

Does responsible behavior of insurance companies pay off?

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ABSTRACT,

There is very little literature on influence of ESG on insurance companies. A review of literature (primarily focused on nonfinancial companies) shows that high ESG reduces idiosyncratic risks of investment, that ESG in general has a positive influence on returns. There is little theoretical basis to explain why this is the case. The aim of the thesis is to study the impact of ESG on the financial performance of insurance companies and to fill in the gap between the knowledge about the influence of ESG on financial companies. Using ESG score from Refinitiv, and ROA and ROE as measures of financial performance, the OLS multiple regression model is created for comparing linear regression coefficients via Z-test of linear regression. From the model, ESG, Environmental and Social scores are significantly positively associated with performance measures ROA and ROE. The paper attempts to fill the knowledge gap on the impact of ESG on performance of insurance companies and could be useful for further model development.

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Keywords

ESG, Insurance companies, financial performance, CSR, financial institutions, sustainable insurance, green insurance.

1. INTRODUCTION

This work is going to assess how the sustainable practices, defined by ESG scores of insurance companies, before and during covid crisis, impact their performance. Within the scope of this work, I am going to assess what is the interaction of performance measures like ROA and ROE and ESG performance via quantitative methods. The objective is to determine whether a high ESG could benefit or harm performance and whether insurance companies require additional external motivation to participate in them. Insurance companies are financial institutions that offer risk management to their customers. They make money by assessing the risks, determining the acceptable premium they are going to receive, and investing the money of the clients for better income margins. Insurance companies are major investors and play an important role in the market. Insurance companies are exposed to environmentally unsustainable assets, which means that they are not motivated enough by policies and social pressures to work for the benefit of society, which is desirable.

Sustainable investments are investment approaches that aim to integrate social or environmental advantages with a company's economic returns, tying ethical, social, economic, and environmental concerns together (Ingenbleek, 2015). ESG - environmental, social, and governance criteria is a common method to evaluate to what extent a company is working towards social goals, it measures sustainability of investment and its impact on society. There are positive externalities of sustainable investments to the society, and therefore the society should aim to improve the incentives for responsible investment. Sustainable production has long been considered more expensive than traditional alternatives, as it must theoretically cover additional ecological and social costs (Ingenbleek, 2015). For investors, the ESG criteria often excludes some high expected return investments from the investment universe, which may lead to lower portfolio return. Many investors are still skeptical of sustainable investments and expect that they come at a cost of lower returns and/or higher risk (Morgan Stanley Institute for Sustainable Investing 2019). From the other side the meta study of over 1000 papers states that most studies show a positive relationship between the ESG score and performance: companies with greater sustainability perform better overall, then do the less sustainable companies (Whelan et al., 2021). However, when it comes to financial institutions, such as insurance companies, there is much less research available. Covid-19 caused a sharp fall in GDP in the US and Eurozone in 2020 and could worsen the position of sustainable institutional investors. Covid-19 hit insurance companies particularly hard, which suffered the biggest losses in March 2020. Insurance companies presented in Refinitiv lost about 33% of their market value between 4 and 23 March, the sharpest decline in ten years (Thomson Reuters, 2022). However, it seems that insurance companies have successfully recovered their value after the fall, and by May 2021 were already reaching all-times highs in terms of value (Thomson Reuters, 2022). It is interesting to examine the years of the covid crisis (2020-2021) and the times before the covid crisis (2018-2019), as the impact of ESG indicators in crisis and non-crisis times can differ due to different environmental pressures. In the expansion periods of business cycle, the economy grows and strengthens the investment climate and, in turn, sustainable investment (Sternfels et al., 2021). In crisis times, it might be expected that initiatives high on ESG, such as green sustainable investments, lose funds and halt development due to pessimistic attitudes on the financial markets.

This paper is academically relevant because it shows an alternative perspective on how sustainability influences the

performance of insurance companies. Globally, this topic is important, because insurance companies still make up for a great proportion of investment, but there is too little literature on incentives of insurance companies to invest responsibly. This paper aims to set things straight and question the assumptions of previous studies in a new context. As far as I am concerned there were no studies specifically considering the sustainability and performance of insurance companies in the time of covid crisis. A deeper understanding of the financial motives of insurance companies could help improve the governmental incentives for responsible investment.

Research question: *How does the ESG performance of publicly listed insurance companies influence their financial performance in the years 2018 - 2021?*

2. LITERATURE REVIEW

2.1 ESG impact on performance

Many scholars are critical of whether the ESG is a method for managers to achieve specific targets and gain financial rewards, or ESG indeed brings greater returns to the shareholders because of the trust of stakeholders. Classical shareholder theory suggests that ESG is simply a donation made by shareholders of a company to its stakeholders (Hu et al., 2018). If this were the case, then the company would have to cover for the additional costs of ESG without adding value, meaning that performance is expected to worsen under this framework. However, previous research has shown significant positive relationship between ESG criteria and returns (Whelan et al., 2021).

2.1.1 Risks Hedging And Value Creation

In the 2005 United Nations Global Compact report, the gains for companies implementing ESG were described as doing well by doing good. ESG has been shown to create more resilience in the risk management of companies (Grant Thornton, 2021), which means that the company should, in theory, perform better in crisis times than the companies that have not taken ESG. ESG is believed to increase the resilience of companies to environmental and social threats and hence reduce the risks of investments (Whelan et al., 2021). Investments with high ESG have been shown to reduce both systematic risks and idiosyncratic risks (firm-specific risks) (Giese et al., 2019). Systematic risk refers to the risk carried by the whole market or segment of the market, in which a company operates, while idiosyncratic risk is firm specific. In the study, high ESG companies were shown to have less idiosyncratic risk, which means that they were less risky for investors. The reasons for that could be that by having a conscious and dynamic governance strategies (which is reflected in high G component), they are able to mitigate and adapt to uncommon and unpredictable situations, that are not industry specific.

2.1.2 ESG Influence During Covid-19 Pandemic

A study (Engelhardt et al., 2021) has found that ESG enhances value for companies in countries with lower disclosure standards during the recent crisis. In theory, high ESG companies are better investments, because ESG disclosure lowers the risks, associated with lack of transparency, therefore increasing their value. However, the study of US states, during the financial crisis, contradicts that point by showing that in states with better disclosure standards, ESG has a greater influence on performance. In the paper (Lins et al., 2017), concerning covid crisis, researchers have found that ESG-rated firms outperform traditional companies in times of covid, which could mean better performance of higher-rated insurance companies, whose

investment portfolio is expected to have higher environmental and social scores.

In the 2008-2009 financial crisis study (Lins et al., 2017), it was found that companies with high CSR outperformed their lower CSR counterparts. The authors argue that this is evidence that during the crisis, the importance of trust increases, reflecting in greater stock returns, while during the recovery period there is no difference in stock returns. Additionally, no reversal of the stock price was found after the crisis, which means that the CSR remains important after the adjustment, which is reflected in the stock price. Some studies have found no evidence that CSR affects stock returns during the Covid crisis. However, a study of US firms found no evidence that CSR affects stock returns during the Covid crisis (Bae et al., 2021). The same article has found a weak positive relationship between CSR and stock returns during covid, when aligned with the institutional environment of the firm. This could mean that if the company is better fit with the expectations in terms of ESG, it is expected to perform better.

The pandemic crisis was shown to decrease the environmental performance of companies due to adverse economic conditions (Guérin & Suntheim, 2021). This is expected because in the ambiguous times the priority shifts from sustainability initiatives to short-term financial priorities. Therefore, it could be expected that the impact of high environmental score during other crises will be lower, as in the study (Giese et al., 2019). During the covid crisis the importance of the social score of the ESG criteria was found to be the most influential on the financial performance of companies and was associated with decreased stock volatility (Engelhardt et al., 2021). It is not surprising that social aspect's influence on performance during 2020 was the most influential on performance – 2020 marked the rise of the BlackLivesMatter movement – and probably biggest protests in US history. This could mean that some companies that do not follow socially inclusive initiatives may be subject to boycott or other forms of economic pressure, creating more risks for investors and lower expected returns. In studies of a different 2008 crisis (Cornett et al., 2016) (Lins et al., 2017), the authors concluded that banks that were socially responsible also had significantly higher ROA. A study (Gregory, 2022) found that companies that score higher in managing governance risk and environmental risk have significantly higher raw returns and BHAR (buy-and-hold-abnormal-returns) during covid. The authors argue that this is because of their ability to hedge risks better, leading to better performance.

2.1.3 The Opposing Theories

The critics of “doing well by doing good” have developed other factors that could explain the perceived better performance of high ESG firms and frameworks, under which high ESG companies are not expected to perform better.

Some studies conducted an analysis within the framework of agency theory and suggested that a manager may be inclined to take on ESG initiatives to achieve a certain benchmark with his or her personal interests in mind (Surroca & Tribó, 2008). The ESG decision may be taken in bad faith and may lead to the loss of ROA and ROE. If this is the case, due to agency costs, the firm will be expected to fail achieving optimal returns.

Some studies suggest that there seems to be a different cause of better performance of companies with higher ESG: after controlling for industry affiliation and accounting and market-based risk measures, (Demers et al., 2021) have not found a significant relationship between high ESG score and return on assets. In this case, it seems that the ESG score, and profitability could be unrelated. As (Bradley, 2021, pg.16) suggests, the

reason for the better performance of companies with high ESG could be that they are more commonly found in more profitable industries. For example, it could be that the high ESG mutual fund invests more in technological start-ups, which were recently booming (Bradley, 2021). In the case of insurance companies specifically, this argument means that the companies with more tech investments are experiencing better returns, because of the tech bubble, but it might be that this investment strategy will not perform as well if the bubble collapses.

Greenwashing and uneven reporting are other factors that can interfere with the link between ESG and performance. For example, (Drempetic et al., 2020) found that larger companies have an advantage in ESG reporting, therefore the link between ESG performance and associated financial performance may be the result of bias in evaluation.

2.2 ESG impact in insurance companies

The literature shows multiple mechanisms by which the ESG score could interact with the financial performance of insurance companies. Insurance companies have two main methods of generating revenue: by charging premiums for insurance and by investing money in assets and generating return on those assets. While the return on assets reflects the ability of company to generate wealth on liabilities and equity - the total amount of money invested, return on equity reflects the ability to generate return on equity only. The ESG score of the insurance company is determined by the outward-oriented environmental and social scores of the investment portfolios and by the inward-oriented the governance score of the insurance company (Oxbow Partners, 2022). Some literature suggests that more Environmental/Social-considerate investment portfolios could be, on average, outperforming less ES-considerate portfolio due to lower risks (Dana Investment Advisors, 2021). A study (Verheyden et al., 2016) on the impact of ESG screening showed that an investor benefited by screening out the 10% of companies with the lowest ESG scores using a “best-in-class” approach. Such portfolios were shown to have higher returns and lower idiosyncratic risk. Those studies suggests that more ESG-focused insurance companies can achieve higher investment returns. This may oppose the classic shareholder theory thesis of market inefficiencies.

Lower risks could lead to less unexpected losses, on average, and if the portfolio would perform better, there would be better return on portfolio, which could influence returns positively. However, the mechanisms why high ESG portfolios achieve better returns are not very clear - even if companies with high environmental and social scores have the lower risks, it should be reflected in their market price, making them less risky but also more expensive investments. The only case in which higher environmental and social score of portfolios would mean better returns on the portfolio is in the case of inefficient market. If this is not the portfolio case, the ESG scores will not influence the portfolio return. As discussed in the framework of classical shareholder theory the ESG criteria are imposing additional costs on investments, which could be true if there is no hidden benefit to returns. However, in the case with this study, it should not be assumed that insurance companies limit their investment universe or incur additional costs to increase ESG scores, as companies may have been guided by other metrics in making their decision, which resulted in a specific ESG score. In the case of internal measures, such as governance pillar score, as literature suggests there is positive relationship between governance and returns during covid in the USA, based on better hedging of risks (Gregory, 2022). The suggested mechanism, in this case, for financial firms, is that raw returns on higher governance score are greater due to lower risks, that may come for instance, from

the lack of defined CSR strategy, but, when controlled for risks, those effects disappear.

The other mechanism of interaction between the ESG score and the performance of the insurance is due to external pressures that it could face. For instance, Campbell argues that socially responsible behaviour of corporations is due to governmental and private regulation, the presence of independent organisations that monitor the behaviour of corporations, and due to institutionalised norms and dialogs among stake holders. Governmental policy intervention could make certain ESG investments more profitable, by, for instance, decreasing the taxation of environmentally friendly goods. This would possibly increase ROA and ROE. The other possible interaction between the ESG of insurance and the returns is through the end consumer. For example, certain consumers might be unwilling to buy insurance from the company that has investments in a company that exploits labour and may prefer to pay more for more sustainable insurance with a higher premium. Ipsos survey indicated that in the view of business journalists, the higher the ESG score, the better the reputation (Ipsos, 2022). However, this will not necessarily lead to better returns, due to additional costs of sustainable investment, and the percentage of consumers willing to pay sustainability premium might not cover it. According to Statista, the most important factor in choosing medical insurance for most Americans is cost of monthly premium, and only 15% of Americans indicate insurance company reputation as the most important factor (PwC., 2016).

2.3 Hypothesis

The hypothesis that can be drawn from the literature review is that ESG scores compliance may add burden to the insurance company; therefore, the financial performance in terms of ROA and ROE could be negatively correlated with the higher ESG score, according to classical shareholder theory. However, if the market is not efficient at accounting for risks and/or ESG brings consumer value, then one could expect that the performance of a company is positively correlated with ROA and/or ROE. So far, most literature suggests that ESG brings more value to the company and that the relationship between ESG, and performance is expected to be weak and positive.

It may be that better risk protection of companies with high ESG, the influence of ESG on performance should be more positive during covid-19 crisis (either stronger positive relationship or weaker negative), because ESG is expected to protect from market risks.

Hypothesis 1: The ESG factors are positively associated with performance.

Hypothesis 2: The relationship between ESG factors and performance is more positive during covid-19 crisis years (FY2020-2021), than in pre-covid years (FY2018-2019).

3. RESEARCH METHOD AND DESIGN

In my research I am planning to primarily use quantitative methods. To assess the impact of ESG policies on insurance funds before and during covid, I am going to conduct multivariate linear regression models between measurements of financial performance and ESG performance. In this model financial performance measurements (ROA and ROE) are presented as a function of ESG policies. To determine whether my model is applicable I will test whether the model is monotonic and could be linearly approximated. I study the models in different years to check the moderation effects of the economic situation, specifically comparing the four models for the years 2018-2021, as this allows for equal comparison.

3.1 Linear regression model

All variables are checked for correlations via the Spearman correlation, with a two-tailed test and 5% alpha. The residual plots of the multivariate regressions are going to be used to ensure that the variables are somewhat linear and do not need recoding.

To test hypothesis 1, multiple linear regression models with OLS were used, as in the previous literature on ESG and ROA (Velte, 2017), with all the available data, treating cases from the same companies, but different years, as independent samples.

$$y = b_0 + b_1ESG + b_2DEBT + b_3INVESTMENT + b_4SIZE + b_5TYPE + \varepsilon$$

Where b_n are correlation coefficients in the OLS. The significance of each variable is determined with 5% alpha using the t-test. Residual analysis for all models will determine whether the linear regression is somewhat useful, and the model will be adjusted accordingly. There will be 8 models in total: for each of the four independent variables (ESG combined score, Environmental score, Social score, and Governance score), and for each of the two dependent variables (ROE and ROA).

To test the independent effect of each E, S, and G score, three additional OLS models will be created with each E, S, and G indicator instead of the combined ESG score.

To test hypothesis 2, independent models E, S, and G will be created for two periods 2018-2019 and 2020-2021. Then the coefficients of E S and G estimates will be compared between time periods using the two-sample Z-test of the linear regression model (Paternoster et al., 1998):

$$Z = \frac{b_{FY2} - b_{FY1}}{SE^*}$$

$$SE^* = \sqrt{SEb_{FY2}^2 + SEb_{FY1}^2}$$

Statistical analysis will determine whether there is a statistically significant difference in performance with the alpha of 5%.

3.2 Variables

Table 1 Variables

Variables	Definition
Pretax ROA	Income before taxes / Average assets
Pretax ROE	Income before taxes / Average equity
ESG score	Refinitiv Eikon ESG combined score out of 100
Social Pillar Score (S-score)	Refinitiv Eikon Social Pillar score out of 100
Governance Pillar Score (G-score)	Refinitiv Eikon Governance Pillar score out of 100
Environmental Pillar Score (E-score)	Refinitiv Eikon Environmental Pillar score out of 100
Debt ratio	Total liabilities / Total assets
Investment ratio	Investment income / Net premiums
Size	Log (total assets)
Insurance type	Type of insurance

The financial performance of insurance companies, which is the dependent variable in the model, will be based on two metrics: ROA and ROE as they are commonly used as indicators of financial performance of insurance companies (Morara & Sibindi, 2021). I decided to use the variables that could influence ROA and ROE, but are unlikely to be influenced by ESG variables: size (Velte, 2017); company type, as previous studies failed to find the influence of ESG after controlling for industry (Demers et al., 2021); debt ratio to reflect unsystematic risk (Velte, 2017); and investment ratio, because it could have some insurance-specific influence.

ROE and ROA are good performance indicators, appropriate in my research because they focus on the whole company, not just on the performance of the investment portfolio, on intrinsic value and not as much on the performance of the market. In my study, I have chosen to use pre-tax ROA and pre-tax ROE to exclude the impact of each country's policies on performance.

As a measure of ESG performance, my independent variable, I am going to use the ESG score, as in many studies, for example (Velte, 2017).

4. DATA COLLECTION & ANALYSIS

4.1 Data collection and management

4.1.1 Data Sample

Table 2 Geographic Location

Region of Headquarters	Number of Companies	Percentage
USA and Canada	93	39%
Asia	50	21%
Europe	50	21%
Latin America and the Caribbean	27	11%
Oceania	11	5%
Africa	5	2%
Grand Total	236	100

Table 3 Insurance Types

Types of insurance	Number of companies	Percentage
Property & Casualty Insurance	94	40%
Life & Health Insurance	73	31%
Multiline Insurance & Brokers	53	22%
Reinsurance	16	7%
Grand Total	236	100

For the ESG rating, the Refinitiv ESG score is used, as it is common (for example (Demers et al., 2021)) in the literature for the evaluation of the influence of ESG on performance. All the available data on Refinitiv on insurance companies around the globe are used in this study. The companies are selected based

on the availability of data on Refinitiv ESG Combined Score Environmental Pillar Score, Social Pillar Score, Governance Pillar Score for financial year 2019. Based on this filter, 236 insurance companies were obtained, located in 39 countries, most of which are in North America, Asia, and Europe, as can be seen in the Table 2. The data are also divided into four categories: Property & Casualty; Life & Health; Multiline and Reinsurance, this can be seen in Table 3.

4.1.2 Transformation and Outliers' Management

To fit the multivariate model, I performed data transformations to normalize the variables, using all data 2018-2021. For the variable 'debt ratio' (liabilities to assets), I clipped data > 1 to 1 because there was a strong negative skew of the data, with a sudden drop of concentration of data points at a debt ratio of 1, with only 9 very spread data points to the right of 1; to normalize the skew I performed the box cox transformation with $\lambda = 3$, as it is sometimes used to normalize financial data (Kartsonakis-Mademlis & Dritsakis, 2020; Osborne & Waters, 2002). For the variable "investment ratio", I clipped data > 10 and < 0 , because all the data above 10 (5 datapoints) are extreme outliers, without which the average investment ratio drops from 210.00 to 0.28. The Midwest Holding Inc 2020 datapoint is especially notable because it had an investment ratio of 168633, which may suggest some issue with data, and for that reason I decided to drop that datapoint altogether. To get rid of the skew in data I performed log base 10 transformation. I have also recoded the insurance company type into 4 dummy variables. After transformations minmax scaling was performed to all variables to make the coefficients comparable in different multiple regression models. The histograms of the data are available in the Appendix 7.1.

4.1.3 Descriptive Statistics.

Table 4 Descriptive Statistics

Variable	N	Mean	SD
Pretax ROA	908	0,49800	0,12492
Pretax ROE	891	0,51254	0,12403
ESG combined score	808	0,48667	0,21292
Social Pillar Score	808	0,50244	0,23750
Governance Pillar Score	808	0,56471	0,22657
Environmental Pillar Score	808	0,31137	0,30798
Liabilities to Assets	923	0,51907	0,24556
Investment Ratio	780	0,38839	0,17792
Log (Assets)	923	0,54672	0,19846
Log (Premiums)	799	0,61148	0,20251

4.2 Correlation analysis

Table 5 Correlation Analysis

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Pretax ROA (1)	-						
Pretax ROE (2)	.732**	-					
Social Score (3)	0,503	0,000	-				
Governance Score (4)	-0,015	0,034	.452**	-			
Environmental Score (5)	-.142**	0,056	.797**	.461**	-		
Liabilities to Assets (6)	-.499**	-.091**	.329**	.108**	.458**	-	
Investment Ratio (7)	-.236**	-.102**	.182**	0,060	.221**	.426**	-
Log assets (8)	-.220**	-0,015	.568**	.394**	.704**	.586**	.441**

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

In Table 5 there is weak negative, but significant correlation between Environmental score and ROA. There is also weak positive correlation with Social score and ROE. ESG variables are significantly positively correlated with Liabilities, this relationship is hard to explain at this stage. It could be because some jurisdictions provide better conditions for more sustainable companies to take on debt and ESG companies choose to take on more debt. The investment ratio is positively correlated to all ESG variables, although insignificant for the governance score. This could mean that companies with greater ESG scores have better returns on their investment activities. Social score and Environmental scores are outward-oriented scores that are mostly determined via portfolio, unlike Governance score, which has insignificant correlation with investment. It stands in the support of the hypothesis that market prices of non-insurance companies that are potential investments do not account for ESG risks adequately. All ESG variables are very significantly correlated with size, which is consistent with the literature, where it was suggested that larger companies have advantages when it comes to ESG reporting (Drempetic et al., 2020). For a multivariate linear regression, I check for the noncollinearity of independent variables, while collinearity is defined as correlation >0.7. The environmental and social score are strongly correlated predictor variables and must be separated to check their true influence on the dependent variables. Also, Environmental score is collinear with Log (Assets), which could intervene with the model.

4.3 Multiple regression analysis

4.3.1 Impact of Aggregate ESG Score On Performance

In Table 6 ROA model has a stronger predictive value than ROE, although both are weak (details can be found in appendix). It is seen that the significance of ESG combined score as a predictor of ROA is significant under 5% alpha, as well as ROE. In the combined ESG model for ROA, the ESG coefficient has a weak influence on ROA, as the regression coefficient is only 0,0563, which indicates a low predictive power. However, ESG has t-score of 2,7, which indicates a great significance (t=2,7; p<0,0002). In the ROA model, there are insignificant variables: Investment ratio (t = -0,3218; p > 0,70), log (assets) (t = 0,42; p

> 0,60); this contrasts the data from Pearson's correlation, where both were found to be significantly negatively correlated with ROA. Possibly the variables lost their significance, when accounting for insurance company type, or perhaps when accounting for debt. In ESG combined model for ROE, the ESG coefficient has a moderate influence on ROE of about 0,10. There is also a great significance for the ESG coefficient (t=3,8; p < 0,0002). In the ROE model there are insignificant variables: Debt Ratio (t = -1,1994; p > 0,20), Investment Ratio (t = -1,76; p > 0,05).

Table 6 ESG Combined Score Models

Model	Unstandardized Coefficients (ROA)	Unstandardized Coefficients (ROE)
(Constant)	0,667* (39,0826)	0,5605* (26,537)
ESG combined score	0,0563* (2,7017)	0,0988* (3,8419)
Total Liabilities Percentage of Total Assets	-0,3347* (-15,9395)	-0,0331 (-1,1994)
Investment Ratio	-0,0072 (-0,3218)	-0,049 (-1,7554)
Log (assets)	0,0135 (0,4284)	-0,0836* (-2,0976)
Multiline & Brokers	-0,0179 (-1,6559)	-0,006 (-0,4528)
Property & Casualty	-0,0317* (-3,3344)	-0,0166 (-1,3993)
Reinsurance	-0,0777* (-5,412)	-0,0568* (-3,1598)
R Square	0,3679*	0,049*

* is significant at the 0.05 level

4.3.2 Residual Analysis

Residual diagrams can be found in the Appendix 7.2. After all the transformations and normalizations, there was still some skewness in the residuals, suggesting that the model may be non-linear. It appears that the models are not linear and are better

approximated by a curve. Strict heteroscedasticity is not observed, especially in the ROA model, but this can be neglected in this analysis. ROA and ROE models from ESG are analogous to the ROA and ROE models from the individual Environmental, Social, and Governance scores, and can be used as a proxy in residual analysis.

4.4 Coefficient analysis

Table 7 Individual ESG Score Models

	Unstandardized Coefficients (Beta)					
	Model ROA	Model ROE	Model ROA	Model ROE	Model ROA	Model ROE
(Constant)	0,6845* (38,596)	0,5892* (26,77)	0,6648* (39,469)	0,5589* (26,783)	0,6757* (37,773)	0,5652* (25,425)
Environment Pillar Score	0,0373* (2,36)	0,0602* (3,088)	----	----	----	----
Social Pillar Score	----	----	0,0847* (4,745)	0,1185* (5,373)	----	----
Governance Pillar Score	----	----	----	----	-0,0106 (-0,616)	0,0141 (0,657)
Total Liabilities Percentage of Total Assets	-0,3401* (-16,172)	-0,042 (-1,515)	-0,3374* (-16,266)	-0,0389 (-1,426)	-0,3389* (-15,974)	-0,0357 (-1,274)
Investment Ratio	-0,0071 (-0,315)	-0,0493 (-1,755)	-0,0045 (-0,206)	-0,0471 (-1,708)	-0,0155 (-0,696)	-0,0597* (-2,125)
Log (assets)	0,0145 (0,444)	-0,0757 (-1,825)	-0,0103 (-0,346)	-0,099* (-2,613)	0,0673* (2,371)	-0,0098 (-0,27)
Multiline Insurance & Brokers	-0,0181 (-1,673)	-0,0063 (-0,47)	-0,0165 (-1,544)	-0,0039 (-0,296)	-0,0171 (-1,57)	-0,0055 (-0,405)
Property & Casualty Insurance	-0,0309* (-3,254)	-0,0153 (-1,292)	-0,0313* (-3,338)	-0,0161 (-1,372)	-0,0312* (-3,273)	-0,0163 (-1,365)
Reinsurance	-0,0755* (-5,226)	-0,0536* (-2,959)	-0,0701* (-4,894)	-0,047* (-2,625)	-0,0779* (-5,365)	-0,0603* (-3,304)
R Square	0,3663*	0,0421*	0,3816*	0,0687*	0,3614*	0,0291*

* is significant at the 0.05 level

In Table 7 there are summarized coefficients of independent variables of 6 multivariate models, all the regression models are statistically significant. It seems that throughout the models, in models with ROE the significance of E and S variables is greater, as well as their strength.

For the ROA and ROE models, the strongest predictors seem to be the Social score (b = 0,0847 for ROA; b = 0,1185 for ROE), which is consistent with literature (Engelhardt et al., 2021). The stronger positive association between the Social score and ROA & ROE in the model could be explained by accounting for Debt, as it was found to have a positive Pearson's correlation with the Social score and is negatively associated with ROA and ROE in the model.

In contrast to the literature, the second strongest ESG predictor for insurance companies is Environmental score (b = 0,0373 for

ROA; b = 0,0602 for ROE). The ROA-Environmental model shows the E-score's significant positive association with ROA while Pearson's correlation shows a significant negative correlation, this is probably because Debt ratio and investment ratio are positively correlated with Environment and negatively with ROA; therefore, they weaken the relationship between the two, when they are not controlled for.

The Governance score is insignificantly related to both ROA and ROE, as was with Pearson's correlation.

4.5 Influence of Covid-19

Table 8 Environmental model in periods before and during Covid-19

	Model ROA		Model ROE	
	2018-2019	2020-2021	2018-2020	2020-2022
(Constant)	0,615* (22,246)	0,726* (24,041)	0,515* (16,522)	0,597* (18,217)
Environmental Score	0,016 (0,653)	0,04 (1,38)	0,047 (1,661)	0,064* (2,027)
Log (Assets)	0,079 (1,588)	0,031 (0,548)	-0,017 (-0,299)	-0,099 (-1,596)
Liabilities to Assets	-0,358* (-10,93)	-0,447* (-11,30)	-0,033 (-0,832)	-0,049 (-1,09)
Investment Ratio	-0,059 (-1,754)	0,006 (0,151)	-0,089* (-2,3)	-0,014 (-0,31)
Multiline Insurance	-0,023 (-1,31)	-0,02 (-1,014)	-0,009 (-0,489)	-0,006 (-0,299)
Property & Casualty	-0,027 (-1,815)	-0,043* (-2,492)	-0,01 (-0,582)	-0,012 (-0,6)
Reinsurance	-0,096* (-4,251)	-0,073* (-2,67)	-0,067* (-2,566)	-0,053 (-1,797)
R Square	0,333*	0,382*	0,045*	0,040

* is significant at the 0.05 level

Table 9 Social model in periods before and during Covid-19

	Model ROA		Model ROE	
	2018-2019	2020-2021	2018-2020	2020-2022
(Constant)	0,604* (22,953)	0,703* (23,529)	0,491* (16,673)	0,563* (17,417)
Social Score	0,084* (2,917)	0,086* (2,656)	0,13* (4,027)	0,114* (3,264)
Log (Assets)	0,029 (0,618)	0,014 (0,272)	-0,067 (-1,253)	-0,111* (-1,972)
Liabilities to Assets	-0,357* (-11,04)	-0,445* (-11,35)	-0,033 (-0,84)	-0,044 (-0,999)
Investment Ratio	-0,055 (-1,648)	0,01 (0,251)	-0,085* (-2,252)	-0,011 (-0,242)
Multiline Insurance	-0,02 (-1,169)	-0,02 (-1,017)	-0,005 (-0,283)	-0,006 (-0,272)
Property & Casualty	-0,027 (-1,841)	-0,044* (-2,568)	-0,01 (-0,622)	-0,013 (-0,67)
Reinsurance	-0,09* (-4,015)	-0,068* (-2,494)	-0,06* (-2,35)	-0,047 (-1,601)
R Square	0,347*	0,392*	0,079*	0,06*

* is significant at the 0.05 level

Table 10 Governance model in periods before and during Covid-19

	Model ROA		Model ROE	
	2018-2019	2020-2021	2018-2020	2020-2022
(Constant)	0,617* (22,21)	0,712* (23,034)	0,502* (15,999)	0,573* (17,126)
Governance Pillar Score	-0,022 (-0,845)	0,02 (0,595)	-0,005 (-0,171)	0,039 (1,047)
Log (Assets)	0,113* (2,596)	0,067 (1,373)	0,041 (0,81)	-0,046 (-0,844)
Liabilities to Assets	-0,361* (-10,92)	-0,444* (-11,144)	-0,03 (-0,749)	-0,043 (-0,954)
Investment Ratio	-0,064 (-1,907)	0,001 (0,013)	-0,097* (-2,514)	-0,022 (-0,495)
Multiline Insurance	-0,022 (-1,255)	-0,019 (-0,943)	-0,009 (-0,465)	-0,004 (-0,203)
Property & Casualty	-0,027 (-1,795)	-0,044* (-2,547)	-0,01 (-0,59)	-0,013 (-0,695)
Reinsurance	-0,096* (-4,241)	-0,079* (-2,842)	-0,07* (-2,71)	-0,063* (-2,093)
R Square	0,333*	0,379*	0,037	0,030

* is significant at the 0.05 level

Table 11 Difference between the regression lines

	Z-score of the difference	
	ROA	ROE
Environmental Score	0,733	0,660
Social Score	0,518	0,375
Governance Score	0,838	0,823

From Figures 8-11, it seems that there are no statistically significant differences between ESG variables during covid years and in the period before covid; moreover, very few models even had statistical significance. Z-scores, presented in Table 11, show that there is no statistically significant difference between the regression lines, and the direction of change is inconsistent for the ESG variables.

5. CONCLUSIONS

Consistent with most of the research on the topic, the models designed in this research found a significant positive relationship between the ESG variables and the performance. It appears that the outward-oriented Environmental and Social scores that are determined by the investment portfolio are more influential, than inward-oriented Governance score. The previous literature found that Social score is the strongest predictor on the performance of non-financial companies, followed by governance. It seems that insurance companies, may benefit from investment in ecologically and socially responsible companies, but there was not enough evidence that internal measures, represented by the governance score, influence ROA or ROE. The stronger influence of external measures could mean that the companies in the portfolio with high Environmental and Social score, give better returns, or that the consumers value companies with responsible investment more and are prepared to pay higher premiums.

Social, Environmental, and Governance scores were stronger predictors of ROE, than ROA throughout the study, which could suggest that the ESG enhances profitability, and, to a lesser extent, revenue-generating efficiency.

The models failed to find evidence of additional cost of ESG, coming from the classical theory, unless it comes in the form of greater debt ratio. The Environmental score was only found to have a positive significant effect on performance measure ROA when controlled for debt and size; if this was not the case, the relationship with ROA would be significant and negative. There is a possibility that more Environmental and Social concerns are somehow increasing the tendencies of companies to take on more debt, which could harm the returns in some way. I suggest two reasons why more environmentally and socially sustainable companies choose to undertake more debt: they are expecting less risk from their investments, or they have more favorable conditions for undertaking more debt, for example greater tax returns, which were not accounted for in the scope of this study (In the model pretax ROA and ROE were used).

Unfortunately, in this study, conclusion about influence of crisis was not reached. No statistically significant difference between the performance in pre-covid years and covid years was found. This is likely because the data set is too small.

5.1 Recommendations for Future Research

Studying a small number of time periods greatly limits the understanding of the impact of the crisis on the relationship between ESG metrics and company profitability – there is too

little data to make any judgment. For future research on the impact of the economic crisis, it is recommended to investigate other economic downturns. For instance, the upcoming energy crisis in Europe could have a positive impact on the influence of Environmental score on financial performance. One could perform time-series forecasting to correct the current models of expected performance of insurance companies for ESG.

The study of the impact of ESG variables on insurance companies can be continued by examining the interaction of ESG with debt. Weak collinearity of the ESG variables with the debt ratio appears to intervene in the relationship between the ESG variables and ROA and ROE (especially for ROA). I have suggested that there may be some reason why companies with a higher ESG tend to have a higher liability ratio. It would be interesting to further explore the interaction between debt and ESG performance.

Another interesting topic in this area is the influence of government policies on ESG. As discussed previously, there could be incentive structures of insurance companies with high ESG to undertake additional debt.

For further research on influence of ESG in insurance companies, greater sample sizes could be taken from different years. The researcher must be cautious of possible covariance of years with other variables; therefore, I suggest treating the year as a covariate in a multiple regression model or in other models the researcher wishes to employ.

5.2 Practical implications

This paper contributes to existing knowledge on the impact of ESG in different economic situations and attempts to break down the notion that the impact of ESG on financial performance is a fixed characteristic.

The models in this work can be used for approximation and simplification purposes of individuals, wishing to invest in insurance company or when taking an investment decision on behalf of an insurance company. This study advises to consider Social score of the company in decision making, since it is likely to have at the very least a positive association with financial performance. For a more precise model, the company data may be recoded and used in the model.

In conclusion, I believe that the evidence gathered from this research is insufficient to argue for a causal relationship between ESG performance and financial performance. There could be issues of outside variables that could explain the perceived association, and at the same time, a model with so many controls risks overfitting the data.

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sustainable business.

7. APPENDIX

7.1 Variable Histograms

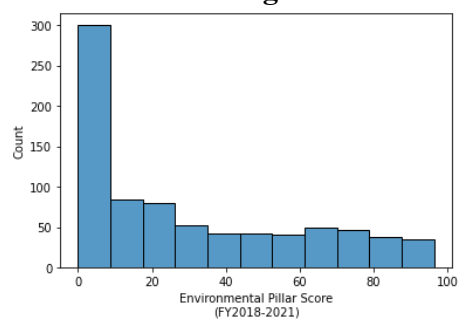


Figure 1 Raw E-score

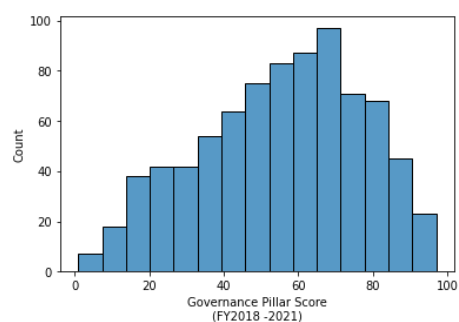


Figure 2 Raw G-score

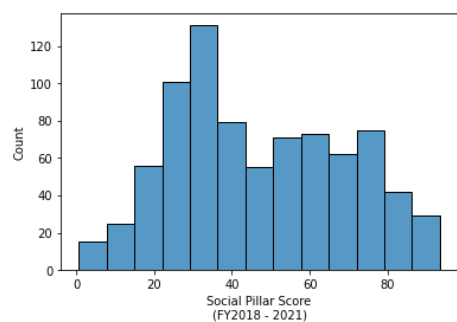


Figure 3 Raw S-score

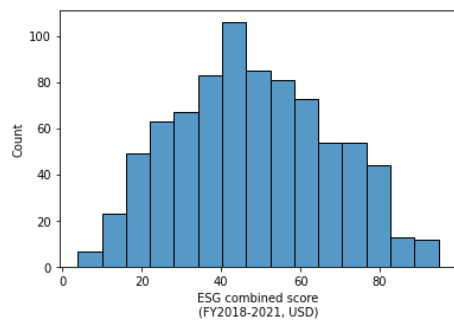


Figure 4 ESG combined score

Table 12 Debt ratio (Before and After Transformation)

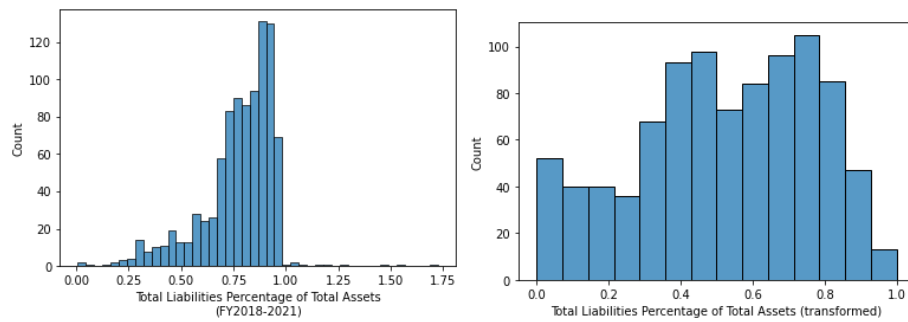


Figure 5 Investment Ratio (Before and After Transformation)

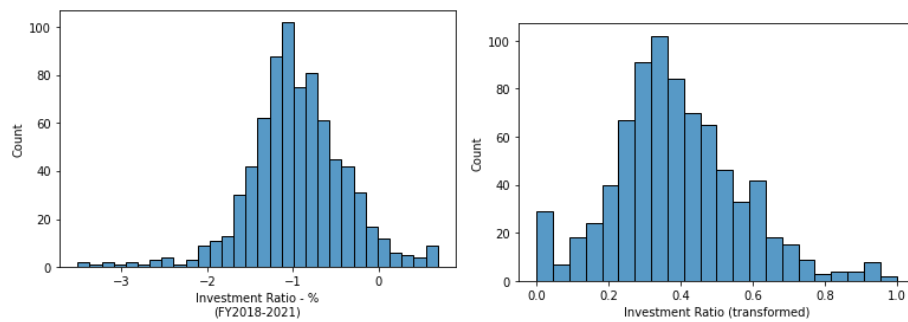


Figure 6 Size (Before and After Transformation)

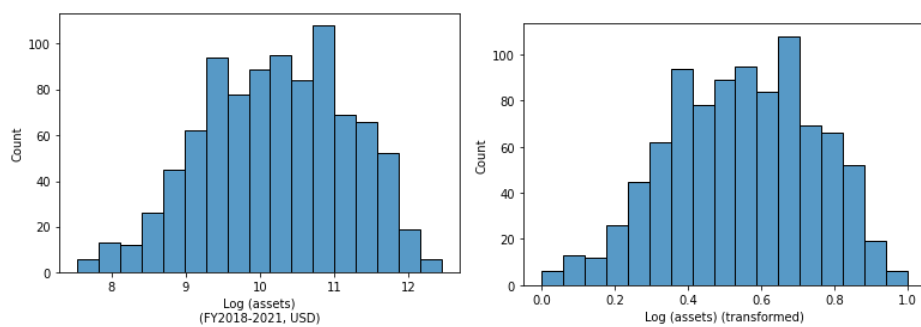


Figure 7 Pretax ROA (Before and After Transformation)

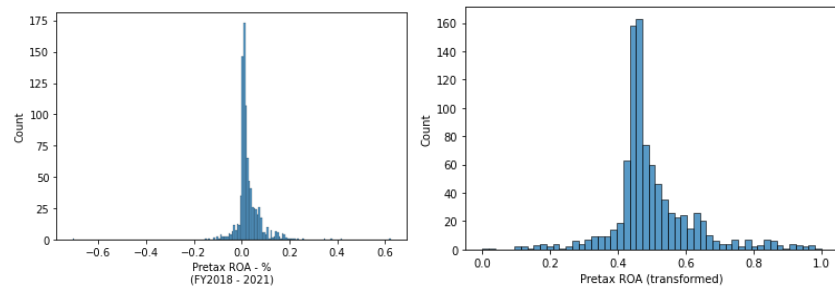
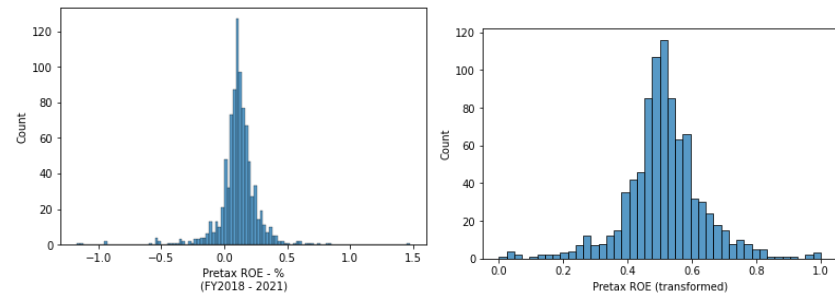


Figure 8 Pretax ROE (Before and After Transformation)



7.2 Residual Plot

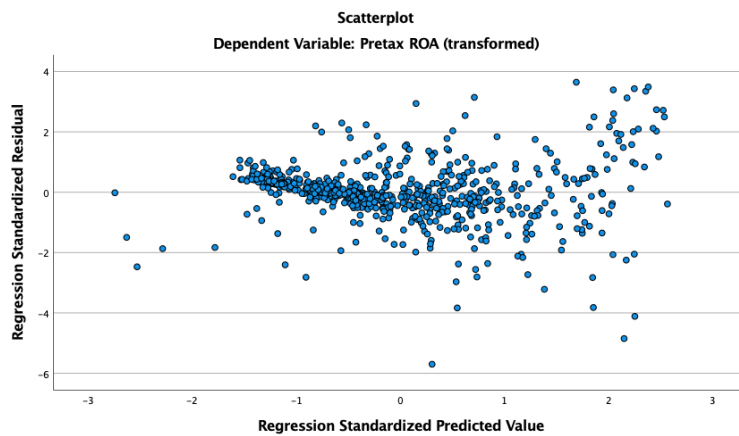


Figure 9 ESG Combined ROA Residual Plot

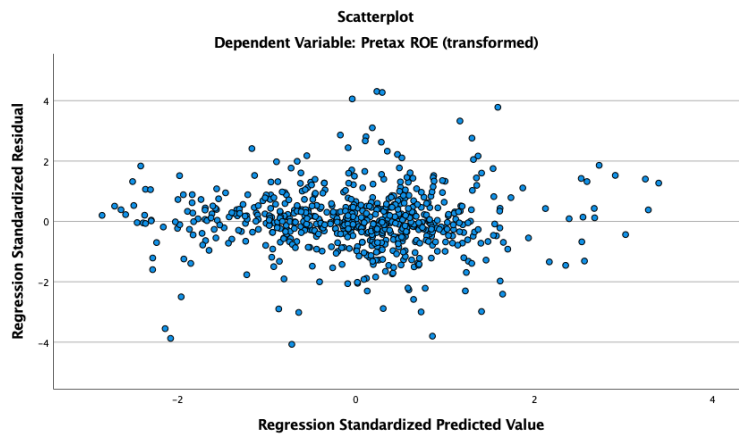


Figure 10 ESG Combined ROE Residual Plot