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Impact of ESG Implementation on Credit Ratings and Financial Performance: A Sustainability Perspective*

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Abstract

The purpose of this paper is to analyse how the implementation of the ESG concept affects the credit rating and financial performance from a business micro-perspective. Environmental, social, and governance factors and risks, as components of the ESG concept, are challenging companies and pose sustainability risks to which companies react differently. The development of green financial instruments is an additional incentive for companies to commit to the process of green transition. Assessing ESG performance helps recognise strengths and weaknesses of the corporate sector in the process of contributing to global sustainability goals. Current sustainability achievements of companies can be analysed through ESG ratings. This research found that differences in rating agencies' methods for defining ESG criteria and assessing ESG ratings do not ultimately lead to significant deviations in ratings. The implementation of the ESG concept in large companies (corporations) has no impact on profitability in the short term. Therefore, the effects of sustainability investments should be monitored over the long term. The research results indicate positive relationships between governance factors, ESG ratings, and the credit ratings of large companies. Based on the given results, it is concluded that investing in sustainability and ESG implementation has an overall positive impact on a company's performance.

Keywords: *sustainable finance, green investments, ESG ratings, financial performance*

JEL classification: *G11, G24, G32, Q56*

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1. Introduction

According to the European Environment Agency (2024), sustainable finance involves the integration of environmental, social, and governance (ESG) criteria into investment decision-making processes. The concept of environmental, social, and governance (hereafter: ESG) criteria was first introduced in the United Nations (hereafter: UN) report, the Global Compact (2004), Who Cares Wins: Connecting Financial Markets to a Changing World (Eccles et al., 2019). With the introduction of the ESG concept, a methodology for ranking companies based on their triple-bottom-line performance in the area of sustainability was also introduced.

The ESG concept stems from the broader framework of corporate social responsibility and involves analysing non-financial performance elements to improve technological processes aiming to reduce a company's environmental impact while positively influencing its financial results (Hughes et al., 2021). As a recently developed approach, ESG is constantly considered as a determinant of the sustainable growth of companies, just as is the case with the traditional financial determinants of corporate growth (Malinić et al., 2020). Devalle et al. (2017) outline that the interplay between ESG factors and credit risk is an inevitable factor in overall financial stability and capacity to meet long-term obligations.

In order to determine the short-term effects of the implementation of the ESG concept on the company's financial results, the focus was placed on the net profit margin, which is a clear indicator of a company's bottom-line profitability. This methodology enables the direct assessment of financial repercussions and provides valuable insights into the efficiency and effectiveness of initial ESG investments from a purely profit-driven perspective (Agranat, 2023).

The study includes an overview of related research through the literature. It outlines the methodology for selecting the sample from which the independent and dependent variables are derived, the methodology for determining the relationships between the variables, an analysis of the research findings, and a discussion leading to a conclusion of the paper.

2. Literature review

In corporate practice, high ESG ratings and sustainability standards integrated into business operations are expected to enable better access to green financial instruments, suggesting that an improvement in a company's ESG rating has a positive impact on its creditworthiness. In practice, to ensure that sustainability information is as relevant as financial information, sustainability issues that are financially relevant or material to the company's business model must be identified (Eccles et al., 2012). According to Vortelinos et. al. (2024) and Alain et al. (2017), there is a positive correlation between

ESG ratings and credit ratings. Chodnicka-Jaworska (2021) states that ESG ratings have a strong and positive influence on credit ratings, which can also be explained by the methodology used to determine credit ratings, as rating agencies include ESG factors in their assessments. Rating agencies take into account the degree of corporate social responsibility when assessing a company's creditworthiness (Attig et al., 2013). Similarly, Jiraporn et al. (2014) find that corporate social responsibility has a positive impact on creditworthiness. According to Kim and Li (2021), ESG ratings have a positive effect on creditworthiness, with the relationship being stronger for large companies. Agosto et al. (2022) also suggest that ESG ratings can be used to predict a company's credit rating.

Implementing the ESG concept in business operations and investing in sustainability can also have an impact on a company's financial performance. Various factors play a role here, e.g., industry specifics, the alignment of investments with the business focus, the size of the company, the source of financing, the amortisation period of the investments and other variables. According to Bissoondoyal-Bheenick et al. (2023a), company size plays an important role in examining the correlation between ESG ratings and financial performance. Chen et al. (2023) found that the implementation of the ESG concept in companies has a positive effect on financial performance, with this effect being more pronounced for large companies. A higher ESG score correlates with better financial performance (Wang, 2024). Companies with effective ESG management reduce financial costs, which has a positive impact on their financial performance (Fatemi et al., 2018). However, the hypothesis that sustainability investments increase profitability is not supported by all studies. According to Garcia and Orsato (2020) and McGowan (2022), companies that invest in environmental and social responsibility may waste resources and incur additional costs, resulting in a negative impact on the business. Some authors are indifferent about the relationship between ESG and company performance. Hussain et al. (2018) and Li (2024) conclude that ESG ratings do not affect a company's financial performance. Financial performance is a broad array of metrics, including profitability, revenue growth, operational efficiency, and market valuation, which collectively reflect a company's financial health and operational success (Earnhart, 2018). In this research focus is on net profit margin. This focused approach allows for a more granular assessment of the causal links between ESG adoption and financial profitability, particularly within the constrained timeframe of short-term financial reporting (Seco et al., 2024).

The historical overview of key studies incorporating non-financial factors in credit risk assessment begins in the 1990s with a focus on corporate governance and corruption (e.g., Ciocchini et al., 2003), continues in the 2000s with the integration of intangibles such as human capital (Situm, 2014), reaches a milestone with the early inclusion of intellectual capital in credit evaluation (Iazzolino et al., 2013), and since the 2010s has been dominated by the ESG approach (e.g.,

Kiesel & Lücke, 2019; Bonacorsi et al., 2024), which today links these factors to sustainability and credit risk reduction.

Numerous studies confirm a positive relationship between ESG performance and credit ratings using either aggregated scores or multiple ESG data providers (Attig et al., 2013; Jiraporn et al., 2014; Chodnicka-Jaworska, 2021; Kim & Li, 2021; Agosto et al., 2022; Vortelinos et al., 2024), but their approach cannot disentangle the true effect of ESG factors, and especially the distinct contributions of the Environmental (E), Social (S), and Governance (G) pillars from the confounding influence of methodological heterogeneity across agencies (Dorfleitner et al., 2015; Chatterji et al., 2015; Berg et al., 2019; Abhayawansa & Tyagi, 2021; Billio et al., 2024). This research is the first to examine the relationship between ESG performance and credit ratings exclusively within a single rating agency's consistent methodological framework (Moody's ESG Issuer Profile Scores and Moody's long-term issuer ratings), thereby eliminating cross-provider methodological divergence and enabling a clean decomposition of the individual contributions of the Environmental, Social, and Governance pillars.

This study analyses the relationship between ESG ratings and a company's financial performance. The hypothesis is that ESG ratings and financial performance are either uncorrelated or show a weak or negative correlation. This is because the ESG implementation concept is a long-term investment in sustainability and stability, while financial performance is often assessed annually.

The research objective of this paper is to determine the relationship between ESG ratings of large companies and their credit ratings. The main hypothesis is:

> H1: *There is a positive relationship between ESG ratings and the long-term credit ratings of large companies.*

In addition, the impact of ESG ratings on the financial performance of large companies is analysed. The auxiliary hypothesis is:

> H2: *ESG ratings have no impact on the financial performance of large companies.*

3. Data and methodology

In this part of the article, the most important characteristics of the research sample are explained and integrated into the methodological framework conducted through the empirical research.

3.1. Sample

The introduction of corporate social responsibility practices also creates a basis for ESG-based reporting. Many companies are already analysing and developing their own sustainability indicators or relying on indicators prescribed by international sustainability reporting standards. According to Bissoondoyal-Bheenick et al. (2023b) and Del Vitto et al. (2023), the methods for calculating ESG ratings vary, and it is possible to obtain different data for the same rated companies.

The weighting of environmental, social and governance factors in ESG ratings depends on the calculation methodology (Billio et al., 2024). ESG data providers use different methodologies, which can lead to discrepancies in ESG ratings for the same companies. These discrepancies can arise due to different theoretical interpretations of ESG factors, different calculation methods, and challenges in data measurement (Abhayawansa & Tyagi, 2021). Dorfleitner et al. (2015) notes that different ESG data providers use methodologies that differ in the number of scores assessed, with only weak convergence of scores; however, the final results often show some degree of correlation. According to Chatterji et al. (2015), the ratings of sustainability indicators by different rating agencies show a very low correlation.

The determination of ESG ratings is preceded by the definition of triple-bottom-line measurement criteria, which are based on the structure of sustainability impacts and contributions that must be defined at the sector level. This explains why the assessment results differ, as even slight differences in the assessment of the qualitative criteria can lead to different ratings. Differences in the calculation reflect differences of opinion on the relevance of different ESG categories, and it is legitimate for different raters to have different views on these issues (Berg et al. 2019). Discrepancies occur even with easily measurable data, and measuring social impact and the quality of corporate governance remains a challenging task for company owners and managers.

The size of a company influences its resilience to changes in the environment and its ability to implement different business concepts such as ESG. Due to their capacity, large companies have an advantage in implementing ESG concepts compared to small and medium-sized companies, and ESG ratings positively influence creditworthiness (Organisation for Economic Co-operation and Development [OECD], 2020). According to Akgun et al. (2021), the lack of ESG rating data for small and medium-sized enterprises (SMEs) steers investors towards large companies. Large companies provide more detailed financial and non-financial reports, making them a more suitable sample for research.

The study uses data from a single source, Moody's Investor Service (Moody´s Ratings), for the entire sample, including observations of ESG ratings, credit ratings,

and net profit margins. Data was collected for fifty large companies covering their financial performance, ESG ratings and credit ratings (Table 1). Using the same database for the entire sample ensures the consistency and accuracy of the data series. The sample includes large companies from different parts of the world, selected based on the criterion that they have a turnover of more than 10 billion euros in 2023.

The following variables (Table 1) were derived from the sample of fifty large companies: the independent variable ESG Rating 2023 (hereafter: ESGR), the independent variable E Rating 2023, which represents the environmental factor of the ESG rating (hereafter: ER), the independent variable S Rating 2023, which represents the social factor of the ESG rating (hereafter: SR), the independent variable G Rating 2023, which represents the governance factor of the ESG rating (hereinafter: GR), the dependent variable Credit Rating 2023 (hereinafter: CR) and the dependent variable Net Profit Margin Ratio 2023/2022 (hereinafter: NPMR).

Table 1: Sample and data groups

No.	Company name	ESGR	ER	SR	GR	CR	NPMR
1	ABBVIE INC	CIS-3	3	4	1	A3	0.44
2	Accenture	CIS-1	2	2	1	Aa3	0.96
3	Adobe	CIS-1	2	2	1	A1	1.04
4	AIA Group	CIS-2	3	4	2	A1	1.05
5	Allianz SE	CIS-2	3	4	2	Aa2	0.80
6	Amazon	CIS-3	3	3	2	A1	11.00
7	Apple	CIS-2	3	3	2	Aaa	1.00
8	ASML	CIS-2	3	2	1	A2	1.07
9	AT&T	CIS-3	2	3	3	Baa2	2.74
10	Bank of America	CIS-2	3	4	2	A1	0.92
11	Bank of China	CIS-2	3	3	2	A1	0.96
12	Bank of Communications	CIS-2	3	3	2	A2	0.73
13	Berkshire Hathaway	CIS-2	3	3	1	Aa2	3.25
14	BHP Group	CIS-3	5	4	1	A1	0.52
15	BNP Paribas	CIS-2	3	4	2	Aa3	1.07
16	Broadcom	CIS-3	3	2	3	Baa1	1.16
17	Brookfield Corporation	CIS-3	3	4	3	A3	0.49
18	Cardinal Health	CIS-3	4	4	2	Baa2	1.31
19	China Com. Construction	CIS-3	2	4	3	Baa1	1.19
20	China Construction Bank	CIS-2	3	3	2	A1	1.04
21	China Life insurance	CIS-2	3	4	2	A1	0.65
22	China Mobile	CIS-2	2	3	2	A1	0.98

Table 1: Sample and data groups

No.	Company name	ESGR	ER	SR	GR	CR	NPMR
23	China Nat. Offshore Oil	CIS-2	5	4	2	A1	0.53
24	China Railway Con. G.	CIS-3	2	4	3	A3	0.94
25	China Resources Land	CIS-3	3	4	3	Baa1	0.92
26	China State Con. Hold.	CIS-3	2	4	3	Baa2	0.97
27	Cigna Group	CIS-3	2	5	2	Baa1	0.71
28	Cisco Systems	CIS-1	3	3	1	A1	0.97
29	Coca-Cola	CIS-2	3	3	2	A1	1.06
30	Comcast	CIS-2	2	3	2	A3	2.86
31	CVS Health	CIS-3	3	4	3	Baa2	1.74
32	Daimler Truck	CIS-3	4	4	2	A3	1.28
33	Danaher	CIS-2	2	3	2	A3	0.74
34	Dell	CIS-3	3	3	3	Baa3	0.43
35	Deutsche Telekom	CIS-2	2	3	2	Baa1	2.27
36	Ford Motor	CIS-4	4	4	3	Ba1	2.97
37	General Motors	CIS-3	4	4	2	Baa2	1.03
38	Generali	CIS-2	3	4	3	A3	1.07
39	Hilton Dom. Oper. Co.	CIS-3	2	3	3	Ba1	0.78
40	IBM	CIS-2	2	2	2	A3	4.48
41	Meta Platforms	CIS-2	2	3	2	Aa3	1.46
42	Morgan Stanley	CIS-3	3	4	3	A1	1.10
43	Nike	CIS-2	3	4	2	A1	0.76
44	NVIDIA	CIS-2	3	2	1	Aa3	0.44
45	Oracle	CIS-4	2	2	4	Baa2	1.08
46	PayPal Holdings	CIS-1	2	2	1	A3	1.62
47	Samsung Electronics	CIS-2	3	2	2	Aa2	0.31
48	Tesla	CIS-2	2	3	3	Baa3	1.00
49	Visa	CIS-1	2	2	1	Aa3	0.74
50	Walmart	CIS-1	3	3	1	Aa2	0.76

Source: Author's calculations based on Moody's (2024) data

The sample consists of large companies from various industries. Therefore, the NPMR was chosen as the financial performance indicator to eliminate industry effects and provide insight into how much a company has improved its financial efficiency in 2023 compared to other companies. Even though some companies may have higher net profit margins in 2023, they may not have improved their financial results compared to 2022.

According to Moody's (2024), companies such as Visa, PayPal, Adobe, Accenture, and Walmart are among the companies with the highest ESG ratings. Moody's credit rating system uses twenty-one different ratings. These ratings range from the highest, Aaa to the lowest, C. Ratings from Aa to Caa are further differentiated by adding numbers from one to three:within each, one indicates the strongest and three the weakest.

The lowest credit rating of C is equated with a value of one in the data analysis, while the highest rating of Aaa is equated with a value of twenty-one. Moody's assigns ESG ratings on a scale of one to five, with CIS-1 being the highest rating. For the further analysis, the ESG ratings are used inversely to reflect a positive relationship with the dependent variables. The highest ESG rating is assigned a value of five and the lowest ESG rating a value of one. The table below contains the variables and descriptive statistics.

Table 2: Variables and Descriptive Statistics

	No. Obs.	Std. Dev.	Mean	Median	Variance	Type in model
ESGR	50	0.74	3.70	4	0.54	Independent
ER	50	0.77	3.16	3	0.59	Independent
SR	50	0.80	2.74	3	0.64	Independent
GR	50	0.76	3.90	4	0.58	Independent
NPMR	50	1.60	1.39	1	2.57	Dependent
CR	50	2.24	15.60	15	5.02	Dependent

Source: Author's calculations

Table 2 shows the standard deviation, the mean, the median, and the variance values for the variables. The independent variables are similarly distributed. The dependent variable NPMR has a higher variance value than the mean, which indicates widely dispersed data points.

3.2. Methodology

A multiple linear regression model was created in which the independent variables ESGR, ER, SR, GR, the dependent variable CR and the equation parameters λ and β are shown. The parameter λ represents the intercept in the model, β is the regression coefficient and Ɛ is the random error. The model is shown by the equation:

$$CR = \lambda + \beta_1 ESGR + \beta_2 ER + \beta_3 SR + \beta_4 GR + Ɛ \quad (1)$$

The variables ER, SR and GR are included in the multiple linear regression model to determine which of these variables has the greatest influence on the dependent variable CR. ESGR is the overall ESG rating, including environmental, social, and governance performance. ER measures ecological impact and sustainability, SR assesses human capital, community, and labor practices, and GR evaluates board effectiveness, transparency, and ethics. Despite the relatively small sample size of 50 observations, the robustness of the model will be ensured through the application of a diverse suite of estimation methodologies (Fain, 2020).

Before determining the correlations between the variables, the Fisher test (hereafter: F-test) and the Akaike information criterion (hereafter: AIC) are used to test how well the variables in the model fit together. According to Siegel (2012), the F-test compares two variances and measures their relationship. The validity of the model depends on the number of parameters in the model and the logarithm of the maximized value of the likelihood function for the model (Akaike, 1973/1992).

The model was checked with various tests. The coefficient of determination was measured, the AIC estimation test was performed, the extended AIC test (hereafter: AICC), which is adapted to the sample size, the Bayesian information criterion (hereafter: BIC) and the Schwarz-Bayesian information criterion (hereafter: SBC) were evaluated. The standard error of the estimate (hereafter: SEE) was measured, an F-test was performed and the p-value of the F-test was calculated.

Table 3: Variable fit in the model

	R2	AIC	AICC	BIC	SBC	SEE	F	p-value
ESGR	0.4379	110.8605	112.2241	61.5410	66.5086	1.7338	11.9460	0.0000
ER	0.2701	123.9198	125.2835	74.6004	79.5679	1.9756	5.6755	0.0022
SR	0.0256	138.3706	139.7342	89.0511	94.0187	2.2828	0.4023	0.7520
GR	0.3984	114.2607	115.6244	64.9413	69.9088	1.7937	10.1525	0.0000

Source: Author's calculations

The result of the AICC for ESGR = 112.22 shows that the variable ESGR fits the model best. The variable GR has an AICC result of GR = 115.62, which fits the model, and the variable ER also fits the model with an AICC result of ER = 125.28. The F-test results for the variables ESGR, GR and ER are above the critical F-value of 2.57 at a significance level of 5%, which confirms that these variables fit the model together. However, the variable SR does not fit the model and is not analysed further.

The critical F-value was determined using F-value tables, taking into account the degrees of freedom for the numerator and denominator, which were calculated

according to the number of parameters and observations in the model. Spearman's rank correlation coefficient is used to measure the correlation between the independent variables ESGR, ER and GR and the dependent variable CR. Normally, the correlation between two variables is measured using Pearson's correlation coefficient. In this case, however, Spearman's correlation coefficient, an approximation of Pearson's coefficient, is used as it measures rank correlation.

ESG ratings and credit ratings are rank variables whose values are determined by rank interval, making non-parametric measurement methods more precise for this type of data as they are specifically designed for ranks. Spearman's rank correlation coefficient is represented by the following equation:

$$R_s = 1 - \frac{6\sum_{i-1}^{n} di^2}{N^3 - N} \tag{2}$$

It often happens that measures or ranks are known, but not in such a way that the method of moments or even a Pearson method could be used to determine the correlation (Spearman, 1904). After testing the correlation based on the model mentioned, a correlation test between the variables ESGR and NPMR is performed. As the companies belong to different peer groups, an adjustment was made by using the growth in profit margin in 2023 compared to 2022 as the dependent variable. This approach ensures comparable data collected from large companies in different industries. Some industries are more profitable than others, and the net profit margin by itself is not a comparable metric unless the sample is selected based on industry criteria.

It is assumed that there is no correlation between the variables ESGR and NPMR. If a correlation exists, it is expected to be weak and negative, as investments in the ESG concept represent a cost that may have a negative impact on financial results in the short term. The correlation between ESG ratings and net profit margin growth is measured using Pearson's correlation coefficient. According to Cohen (1977), a correlation coefficient between ±0.50 and ±1, measured on a large sample, is considered a strong correlation. According to Wishart (1931), the strength of the correlation depends on the sample size, as more observations increase the standard error. For large samples, the criterion for determining the strength of the correlation must be weaker than for smaller samples.

4. Results and analysis

Table 4 shows the Spearman rank correlation matrix between the variables ESGR, ER, GR and CR, with the results indicating the direction and strength of the statistical relationship between the variables.

Table 4: Correlation Matrix of ESG Ratings and Credit Rating

Variables	ESGR	ER	GR	CR
ESGR	1.0000	0.1674	0.6836	0.6364
ER	0.1674	1.0000	-0.1208	-0.1648
GR	0.6836	-0.1208	1.0000	0.5672
CR	0.6364	-0.1648	0.5672	1.0000

Source: Author's calculations

The correlation coefficient between the variables ESGR and CR is 0.64 which indicates a positive relationship between them. According to Bujang and Bahurum (2016), a correlation coefficient of 0.6 with a significance of 90% and a test significance level of 5% can be determined with a minimum sample size of 24 observations. A correlation with a significance of 80% and a significance level of 5 requires a minimum sample size of 19 observations. As the test was carried out with 50 observations, it can be concluded that the measured correlation coefficient of 0.64 represents a strong positive correlation.

The measured correlation between the variable GR and CR is 0.57, which indicates a weak correlation, while there is no correlation between the variables ER and CR. The independent variable GR correlates with the dependent variable CR but is also correlated with the independent variable ESGR. Considering the variables exhibit moderately strong correlations, multicollinearity with a variance inflation fator (VIF) analysis was examined. The results of the analysis indicated high VIF values exceeding 10, confirming the presence of high multicollinearity. Due to multicollinearity, GR is excluded from the model. By including the variables ESGR, ER and CR in the multiple linear regression model, the results show the parameters of the regression equation.

Table 5: Multiple Linear Regression of Variables ESGR, ER and CR

Multiple Linear Regression			Value			
R			0.657184			
R^2			0.431891			
R^2 (Adjusted)			0.407716			
F(3.47)			17.86532			
p - Value			0.000002			
Stand. Dev. Of Estimation			1.724385			
	b*	SE	b	SE	t(46)	*p*-value
Intercept			10.569	1.4895	7.0954	0.0001
ER	-0.2571	0.1121	-0.7525	0.3281	-2.293	0.0263
ESGR	0.6572	0.1121	2.002	0.3415	5.862	0.0001

Source: Authors' compilation based on data from Statistica software

Based on the results of the multiple linear regression presented, the coefficient of determination is positive and significant for the establishment of a linear relationship, which leads to the rejection of the null hypothesis that there is no linear relationship between the variables. The regression analysis confirmed that the parameters of the variables ER and ESGR are significant for the equation, as the p-value is less than 0.05. The regression equation is as follows:

$$CR = 10.57 + 2ESGR - 0.75ER + \varepsilon \quad (3)$$

The regression analysis confirms a positive relationship between the independent variable ESGR and the dependent variable CR, which confirms the results of the Spearman rank correlation matrix analysis. The main hypothesis of the study, H1: *There is a positive relationship between ESG ratings and the long-term credit ratings of large companies*, is accepted.

The potential for sectoral differences is recognised, particularly given the inclusion of 11 financial institutions (e.g., banks and insurers) in sample of 50 large companies. To address this, subsample analysis was conducted dividing the data into financial (N=11) and non-financial (N=39) companies. Subsample cross-sectional regression results reveal that, while the ER exerts no significant influence on CR among financial institutions, the positive relationship between overall ESGR and CR remains robust in both financial and non-financial companies, upholding H1 across sectors.

The independent variable ER has a slightly negative influence on the dependent variable CR, which could indicate that low values for environmental and social factors are compensated for by high values for governance factors, which leads to higher ESG ratings and better credit ratings. It can be assumed that governance risks are weighted more heavily in the calculation of credit ratings than environmental and social risks. According to the research results, the environmental ratings of large companies do not correlate with their ESG ratings.

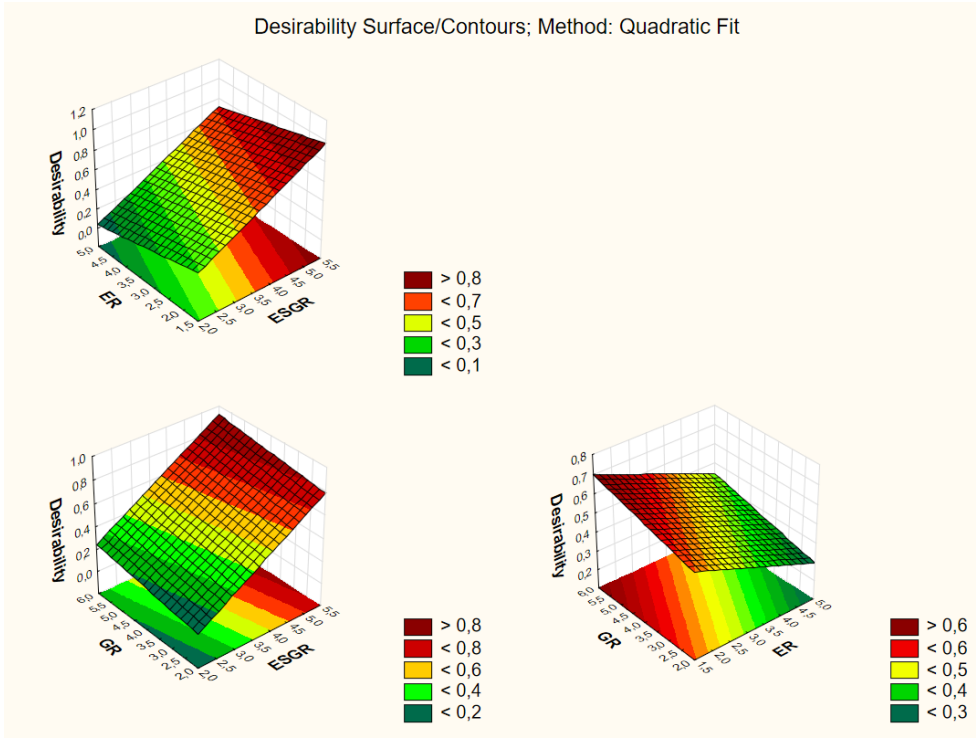
By using the data collected from one credit rating agency for both ESG assessment and credit rating assignment, the analysis removes any potential bias that could arise from differences in weighting methodologies or data sources across providers. The results show that the positive ESG rating and credit rating relationship is driven mostly by the governance pillar, while the environmental and social pillars exhibit no significant influence. For highly rated issuers, governance ratings must be in place before environmental or social initiatives can deliver additional credit rating-relevant benefits. Environmental improvements alone are unlikely to materially upgrade the credit rating of a large corporation unless they are accompanied by equally strong governance practices.

The analysis suggests that according to Moody's rating methodology, high governance scores can lead to high ESG ratings, even if environmental and social

impacts are not rated as highly. The selected sample consists of successful large companies, so it can be expected that these companies will have high governance ratings. The hypothesis that ESG ratings influence creditworthiness is accepted. However, it is important to establish a positive linear relationship between the predictors GR and ESGR.

The correlation coefficient between the variables GR and ESGR is 0.68. Below you can see linear plots representing the combinations of the variables ESGR, ER and GR. The slope of the plot illustrates how changes in one variable affect another and shows the desirability of the statistical relationship on a scale from zero to one. The change of desirability of the statistical relationship is also represented by colours on linear plots, with warmer colours indicating a stronger tendency towards desirability.

Diagram 1: Desirability Surface/Contours; Method: Quadratic Fit



Source: Author's calculations

The GR variable has a strong positive correlation with the ESGR variable, as can be seen from the quadratic overlap diagram. The statistical relationship between the variables was estimated using the linear least squares method. The sum of squared

deviations is smaller in the overlap region where the variables have higher values, indicating a stronger statistical relationship in this area.

According to the research results, high ESG ratings imply a high score for the governance (G) factor, which is a component of the ESG rating. The rating agency Moody's includes qualitative variables in the calculation of the G-score. These variables measure the effectiveness of financial strategy, risk management, management credibility and control, organisational structure, regulatory compliance, symmetry of reporting, governance structure and internal policies (Moody's, 2024). Variables that correlate with the governance factor (G) in the ESG rating are latent variables (Rajagopal and Rajendran, 2019). According to Shill and Strand (2022), corporate managers have a latent ability to influence the quality of implementation of the ESG concept. Governance is an extremely important factor in the ESG concept. Effective governance policies and practices are best placed to facilitate a long-term corporate focus on identifying, monitoring and addressing environmental and social issues (Fairfax, 2024). Latent variables are measured by constructing a structural model and conducting a factor analysis based on the observed manifest variables within the model. There is a need to investigate which latent variables correlate most strongly with the G-score, but this will be the subject of another study.

To determine whether there is a relationship between ESG ratings and the financial performance of a company, the correlation between the variables ESGR and NPMR was measured using Pearson's correlation coefficient. The value of the correlation coefficient was -0.05. Based on the analysis of the result of the correlation coefficient of -0.05 with a significance level of 5%, the auxiliary hypothesis H2: *ESG ratings have no impact on the financial performance of large companies* is accepted.

5. Discussion

In this study, the financial performance of large companies is used as a measure of short-term impact, while credit rating is used as a measure of the long-term impact of ESG investments on their business. Net profit margin is a critical short-term indicator (Ravichandran & Singh, 2024). The long-term strategic advantages of ESG investments are enhanced brand value, improved risk management, and access to green capital (Fain, 2020).

The results of the study show that there is no correlation between ESG investments and the financial performance of large companies, thus proving H2. Some authors, such as McGowan (2022) and Garcia and Orsato (2020), are not indifferent when it comes to the impact of investing in sustainability on the profitability of companies and consider this impact to be negative. In the traditional company financial approach advocated by Milton Friedman it is assumed that the increase in social well-being weighs on additional profits.

It is important to note that large companies can more easily allocate investments in sustainability in terms of their revenues. Investing in sustainability or internalising negative externalities is not only a cost, but also an opportunity to improve business and capture new market segments. The research results on the positive impact of the triple bottom score on credit ratings confirm H1 and show a positive correlation between socially responsible management and the long-term stability of the company. Companies are investing in corporate sustainability and paying attention to climate risk management in order to fulfil market expectations that are aligned with sustainable development goals. In addition to consumers, employees are also changing their preferences when choosing their ideal employer. The research results show the importance of governance factors for ESG ratings and credit ratings. Environmental factors also have an influence on the credit rating, while social factors have no influence on the credit rating. In order to understand why the implementation of the ESG concept has no impact on returns but has an impact on the possibility of debt financing, one must be prepared to observe returns over the long term. This paper explains the importance of corporate governance practises for external financing by examining the relationship between ESG ratings and credit ratings. The pressure on corporate governance to adopt sustainable practises is increasing due to societal demands. This is a key issue in the modern economy as consumers, employees and investors increasingly prioritise sustainability.

Public policies can accelerate the return on investment in sustainability by subsidising green production and consumption. The demand for green products depends on factors such as thelevel of social development, consumer behaviour, sustainable innovation, and purchasing power. By promoting the sustainable market, green financial instruments gain importance, which can lead to a revitalisation of the consumption of green products and increase the returns on green investments.

The research results, which confirm research hypotheses H1 and H2, show the relevance of managing sustainability performance (environmental and social aspects) for financial performance. In this context, the management of an overall approach to the company's governance structures based on the ESG model should deliver results in the form of Sustainable Value (Miljenović, 2018). ESG ratings should function on the basis of an appropriate balance between environmental, social and financial aspects of corporate performance to reflect the implementation and investment in sustainability.

In further research, it would be valuable to conduct a new study exploring how other credit rating agencies besides Moody's, such as Standard & Poor's (hereinafter: S&P) and Fitch, integrate ESG ratings into credit ratings, and to compare the relationship between ESG factors and credit ratings across different agencies. To carry out such a study, a similar analysis would need to be conducted for the other rating agencies. Expanding the existing regression model with a sample of other rating agencies for the same companies is likely to result in high multicollinearity. Therefore, it would be

more appropriate to test a separate model for each rating agency or to conduct a panel analysis with different company samples for each agency.

According to S&P (2025), ESG has a significant impact on the S&P calculation of credit ratings, with the governance factor being the most heavily weighted, accounting for 89% of the overall ESG score. The Fitch rating agency uses 106 different sector templates to implement ESG factors into credit ratings (Fitch, 2025). To expand further research, it would be interesting to compare how different rating agencies incorporate ESG factors into credit ratings for companies across several different economic sectors and analyse which latent variables describe the impact of the ESG governance factor on the credit rating.

6. Conclusion

By testing research variables, this research has confirmed that the impact of investments on overall sustainability needs to be analysed in the long term. The proposed hypotheses (H1 and H2) are even intertwined through the research analysis conducted, as the results show that the profitability of large companies is not affected by the implementation of ESG and its evaluation in the short term. Therefore, the ESG ratings assigned by the rating agencies do not reflect the financial performance of the companies. On this basis, further research should be conducted to define the time period in which ESG implementation has the full impact on the sustainability and financial performance of the company. Although the financial aspects of business performance should be analysed together with the environmental and social aspects, it is clear that companies wishing to make a sustainable contribution must first commit financial resources, as the ESG concept incurs high costs but offers long-term benefits. Investments in sustainability can also gain momentum after the amortisation period. Sustainability goals in business suggest that companies that implement the ESG concept in their operations can gain a competitive advantage and tap into new financing opportunities through green financial instruments. These instruments require assessment through ESG ratings, which then play an important role in the development of green finance and sustainable financial performance in general. Greening can take place either through a company's own initiative or under the influence of its environment. Sustainability investments are not expected to yield quick returns, as sustainability gains importance in the long term. High ESG ratings indicate that a company is stable and a safe investment. The financial market offers a growing number of green financial instruments that target companies with high ESG ratings or support the implementation of the ESG concept. If a company operates in a green industry and invests in sustainability, such an investment can have a positive impact on its financial performance. The impact of sustainability investments is stronger in the long term. The assessment of corporate governance has a significant impact

on the ESG rating, which indicates that accountability for governance decisions is expected. The rating agencies include ESG ratings in their calculation of the creditworthiness of large companies. Social, fiscal, financial, political and legal factors in the external environment are changing the market model of negative externalities, creating new principles, eliminating market imperfections and preventing the breakdown of the price mechanism to internalise negative externalities according to the *polluter pays* principle. The ESG concept offers companies the opportunity to gain a green label and conquer new market segments through its implementation. The demand for eco-designed products depends in part on the level of social development, while the greening of supply and demand enables a holistic approach to the green transition. The agenda of the global Sustainable Development Goals requires the green transformation of companies and the implementation of the ESG concept as a sequence that lays the foundation for sustainability. This should lead not only to a positive long-term impact on a company's operations in terms of financial success based on green investments, but also to broader social and environmental well-being. The ESG concept has become one of the most important factors when evaluating a company whose business model has been extended to include environmental and social aspects of business operations. Therefore, ESG ratings represent an essential part of investment information for companies that relate to green transformation and, in particular, ensure a positive, sustainable impact of companies.

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Utjecaj implementacije ESG-a na kreditni rejting i financijski rezultat poslovanja: perspektiva održivosti

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Sažetak

Cilj ovog rada je istražiti kako implementacija ESG koncepta utječe na kreditni rejting i financijski rezultat iz mikroperspektive poslovanja. Okolišni, društveni i upravljački čimbenici kao komponente ESG koncepta suočavaju poduzeća sa rizicima u području održivog razvoja te poduzeća na njih različito odgovaraju. Razvoj zelenih financijskih instrumenata dodatni je motiv poduzećima da se uključe u zelenu tranziciju. Procjenom ESG rezultata identificiraju se prednosti i slabosti korporativnog sektora u pogledu njegova doprinosa globalnim ciljevima održivosti. Postignuća poduzeća u tome području mogu se analizirati ESG rejtinzima. Ovim istraživanjem utvrđeno je da razlike u metodologiji rejting agencija pri utvrđivanju ESG kriterija i ocjenjivanju ESG rejtinga u konačnici ne rezultiraju značajnim odstupanjima u danim ocjenama. Implementacija ESG koncepta nema utjecaja na financijski rezultat velikih poduzeća (korporacija) u kratkom roku pa stoga učinke ulaganja u održivost valja promatrati u dugom roku. Rezultati istraživanja ukazuju na pozitivne odnose među upravljačkim čimbenicima, ESG ocjenama i kreditnim rejtingom velikih poduzeća. Na temelju dobivenih rezultata zaključuje se kako ulaganje u održivost i implementacija ESG-a ima pozitivne učinke na poslovne tj. financijske rezultate poduzeća.

Ključne riječi: *održivo financiranje, zelene investicije, ESG rejting, financijski rezultat*

JEL klasifikacija: *G11, G24, G32, Q56*

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