analysis of United Kingdom (UK) life insurance firms, suggest that because of the complexity of the corporate governance system, and the possible interaction between different mechanisms, the effectiveness of a corporate governance structure should be evaluated as a whole, rather than separately for individual processes.

Deev and Khazalia (2017), using a sample of European insurance companies releasing corporate governance and social responsibility information and available via Bloomberg's ESG disclosure, state that as for social responsibility, three main factors seem to be relatively more important than others: employee turnover, community spending and UN Global Compact signatory. Furthermore, they provide evidence of better financial performance of insurers with an increased number of board members. Conversely, some authors find board size negatively related to performance because of the difficulties in coordination (Wang et al., 2007), while others detect an unclear or no significant linkage (Connelly, 2004; Hardwick et al., 2003).

As for the analysis of the linkage between outside directors and firm performance, researchers do not achieve univocal results. Some studies show that the number of independent directors is a determinant of improved financial performance (Connelly, 2004; Deev & Khazalia, 2017; Hsu & Petchsakulwong, 2010), others find an insignificant, mixed, or negative relationship (Adams & Jiang, 2016; Hardwick et al., 2003; Hardwick et al., 2011).

In addition many articles focus on the importance of other qualitative characteristics of governance variables (Hardwick et al., 2011; He et al., 2011), suggesting, for example, the positive effect of an increased frequency of board meetings (Deev & Khazalia, 2017; Shaheen & Jaradat, 2019) or some audit quality variables (Diacon & O'Sullivan, 1995; Ho et al., 2009; Hsu & Petchsakulwong, 2010), as well as the importance of board-level financial prestige and expertise

(Adams & Jiang, 2016; Wu et al., 2016), though the latter may increase the underwriting risk because financial experts may encourage management to take higher risk in anticipation of higher returns (Ho et al., 2013).

More recently, Ma and Ren (2020) examined the relationship between institutional ownership and firm risk and performance referred to the time before, during, and after the 2008 financial crisis. Ma & Ren examined risk by using four variables: the standard deviation of the monthly stock return (total risk), systematic risk, idiosyncratic risk, and the standard deviation of ROA; while performance is measured by two variables: cumulative abnormal return during a quarter and an operational performance ROA. They suggest a positive relationship between institutional ownership and risk, in particular total risk, and systematic risk, during the financial crisis. The finding indicates that insurers with stronger institutional influence were more adversely affected by the financial crisis. In contrast, after the crisis, insurers with greater institutional influence, both in terms of level and stability of such ownership, were found to have lower risk, and yet some achieve higher returns. The results suggest that though many institutional investors exited the industry after the crisis, the institutional investors that chose to stay have a longer investment horizon and are actively managing risk in the aftermath of the financial crisis.

Beiragh et al. (2020) used three environmental, eight economic, and four social variables to evaluate 14 insurance companies. Expert opinion was employed to rank the indices using an analytical hierarchy approach. The data envelopment analysis model employed the generated main components as variables. As a result, subjective and objective assessments were combined. Finally, the results validated with correlation tests demonstrate that the best-performing insurance companies have the highest sustainability indices.

Extending the above considerations, we contribute to the literature on ESG factors in insurance companies by further investigating

TABLE 2 Descriptive statistics

Variable	Description	Source	N	Mean	SD	Min	Max	Skewness
ESGSCORE	Overall ESG score	MSCI	2238	0.08	0.12	0	0.79	2.25
ESCORE	Environmental score	MSCI	2238	0.05	0.15	0	1.00	4.26
SSCORE	Social score	MSCI	2238	0.05	0.09	0	0.82	3.23
GSCORE	Governance score	MSCI	2216	0.13	0.23	0	1.00	2.39
COMSCORE	Community strengths	MSCI	1949	0.07	0.20	0	1.00	3.70
EMPSCORE	Employee strengths	MSCI	2225	0.05	0.12	0	0.83	2.54
HUMSCORE	Human rights strengths	MSCI	1582	0.01	0.08	0	1.00	13.15
PROSCORE	Product strengths	MSCI	2200	0.03	0.10	0	1.00	4.28
CGOVSCORE	CG strengths	MSCI	2095	0.12	0.30	0	1.00	2.53
DIVSCORE	Diversity strengths	MSCI	2036	0.12	0.21	0	1.00	2.10
RoA	Return on Assets	BVD	1061	3.50	4.81	-32.45	27.00	-0.73
Solvency ratio	(Eligible capital/regulatory capital requirement) × 100	BVD	1061	26.09	14.28	1.84	84.30	0.69
lnTA	Natural logarithm of total assets	BVD	981	16.09	1.69	10.08	20.56	0.24

Note: The table above reports the descriptive statistics of the variables included in the analysis as well as the descriptions and sources of data.

specific aspects related to the business models of insurance companies and their relationship with ESG awareness, considering also the ESG sub-scores, as detailed in the following section.

3 | METHODOLOGY

3.1 | Strategy

Our investigation strategy follows a two-step method; first, we create several scoring models to evaluate ESG awareness of the insurance companies included in the sample (Brogi & Lagasio, 2019). Then, we use the scores as dependent variables of a set of regression models with the purpose of identifying which characteristics of the insurance companies (from performance, solvency, and size) are the most significant in determining the level of ESG awareness.

3.2 | Data

We collect data from MSCI ESG KLD STATS, which is an annual data set of positive and negative ESG performance indicators applied to a wide number of publicly traded companies. We only select good outcomes (strengths) for the estimation of our ESG scores. Table 1 details the variables included in the analysis divided by the three ESG dimensions, including 16 indicators for Environment, 29 indicators for Social and 17 for Governance. Our initial sample included 107 large US insurance companies over the period 2010–2018. Financial data (Return on Assets; Solvency Ratio; Total Assets) are gathered from Bureau van Dijk (BVD) Datawarehouse.

3.3 | ESG scoring model

The scoring model is based on a binary assessment of the variables included in the calculation, so it is possible to treat each variable as already standardized. Therefore, when the insurance company has indeed applied a specific policy to manage an area of ESG issues, the associated variable is valued “1.” Conversely, if the company has not fulfilled the implementation of a specific policy, then the variable assumes the value “0.” Berg et al. (2019) stress that ESG ratings vary not only in relation to the complexity of the ESG definition, but also in: (a) the complexity of the collection of the various category sets or aspects included in “environmental”, “social” and “governance”; (b) the quantification of certain categories or aspects within “environmental”, “social” and “governance”; (c) the relative weights given to variables in order to measure their relevance in computing the score. We fix these concerns with the suggested approach. First, we do not arbitrarily assign more importance to one of the dimensions (Environmental, Social and Governance) to the scores, because they are equally weighted within the ranking. This helps us to properly observe which dimension is the most important while computing the scores; second, because the proprietary measurement methods

TABLE 3 Results of the LOGIT model with dependent variables in $t + 1$ [Colour table can be viewed at wileyonlinelibrary.com]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	ESG lead1	E lead1	S lead1	G lead1	COM lead1	EMP lead1	HUMS lead1	PRO lead1	CGOV lead1	DIV lead1
RoA	0.236*** (15.11)	0.126*** (4.17)	0.200*** (10.79)	0.463*** (10.69)	0.375* (2.09)	0.300*** (12.11)	-279.9 (-0.58)	-0.317* (-2.32)	0.552*** (3.17)	0.465*** (6.40)
Solvency ratio	0.0118* (2.09)	0.0244* (2.03)	0.0152* (2.18)	0.00346 (0.43)	0.0191 (1.21)	-0.0103 (-1.07)	-0.0194 (-0.38)	0.0508*** (4.37)	0.000171 (0.01)	0.000191 (0.02)
InTA	0.506*** (11.07)	0.404*** (4.28)	0.576*** (10.56)	0.605*** (9.02)	0.554*** (3.94)	0.593*** (8.71)	0.764*** (3.65)	0.435*** (4.35)	0.531*** (6.23)	0.658*** (7.06)
_cons	-10.64*** (-12.39)	-9.530*** (-5.23)	-12.51*** (-12.13)	-11.48*** (-9.38)	-11.72*** (-4.36)	-12.35*** (-9.53)	-15.92*** (-4.01)	-11.38*** (-6.05)	-9.875*** (-6.33)	-12.78*** (-7.23)
N	507	507	507	496	362	503	188	488	445	403
AIC	346.0	301.0	240.1	428.8	247.1	220.4	44.37	190.8	438.1	272.3
BIC	362.9	317.9	257.0	445.6	262.6	237.3	57.32	207.6	454.5	288.3

Note: t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Green is to highlighting positive and significant values; Red is to highlighting negative and significant values.

provided by rating agencies are private and apply different weights, ratings generated are always misaligned with each other (Berg et al., 2019; Buallay, 2019), and we avoid an arbitrary choice of one rating over another. Following Brogi and Lagasio (2019), we first compute separately the E Score, S Score and G Score by averaging the values in the related area of investigation. The scores obtained for the three dimensions are then included in the computation of the overall ESG Score for each insurance company by applying a simple average.

Hence, for each firm-year observation, we calculate the following:

$$ESCORE = \frac{1}{n} \sum_{i=1}^n E_i, \tag{1}$$

where E_i are the selected environment indicators and n is the number of the selected environment indicators.

$$SSCORE = \frac{1}{n} \sum_{i=1}^n S_i, \tag{2}$$

where S_i are the selected Social indicators and n is the number of the selected Social indicators.

$$GSCORE = \frac{1}{n} \sum_{i=1}^n G_i, \tag{3}$$

where G_i are the selected Governance indicators and n is the number of the selected Governance indicators.

Lastly, we include (1), (2) and (3) for calculating the overall ESG Score:

$$ESGSCORE_t = Avg(ESCORE_t + SSCORE_t + GSCORE_t), \tag{4}$$

Moreover, we also look in detail at the composition of other relevant sub-scores as described in Table 2, to have a deeper understanding of the relationship between ESG components and financial performance, stability, and size of insurance companies.

Specifically, within the social score we also compute the “Community strengths” sub-score (COMSCORE), the “Employee strengths” sub-score (EMPCORE), the “Human rights strengths” sub-score (HUMSCORE) and the “Product strengths” sub-score (PROSCORE). Within the Governance score (GSCORE) we identify the sub-scores CGSCORE and DIVSCORE, respectively to assess the corporate governance and diversity strengths of the firm.

In Table 2 we report the descriptive statistics of the variables computed as above described. We use an unbalanced panel composed by 2238 firm-year observations. Looking at the descriptive statistics, we note that almost all the calculated scores range between 0 and 1. The minimum value equal to 0 indicates that there is at least one company in 1 year that has not applied any of the policies included in the definition of the single score. Conversely, the maximum value equal to 1 indicates that there is at least one company in 1 year that has applied all the policies included in the definition of the single score. The latter situation does not occur only in the case of the EMPSCORE (and consequently SSCORE and ESGSCORE). Nonetheless, the average values of the scores are in general

TABLE 4 Results of the LOGIT model with dependent variables in t + 2 [Colour table can be viewed at wileyonlinelibrary.com]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	ESG lead2	E lead2	S lead2	G lead2	COM lead2	EMP lead2	HUM lead2	PRO lead2	CGOV lead2	DIV lead2
RoA	0.280*** (7.69)	-6.026 (-0.26)	0.260 (1.92)	0.441*** (8.26)	0.407* (2.20)	-0.318 (-1.65)	-675.6 (-0.76)	-0.235 (-1.47)	0.551** (3.03)	0.391* (2.44)
Solvency ratio	0.0157* (2.52)	0.00942 (0.71)	0.0173* (2.50)	0.0191* (2.27)	0.0187 (1.16)	-0.00481 (-0.50)	0.0340 (0.52)	0.0567*** (4.39)	0.0120 (1.06)	0.0287* (2.23)
InTA	0.456*** (9.19)	0.277** (2.71)	0.508*** (8.92)	0.579*** (8.46)	0.586*** (3.94)	0.486*** (7.30)	0.613** (2.73)	0.416*** (3.41)	0.520*** (6.22)	0.642*** (6.76)
_cons	-9.997*** (-10.71)	-7.186*** (-3.63)	-11.50*** (-10.73)	-11.52*** (-9.13)	-12.32*** (-4.33)	-10.65*** (-8.39)	-14.70** (-3.10)	-11.46*** (-5.01)	-10.03*** (-6.53)	-13.38*** (-7.35)
N	505	505	505	496	372	500	194	485	439	409
AIC	330.4	281.1	230.3	421.6	246.6	223.9	35.73	163.7	429.7	260.3
BIC	347.3	298.0	247.2	438.4	262.3	240.7	48.80	180.5	446.0	276.3

Note: t statistics in parentheses. *p < 0.05, **p < 0.01, ***p < 0.001. Green is to highlighting positive and significant values; Red is to highlighting negative and significant values.

low, ranging from 0.006 (in the case of the average for HUMSCORE) to 0.132 (GSCORE). This confirms that ESG awareness is still too low and deserves careful attention by insurance firms. Nonetheless, we should be mindful that our data covers the 2010–2018 period and that the focus on ESG factors has exponentially increased in the last few years.

3.4 | Analysis

Since scores are calculated in [0;1] variables are highly skewed. That is why we apply a fractional regression model with different specifications (Probit and Logit; with and without leaded dependent variables).

We thus apply a model with a fractional outcome and continuous dependent variables (y). As further detailed, we run the investigation by considering the values of the dependent variables in both the intervals [0;1] and (0;1), thus assuming or not the extreme values.

Then, we fit a regression for the mean of y conditional on x : $E(y|x)$ with the two regression models:

$$\text{Probit: } E(y|x) = \Phi(x\beta)$$

$$\text{Logit: } E(y|x) = \exp(x\beta) / (1 + \exp(x\beta))$$

We have also checked for the consistency of our findings by applying a zero-inflated and one-inflated regressions to our variables. Noninflated regression is used to predict data with zero counts in excess, which is indeed our case, as also reported in the descriptive statistics. The theory further implies that the excess zeros are produced from the values by a different method and that the excess zeros can be independently modeled. In this way, we can model of regressions by identifying three different paths: the probability that the dependent variable is equal to 0; that the dependent variable is equal to 1; the distribution of the dependent variable is in the range (0;1). The zero and one inflation parts of this model are by default included whenever the dependent variable

contains the value 0 and 1 respectively and excluded otherwise. In the zero-inflate and one-inflate equations, respectively, the impact on the log odds of obtaining the value 0 or 1 and a beta-distribution is used to model the remaining proportions as in Ferrari and Cribari-Neto (2004), Paolino (2001) and Smithson and Verkuilen (2006). We use independent variables as calculated in t and scores variables in both $t + 1$ (*lead1*) and $t + 2$ (*lead2*) because the economic reasoning of our research question is to understand whether the financial performance, solvency and size have an association with the decision of implementing ESG policies, which may take time (we suppose one or 2 years) for companies. Furthermore, this also allows us to check for the stability of the results in the following years.

4 | RESULTS

Running the different models of fractional regression, we find that ESG score associated positively affect RoA, both in $t + 1$ and $t + 2$ (Table 3 and Table 4), and its statistical significance is almost always at 1%. Thus, confirming previous findings in the field of scientific literature that ESG enhances company performance and creates value for company's stakeholders (see Brogi & Lagasio, 2019). Looking at the breakdown in the three different dimensions (E Score, S Score and G Score), it is possible to highlight a constant positive and significant association - both in $t + 1$ and $t + 2$ - only for the G Score, whereas E Score and S Score are positively and significantly associated with RoA only in $t + 1$ (Table 3 and Table 4). Furthermore, we observe that in $t + 1$ RoA shows a positive and significant association with EMP and DIV variables (less with CGOV variable), whereas it has a negative and low association with PRO; so, this result must be further investigated. The positive associations of the regression of RoA over all the variables is robust while comparing with the findings in the other models.

Paying attention to the Solvency ratio we observe a positive correlation with the ESG Score both in $t + 1$ and $t + 2$, even though not very

TABLE 5 Results of the PROBIT model with dependent variables in $t + 1$ and $t + 2$ [Colour table can be viewed at wileyonlinelibrary.com]

	(1) ESG lead1	(2) E lead1	(3) S lead1	(4) G lead1	(5) ESG lead2	(6) E lead2	(7) S lead2	(8) G lead2
RoA	0.131*** (15.18)	0.0638*** (3.93)	0.102*** (9.35)	0.264*** (11.78)	0.143*** (7.55)	-3.418 (.)	0.127* (2.05)	0.247*** (8.18)
Solvency ratio	0.00620* (2.05)	0.0117 (1.92)	0.00715* (2.13)	0.00251 (0.55)	0.00786* (2.42)	0.00419 (.)	0.00779* (2.36)	0.0109* (2.36)
InTA	0.270*** (10.89)	0.200*** (4.14)	0.286*** (10.26)	0.347*** (9.32)	0.237*** (8.84)	0.134 (.)	0.246*** (8.52)	0.328*** (8.43)
_cons	-5.763*** (-12.47)	-4.899*** (-5.29)	-6.374*** (-12.32)	-6.617*** (-9.79)	-5.306*** (-10.68)	-3.677 (.)	-5.756*** (-10.83)	-6.555*** (-9.25)
N	507	507	507	496	505	505	505	496
AIC	345.9	301.3	240.0	428.5	330.5	273.3	230.3	421.4
BIC	362.9	318.2	256.9	445.3	347.4	273.3	247.2	438.2

Note: t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Green is for highlighting positive and significant values; Red is for highlighting negative and significant values.

significant. After all, looking at the breakdown in the three different dimensions (E Score, S Score and G Score), it is possible highlight the same result only for the S Score, since there is a positive (but with a low significance) association with E Score only in $t + 1$ and with G Score only in $t + 2$. Moreover, there is not any association of the Solvency ratio and the other variables except for PRO both in $t + 1$ and $t + 2$.

These results suggest that ESG practices are not significantly affected by the capital level of insurance companies. The matter is more related to profitability and size, which is a reasonable result.

Looking at the insurance companies' dimension variable, we notice that the LnTA shows - both in $t + 1$ and $t + 2$ - a strong and significant positive association not only with the ESG Score and the three different dimensions (E Score, S Score and G Score), but also with the other variables.

The above considerations are also substantially confirmed when we focus our attention on the other Probit Lead 1 vs Lead 2 model (Table 5). Indeed, a positive and statistical significance of the ESG

Score and of the three different dimensions (E Score, S Score and G Score) with ROA and LnTA, whereas association with the Solvency Ratio is not very significant.

The last model (Table 6), on the other hand, shows results that are partly divergent from the previous ones. In a zero inflate hypothesis it is possible to appreciate on one side a negative and statistical significance between a Solvency Ratio and some of ESG Score and some of the three different dimensions (E Score, S Score and G Score) whereas on the other side LnTA highlights a negative and significant association with the ESG Score and the three different dimensions (E Score, S Score and G Score).

5 | DISCUSSION

Despite the growing attention to the ESG issues in every field of economics, there is still lack of scholarly articles on the insurance

TABLE 6 Results of the ZOIB model with dependent variables in $t + 1$ and $t + 2$ [Colour table can be viewed at wileyonlinelibrary.com]

	(1) ESG lead1	(2) E lead1	(3) S lead1	(4) G lead1	(5) ESG lead2	(6) E lead2	(7) S lead2	(8) G lead2
proportion								
RoA	0.141*** (11.35)	0.000955 (0.07)	0.0306** (3.22)	0.0788 (1.46)	0.104*** (4.05)	3.160 (0.13)	-0.00593 (-0.27)	0.0857 (1.52)
Solvency ratio	0.000814 (0.22)	0.00210 (0.40)	-0.000888 (-0.25)	0.00763 (1.42)	0.000979 (0.23)	-0.00407 (-0.88)	-0.00266 (-0.75)	0.0114* (2.10)
LnTA	0.250*** (8.47)	0.0412 (1.40)	0.114*** (4.54)	0.192*** (3.91)	0.226*** (6.11)	0.0473 (1.49)	0.0996*** (3.46)	0.185*** (3.43)
_cons	-5.582*** (-10.15)	-1.572** (-2.73)	-3.332*** (-7.20)	-3.995*** (-4.46)	-5.263*** (-7.76)	-1.620** (-2.69)	-3.096*** (-5.93)	-4.041*** (-4.12)
zero inflate								
RoA	-26.72 (-0.72)	-0.430*** (-6.63)	-0.545* (-2.18)	-33.41 (-1.14)	-27.29 (-0.78)	4.582 (0.17)	-0.458 (-1.88)	-33.08 (-1.17)
Solvency ratio	-0.0275** (-2.88)	-0.0379*** (-3.36)	-0.0232* (-2.42)	-0.0124 (-1.24)	-0.0326*** (-3.58)	-0.0416*** (-3.56)	-0.0265** (-2.93)	-0.0277** (-2.81)
LnTA	-0.728*** (-8.45)	-0.951*** (-7.78)	-0.783*** (-7.90)	-0.669*** (-7.32)	-0.584*** (-7.39)	-0.806*** (-7.26)	-0.639*** (-7.25)	-0.612*** (-7.27)
_cons	11.95*** (7.94)	17.81*** (7.94)	13.84*** (7.81)	11.77*** (7.35)	9.841*** (7.14)	15.66*** (7.56)	11.62*** (7.35)	11.26*** (7.51)
ln_phi								
_cons	2.151*** (31.37)	2.413*** (18.10)	2.481*** (14.10)	1.933*** (22.52)	2.112*** (26.93)	2.725*** (15.87)	2.466*** (13.20)	1.877*** (22.16)
oneinflate								
_cons		-2.460*** (-7.46)		-1.374*** (-7.75)		-2.217*** (-6.98)		-1.536*** (-8.12)
N	507	507	507	496	505	505	505	496
AIC	128.9	362.6	242.5	595.4	148.6	349.1	272.8	597.3
BIC	167.0	404.9	280.5	637.4	186.7	391.3	310.8	639.4

Note: t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Green is for highlighting positive and significant values; Red is for highlighting negative and significant values.



industry. This paper adds a contribution to the literature on sustainability in insurance companies and fills the gaps of the existing research contributing to studies in the following ways.

First, as discussed above, this paper mainly differs from the previous academic and empirical studies that analyzed almost exclusively the social responsibility and corporate governance dimension among the three dimensions of ESG focusing on effectiveness of governance mechanisms variously compared to financial performance and risk taking (Armitage & Kirk, 1994; Diacon & O'Sullivan, 1995; O'Sullivan & Diacon, 2003; Datta, 2018; Martin & Herrero, 2020; Orij et al., 2021). As far as we know, our research proposes an alternative perspective, as it relates all the three ESG pillars (Environment, Social and Governance) to financial performance, solvency, and size characteristics of insurance companies.

Then, the new research method represents the novelty of this article, compared to previous studies related to the insurance sector. The investigation strategy follows a two-step method: after creating several scoring models in order to evaluate ESG awareness (Brogi & Lagasio, 2019) of the 107 large, listed US insurance companies included in the sample, we used the ESG score and the three-dimensional scores (E score, S score and G score) as dependent variables of a set of regression models, with the purpose of identifying which characteristics of the insurance companies – among performance, solvency and size – are the most significant in determining the level of ESG awareness.

The robustness of our findings, confirmed by the subsequent application of a zero-inflated and one-inflated beta regression, offers a vast array of theoretical and practical implications relevant for both researchers and practitioners. Indeed, the research points out the tools to deepen the analysis of the link between ESG practices of an insurance company and its size and solvency characteristics, as well as its profitability. It also raises insurers' awareness of the potential benefits of implementing a specific ESG-driven approach in business process management. Furthermore, policy makers and regulators in financial intermediation should be guided in developing principles and regulatory frameworks, aimed at strengthening the application of ESG principles and their disclosure (Bengo et al., 2022) in insurance industry.

6 | CONCLUSION

This paper paves the way for further research on ESG in the context of insurance companies.

Indeed, this is, as far as we know, the first paper focusing on the relationship between ESG awareness and financial performance, solvency, and size of insurance companies.

We performed a robust investigation of data coming from large and listed insurance companies based in US with a time span ranging from 2010 to 2018.

The analysis implies a two-step procedure, which in the first part applies a scoring model to several aspects of ESG awareness by the company. Then, we run a fractional regression model to assess the association between the financial characteristics of insurance

companies (profitability, solvency, and size) and the scores as calculated above.

We find a significant and positive association between ESG factors and two of the above financial characteristics of insurance companies or rather profitability and size. Furthermore, we also acknowledge that more profitable and larger insurance companies have been faster in the decision to implement ESG policies as we can see from the results obtained from our models both in t1 and in t2.

In summary, the answers to our research questions are: (a) we found a link between ESG awareness and the financial characteristics of insurance companies; (b) specifically, profitability and size are the most important in determining the implementation of ESG policies, the solvency ratio is also a relevant but with an exception in the environmental score, where the relation is positive but not statistically significant; (c) we also further confirmed our results by looking at the sub-scores calculated. Indeed, all the results obtained for the sub-scores are consistent with that identified in the ESG overall score, meaning that there is a strong internal consistency of the proposed model.

To check the robustness of our findings we complement our initial analysis with: (i) the application of a zero-inflated beta regression, which exclude extreme cases that may generate biased results; (ii) the replication of our model in $t + 2$, which is useful to partially address endogeneity issues that characterize our model Ozkan (2007). Nonetheless, to answer our research question, endogeneity may not be considered because we are only looking for the association between variables instead of searching for a causality relationship.

Apart from endogeneity, another shortcoming could be the sample of the analysis. We relied on US data, because it is, as far as we know, the best available database on insurance companies with granular data on ESG and financial information. We encourage future research on this topic using an alternative geographical setting, which would be interesting to compare policies issued and implemented in different countries.

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CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest.

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