EVIDENCE FOR THE MODERATING ROLE OF ENVIRONMENTAL, SOCIAL, AND GOVERNANCE ON THE PROFITABILITY OF INSURANCE COMPANIES

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Abstract

Insurance companies strive to incorporate environmental, social, and governance (ESG) in their businesses, as managers recognize that strong ESG performance is necessary to guarantee access to capital and enhance company value (Di Tommaso & Mazzuca, 2023; Eling, 2024). This article focuses on the moderating role of ESG in determining insurers' profits, analyzing a panel data set covering insurance companies worldwide during the period 2013 to 2024. The results reveal that high ESG ratings amplify the association of profits with underwriting premiums while weakening the dependence of profits on investments. Additional outcomes show that ESG has an effect on the composition of the investment portfolio, inducing insurers to have larger shares of assets invested in debt securities than in equity-type securities. These findings are important for insurance executives, providing deeper insight into how the improvement of ESG dimensions impacts profits from separate channels, while also having an influence on investments. Understanding the dynamics of insurance profits is relevant from a supervisory perspective, too, as a sound and well-performing insurance sector is crucial to preserve stability at the systemic level.

Keywords: Insurance Companies, Profitability, ESG, Underwriting, Investment

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1. INTRODUCTION

The insurance business is fundamentally about mutualizing and managing risks, which are closely tied to environmental, social, and governance (ESG) criteria. Insurers have long recognized that a robust governance structure and understanding the consequences of climate change and environmental disasters can benefit multiple aspects of their business and protect the company's value. Recent literature shows that insurers with high ESG ratings are financially more stable (Chiaramonte et al., 2020; Bressan, 2023a) and have a higher market valuation (Di Tommaso & Mazzuca, 2023;

Bressan, 2023a). Nevertheless, it remains uncovered by the literature whether the ESG characteristics of insurers influence profits.

This paper contributes by bringing new knowledge to this topic. The next section will develop working hypotheses aimed at establishing whether ESG has a moderating role in determining the two main sources of insurers' profitability, namely underwriting and investments. These hypotheses are tested using panel data from global insurance companies between 2013 and 2024. The main findings are that insurers' strong ESG characteristics enhance their dependence on profits on premiums, while profits are less related to investments when ESG ratings are high. The interpretation is that robust ESG criteria improve the claim management of insurers, leading to more stable and predictable liabilities in the future, which they match with a less aggressive (while also less rewarding) investment. Moreover, additional results show that ESG has an effect on the composition of the investment portfolio, inducing insurers to have larger shares of assets invested in debt securities than in equity-type securities.

This evidence is important for academics and insurance managers. The findings support previous literature showing the positive effect of ESG on insurance profits (Brogi et al., 2022; Bressan, 2023b), while also proving that such an effect would be better understood by considering in more detail the different sources of profitability. In particular, this study is the first research showing that insurers' ESG ratings are significantly associated with the asset composition. This is especially important for executives, who could better understand the way in which incorporating ESG values in the business would ultimately reflect on profits. Finally, the dynamics outlined in the paper are interesting for supervisors too, because a financially healthy insurance sector has a pivotal role in the well-functioning of the economic environment.

The rest of this article is structured as follows. Section 2 reviews the literature and develops the working hypotheses. Section 3 outlines the data and the regression models. Section 4 presents and discusses the results. Section 5 concludes the paper.

2. LITERATURE REVIEW AND WORKING HYPOTHESES

The literature on corporate ESG has largely focused on non-financial firms. However, a recent strand of research has also examined the ESG performance of insurance companies, exploring the association with aspects such as financial stability (Chiaramonte et al., 2020; Bressan, 2023a) and stock market valuations (Di Tommaso & Mazzuca, 2023; Bressan, 2023a). Brogi et al. (2022) build a scoring model for the ESG awareness of the insurance company, showing that firms with the highest level of ESG awareness are larger, more profitable, and solvent. From a variety of insurer-specific indicators, Brogi and Lagasio (2019) construct an ESG index that is found to be positively associated with profitability. Khovrak (2020) outlines an ESG-driven approach to managing the more sustainable development of insurance companies. Finally, Bressan (2023b) shows that the purchase of reinsurance decreases

the company's ESG score, thereby making the firm more profitable[1].

However, previous literature has primarily considered the direct impact of ESG on the financial dimensions of insurers. Building upon this knowledge, the following discussion focuses on the moderating role of ESG in determining the profits of insurance companies. The objective is to build testable hypotheses that explain how ESG can influence the dynamics that drive insurers' profitability.

The main source of profit for insurance companies is the sale of insurance products, but they also generate revenue by investing premium income that is not being paid out to customers to cover losses. The following two hypotheses establish how insurers' ESG ratings influence the way in which profits depend on underwriting and investments. The evidence in Bressan (2023a) shows that high ESG insurers are financially stable and underwrite more policies. Similarly, Chiaramonte et al. (2020) report that default risk decreases for insurers that have high ESG ratings. The recent study conducted by the insurance broker Howden found that high ESG insurers experienced low losses, improving their underwriting performance (Howden, 2022). Moreover, ESG facilitates easier access to capital markets, as the continued growth of green and sustainable funds compels insurers to enhance their ESG ratings to maintain full access to capital (Bakor, 2022). Carannante et al. (2024) develop a model suggesting that increasing engagement in ESG activities leads to an improvement in the insurance company's reputation, to the extent that policyholders are willing to pay extra for the insurer's commitment to ESG. Therefore, a strong ESG performance will likely allow the insurer to process insurance claims more efficiently, which is crucial for companies in the event of a loss. The positive effect of ESG on claim management brings the expectation that a well-performing ESG insurer would earn a high income from its underwriting operations, ultimately increasing profits. In other words, the first hypothesis states that ESG moderates the positive effect of underwriting on profits:

H1: The positive effect of underwriting on profits is stronger for high ESG insurers.

The literature has not covered the relationship between ESG performance and insurers' investments. Previous articles have examined other important characteristics of investments made by insurance companies. These include, for example, time-variation of investments related to the economic cycle (Rousová & Giuzio, 2019), the measurement of investment risk (Hue et al., 2019), and how financial constraints can shape investment (Ge & Weisbach, 2021). Some papers primarily focus on fixed income investments (Knox & Sørensen, 2024), while other articles discuss equity-type investments (Garavito et al., 2024) or examine the portfolio composition of both asset classes (Liu & Yang, 2004). However, the literature does not address whether insurers' investments account for the company's ESG performance. As insurers invest premiums received from customers, they generally choose assets with features aligned with the characteristics of the insurance products they sell. This means that the risks from insurance

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[1] A few articles in the recent literature have focused on environmental aspects, for example, the reporting of carbon emissions in insurance (Dawson et al., 2022) and the relationship between financial dimensions of insurers and natural disasters (Gupta et al., 2023; Montero et al., 2024).

liabilities should balance with the risks undertaken through investment activities. Put differently, insurers should invest the available funds in line with statistical expectations of loss in the future (Kočović et al., 2011). If a high ESG insurer has better claim management, the firm is likely to face less volatile cash flows in the future, being capable of anticipating and managing future losses. This implies that the firm would be less inclined to invest in highly volatile (and highly rewarding) securities. In contrast, low ESG firms would be willing to select investment securities with a risk-reward profile that tracks more uncertain cash flows in the future. As a result, the profits of low ESG firms reflect investment earnings in a larger share compared to high ESG firms. The second hypothesis states that ESG weakens the effect of investments on profits:

H2: The positive effect of insurers' investments on profits is lower for high ESG insurers.

Finally, the third hypothesis relates ESG to the investment portfolio composition, which consists of debt and equity securities. Based on the previous arguments, the hypothesis is that low ESG insurers would exhibit a higher propensity to invest in equity securities, which offer high returns but also expose them to significant market risks. In contrast, high ESG firms rely on predictable and stable cash flows over time, leading firms to invest their premiums in more stable debt instruments. Therefore, the third hypothesis states the following:

H3: High ESG insurers invest larger shares of their investment portfolios in debt securities, while lower shares in equity securities.

3. METHODOLOGY

3.1. Sample and variables

The study employs a panel data set covering insurance companies worldwide during the period 2013 to 2024. The firms are all publicly listed and are in operation during the study period. Balance sheet data and ESG ratings are sourced from S&P Global[2]. Table 1 displays the composition of the sample across insurance segments, i.e., financial guaranty, life and health, managed care, mortgage guaranty, multiline, property and casualty, and title insurance. The majority of observations are available for property and casualty, life and health, and multiline insurers.

The focus of the analysis is corporate profitability. In the baseline model, profitability is assessed from the return on assets (*ROA*), i.e., the ratio of net income to total assets. For robustness, two other measures of profitability are tested. The return on equity (*ROE*) is the ratio of net income to total book value equity, while the return on capital (*ROC*) is the ratio of net income to total capital employed. According to *H1* and *H2*, insurance profits depend on underwriting and investment operations, while ESG ratings moderate this effect.

The variable *UNDERWR* is the log of net premiums earned. Robustness tests will also employ the log of premiums written (*NETWR*) and the ratio

of net premiums written to policyholder surplus (*NETWRSURPL*). Policyholder surplus is total assets minus total liabilities. Both quantities, *UNDERWR* and *NETWR*, increase with the underwriting activities. *NETWRSURPL* is the so-called "surplus ratio" and is inversely related to the insurer's capacity. A high value of *NETWRSURPL* indicates that premiums grow without a corresponding increase in surplus, constraining the capacity to write new policies. Investment is measured with the ratio of total investments to total assets (*INV*). The investment components are mainly debt and equity securities. Therefore, the ratio of total investment in debt securities to assets is called *DEBTINV ASS*, while the ratio of total investment in equity securities to assets is called *EQUITY INV ASS*. To identify the respective shares in the investment portfolio, *DEBTINV* and *EQUITY INV* calculate the ratio, respectively, of debt and equity investments to total investments. The ESG rating of the firm is on a scale of 0–100, where a higher score indicates better ESG dimensions. The regression models control for firm-specific characteristics, i.e., the firm size measured with the log of total assets (*SIZE*), and the financial leverage approximated with the ratio of book value debt to book value equity (*DEBTEQ*). All these definitions are summarized in Table 2. After winsorizing the variables at the 1st and 99th percentiles, descriptive statistics are calculated and presented in Table 3. Consistent with the common intuition, the investment portfolios of the insurers in the sample are predominantly composed of debt instruments. In fact, *DEBTINV* is on average 71%, compared to the average 10% of *EQUITY INV*. This reflects the business model of insurance companies, which have a propensity to invest in longer-term fixed-income securities (mainly corporate and government bonds) offering a considerably more predictable future cash flow compared to stock market investments. Long-duration and low-risk investments are used to pay off claims that are expected far in the future. Nevertheless, insurers often participate in the stock market to achieve better diversification and enhance returns. However, as firms must ensure they do not incur unsustainable losses in the short term, stocks typically account for a limited part of their investment portfolios. Table 4 reports pair-wise correlation. As expected, *ROA* is positively correlated with *UNDERW* and *INV*. To verify this association conditionally and determine whether ESG ratings have a moderating role, a regression analysis will be performed.

Table 1. Number of firm-year observations by insurance segments

Segment	N
Financial guaranty	10
Life and health	307
Managed care	56
Mortgage guaranty	29
Multiline	167
Property and casualty	422
Title insurance	27
Total	1,153

Source: Authors' elaboration.

Table 2. Definition of variables

Variables	Definition
ROA	Return on assets, i.e., the ratio of net income to total assets.
ROE	Return on equity, i.e., the ratio of net income to total book value equity.
ROC	Return on capital, i.e., the ratio of net income to total capital employed.
UNDERWR	Log of net premiums earned.
NETWR	Log of premiums written.
NETWRSURPL	Ratio of net premiums written to policyholder surplus. Policyholder surplus is total assets minus total liabilities.
INV	Ratio of total investments to total assets.
DEBTINV ASS	Ratio of total debt investments to total assets.
EQUITY INV ASS	Ratio of total equity investments to total assets.
DEBTINV	Ratio of total debt investments to total investments.
EQUITY INV	Ratio of total equity investments to total investments.
ESG	Company ESG score (scale is 0–100).
SIZE	Log of total assets.
DEBTEQ	Ratio of the total book value of debt to the total book value of equity.

Source: Authors' elaboration.

Table 3. Descriptive statistics

Variables	Mean	Min	Max	Std. Dev.
ROA	0.0230	-0.0781	0.1402	3.1734
ROE	0.1047	-0.4028	0.4806	11.2987
ROC	0.0710	-0.1185	0.3087	5.8376
UNDERWR	15.8474	10.4912	20.4457	1.7481
NETWR	15.5194	2.6391	20.4681	2.0926
NETWRSURPL	1.0654	0.0000	3.2754	0.7126
INV	0.6013	0.0027	0.9570	0.1952
DEBTINV ASS	0.4172	0.0002	0.9211	0.1899
EQUITY INV ASS	0.0646	0.0000	0.6264	0.0838
DEBTINV	0.7108	0.0001	1.0000	1.2448
EQUITY INV	0.1008	0.0000	0.7578	0.1171
ESG	40.0300	2.0000	90.0000	18.3400
SIZE	17.7587	10.9016	23.0400	1.9092
DEBTEQ	0.6378	0	6.3042	1.0302

Note: The estimation period is 2013–2024. See Table 2 for the definitions of the variables.
Source: Authors' elaboration.

Table 4. Pair-wise correlation coefficients (Part 1)

Variables	ROA	ROE	ROC	UNDERWR	NETWR	NETWRSURPL
ROA	1.0000					
ROE	0.6491***	1.0000				
ROC	0.7001***	0.7542***	1.0000			
UNDERWR	0.0450*	0.1021**	0.0621*	1.0000		
NETWR	-0.1231**	-0.0190	-0.0391	0.8565***	1.0000	
NETWRSURPL	-0.1110**	-0.0532	0.0181	0.3404***	0.3896***	1.0000
INV	0.0811*	0.0914**	0.0732*	0.0800*	0.2561***	0.0563
EQUITY INV ASS	0.1781***	0.0943**	0.0236	0.0833*	0.0893*	-0.0309
DEBTINV ASS	0.2001***	0.0553	0.0822*	-0.0915**	0.0786	-0.0400
EQUITY INV	0.1823***	0.0795*	0.0184	0.0312	0.0325	-0.0567
DEBTINV	0.1281***	-0.0045	0.0376	-0.1475***	-0.1634***	-0.0811*
ESG	-0.0843**	0.0472	-0.0244	0.4811***	0.3934***	-0.0040
SIZE	-0.2491***	0.0090	-0.1241***	0.4555***	0.4259***	0.0702
DEBTEQ	-0.1782***	-0.0693*	-0.0974**	0.1295***	0.1644***	-0.0401

Table 4. Pair-wise correlation coefficients (Part 2)

Variables	INV	EQUITY INV ASS	DEBTINV ASS	EQUITY INV	DEBTINV	ESG	SIZE	DEBTEQ
ROA								
ROE								
ROC								
UNDERWR								
NETWR								
NETWRSURPL								
INV	1.0000							
EQUITY INV ASS	0.3142***	1.0000						
DEBTINV ASS	0.6192***	-0.0901**	1.0000					
EQUITY INV	0.1005**	0.9352***	-0.2251***	1.0000				
DEBTINV	-0.1115***	-0.3082***	0.7504***	-0.3367***	1.0000			
ESG	-0.0604	-0.0874**	-0.0423	-0.1292***	0.0180	1.0000		
SIZE	0.1288***	0.0164	-0.1254***	-0.0444	-0.1995***	0.5091***	1.0000	
DEBTEQ	-0.0429	-0.0468	-0.1354***	-0.0619	0.0032	0.1000**	0.2713***	1.0000

*Note: The estimation period is 2013–2024. See Table 2 for the definitions of the variables. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.*
Source: Authors' elaboration.

3.2. Regression models

To test the working hypotheses *H1* and *H2,* the following panel regression for the profitability of insurer *j* in year *t* is specified:

$$
\begin{aligned}
Profitability_{j,t} = {}& \alpha + \beta UNDERWR_{j,t} + \gamma INV_{j,t} + \rho\big(UNDERWR_{j,t} \times ESG_{j,t}\big) + \sigma\big(INV_{j,t} \times ESG_{j,t}\big) \\
& + \delta Controls_{j,t} + Time\ effects + Region\ effects + \varepsilon_{j,t}
\end{aligned}
\tag{1}
$$

In the baseline model, the *ROA* measures profitability. The controls include *SIZE* and *DEBTEQ.* Time and region fixed effects capture characteristics that are invariant over time and geographic regions (Africa, Asia-Pacific, Europe, Latin America and the Caribbean, Middle East, United States and Canada), while α and ε represent, respectively, a constant and an error term[3]. The working hypothesis *H1* predicts that the coefficient ρ of the interaction between *UNDERWR* and *ESG* is positive on ROA. Instead, the working hypothesis *H2* predicts that the coefficient σ on the interaction between *INV* and *ESG* is negative.

To test the working hypotheses *H3,* the shares of debt and equity investments to total investments (respectively *DEBTINV* and *EQUITY INV*) are regressed on the insurer's ESG rating:

$$
\begin{aligned}
DEBTINV_{j,t} = {}& \eta + \kappa ESG_{j,t} + v Controls_{j,t} + \\
& Time\ effects + Region\ effects + \omega_{j,t}
\end{aligned}
\tag{2}
$$

$$
\begin{aligned}
EQUITY\ INV_{j,t} = {}& \psi + \zeta ESG_{j,t} + \tau Controls_{j,t} + \\
& Time\ effects + Region\ effects + \mu_{j,t}
\end{aligned}
\tag{3}
$$

In Eq. (2) and Eq. (3), the control variables are *SIZE, UNDERWR,* and *DEBTEQ.* Time and region fixed effects, along with a constant and an error term, are included. The working hypothesis *H3* predicts that κ should be positive, while ζ should be negative. This means that high ESG insurers invest more in debt securities, while they reduce the exposure of the portfolio to equity securities.

4. RESULTS AND DISCUSSION

The results in Table 5 (column 1) are consistent with *H1* and *H2.* That is, ESG ratings influence how insurer profitability depends on underwriting and investments. More precisely, the moderating role of *ESG* has opposite directions: While ESG ratings strengthen the relationship between profits and underwriting, they weaken the relationship with investments. To verify more carefully the interaction of *ESG* with investment, columns 2–3 of Table 5 test separately equity investments and debt investments, taken as ratios to total assets. Both variables *EQUITY INV ASS* and *DEBTINV ASS* have a positive coefficient, but their interaction with *ESG* is negative. This means that profits increase with investments, but this effect is weaker for high ESG insurers[4].

Overall, the findings are consistent with previous evidence showing that ESG improves insurance profits (Brogi & Lagasio, 2019; Brogi

et al., 2022; Bressan, 2023b)[5]. However, the approach followed in this analysis of disentangling the contribution from underwriting and investment on profits reveals that ESG amplifies the positive impact of underwriting.

Table 5. Regressions of insurer's profitability

Variables	ROA	ROA	ROA
UNDERWR	0.7879***	0.7910***	0.7866***
	(0.1458)	(0.145)	(0.1070)
UNDERWR * ESG	0.0055***	0.0023**	0.0004
	(0.0013)	(0.0011)	(0.0009)
INV	8.2404***		
	(1.6651)		
INV * ESG	-0.1484***		
	(0.0307)		
DEBTINV ASS		7.3868***	
		(2.0001)	
DEBTINV ASS * ESG		-0.1161***	
		(0.0389)	
EQUITY INV ASS			10.6212***
			(2.5855)
EQUITY INV ASS * ESG			-0.1591***
			(0.0477)
SIZE	-1.1747***	-0.9830***	-1.0651***
	(0.1081)	(0.1233)	(0.1009)
DEBTEQ	-0.0997	-0.1887*	-0.0630
	(0.0854)	(0.1052)	(0.0780)
Constant	7.3028***	7.3924***	9.4170***
	(1.5592)	(1.8267)	(1.5223)
Time and region fixed effects	Yes	Yes	Yes
No. of observations	1,013	888	903
R-squared	0.2597	0.2371	0.2700

Note: Column 1 reports estimates of Eq. (1). Column 1 and column 2 report, respectively, estimates of Eq. (1) substituting INV with DEBTINV and EQUITY INV.

To stress the robustness of the baseline results, in Table 6, a few changes to Eq. (1) are made. First, to verify whether the outcomes vary across types of insurance, in column 1, the interaction with ESG is further interacted with an indicator for the insurance segment. The signs are homogeneous over segments, and differences in magnitude are not extremely striking. Second, in alternative to *UNDERWR,* the insurer's underwriting is measured employing *NETWR* (column 2) and *NETWRSURPL* (column 3). The two quantities are available only for a few firms; therefore, the sample for the two regressions is smaller. As both variables have a positive sign, the results are in line with previous results, confirming the hypothesis that high ESG insurers underwriting high premiums are also more profitable (*H1*). Notice that, using these alternative measures for underwriting, the effect of investment on *ROA* does not vary with respect to the baseline

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[3] Equation (1) includes fixed effects. In all the equations estimated in the analysis, we checked that the fixed effects model is preferred to the random effects model according to the test of Hausman (1978).
[4] For all the tables, the results would be similar, testing separately the ESG ratings. By conducting separate regressions, it was verified that the coefficients had similar magnitude and statistical significance. These results are not reported in the paper, but are available on request.

[5] As mentioned, the literature about ESG and corporate profitability has focused largely on non-financial firms. For example, evidence that ESG leads to higher corporate profits includes Kim and Li (2021) and D'Amato et al. (2024). However, financial firms, such as banks and insurers, are hardly comparable to non-financial industries. Therefore, studying the effect of corporate social responsibility and ESG on profits requires accounting for business-specific aspects (Soana, 2011; Kalyani & Mondal, 2024). This paper investigates in more detail to ESG is factored into the determinants of insurance profits.

model. Finally, columns 4 and 5 run regressions for alternative measures of profitability, i.e., the *ROE* and the *ROC*. The signs of the interaction terms are the same as in the baseline equation, and they are all statistically significant. Overall, the evidence in Table 6 confirms that ESG has a robust moderating role in determining the profits of insurers.

Table 6. Regressions of insurer's profitability: Robustness

Variables	ROA	ROA	ROE	ROC	ROA
NETWR		0.0634			
		(0.1360)			
*NETWR * ESG*		0.0061***			
		(0.0017)			
NETWRSURPL			-1.4718***		
			(0.4911)		
*NETWRSURPL * ESG*			0.0265***		
			(0.0106)		
UNDERWR	0.5661***			1.2109*	1.2306***
	(0.1485)		(0.6182)	(0.2651)	
*UNDERWR * ESG*				0.0127***	0.0052***
				(0.0046)	(0.0028)
INV	6.3688***	10.2319***	6.0528***	19.6481***	8.5433***
	(1.5228)	(2.0381)	(1.0809)	(6.0372)	(2.6404)
*INV * ESG*		-0.1477***	-0.0427**	-0.3413***	-0.1513***
		(0.0362)	(0.0176)	(0.1125)	(0.0507)
Financial guarantee * UNDERWR * ESG	0.0292***				
	(0.0055)				
Life and health * UNDERWR * ESG	0.0047***				
	(0.0011)				
Managed care * UNDERWR * ESG	0.0069***				
	(0.0016)				
Mortgage guarantee * UNDERWR * ESG	0.0705**				
	(0.0307)				
Multiline * UNDERWR * ESG	0.0036***				
	(0.0011)				
Property and casualty * UNDERWR * ESG	0.0021				
	(0.0016)				
Title insurance * UNDERWR * ESG	0.0139**				
	(0.0063)				
Financial guarantee * INV * ESG	-1.0343***				
	(0.1732)				
Life and health * INV * ESG	-0.1390***				
	(0.0306)				
Managed care * INV * ESG	-0.1882**				
	(0.0744)				
Mortgage guarantee * INV * ESG	-0.9467**				
	(0.4756)				
Multiline * INV * ESG	-0.1338***				
	(0.0308)				
Property and casualty * INV * ESG	-0.0533*				
	(0.0312)				
Title insurance * INV * ESG	-0.2093				
	(0.1708)				
Constant	5.3688***	9.3142***	9.6979***	3.4422	14.3869***
	(1.5887)	(2.0241)	(1.9336)	(6.4178)	(3.1886)
Controls	Yes	Yes	Yes	Yes	Yes
Time and region fixed effects	Yes	Yes	Yes	Yes	Yes
No. of observations	1,013	690	695	1,012	1,007
R-squared	0.4224	0.2514	0.2396	0.0951	0.1404

Note: Column 1 reports estimates of Eq. (1) with an indicator for insurance segment. Column 2 reports estimates of Eq. (1) substituting INV with NETWR. Column 3 reports estimates of Eq. (1) substituting INV with NETWRSURPL. Column 4 reports estimates of Eq. (1) substituting ROA with ROE. Column 5 reports estimates of Eq. (1) substituting ROA with ROC.
Source: Authors' elaboration.

Table 7 shows effects from ESG ratings on the insurers' investment portfolio composition. Column 1 estimates Eq. (2) controlling for firm size. Column 2 estimates Eq. (2) with the entire set of controls, implying a small reduction in the number of observations due the lack of data available for all regressors. In both columns, the sign of ESG confirms the validity of *H3*, revealing that insurers with a strong ESG performance increase their shares of debt investments in the portfolios. For robustness, in column 3 debt investments are normalized by total assets: The sign of ESG remains positive, although not statistically significant. Columns 4–6 perform regressions on equity investments following Eq. (3). The coefficient of ESG is always negative and statistically significant, as predicted by *H3*. To verify this outcome more carefully, in Table 8 the sample is divided into low/high ESG firms. For every year in the sample, low ESG firms have ESG below the sample median. Instead, high ESG firms have ESG above or equal to the sample median. Then, two separate regressions of ROA are run for the two subsamples. The aim is to verify whether the association between earned premiums and investment composition varies with the ESG performance. Interestingly, for high ESG insurers the increasing premiums lead to a significantly larger share of debt investments, while equity investments do not change considerably. In contrast, the pattern is opposite for low ESG firms, in which premiums correlate negatively with debt investments while positively

with equity investments, thereby making their portfolios likely exposed to equity market risks. Namely, the findings suggest that ESG characteristics influence in a considerable way their

business models. Overall, the analysis has revealed that incorporating ESG would affect financial decisions of insurers, driving changes in profit dynamics as well as investments dynamics.

Table 7. Regressions of insurer' investment portfolio allocation

Variables	DEBTINV	DEBTINV	DEBTINV ASS	EQUITY INV	EQUITY INV	EQUITY INV ASS
ESG	0.0019***	0.0012**	0.0002	-0.0013***	-0.0011***	-0.0008***
	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0001)	(0.0002)
SIZE	-0.0377***	-0.0366***	-0.0117	0.0010	-0.0086***	-0.0041*
	(0.0035)	(0.0072)	(0.0072)	(0.0027)	(0.0031)	(0.0029)
UNDERWR		0.0174***	0.0014		0.0130***	0.0089***
		(0.0064)	(0.0070)		(0.0032)	(0.0032)
DEBTEQ		0.0268***	-0.0205***		-0.0088**	-0.0072**
		(0.0071)	(0.0062)		(0.0041)	(0.0041)
Time and region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	1,426	1,037	893	1,153	908	908
R-squared	0.2095	0.2558	0.0372	0.0691	0.0786	0.0863

*Note: Column 1 reports estimates of Eq. (2) controlling for SIZE. Column 2 reports estimates of Eq. (2) controlling for SIZE, UNDERWR, and DEBTEQ. Column 3 reports estimates of Eq. (2) substituting DEBTINV with DEBTINV ASS, while controlling for SIZE, UNDERWR, and DEBTEQ. Column 4 reports estimates of Eq. (3) controlling for SIZE. Column 5 reports estimates of Eq. (3) controlling for SIZE, UNDERWR, and DEBTEQ. Column 6 reports estimates of the model (3) substituting EQUITY INV with EQUITY INV ASS, while controlling for SIZE, UNDERWR, and DEBTEQ. The estimation period is 2013–2024. See Table 2 for the definitions of the variables. Robust standard errors in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.*
Source: Authors' elaboration.

Table 8. Regressions of investment portfolio allocation of low/high ESG insurers

Variables	DEBTINV		EQUITY INV	
	Low ESG	High ESG	Low ESG	High ESG
UNDERWR	-0.0166**	0.0352***	0.0322***	-0.0069
	(0.0083)	(0.0122)	(0.0052)	(0.0067)
SIZE	-0.0181*	-0.0635***	-0.0237***	0.0158***
	(0.0103)	(0.0127)	(0.0047)	(0.0058)
DEBTEQ	0.0049	0.0340***	-0.0139***	0.0035
	(0.0061)	(0.0106)	(0.0048)	(0.0081)
Constant	1.3563***	1.3199***	0.0113	-0.1070
	(0.1183)	(0.1809)	(0.0625)	(0.0745)
Time effects	Yes	Yes	Yes	Yes
No. of observations	567	464	505	398
R-squared	0.0785	0.1061	0.0853	0.0584

*Note: Column 1–2 report estimates from regressions of DEBTINV on UNDERWR, SIZE, and DEBTEQ for low/high ESG insurers. The estimation period is 2013–2024. For every year, low ESG insurers have ESG below the sample median, while high ESG insurers have ESG above or equal to the sample median. Column 3–4 report estimates from regressions of EQUITY INV on UNDERWR, SIZE, and DEBTEQ for low/high ESG insurers. See Table 2 for the definitions of the variables. Robust standard errors in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively.*
Source: Authors' elaboration.

5. CONCLUSION

Analyzing insurers worldwide from 2013 until 2024, the article shows that ESG moderates the effect of underwriting and investment on insurers' profits. More precisely, when ESG scores increase, profits are more strongly associated with underwriting premiums, while depend less on investments. The interpretation is that ESG improves insurance claims management, reducing the uncertainty about future liabilities. Consequently, high ESG insurers can earn high margins from their underwriting, investing premiums in more stable (while less rewarding) investment securities. These findings are relevant especially for insurance executives. In fact, as they strive to foster the sustainability of the business (Eling, 2024), insurance managers should take into account more carefully that strong ESG dimensions would affect profits on different sides. Incorporating ESG into the operating activity, insurers could benefit from better claims management and processing, which ultimately would improve business and underwriting profits. For instance, transitioning to digitized claims and sustainable repairs would not only enhance insurers' environmental footprint but also significantly boost customer satisfaction and trust. Furthermore, ESG values are important for companies to evaluate

the risk of climate change. Insurers with greater attention to ESG would integrate climate risk assessments into their claims management processes by examining the potential effects of climate change-related events, such as floods, wildfires, and storms, on insured properties. By understanding these risks, insurers can mitigate potential losses and ensure they have sufficient resources to handle claims efficiently.

However, also from a supervisory perspective it becomes interesting to learn the dynamics of insurance profits, because a sound and well-performing insurance sector is crucial to preserve stability at the systemic level (European Central Bank, 2009; International Association of Insurance Supervisors, 2011; French et al., 2015).

This article entails few limitations that could be extended by future research. First, the analysis used variables in the data source that had a sufficient number of observations across firms and countries. For example, it was not possible to find sufficient data on reinsurance purchases or expense ratios, which both would likely impact insurers' profits. Moreover, the insights from this study have to discount the lack of a unified framework across regions for the disclosure and assessment of non-financial information and ESG characteristics. The recent regulatory developments worldwide drive

from existing voluntary disclosures of climate-related risks to mandatory requirements that potentially carry increased legal liability. The legal frameworks remain still heterogeneous worldwide. For example, in the European Union the Corporate Sustainability Reporting Directive (CSRD) addresses non-financial reporting and sustainability reporting that applies to all companies of a certain size (Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting, 2022). In the US, the Securities and Exchange Commission (SEC) released its climate disclosure requirements proposal in March 2024 (U.S. Securities and Exchange Commission, 2024). For a review concerning the legal frameworks surrounding ESG practices, see, for example, Kalyani and Mondal (2024). Regulations aimed at establishing a comprehensive framework for ESG measurement would improve the transparency and comparability of ESG scoring across geographies and providers. For example, it would be interesting to test the findings of this analysis using the ESG ratings obtained from alternative data providers.

In addition, concerning insurers' investments, access to more granular datasets could offer deeper insights into how ESG affects portfolio composition, in terms of issuer, maturity, or level of risk. Future research could also develop a theoretical model that explains the insurer's portfolio allocation based on its ESG performance. This would provide a more robust theoretical foundation to the seminal empirical results of this paper.

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