RUCH PRAWNICZY, EKONOMICZNY I SOCJOLOGICZNY
Rok LXXXVI – zeszyt 1 – 2024
https://doi.org/10.14746/rpeis.2024.86.1.09

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DISENTANGLING ESG: ENVIRONMENTAL, SOCIAL AND GOVERNANCE RATINGS, AND THE FINANCIAL PERFORMANCE OF POLISH LISTED COMPANIES

ROZPLĄTUJĄC ESG: OCENY WYMIARU ŚRODOWISKOWEGO, SPOŁECZNEGO I ŁADU KORPORACYJNEGO A WYNIKI FINANSOWE POLSKICH SPÓŁEK GIEŁDOWYCH

Socially responsible investments are a significant element of the global capital market and are becoming increasingly important also in the eyes of Polish investors. ESG ratings are a crucial decisive criterion, as they provide information on the corporate governance (G), and social (S) and environmental (E) activities, of companies. Even though the abovementioned areas differ significantly, the use of ESG ratings by investors is often narrowed down to the total ESG score. Additionally, the literature does not provide unambiguous results on whether the impact of total score as well as the individual pillars of E, S and G on the accounting-based financial performance of companies is statistically significant, and positive or negative. Sparse academic studies concentrate mainly on highly developed markets and accounting-based measures of profitability, leaving aside emerging markets, like Poland, and the other main characteristics of financial performance, like liquidity, efficiency, or leverage. The aim of this paper is therefore to fill the above gap by identifying the dependence of ratings in E, S and G areas and the accounting-based financial performance of companies listed on the Warsaw Stock Exchange. Selected financial parameters and company quotations were taken from the Notoria Serwis SA database, while data on ESG ratings from Refinitiv Eikon were used to perform correlation analysis. The analysis covers the years 2013–2022. The findings indicate a significant positive bi-directional impact of corporate governance (G) and efficiency, as well as of controversies score and efficiency. A linkage has also been revealed between controversies score and profitability. However, the hypothesis of an unequivocally positive impact of ESG factors on financial results, or conversely of financial results on ESG aspects, should be rejected.

Keywords: socially responsible investments; corporate financial performance; ESG performance; ESG ratings
JEL: G11, G14, M14, O16

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RPEiS 86(1), 2024: 149–178. *ISSN (Online) 2543-9170 ISSN (Print) 0035-9629*

Inwestycje społecznie odpowiedzialne są istotnym elementem światowego rynku kapitałowego i nabierają coraz większego znaczenia również w oczach polskich inwestorów. Istotnym kryterium decyzyjnym są w tym kontekście ratingi ESG, dostarczające informacji z zakresu ładu korporacyjnego (G), aktywności w obszarze społecznym (S) i środowiskowym (E). Mimo że powyższe obszary istotnie różnią się od siebie, to jednak wykorzystanie przez inwestorów ratingów ESG często zawęża się do łącznej oceny ESG. Dodatkowo w literaturze nie podaje się jednoznacznych wyników, czy wpływ całkowitego scoringu ESG oraz poszczególnych jego filarów na wyniki finansowe przedsiębiorstw jest istotny statystycznie, pozytywny czy negatywny. Należy również zauważyć, że badania tego typu są jak dotąd dość nieliczne i koncentrują się głównie na rynkach wysoko rozwiniętych, a także miarach rentowności, pomijając rynki wschodzące (takie jak Polska) i inne obszary wyników finansowych (takie jak płynność, efektywność czy dźwignia finansowa). Celem niniejszego artykułu jest zatem wypełnienie powyższej luki przez identyfikację zależności ocen ratingowych w obszarach E, S i G oraz wyników finansowych spółek notowanych na Giełdzie Papierów Wartościowych w Warszawie. Wybrane parametry finansowe oraz notowania spółek zostały pobrane z bazy Notoria, natomiast dane dotyczące ratingów ESG z Refinitiv Eikon w celu przeprowadzenia analizy korelacji. Badanie obejmuje lata 2013–2022. Wyniki wskazują na istotny pozytywny dwukierunkowy związek ładu korporacyjnego (G) i efektywności oraz scoringu kontrowersji i efektywności. Występują także związki pomiędzy rentownością przedsiębiorstw a ich scoringiem kontrowersji. Należy jednak odrzucić hipotezę o jednoznacznie pozytywnym wpływie ESG na wyniki finansowe lub wyników finansowych na wynik ESG.

Słowa kluczowe: inwestowanie społecznie odpowiedzialne; ratingi ESG; wyniki finansowe; ocena wymiaru środowiskowego, społecznego i ładu korporacyjnego
JEL: G11, G14, M14, O16

I. INTRODUCTION

The term 'ESG' gained momentum after its first use in the 2004 World Bank publication on sustainability issues and financial markets (UN & FDFA, 2004). Environmental (E), social (S) and governance (G) factors, once integrated by companies, help to achieve the goal of sustainable development. Investors perceive such companies as Socially Responsible Investments (SRI) and seek financial and non-financial information to make informed choices. Even though reporting initiatives Principles for Responsible Investment (PRI) or Global Compact, along with rating agencies (e.g. MSCI KLD, Refinitiv) provide more clarity, the investors' fundamental question about the impact of ESG ratings on financial performance (FP) and shareholder value remains unanswered.

The companies that perform better in E, S and G 'can increase shareholder value by, for example, properly managing risks, anticipating regulatory action or accessing new markets, while at the same time contributing to the sustainable development of the societies in which they operate. Moreover, these issues can have a strong impact on reputation and brands, an increasingly important part of company value' (UN & FDFA, 2004). This effect should be reflected in accounting-based measures. The perspective is called corporate financial performance (CFP). The alternative approach is the one based on capital market performance measurement – investor financial performance (IFP) perspective – as investors reflect their expectations for future returns via their stock buy-sell decisions (Whelan et al., 2021). IFP focuses on meth-

ods adopting for example stock returns and risk, or Sharpe ratio measures of investment performance.

The number of studies that highlight the positive link between ESG and financial performance is much higher than in the case of studies reporting negative bonds or no relationship (Friede et al., 2015). Whelan et al. (2021) report that 60% of portfolio-performance-based studies show a positive relationship between ESG and FP. Multiple results indicate that higher ESG transparency (Yu et al., 2018) or the better ESG performance of companies (Gregory et al., 2014) is associated with better market valuation. The positive relationship is also confirmed in the case of mutual funds' performance and ESG ratings by a number of authors (Abate et al., 2021; Das et al., 2018; López Prol & Kim, 2022). However, the picture is not free from vagueness and needs researchers' attention (Friede et al., 2015; Gillan et al., 2021). Weston and Nnadi (2023) indicate that there is no evidence that ethicality boosts exchange-traded funds' performance. At the same time, the authors report that PRI-following companies outperform firms that do not follow the United Nations guidelines. Folger-Laronde et al. (2022), using Eco-fund rating from Corporate Knights measuring weekly financial returns during the COVID-19 pandemic, present a negative relationship between ESG and the financial performance of exchange-traded funds. A recent study by Huang et al. (2020) also cast some doubts, indicating that the mixed results regarding the connection between CSR (corporate social responsibility) and FP reported by many studies overlook the fact that macro-level economic fluctuations blur the results. The ambiguity of the results is also increased by various methodologies, data sources and the markets investigated (Giese et al., 2019). The last factor is a particularly important one for our study since the Polish market of socially responsible investments is at the early stage of development and its potential to grow is considerable (Dmuchowski et al., 2023; Shin et al., 2023). Additionally, so far studies on ESG and FP for the Polish market are rare, provide a partial picture, and the results are mixed (Baran et al., 2022; Przychodzen & Przychodzen, 2015). To our knowledge, as yet the issue of the relationship between CFP and ESG performance has not been analysed in-depth for the Polish market.

Therefore, our study aims to provide additional empirical evidence in the debate over the relationship between ESG ratings and accounting-based measures of corporate financial performance, and to fill the gap for companies traded on the Warsaw Stock Exchange. The study furthers understanding of the relationship between ESG aggregate score as well as E, S and G pillars separately, and selected measures of CFP representing fundamental groups of financial indicators, namely profitability, liquidity, efficiency, and leverage ratios.

The study focuses on the Polish market, considering public-limited companies at the Warsaw Stock Exchange. This is motivated by several reasons. First, there is a limited number of studies on ESG and CFP performance for the Polish stock market. Second, existing studies for Poland provide mixed results and only concentrate on selected aspects of ESG, for example eco-innovations (Przychodzen & Przychodzen, 2015), or they restrict the analysis to a specific sector, for instance the energy sector (Baran et al., 2022). Third, the literature suggests

that there is a need to investigate each country separately as the firm's CSR rating and its country characteristics (e.g. political institutions, and globalization) are correlated or find significant differences in the ESG-FP relationship between countries or regions (Friede et al., 2015; Gillan et al., 2021; Liang & Renneboog, 2017; Shin et al., 2023). To the best of our knowledge, the scope of our study is a unique one and nothing similar has been published so far.

The structure of the paper is as follows. First, a review of the literature focused on the relationship between ESG and financial performance is presented. Second, the methodology used in our study and data sources are introduced, followed by a section presenting the main results. Finally, the findings are summarized and confronted with existing literature results.

II. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The issue of the relationship between corporate responsibility or ESG performance and financial performance (FP) has been among the most debated questions in the CSR and SRI-related literature for many years. The recent literature review studies by Velte (2022) and Gillan et al. (2021), as well as a 2015 paper by Friede et al. (2015) based on over 2,000 studies, indicate that the issue is far from being unequivocally solved empirically.

This link is analysed from several perspectives. The CFP relates to the corporate perspective illustrated by accounting-based indicators, like return on assets, or market value indicators, for example, Tobin's Q or P/E (Gillan et al., 2021; Weston & Nnadi, 2023). The IPF focuses on price change, stock returns and risk measures, usually in the context of portfolio performance (Whelan et al., 2021). Some studies also analyse this issue from the perspective of the cost of capital based on beta or credit quality (Kim & Li, 2021).

The ESG-FP tie is a complex issue, with several questions generating scientific debate. This paper focuses on the first sphere, analysing the relationship between ESG and CFP, particularly focusing on accounting-based measures representing major areas of corporate financial conditions. Therefore, the remaining part concentrates on the corporate perspective. We review the existing literature and develop the research hypotheses for this study.

1. ESG – CFP relationship

First, the issue of the mere presence of the relationship between ESG and CFP is analysed. While the majority of studies find that they are linked positively (Clark et al., 2015), other results lead to mixed conclusions. Gillan et al. (2021) and Velte (2022) identify this question as an area in need of further investigation.

A thorough study by Friede et al. (2015) based on more than 2,000 empirical studies indicates that 90% of them find a nonnegative ESG–CFP relation; its authors proceed with a two-step analysis, investigating so-called 'vote-count' studies (counting the number of studies with significant positive, negative, and nonsignificant results) and meta-analyses (providing econometric review). They find that the share of positive relationships for the two types of studies is nearly

50% and over 60%, respectively, and that this relationship is stable over time. A negative relationship is found in less than 10% of the analysed research of both types. An attempt to determine the relationship between CFP and ESG was also made by Whelan et al. (2021), who analysed studies published after Friede et al.'s work. In the case of accounting-based corporate financial performance, a positive relationship was reported by nearly 60% of the studies analysed.

Giese et al. (2019) find a positive relationship between ESG ratings and a company's idiosyncratic risk profile represented by higher profitability (measured by gross profitability ratio) and lower exposures to tail risk. This is confirmed, for example, by Kumar and Firoz (2022) for accounting-based indicators. Lee et al. (2016), on a sample of Korean firms covering the period 2011–2012, use the regression method and report a positive impact of environmental responsibility on a firm's profitability. Chouaibi et al. (2021), using a sample of 115 British companies and 90 German companies during the 2005–2019 period, present findings with a positive relationship between ESG practices and financial performance measuring, including market-to-book value, return on assets, asset turnover, return on equity, and Tobin's Q. Kim and Li (2021) found that the total ESG score has a positive impact on corporate profitability measured with EBIT (Earnings Before Interest and Taxes).

On the other hand, some studies report a negative correlation or no relationship. Atan et al. (2018) in their study on 54 Malaysian companies based on Bloomberg ESG data develop panel data regressions between ESG and ROE (Return on Equity) and Tobin's Q, and conclude that there is no significant relationship. It should be pointed out that the results could be somewhat limited due to the short period taken into account (2010–2013), as the long-term is raised as one of the characteristics strengthening the link between ESG and CFP (Whelan et al., 2021). Fahad and Busru (2021) report the negative impact of CSR disclosures on a company's profitability (as well as the firm's value). Duque-Grisales and Aguilera-Caracuel (2021), studying companies in Brazil, Chile, Colombia, Mexico, and Peru, discovered that those with the best ESG scores tend to be less profitable with respect to ROA (Return on Assets). In a paper by Lee et al (2023), firm performance is measured by Tobin's Q and the results show that only the social score has a significant impact on firm performance, the other two (environmental and governance pillars) are insignificant.

Mixed results are also reported. Giannopoulos et al. (2022) find that ROA is affected negatively by the increased investment in ESG initiatives while Tobin's Q is affected positively. Han et al. (2016) found a positive linkage between governance and financial performance, and a negative connection with the environmental score. Al Amosh et al. (2022) results reveal that environmental and social performance positively impact the financial performance indicators, but governance performance positively affects only ROA. Additionally, aggregated ESG had a positive impact on the financial performance indicators. Similarly, Alareeni and Hamdan (2020) present results from the regression models suggesting that ESG disclosure has a significant positive impact on all firms' operational, financial, and market performance. However, considering the sub-components of ESG, the sign of influence may differ: environmental and so-

cial responsibility indicators were negatively associated with ROE & ROA. Kim and Li's (2021) results show that aggregate ESG score positively impacts the selected performance indicators – ROA. Once again, the ESG components exhibit opposite directions of impact. The positive relationship between governance and corporate profitability was only observed in firms with weak governance levels. Environmental score has a surprisingly negative effect on credit rating, and social factor has the most significant positive impact on credit rating. Baran et al. (2022), analysing eight major companies from the Polish energy sector, conclude that while in some cases a strong relationship between ESG scores and profitability measured by ROA, ROE and ROS (Return on Sales) exists, the overall results do not give grounds for establishing a link.

Therefore, considering the literature findings that suggest the signs of a positive relationship, it is hypothesized that:

H1: Composite ESG score is positively correlated with CFP.

2. Environmental, social and governance components

While ESG composite performance vs. CFP is unclear, doubts arise over the relationship with CSR components as well as with environmental, social and governance indicators (Friede et al., 2015).

Clark et al. (2015) report that 88% of the studies they analysed find a positive relationship between higher sustainability and operational performance or a negative impact (e.g. legal fines, disruptions in the supply chain due to environmental externalities) of neglecting sustainability and ESG issues. Velte (2022) confirms those results, indicating that environmental performance is sometimes used as a proxy for general CSR activities. In the review of Friede et al. (2015), environmental area has the lowest share of negative findings and the highest discrepancy between negative and positive results reported by underlying studies (4% in comparison with 59% respectively). Whelan et al. (2021) review climate change ESG studies and conclude that 57% report a positive association with financial performance. For meta-analyses, this proportion was even higher as twelve out of thirteen show a positive relationship, covering the vast period of more than 40 years (1976–2018) and over 1,200 individual studies (Whelan et al., 2021). A positive relationship between environmental indicators and financial performance is also reported by Lee et al. (2016) and Yu et al. (2018). Przychodzen and Przychodzen (2015) report that Polish and Hungarian eco-innovators perform better in terms of ROA and ROE. Since the majority of this sample represented companies traded on the Warsaw Stock Exchange, we may assume that the results support a positive link between profitability and Environmental score.

A positive link with FP is also found for social and governance components. In the research of Friede et al. (2015), the proportion of studies focusing on the social sphere showing a negative correlation is 5%, in comparison with 55% of papers indicating a positive link. A positive relationship between social and financial activities is also reported by a meta-analysis by López-Arceiz

et al. (2018) covering twenty years of research and 83 papers. In the case of the governance sphere, Friede et al. (2015) report the highest proportion of findings, indicating a positive relationship with FP (more than 60%), although this area has also the highest share of negative influence results (nearly 10%).

However, the E, S and G components analysed separately are not free from ambiguity. A negative impact of CSR disclosures in the areas of environment and society is reported by Fahad and Busru (2021). Kumar and Firoz (2022) find a positive impact on environmental and governance performance but fail to prove such dependence for social disclosures. Atan et al. (2018) also consider E, S and G separately and find no significant relationship with profitability (or with market value or cost of capital).

However, since the majority of studies indicate that when analysed separately E, S and G pillars are positively linked with CFP, it is expected that:

H2: Environmental rating score is positively correlated with CFP.
H3: Social rating score is positively correlated with CFP.
H4: Governance rating score is positively correlated with CFP.

3. Measures of financial performance

Profitability ratios are used most often to investigate whether the relationship between ESG and accounting-based financial performance exists, however other accounting-based measures of financial conditions are exploited as well. The findings of D'Amato et al. (2021) indicate that financial statement items have the power to explain the ESG score. Bruna et al. (2022) search for dependencies between ESG score and financial performance represented by a composite score based on five financial ratios expressing the main spheres of financial analysis (e.g., liquidity, solvency, activity, leverage).

The studies quite regularly use return on assets (ROA) (Clark et al., 2015), return on equity (ROE; Atan et al., 2018), return on capital employed (ROCE; Kumar & Firoz, 2022), return on sales (ROS), or dividend per share (DPS; Fahad & Busru, 2021). The analysis of ROA and ROE performed by Lee et al. (2016) concludes that there is a positive and statistically significant relationship between the indicators and environmental responsibility. Kumar and Firoz (2022) find a positive impact on ROA and ROCE for Indian companies. Weston and Nnadi (2023) report that PRI-abiding companies outperform non-abiding firms and use ROE as one of the variables distinguishing those two groups. Other studies indicate a negative or no relationship. In the work of Atan et al. (2018), ROA is not statistically or significantly linked to the ESG total score, or the pillars analysed separately. For revenues on sales, Nollet et al. (2016) find a negative correlation for total ESG, environment and governance performance, and a positive for social score. D'Amato et al. (2021) find a negative correlation between ESG score and sales-to-assets ratio.

A selection of profitability and liquidity ratios as well as leverage are used as independent variables explaining ESG disclosures by Yu et al. (2018). Depending on the model applied, ROA (industry-adjusted), current ratio and leverage are

found to be statistically significant. Quick ratio is positively or negatively correlated, but insignificant. In the case of environmental disclosures, the average return on equity and current ratio are strong explanatory variables, while the quick ratio is significant at the 10% level. At the same time, the sign of all indicators remains positive for all models, indicating that this relationship is positive. D'Amato et al. (2021) find a negative correlation between ESG score and liquidity ratio (current assets to current liabilities), while Zhang et al. (2023) report that ESG score is a significant explanatory variable for current ratio, and the direction of influence is positive in a study based on a large sample of Chinese listed firms.

Neither financing structure and solvency nor efficiency indicators are widely investigated in the context of ESG.

Some conclusions for debt indicators can be drawn indirectly from Atan et al. (2018), who report a positive impact of combined ESG on WACC, which takes into account the relationship between equity and debt. However, the issue is unclear since the ESG components analysed separately do not give evidence of a significant link. D'Amato et al. (2021) find a positive but weak correlation between ESG score and solvency ratio (debt to total assets). In the study of Zhang et al. (2023) both short-term and long-term debt ratios are statistically significantly explained by the ESG score in regression models. Kim and Li (2021) report that the debt-to-equity ratio is negatively connected with the total ESG score as well as with the environmental and social pillars when analysed separately. The study shows no dependency between this ratio and governance performance. However, the interest coverage ratio produces slightly different results: negative for the social score and positive for remaining areas, including aggregate ESG activities. Nollet et al. (2016) report a positive correlation between leverage and total ESG score as well as E, S and G analysed separately. Jahmane and Gaies (2020) and Xie et al. (2019) support the results about the overall CSR score and E, S and G components taken separately, and find the correlation to be statistically significant. This is opposite to Kumar and Firoz's (2022) findings, where leverage is negatively linked to total ESG score as well as E, and S analysed separately, except for G showing a positive connection with leverage, although this relationship is not statistically significant. Chouaibi et al. (2022), using a sample of 115 British companies and 90 German companies during the 2005–2019 period, present the findings with a positive relationship between ESG practices and financial performance measured by asset turnover ratios.

Based on the above studies it is expected that:

H5: Profitability indicators are positively correlated with ESG performance.
H6: Liquidity indicators are positively correlated with ESG performance.
H7: Efficiency indicators are positively correlated with ESG performance.
H8: Leverage indicators are positively correlated with ESG performance.

III. DATA AND METHODOLOGY

The concept of 'ESG performance' used to formulate the hypotheses is not uniquely defined. Before any data-based analysis can be conducted, this term must be appropriately operationalized. A common way to solve this

problem is to introduce a set of measures reflecting particular ESG criteria numerically.

In our study, the database provided by Refinitiv (2022) was used, as it is one of the most comprehensive databases available. It covers approx. 85% of the global market capitalization and provides more than 630 data points. From this set a group of 186 the most material data points of high comparability was chosen and was treated as an input to the calculation of the final ESG score, being a weighted average of the subscores reflecting the company's ESG performance.[1] These data points were then grouped into 10 clusters belonging to particular pillars: environmental (use of resources, emissions and environmental innovations), social (issues connected with human rights, workforce, communities and product responsibility) and governance (covering management, relations with shareholders and CSR strategy). The calculation process is based on ranked data points and is thus less sensitive to outliers. The score is calculated as a percentile according to the formula:

$$Score = \frac{no.\ of\ companies\ with\ a\ worse\ value + 0.5 \cdot no.\ of\ companies\ with\ the\ same\ value}{no.\ of\ campanies\ with\ a\ value}.$$

Then the final score for each subcategory is simply a sum of the subscores. In the next step the materiality of each subcategory was assessed and their weights are determined. In the case of Refinitiv ratings, the weights are data-driven and aimed at reflecting the relative importance of the themes to a particular industry. The process includes the construction of the materiality matrix assigning materiality scores varying across industries to subcategories. Usually, the materiality score is calculated either as a decile rank based on the industry median (in the case of numerical data points) or as a decile rank referring to the level of disclosure of data points in the analysed industry group (transparency weights for Boolean variables). Sometimes the weights are assigned arbitrarily. Then, the summed scores of all categories are used to obtain the relative magnitude of the category serving as a weight to calculate the average score. The pillar scores are determined in the same way.

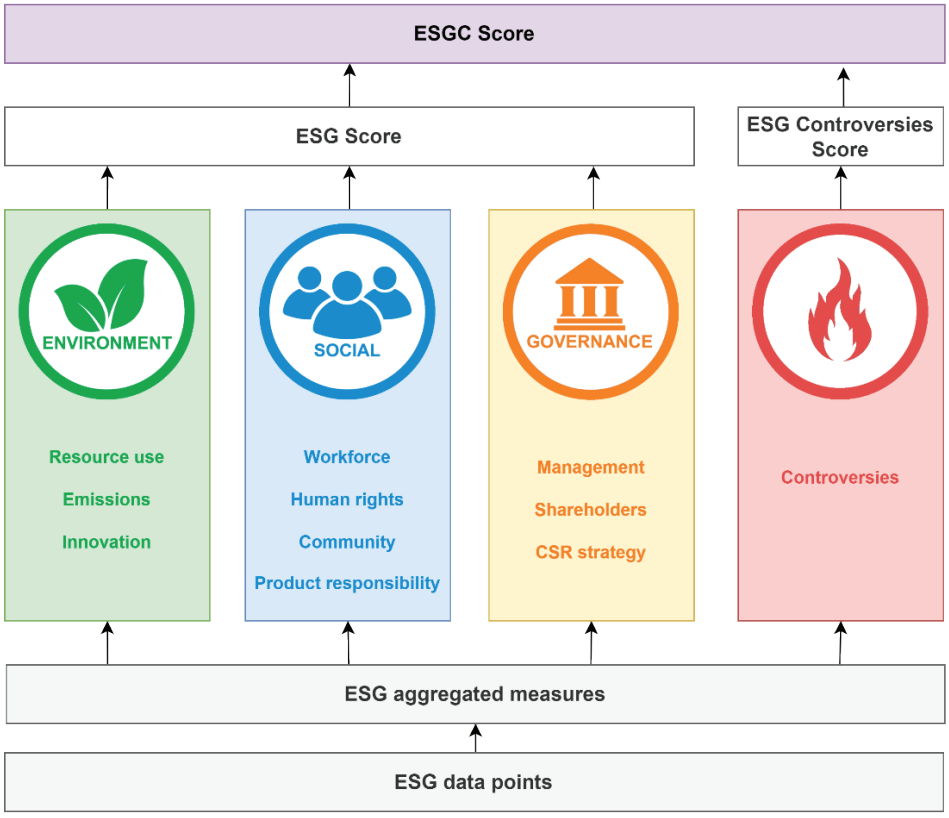
A significant innovation in the determination of the final score is introducing a separate ESG Controversies pillar (Fig. 1). Its main aim is to capture the negative impact of material ESG controversies revealed by global media. While the classic ESG score is based on data disclosed by companies in annual reports or stock exchange filings, the Controversies pillar relies on information published by news sources. Every time a scandal takes place, it is categorized (23 controversy themes are used) and the company is punished. The punishment is carried out by multiplying the number of controversial events using 3 various severity weights: 0.33 for large-cap companies (market cap equal to at least 10 billion), 0.67 for medium-cap entities, and 1 for small-cap ones (market cap smaller than 2 billion). The companies with no controversies

[1] The Refinitiv scores vary between 0 and 100 and the higher the value of a score, the more desired is the result. The ESG Score is based on the scores calculated for various categories reflecting a company's environmental, social and governance performance.

are awarded with Controversies Score of 100. The score of the remaining ones is based on the standard percentile ranking applied to companies with controversies within an industry group. The severity weights are used to penalize small and medium-sized companies more heavily than large ones to eliminate the market cap bias (large-cap companies usually attract more media attention than small-cap ones). Therefore, not only the data provided by the entity are evaluated, but also information delivered by the media. The final ESGC Score is an average of the ESG and Controversies Scores (with the proviso that the Controversies Score cannot raise the final value above the ESG rating). In the last step, the score is translated into a letter grade.

Figure 1

Pillars and themes used to calculate the ESG and ESGC scores



Source: the authors' elaboration based on Refinitiv (2022).

When analysing the method of calculating Refinitiv ESG ratings, it should be noticed that in spite of the claims that they are objective and data-driven, all the problems mentioned in the literature also apply to them (Larcker et al.,

2022). Nevertheless, despite all the objections against ESG ratings, there are no other, universal quantitative tools that can be used as proxies for companies' ESG performance. This is why they are used in this study (and others).

The financial data used in the calculations were provided by Notoria Serwis SA. Its database covers all active and inactive companies listed on the Warsaw Stock Exchange. After rejecting all the companies with missing data, our final database included 1,296 items out of 1,439. Unfortunately, the availability of the ESG ratings is highly limited, partially because dozens of companies were delisted before the ESG measures started to be calculated. From the Refinitiv database, the authors chose all the companies given any ESG score in any year during the past decade (2013–2022). Finally, we got a set of 43 entities listed on the Warsaw Stock Exchange rated using the ESG measures. Since under Polish law the structure of financial statements prepared by banks and insurance companies is essentially different from the structure of statements published by non-financial enterprises, the authors decided to analyse the non-financial companies. The reason for making such a decision was the number of entities: 33 non-financial companies, while only 1 insurance company and 9 banks were included in the sample. This choice also determined the scope of financial performance measures that could be analysed in the study. All the measures calculated by Notoria Serwis SA for the abovementioned companies were chosen and grouped into four clusters: profitability, efficiency, leverage and liquidity measures. The detailed definitions of the variables are presented in the Appendix.

Since the number of Warsaw Stock Exchange-listed companies with an assigned ESG score is rather limited, they are analysed not year by year, but pooled. Unfortunately, in the case of many companies, not all ESG ratings are assigned, thus the effective number of observations equals approx 180–230. Due to the presence of outliers in the dataset, the authors chose to trim the data by 5%. The count of available data points declined to approx. 150–210. This number of data points still enables drawing well-grounded conclusions. The main tool to discover the relationships between ESG factors and financial performance used in the study is correlation analysis, supported by the visual analysis of network diagrams depicting the relations revealed. Using the available data, Pearson and Spearman correlation coefficients as well as Kendall's tau were calculated for each pair of financial and ESG variables. Not only the original values were used, but also the size-adjusted ones (the raw ESG ratings were regressed in accordance with the company's size measured by the log of its market capitalization and the residuals were additionally examined).

IV. RESULTS

In the first step, the historical correlations matrix of the scores was analysed (Fig. 2 and 3). For the sake of brevity only Pearson and Spearman correlation coefficients are shown, as Kendall's Tau provides results very similar to rank correlation.

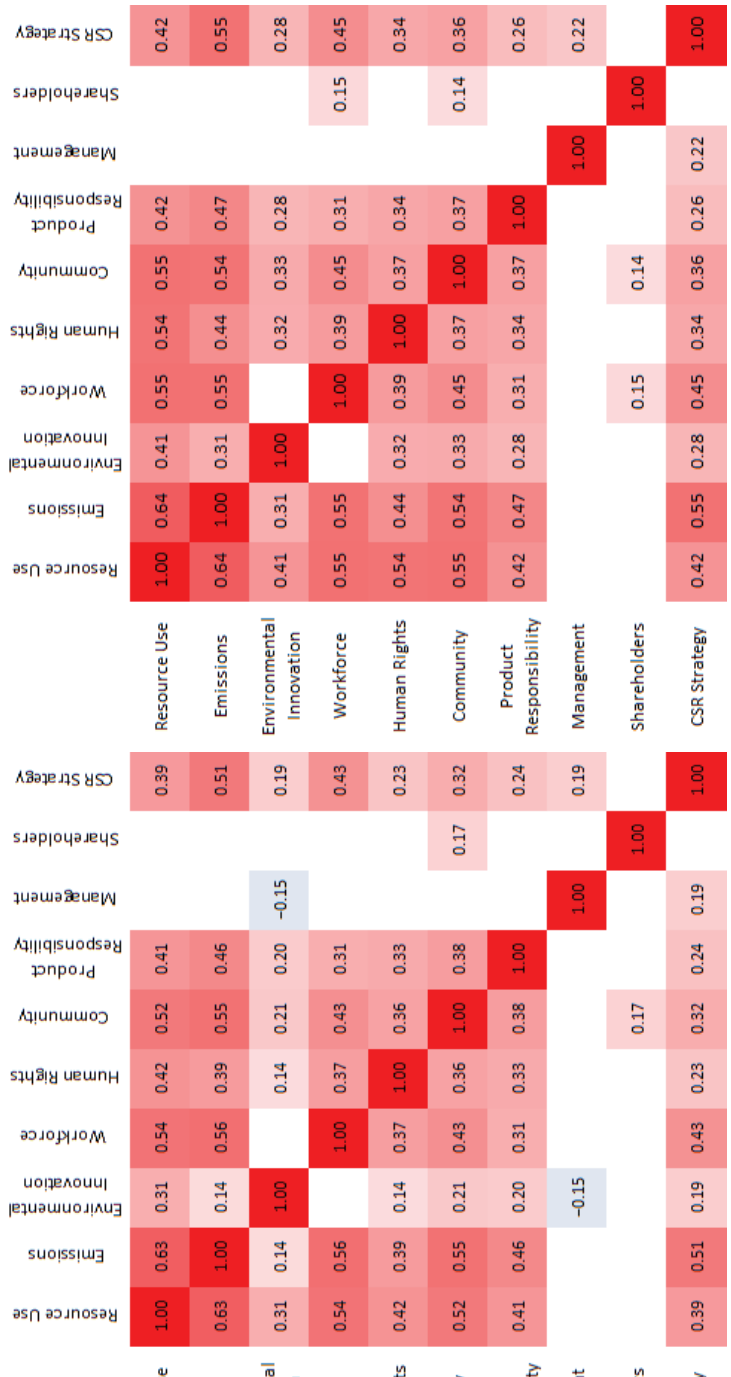
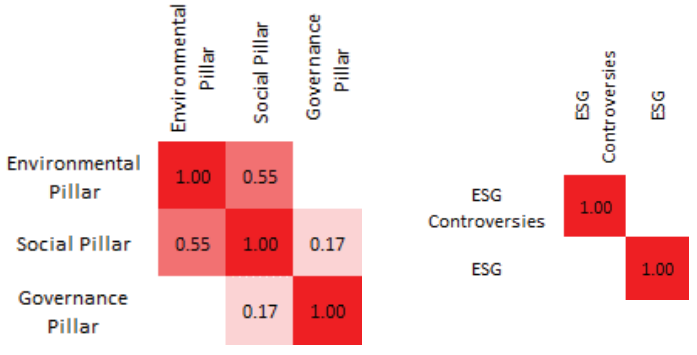


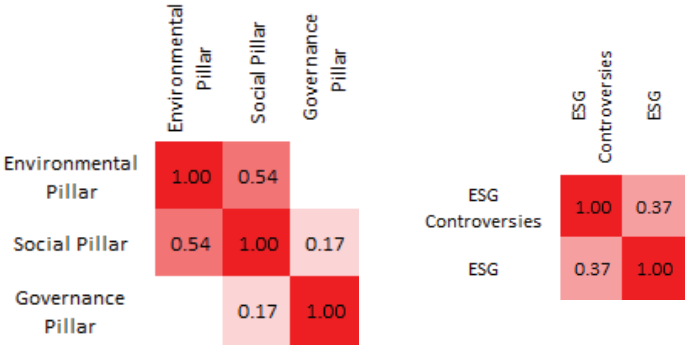
Figure 2

Correlations between ESG pillars and categories scores

Figure 2 (*continued*)



Pearson correlation matrix



Spearman correlation matrix

	Environmental Pillar	Social Pillar	Governance Pillar
Environmental Pillar	0.36	0.37	0.11
Social Pillar	0.37	0.36	0.12
Governance Pillar	0.11	0.12	0.06

Average Pearson correlation between pillar categories

	Environmental Pillar	Social Pillar	Governance Pillar
Environmental Pillar	0.46	0.42	0.14
Social Pillar	0.42	0.37	0.14
Governance Pillar	0.14	0.14	0.07

Average Spearman correlation between pillar categories

Source: the authors' elaboration based on Refinitiv (2022).

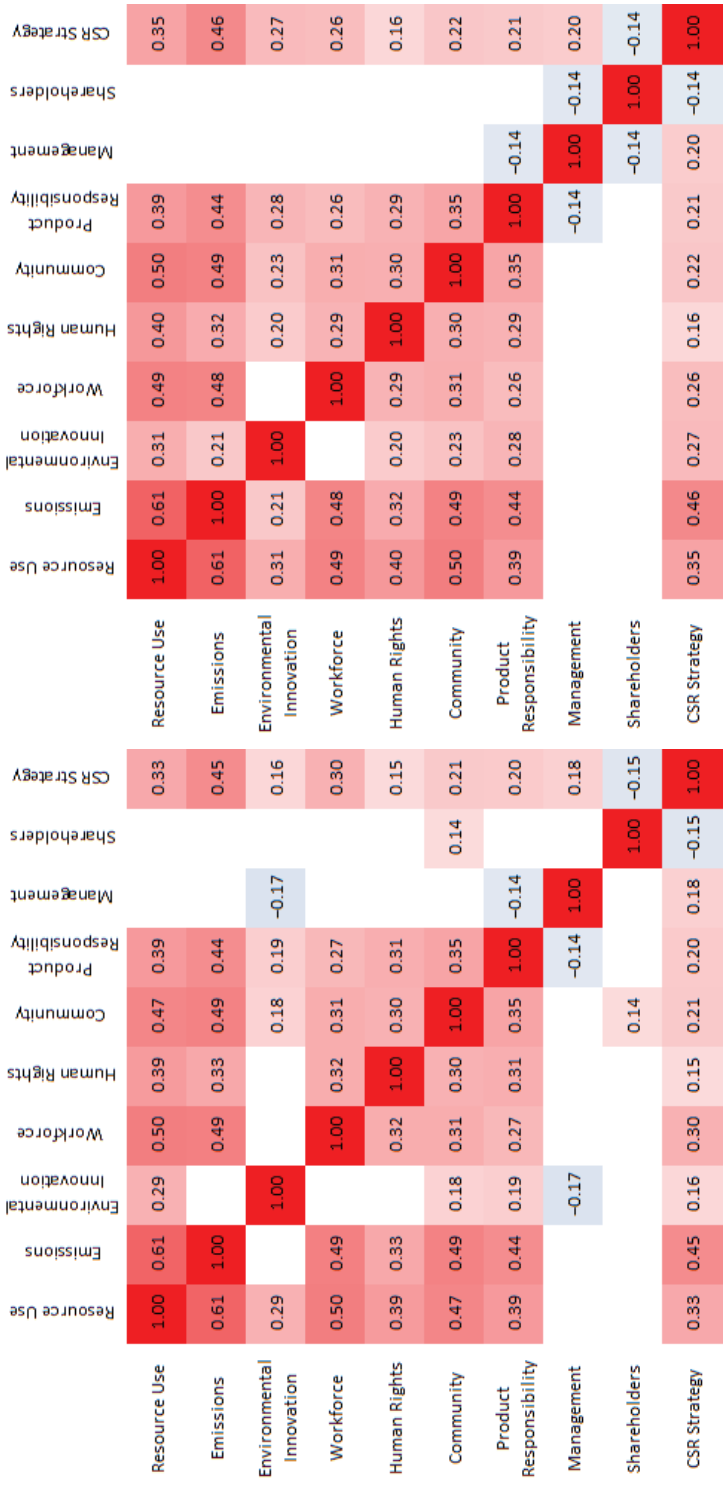
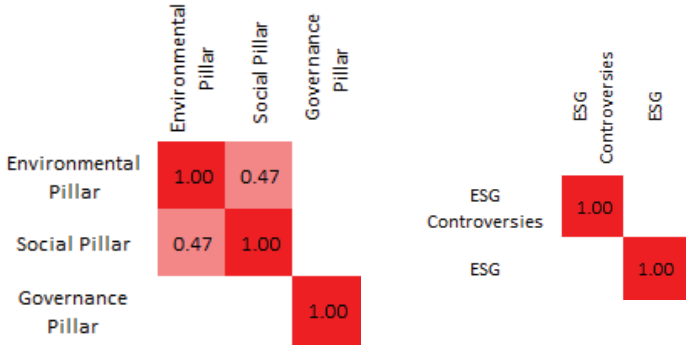


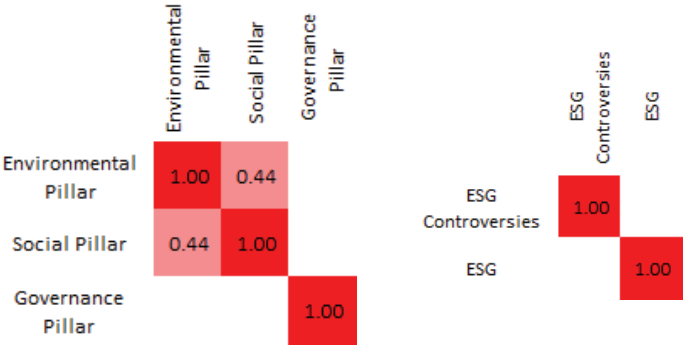
Figure 3

Correlations between ESG pillars and categories size-adjusted scores

Figure 3 (*continued*)



Pearson correlation matrix



Spearman correlation matrix

	Environmental Pillar	Social Pillar	Governance Pillar
Environmental Pillar	0.30	0.32	0.09
Social Pillar	0.32	0.31	0.07
Governance Pillar	0.09	0.07	0.01

Average Pearson correlation between pillar categories

	Environmental Pillar	Social Pillar	Governance Pillar
Environmental Pillar	0.38	0.35	0.12
Social Pillar	0.35	0.30	0.06
Governance Pillar	0.12	0.06	–0.03

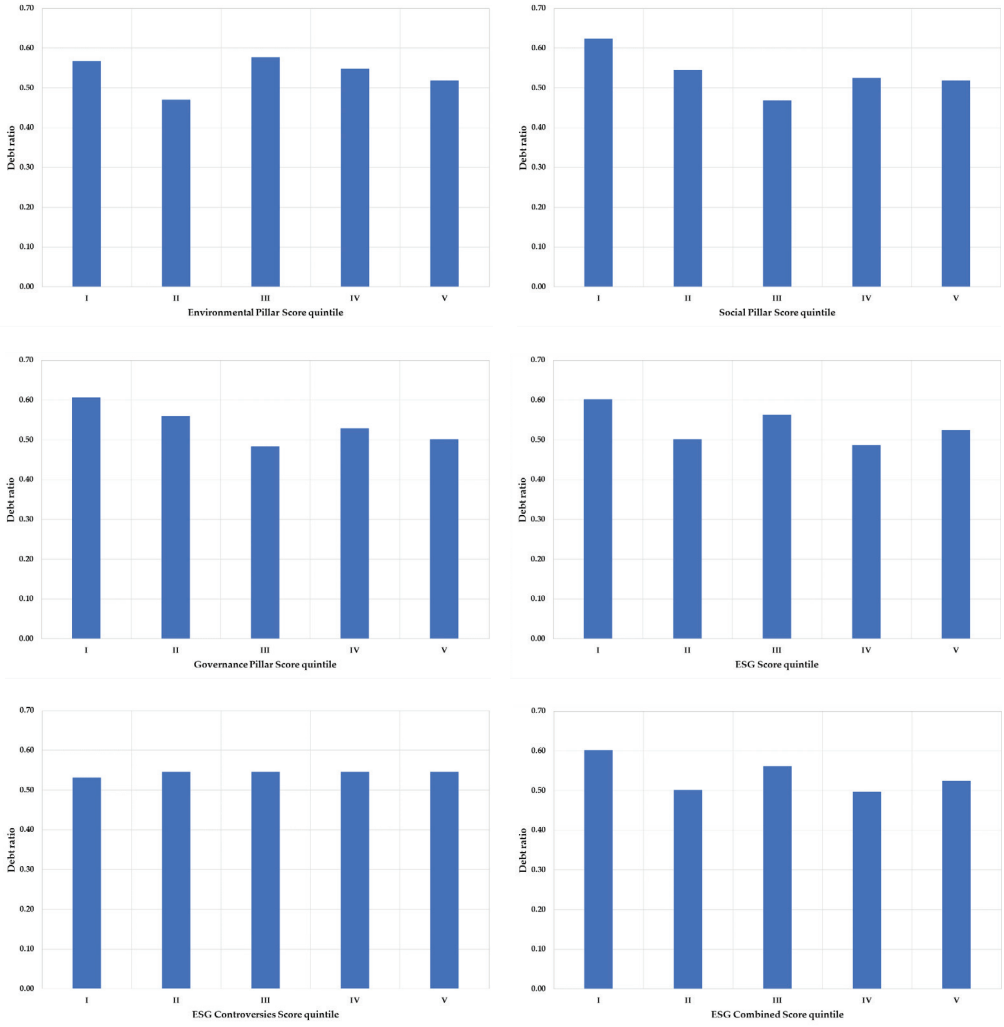
Average Spearman correlation between pillar categories

Source: the authors' elaboration based on Refinitiv (2022).

As can be observed for ESG ratings, the differences between Spearman's and Pearson's correlation coefficients are not substantial, although Spearman's coefficients are slightly higher. If we consider the correlation between the pillars, the highest one can be observed in the case of Social and Environmental ones and this relationship does not disappear if the influence of company size is removed. The Governance pillar is virtually unrelated to the remaining ones (especially if size-adjusted scores are considered). The dependency between the ESG Score and the Controversies Score is questionable and is not robust to company size adjustment or the even weaker correlation between the Social and Governance pillar.

Figure 4

Medians of debt-to-equity by ESG scores quintiles

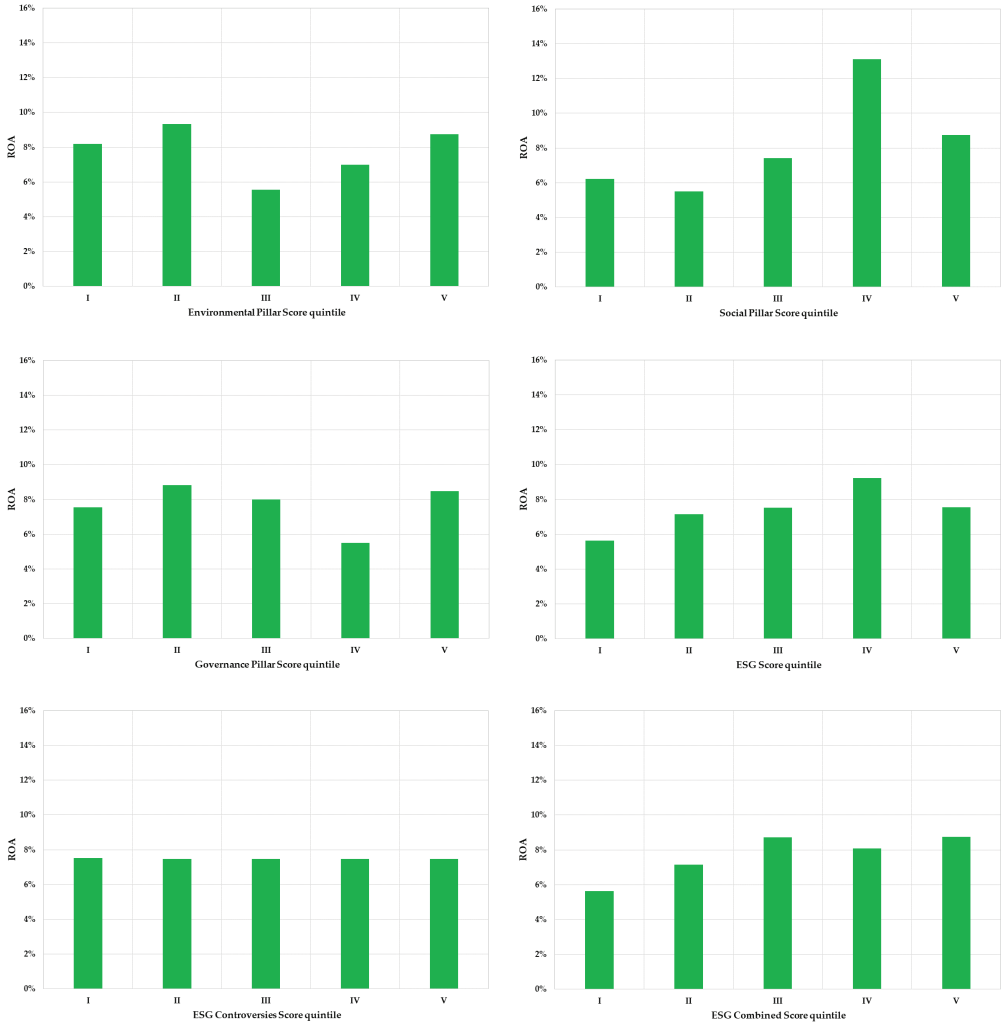


Source: the authors' elaboration based on Refinitiv (2022).

These conclusions are confirmed by analysis of the correlations between the categories the pillars are composed of. Linkages between Social pillar subcategories are weaker than their correlations with Environmental Pillar ones. In contrast, the Management and Shareholders categories of the Governance pillar are independent from all other categories, and this is probably why the Governance pillar can be treated as a separate one. Thus, a confirmation of the proposal that governance issues should be treated differently than social and environmental ones was obtained (Cornell, 2022). As a final conclusion it can be stated that the intrapillar correlations are moderate (E and S) or almost non-existent (G), while Environmental and Social scores move similarly but independently from the Governance score.

Figure 5

Medians of return on assets by ESG scores quintiles

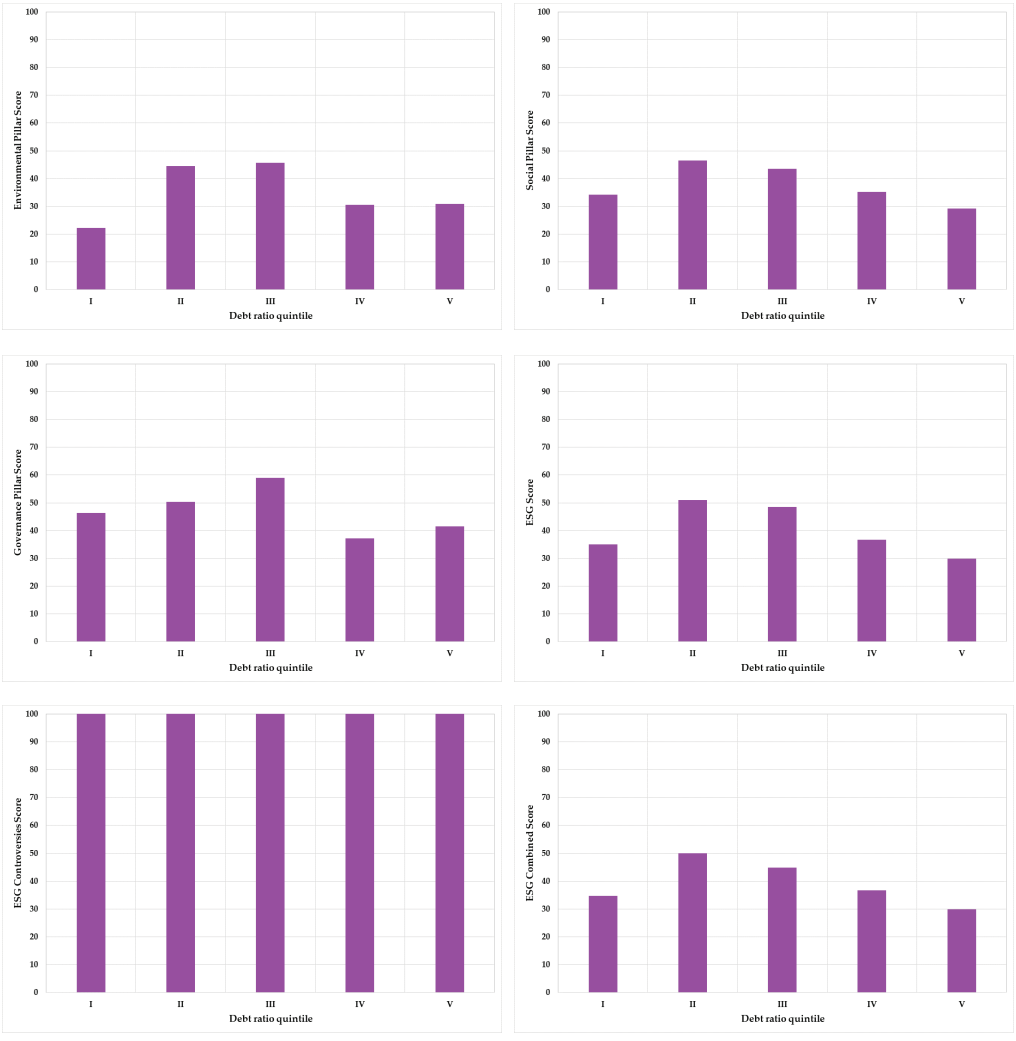


Source: the authors' elaboration based on Refinitiv (2022).

In the next step the correlations between all financial variables and all ESG scores were calculated (the authors used raw as well as size-adjusted ESG scores). Moreover, having standardized the financial variables, the differences between their mean and median values calculated for the first and fifth quintiles were compared (in the case of averages using the *t*-test). The results for the Return on Assets and debt-to-equity ratio are depicted in Figures 4–7 (here not standardized). It is also necessary to mention the problem of a possible time lag between changes in the variables. In this study, due to the limited dataset, only a one-year lag was taken into account. A one-year lag is used, for example, by Atan et al. (2018) investigating dependence between ESG and changes in CFP.

Figure 6

Medians of ESG scores by debt-to-equity quintiles



Source: the authors' elaboration based on Refinitiv (2022).

Figure 7

Medians of ESG scores by return on assets quintiles

Source: the authors' elaboration based on Refinitiv (2022).

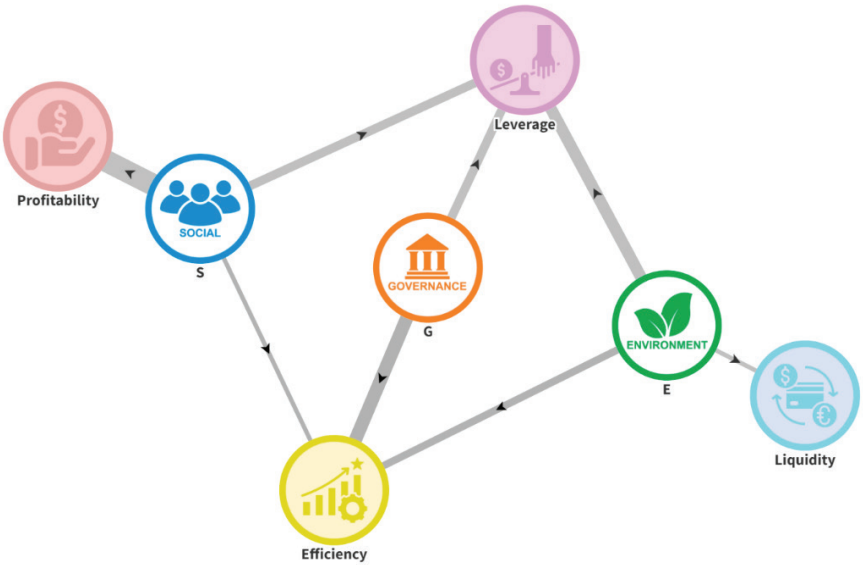
Any patterns are hardly visible; however, it can be observed that ROA medians for the fifth ESG quintiles are higher than for the first ones, and the reversed situation takes place for the debt-to-equity ratio. A similar problem with drawing immediate conclusions occurs when analysing the influence of these two financial variables on ESG scores. Thus, the final conclusions were formulated using extreme quintile value differences but also correlation coefficients. The detailed results are not included in the paper for the sake of brevity (though they are available upon request); instead, they are

summarized using network charts showing the identified relationships and their strength. To make the assessment process as conclusive as possible, the financial metrics used were divided into four groups aimed at measuring different aspects of the company's situation: profitability, efficiency, leverage and liquidity.

The most prominent relationship observed is the mutually positive influence of the Governance pillar and efficiency measures (Fig. 8–9). This relationship can be observed independently of the time lag or whether the ESG metrics are size-adjusted or not. This result is not surprising as the Governance pillar includes the Management category or CSR Strategy. Analysing these categories, it can be concluded that improvement in Governance score inevitably leads to increased efficiency (which is especially strong in the case of Management subscore). A similar situation arises when considering the size-adjusted Controversies Score and efficiency measures, although the reasoning is weaker due to changes in the sign of the relationship when analysing different metrics and lags. However, it seems that the final influence of the rising Controversies Score on the company's efficiency is positive (current assets turnover in days diminishes significantly) and vice versa (including lagged values).

Figure 8

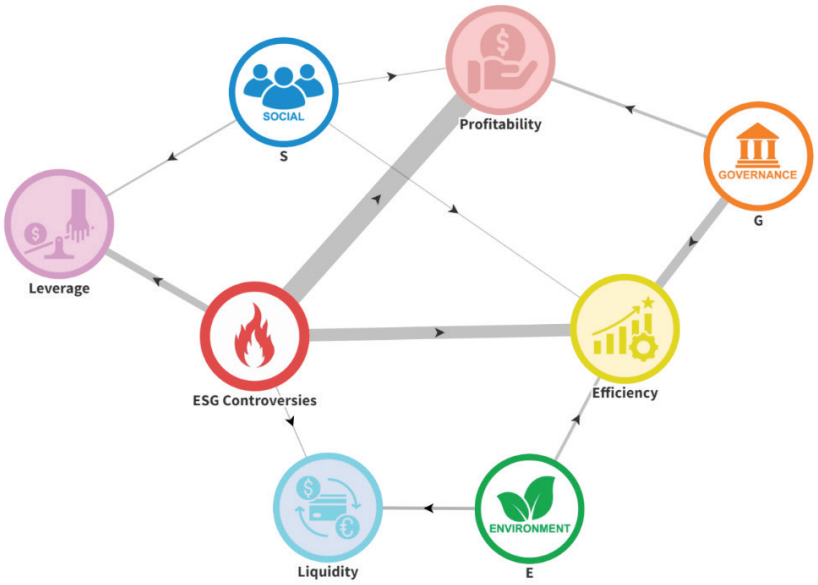
Network of dependencies between ESG pillars and groups of financial variables (contemporaneous)



Source: the authors' elaboration based on Refinitiv (2022).

Figure 9

Network of dependencies between size-adjusted ESG pillars and groups of financial variables (contemporaneous)



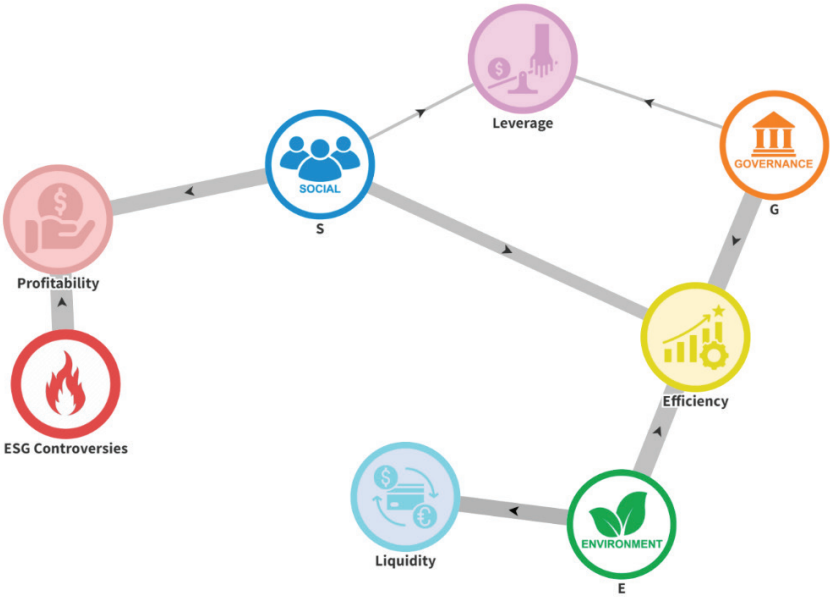
Source: the authors' elaboration based on Refinitiv (2022).

A positive relation of similar strength is observed while analysing non-size-adjusted data regarding the Social pillar and Profitability (Fig. 8). However, this phenomenon disappears when the size adjustment is made (Fig. 9). It must be concluded that this dependency is rather a result of a positive influence of the company's size on its margins as well as the Social Score (a positive relationship between size, margins and Social Score was observed). An analogous situation occurs if consider positive correlation between the Environmental pillar and Efficiency measures.

The last well-grounded dependency is the relationship between the company's profitability and its Controversies Score. It is observable only in the case of lagged data. On the one hand, the improvement in the Controversies Score leads to decreasing profitability in the next year, but size adjustment annihilates this pattern (Fig. 10–11). This result is rather astonishing as both variables are positively related to the company's market value. On the other hand, a rise in an entity's profits results in a growing score in the next period and this relation is observed only in the case of size-adjusted ESG ratings (Fig. 12–13). It can be interpreted in a traditional way: an abundance of funds leads to more careful monitoring of ESG risk exposures by the company and diminishes the number of scandals influencing the company's reputation.

Figure 10

Network of dependencies between lagged ESG pillars and groups of financial variables



Source: the authors' elaboration based on Refinitiv (2022).

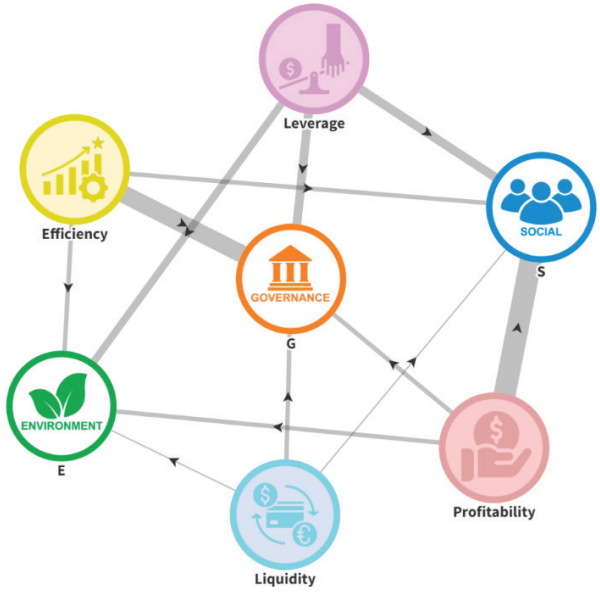
Figure 11

Network of dependencies between lagged size-adjusted ESG pillars and groups of financial variables

Source: the authors' elaboration based on Refinitiv (2022).

Figure 12

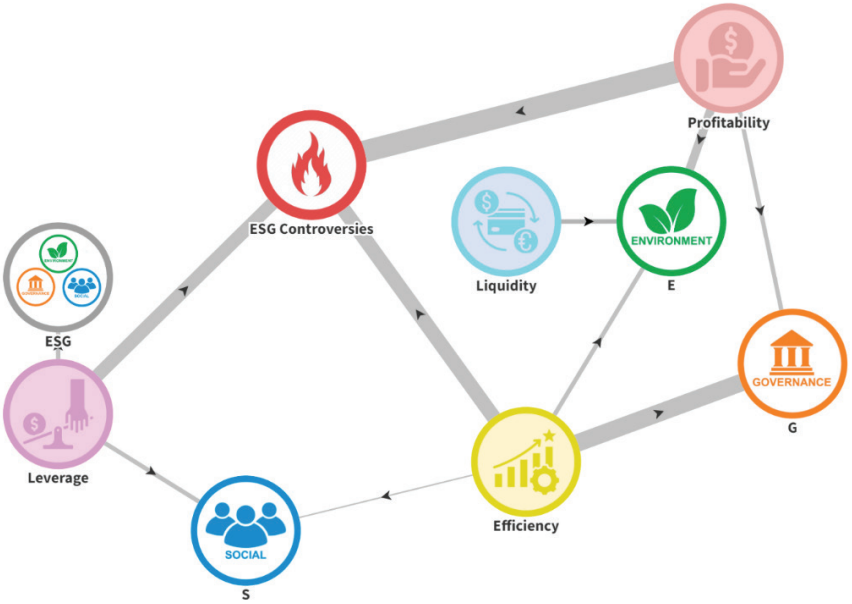
Network of dependencies between ESG pillars and lagged groups of financial variables



Source: the authors' elaboration based on Refinitiv (2022).

Figure 13

Network of dependencies between size-adjusted ESG pillars and lagged groups of financial variables



Source: the authors' elaboration based on Refinitiv (2022).

V. DISCUSSION

The results presented in the previous section partially confirm the 'virtuous circle' hypothesis (Nelling & Webb, 2009). Having analysed the correlations between ESG scores and financial data, it must be noticed that there is no direct relationship between composite ESG ratings (ESG Score and ESGC Score) and financial variables. At the most general level the relationship assumed in hypothesis H1 is hidden by the noise and no visible improvement can be observed if one of the variables rises (independently of whether contemporaneous changes or lagged ones are considered). This is why the H1 in the case of the Polish stock market must be rejected. Similar results, indicating no or weak relationship, are reported by several studies, particularly for emerging markets in Malaysia (Atan et al., 2018), or India (Fahad & Busru, 2021). Considering the relationship between the specific characteristics of each country and ESG performance (Shin et al., 2023), we may assume our findings represent the features of the Polish emerging SRI market. This weak bond is supported by the research of Baran et al. (2022), however their results are limited to companies representing the Polish energy sector. Moreover, the potentially distorting influence of the company's size on ESG factors was confirmed. The results of the regressions run reveal a weak positive influence of size on ESG scores, a phenomenon frequently described in the literature (Drempetic et al., 2020; Yu et al., 2018). This conclusion unambiguously suggests that the authors' decision to analyse the relationship between ESG factors and financial performance twofold was justified.

Our results indicate that the dependencies between the pillars of ESG and financial metrics can exist, but do not manifest themselves strongly enough to be observed by analysing the aggregated values. Regarding the problem raised for example by Kumar and Firoz (2022) of possible different behaviours of ESG pillars, using the results obtained in this study it can be found that not only the ESG factors are heterogeneous, but the CFP measures are as well. Initially, a positive correlation between each pillar and a chosen group of financial measures was discovered, which seems to support our hypotheses H2–H4. The Social Pillar Score was positively tied to profitability, the Governance Pillar Score to the efficiency metrics, and the Environmental Pillar Score was positively related to efficiency ratios. However, the relationship manifested itself only in the case of selected CFP measures. Additionally, after the removal of the size influence on ESG ratings the Environmental and Social Pillar Scores seem to be unrelated to any group of financial measures considered. In light of these results, the hypotheses H2 and H3 must be treated as falsified. No relationship between ESG components analysed separately and financial profitability, as well as measures influencing the cost of capital of a company, was found for example by Atan et al. (2018), however Przychodzen and Przychodzen's (2015) results for eco-innovators suggest the existence of a positive link. It could

be also noticed that the uniformly positive or negative influence of any ESG factor on various, sometimes extremely different financial metrics is highly improbable. Nevertheless, even if the financial measures considered were divided into appropriate groups, the phenomenon described for Environmental and Social Pillars could be attributed rather to rising ESG factors due to the company's size rather the purely to the ESG factors. Contrary to these results, the ties between the Governance Pillar and efficiency ratios are robust to the removal of size effects, which supports our H4, however only to the extent that efficiency indicators are concerned, and H7 in the context of the Governance Pillar. The high-quality management and suitable CSR strategy lead to increased efficiency in using the company's resources. This is a real example of the 'virtuous circle', as this relationship is valid not only for the simultaneous changes but, more importantly, also if lags in variables are taken into account. An additional confirmation of the specific character of the Governance Pillar is the lack of correlation between categories consisting of it with categories from other pillars. A similar discrepancy for the exceptional status of the governance area is reported for example by Kim and Li (2021), who find a negative relationship between the debt-to-equity ratio and E and S pillars, while no relationship for Kumar and Firoz's (2022) work also shows that the governance sphere seems to be guided by separate mechanisms regarding its ties with financial indicators.

Among the remaining ESG factors and metrics, only the ESGC Score and profitability measures were proved to be related to each other, which could support the H5 hypothesis. However, the nature of this relationship is not one-directional. As the data analysis revealed, rising profits result in a delayed rise in ESGC Score (i.e. improvement). Contrary to this positive relation, an increase in the Controversies Score leads to a fall in the company's profitability (this effect disappears when size-adjusted values are considered). As a result, cyclicality should be observed in a company's profitability and scandals regarding its business operations. This pattern seems to occur quite probably, and it is confirmed in other studies, indicating that the causality direction in ESG–CFP research is a complex issue. For example, Fahad and Busru (2021) investigate both directions of influence between CSR disclosure and CFP and find adverse impacts in both cases. The studies of Hamdi et al. (2022) on 504 US firms in the period 2000–2020 confirm that increasing US corporate financial performance increases ESG performance. Velte (2022) indicates that CSR activities precede financial outcomes if the market appreciates the management's efforts to increase ESG standings.

While our study provided some evidence for efficiency and profitability indicators linked with ESG, we cannot confirm the statistically significant dependence between liquidity and leverage performance indicators (H6 and H8). Since such analyses in the existing literature are scarce and provide mixed results (D'Amato et al., 2021; Yu et al., 2018; Zhang et al., 2023), our findings do not stand out disproportionally.

VI. CONCLUSIONS

Our findings give grounds for some potentially meaningful conclusions:

First, some light is cast on the Polish stock exchange as an example of an emerging SRI market. In the context of fast-growing sustainability-guided investments, along with the new EU CSRD Directive and – last but not the least – EU climate neutrality goals confronted with Polish energy transformation needs, the issue of ESG total, as well as separate E, S and G pillars and their link to financial performance, will be gaining momentum for many groups of investors. The results confirming the link between ESG Controversies and financial performance, particularly its cyclicality, should be material for managers shaping ESG disclosure strategy as well as short-term investors, who gained additional evidence of the negative impact on financial performance in companies forced to extinguish ESG controversies.

Some evidence of the special position of the Governance pillar is also provided. First, it is weakly related to the two other pillars. Second, due to its link with efficiency performance, independent from the lag and company size. This result matters for relatively easily achievable organizational changes which increase the G score and – as the ESG total score is rising as well, can then contribute to, for instance, a company's image in the eyes of financial institutions and their financing decisions.

Finally, the results contribute to filling the gap in research investigating the phenomenon of interdependencies between ESG and financial performance. The study could be assigned to the literature partially confirming the positive relationship between financial standing and ESG factors. Its novelty is not only the attempt to analyse the scientific gap regarding these phenomena, but also the unusually rich set of financial measures analysed and the treatment of various ESG ratings as separate, equally important factors, along with ESG controversies. Additionally, the unresolved debate over causality between ESG and financial indicators was furthered to some extent. Giese et al. (2019), following Krüger (2015), point out that many studies do not separate correlation and causality, implicitly assuming that ESG influences FP, while the question of causality is also not clearly answered. Applying a one-year lag, it has been proven that in some cases (protectability and Controversies) the causality can work in both directions.

The main limitation of the research conducted is the rather modest set of companies analysed. The authors are aware of the fact that the conclusions drawn in this study are of limited applicability and cannot be easily generalized. This fact leads also to a conclusion that our results cannot be directly compared to the outcomes of the research regarding developed markets. Nevertheless, the authors, when faced with the choice between resigning from the investigation due to a limited dataset, or conducting research of limited applicability, but only partially filling the scientific gap discovered, opted for the latter. Having analysed the limitations of the study, the authors conclude that conducting expanded research on these issues, considering other CEE

countries vs the developed markets, will be promising. Nevertheless, we hope that despite the abovementioned limitations our study sheds a new light on these intriguing problems.

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APPENDIX

Table A1

Financial measures used in the study

Group	Measure	Definition
Profitability	Gross profit margin	Gross profit: Sales
	EBITDA margin	EBITDA: Sales
	Operating profit margin	Operating profit: Sales
	EBT margin	EBT: Sales
	Net profit margin	Net income: Sales
	ROA	Net income: Average assets
	ROE	Net income: Average equity book value
Efficiency	Receivables turnover	365 * Average receivables: Sales
	Inventory turnover	365 * Average inventory: (COGS + SG&A)
	Current assets turnover	365 * Average current assets: Sales
	Assets turnover	365 * Average assets: Sales
	Payables turnover	365 * Average payables: (COGS + SG&A)
	Operating cycle	Receivables turnover + Inventory turnover
	Cash conversion cycle	Operating cycle – Payables turnover
	Asset utilization	Sales: Average assets
	Working capital ratio	(Current assets – current liabilities): Assets
Leverage	Leverage	Average assets: Average equity book value
	Assets ratio	Equity book value: Assets
	Debt ratio	Liabilities: Equity book value
	Debt service coverage ratio	(Operating profit + Depreciation): Interest
	Debt security ratio	Average liabilities: (Operating profit + Depreciation)
	Load gross profit	Net income: EBT
	Load operating profit	EBT: Operating profit
Liquidity	Current ratio	Current assets: Current liabilities
	Quick ratio	(Current assets – Inventory): Current liabilities
	Cash ratio	Cash: Current liabilities

Source: the authors' elaboration based on Notoria Serwis SA (2021).