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THE IMPACT OF SUSTAINABLE DEVELOPMENT ON THE RETURN ON EQUITY (ROE) AND CAPITAL EXPENDITURE (CAPEX) IN MINING COMPANIES IN EUROPE

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Purpose: The main objective of the article is to investigate whether the implementation of ESG policies affects the return on equity (ROE) and capital expenditure (CAPEX) in European mining companies in the years 2017-2023.
Design/methodology/approach: The study was conducted on mining companies from Europe. The main tool of the analysis is the OLS (Ordinary Least Squares) model with heteroscedasticity correction to examine the relationship between ROE, capital expenditure and ESG indices and control variables.
Findings: The research results indicate a statistically significant, but unexpected negative impact of ESG policies on the analyzed financial indicators in mining companies. A small but statistically significant negative impact of ESG policy implementation on ROE was found. The impact of ESG policies on capital expenditure (CAPEX) is even stronger and also negative.
Research limitations/implications: Due to the time-limited nature of the research sample, the conclusions drawn are relatively short-term.
Practical implications: The authors point to the need for a cautious interpretation of ESG effectiveness in capital-intensive industries. Although ESG policy is increasingly recognized as an integral element of financial analysis and has a positive impact on investment attractiveness and resilience to external shocks in the long term. This is of great importance to investors and market analysts.
Originality/value: Despite the growing importance of ESG issues, there is still a lack of clear and widely documented empirical evidence on the impact of implementing sustainability policies on key financial indicators of companies, especially in high-carbon industries such as the mining sector. The results can be an important contribution to the debate on the role of sustainability in shaping investment decisions and financial strategies of companies.
Keywords: Sustainable development, CAPEX, profitability, ROE.
Category of the paper: Research paper.

1. Introduction

Contemporary conditions for conducting business are increasingly shaped by the ideas of sustainable development, social responsibility, and the growing expectations of stakeholders in terms of transparency and corporate responsibility (Ahmadu et al., 2025). One of the key tools for assessing these aspects is the environmental, social, and governance indicator (ESG), which allows the analysis of the impact of a company's activities on the natural environment, society, and the quality of the organisation's management. ESG indicators are also increasingly becoming an element of financial analysis, used by investors and analysts to assess the long-term attractiveness and investment risk of a given entity (Kandpal et al., 2024).

Despite the growing importance of ESG issues, there is still a lack of clear and widely documented empirical evidence that confirms the impact of implementing sustainable development policies on key financial indicators of companies, especially in high-emission industries such as the mining sector. Mining activities, on the one hand, have a significant impact on the natural environment and local communities and, on the other hand, generate high profits and require intensive investment. Therefore, implementing ESG policies in this industry may involve significant strategic and financial dilemmas. The objective of this article is to analyse the impact of implementing ESG policies on return on equity (ROE) and capital expenditure (CAPEX) in European mining companies in the years 2017-2023. The adopted research period includes the years in which these companies began to systematically report non-financial data in line with ESG guidelines, which allowed for a reliable quantitative analysis. The study was carried out based on annual data from the S&P Global Market Intelligence database, and panel regression models with fixed effects were used for the analysis, which allow the specificity of individual companies. The analysis paid special attention to the relationship between the ESG indicator and the CAPEX level in the short term (current) and medium and long term (3 and 5 years). Furthermore, the impact of ESG policy on return on equity was analysed, taking into account a number of control variables such as financial leverage, current liquidity, and asset turnover. The results of the study provide new information on the consequences of implementing ESG policy in a sector with particular socio-environmental sensitivity and can be an important contribution to the debate on the role of sustainable development in shaping investment decisions and financial strategies of companies.

2. Literature review

2.1. The relationship between ROE (Return on Equity) and the level of a company's involvement in ESG policy

From the perspective of investors, the relationship between ROE (Return on Equity) and the level of a company's involvement in ESG policy (Environmental, Social, Governance) is crucial for assessing the investment attractiveness of a company (Ahmadu et al., 2025). ROE, as a measure of the efficiency of using equity capital, allows investors to assess how effectively management creates value for shareholders (Keter et al., 2023). Combined with the analysis of ESG factors, it provides a more complete picture of the company's risks and growth potential in the medium and long term (Chen et al., 2023; Wang et al., 2024).

For a growing number of investors, especially institutional ones, ESG is no longer just an add-on, but an integral element of financial analysis. It is recognised that companies with high ESG standards are better managed, more resistant to external shocks (e.g., regulatory, environmental, reputational) and achieve more stable and sustainable rates of return in the long term (Fafaliou et al., 2022). Investors pay attention not only to the direct level of ROE, but also to whether it is achieved at the expense of the environment, ethics, or corporate governance (Zhou et al., 2022; Zumente et al., 2021).

However, in the short term, the implementation of ESG policies can cause a decline in profitability indicators, including ROE (Ali et al., 2025; Yavuz et al., 2025). This is due to the fact that pro-environmental or social activities often require significant investment outlays and changes in the operating model, which do not bring immediate financial effects (Muyiwa-Ajayi et al., 2024; Cristea et al., 2024). For some investors focused on quick profits, this may be a negative signal, suggesting reduced capital efficiency.

Despite this, the dominant trend in financial markets is the growing recognition that ESG and ROE are not opposite, but complementary (Candio, 2024). More and more empirical studies confirm that socially and environmentally responsible companies achieve higher ROE in the long term, among others, because of reducing risk costs, improving stakeholder relations, customer loyalty, and easier access to cheaper capital (Chiomg, 2010; Saleh et al., 2011; Serzante et al., 2024; Ali et al., 2025; Muyiwa-Ajayi et al., 2024).

2.2. CAPEX as a Source of Sustainable Development of an Enterprise

Capital expenditure (CAPEX), understood as investment investments in fixed assets of an enterprise, plays a key role in the implementation of the sustainable development strategy (Kwistianus, 2022). They constitute the foundation for the transformation of an organisation towards a more effective, innovative, and responsible operating model. In the context of environmental, social, and governance (ESG), CAPEX can be perceived not only as an indicator of the company's development capacity but also as a real tool for implementing changes in the

scope of limiting the environmental impact, improving working conditions, or strengthening corporate governance (Myronchuk et al., 2024).

Capital investments, including the purchase of modern energy-saving technologies, the development of low-emission infrastructure, or the digitisation of operational processes, contribute to the achievement of environmental goals. At the same time, they allow for increased operational efficiency and reduce risks related to non-compliance with environmental regulations (Mousse et al., 2023). From a social point of view, CAPEX can be directed toward improving the safety and quality of the working environment, resulting in greater employee satisfaction and the building of a positive image of the company (Huang et al., 2023; Kwistianus, 2022; Haga et al., 2024).

In the long term, appropriately targeted capital expenditures become an important factor in building a competitive advantage based on ESG values (Zumente, Bistrova, 2021). Companies that systematically invest in durable and sustainable resources demonstrate greater resilience to market changes and are also better perceived by institutional investors, who are increasingly guided by sustainable development criteria when allocating capital (Panagopoulos, Tzionas, 2023; Muyiwa-Ajayi et al., 2024).

However, it should be noted that the effectiveness of pro-ESG CAPEX depends on a coordinated strategic approach. Investments must be consistent with the goals of sustainable development, but also economically rational so that they do not disrupt financial liquidity and do not lead to excessive capital burdens (Amin et al., 2025; Zhou et al., 2022). Therefore, companies must balance the pursuit of ESG goals with an analysis of the return on investment (ROI), the life cycle of the project, and its impact on profitability (Saleh et al., 2023; Wanday et al., 2022).

CAPEX plays a central role in the implementation process of sustainable development (Myronchuk et al., 2024; Parapat, Ruhiyat, 2024). It is a mechanism enabling the permanent transformation of the company's structure, provided that it is used in a strategic, coordinated manner and in line with long-term ESG goals (Chiucchi et al., 2025).

ESG policies offer long-term value creation and risk mitigation, their effective implementation remains challenged by short-term financial pressures, high initial investment costs, and the need for strategic alignment between sustainability goals and economic performance. Despite the long-term benefits of integrating ESG policies into corporate strategy, companies face significant challenges such as balancing short-term profitability with sustainability investments, ensuring economic rationality in ESG-driven CAPEX, and aligning stakeholder expectations with long-term value creation.

3. Research methodology

The study was carried out on a group of mining companies operating in Europe. The period from 2017 to 2023 was adopted for the study because these companies reported their ESG activities only from 2017.

The study used annual data. All data used in the study came from the S&P Global Market Intelligence database. The companies qualified for the study were all companies operating in Europe, classified by S&P Global Market Intelligence to the Industry Classification In (Primary) Oil, Gas and Consumable Fuels sector. This sector includes, among others, mining companies specializing in the extraction of coal, iron ore or copper, natural gas or crude oil. These companies also had to be active on the market/operating for the entire analyzed period. Prices were adjusted for changes in equity, such as subscription rights, dividends, and splits. The following data were used for the calculations:

- Pref – measured using ROE, CAPEX, CAPEX 3YGr, CAPEX 5YGr.
- ESG Index – The S&P Global Market Intelligence ESG Index includes all disclosures on environmental factors, social, and governance indicators of the company (i), in period (t).
- Lev – financial leverage; control variable measured as the ratio of total debt to total assets of the firm (i) in period (t) (Hamdana, 2020).
- Turn(TA) – asset turnover, measured by net sales as a percentage of total assets.
- CR – current liquidity ratio.

Capital expenditure (abbreviated as 'CAPEX') is a payment made in cash or credit to purchase long-term physical or fixed assets used in the firm's operations. The expenditure is capitalised (that is, not recorded directly in the firm's income statement) on the balance sheet and is considered an investment by the firm in expanding its operations (Olayinka, 2022; Grozdić et al., 2020).

CAPEX is important for firms to expand and maintain their operations by investing in new properties, plants, equipment, products, and technologies. Financial analysts and investors pay special attention to a firm's capital expenditure because it does not initially appear on the income statement but can have a significant impact on cash flows (Jiang et al., 2023; Fridson, Alvarez, 2022).

The table below presents the data data statistics for the analysed used in the study.

Table 1.
Summary statistics of all variables

	Mean	Median	Max	Min	S.D.
CR	1.365	1.282	3.070	0.419	0.466
ROE	11.042	10.599	95.658	-315.796	38.484
Turn(TA)	0.976	0.742	3.975	0.113	0.805
ESG Index	53.230	53.000	86.000	22.000	15.922
Lev	61.236	60.077	109.118	33.037	13.588
CAPEX	-3945170.168	-875739.665	-3412.988	-23011000.000	5933579.589
CAPEX 3YGr	2.787	-0.541	77.119	-71.373	22.698
CAPEX 5YGr	2.759	1.454	87.310	-63.113	17.760
CR	1.365	1.282	3.070	0.419	0.466

Source: own study.

The following hypotheses were tested in the study.

1. The ROE indicator is affected by the company's ESG policy.
2. The CAPEX indicator is affected by the company's ESG policy.
3. The CAPEX indicator over a 3-year period is affected by the company's ESG policy.
4. The CAPEX indicator over a 5-year period is affected by the company's ESG policy.

The analysis related to the companies' preferences regarding the impact on ROE and CAPEX was presented in the form of parameter estimation of OLS models with heteroskedacity correction and panel models. The study used cross-sectional regression analysis and panel data. Tests were also conducted for the presence of fixed and random effects (redundant fixed effects - Wald test, random effects - Breusch-Pagan test).

The model for the total sample is presented in Equation 1.

$$Pref_{it} = \alpha_0 + \alpha_1 ESG_{it} + \alpha_2 CR_{it} + \alpha_3 \text{Turn}(TA)_{it} + \alpha_4 Lev_{it} + \varepsilon_{it} \quad (1)$$

4. Research results

After conducting a descriptive analysis of the variables and testing the assumptions of the regression analysis, we use regression analysis to examine the impact of the ESG index [independent variables] on ROE, capital expenditure in the current period and in the period of 3 and 5 years [dependent variables]. First, using the OLS model with heteroskedasticity correction, we examine the relationship between ROE, capital expenditure in the current period and in the period of 3 and 5 years, and ESG indices and control variables using equation 1.

To analyse the model specification, we also used the RESET test, which showed the precision of the applied model (p value > 0.05). The results obtained from the RESET test show that the model specification of the variables is correct. The results of this estimation are presented in Table 2.

Table 2.
Estimation of model parameters from equation (1) using the OLS method

	ROE	CAPEX	CAPEX 3YGr	CAPEX 5YGr
const	38.380 **	−3.783	41.411 **	34.360 ***
Lev	−0.6253 ***	33054.6	−0.4795 **	−0.4276 ***
Turn (TA)	11.480 ***	803094***	1.69	9.296 ***
CR	9.690 *	1000310.00	7.155	−0.2463
ESG Index	−0.223 *	−63860.3***	−0.339 **	−0.242 ***
R2	27%	23%	13%	25%

Note: ∗/∗∗/∗∗∗ Indicators are significant at 10% / 5% / 1% respectively.

Source: own study.

As can be seen, the variable related to the applied ESG policy has a statistically significant impact on all the indicators analysed. Interestingly, this impact is negative, suggesting that a greater application of ESG-related policies will reduce the indicators analysed. In the case of the ROE indicator, we observe a small but statistically significant negative impact of the application of ESG policies in mining companies. As for capital expenditure, the impact of ESG policies is stronger here, but also negative. This suggests that increasing the impact of ESG policies will result in a reduction in capital expenditure (both current and in the 3 and 5-year periods).

When analysing the control variables, the greatest impact on CAPEX (both current and in the 3 and 5 year periods) is exerted by variables related to asset turnover, measured by net sales as a percentage of all assets, and financial leverage. In the case of ROE, all control variables have a statistically significant impact on its value.

Then, tests were conducted for the presence of fixed and random effects (redundant fixed effects, Wald test, random effects, Breusch-Pagan test). Cross-sectional regression analysis was performed by estimating models with fixed and random effects for various combinations of effects. Since the models with random effects did not provide statistically significant results, only the models with fixed effects were subjected to further analysis. The results obtained in the panel analysis confirmed the results obtained in the previous models.

5. Discussion and Conclusions

The results of the conducted analyses indicate a statistically significant impact of ESG policy on the analysed financial indicators in mining companies, however, the direction of this impact is unexpected - negative. This means that intensification of activities consistent with ESG policy is associated with a decrease in the value of indicators such as ROE (Return on Equity) or the level of capital expenditure (CAPEX). In particular, although the impact on ROE is relatively small, it remains statistically significant, indicating the durability of this relationship in the studied group of companies. An even more pronounced effect was observed in relation to capital expenditure - both current and in longer periods (3 and 5 years) - where

ESG policy shows a strong, negative impact, suggesting a reduction in capital investments as the commitment to sustainable development increases. These findings are consistent with previous studies presented by Yavuz et al. (2025), Zhou et al. (2022) and Chen et al. (2023).

Interpreting these results requires taking into account the characteristics of the mining industry, which is capital intensive and is particularly exposed to increasing costs related to environmental, social, and corporate governance regulations. Implementing ESG policies can require incurring costs of operational transformation, implementing new technologies, restructuring processes, or limiting activities in areas considered incompatible with the principles of sustainable development. As a result, companies can decide to limit investments or allocate funds to activities that are less profitable in the short term, affecting the decrease in capital efficiency indicators.

However, contrasting cases within the sample reveal that some mining companies (as Galp Energia, MOL, OMV, Energies SE) with high ESG performance have maintained stable or even improved ROE and CAPEX levels, suggesting that the negative relationship is not consistent across the sector. These exceptions may indicate the presence of moderating factors, such as access to green financing, proactive stakeholder engagement, advanced ESG integration strategies, or geographic advantages tied to more supportive regulatory environments. Recognising these divergences underlines the need for a more granular understanding of the conditions under which ESG initiatives can enhance or hinder financial performance.

At the same time, the results of the analysis of control variables indicate that the level of investment expenditure is significantly affected by asset turnover indicators and financial leverage, which confirms that the structure of the balance sheet and the efficiency of asset management remain key determinants of investment decisions regardless of the ESG policy. In the case of ROE, all control variables demonstrate statistical significance, which confirms the complexity and multifactorial nature of the mechanisms shaping the return on equity. These findings are consistent with previous studies presented by Grozdić et al. (2020) and Parapat et al. (2024).

The Wald and Breusch-Pagan tests, as well as a comparison of regression models with fixed and random effects, clearly indicate the superiority of models with fixed effects in the context of the quality of fit and the significance of the results. This confirms that the specificity of individual companies plays a key role in shaping the relationship between ESG and financial performance, which supports the need to take into account individual effects in panel studies. In summary, the results obtained indicate that in the mining sector, increased participation in ESG policy can be associated with a short-term decrease in financial indicators such as ROE and CAPEX. This may result from the costs of adapting to the requirements of sustainable development and changes in the investment profile of companies. However, the presence of high-performing ESG firms that defy this trend suggests the need for a more differentiated analysis. These findings highlight the importance of cautious interpretation of ESG effectiveness in capital-intensive industries and call for further research into long-term outcomes and firm-specific ESG strategies.

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