




# The impact of ESG ratings on the market performance of commodity stock sector before and during the COVID-19 pandemic

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## Abstract

**Motivation:** The growing importance of ESG in the international economy makes the analysed issues extremely interesting. More and more studies show the growing role of ESG performance on company financial and market results as well as analyse the impact of the COVID-19 pandemic on the financial market. The study of rate of return and the relationship between the largest company companies in European Union Member States is of key importance considering the investment portfolio risk.

**Aim:** The main aim of the article is impact assessment of ESG performance of the firm (proxied by ESG scoring by Refinitiv) on the rate of return of commodity sector companies listed on financial markets of European Union Member States. The second goal of the paper is to determine the impact of the COVID-19 pandemic on the rate of return of the analysed companies. The third and final goal is to assess the impact of sector leader



status on the rate of return of these companies (i.e. KGHM, PKN Orlen, Royal Dutch Shell and Rio Tinto).

Results: ESG disclosure by the surveyed companies and ESG scoring had negative impact on the rate of return, while E, S and G scorings did not affect rate of return at all. Sector leaders were less negatively impacted by the COVID-19 economic crisis than the rest of the sector, however sector leadership status was not statistically significant. COVID-19 pandemic positively influenced the rate of return of analysed companies. In case of commodities stock companies, the economic crisis caused by the pandemic brought about higher levels of uncertainty in the financial markets.

*Keywords: commodity companies; ESG; stock exchange; pandemic*  
*JEL: B26; G15; Q02*

## 1. Introduction

In the mainstream theory of finance, one of the leading goals of the company is to maximize shareholders wealth (Jensen, 2001). In this concept, the purpose of a firm is not to act morally, but simply to profit. However, financial factors are not the sole determinants of the efficiency of enterprises. Issues related to the environment, social and corporate governance (ESG) factors are continuously gaining on importance since at least the beginning of the 21<sup>st</sup> century. A number of social changes and growing care for the environment make ESG performance a new area of enterprise competitiveness. This raises the need to shift the paradigm in how companies operate, in order to focus on the long-term value creation for all stakeholders of the company rather than on maximization of shareholders wealth (Schoenmaker & Schramade, 2019).

The main purpose of the article is the impact assessment of ESG performance of the firm on the rate of return of commodity sector companies listed on financial markets of European Union Member States. The second goal of the article is to determine the impact of the pandemic on the rate of return of the analysed companies. Thirdly, the paper aims to assess the impact of sector leader status on the rate of return of these companies (i.e. KGHM, PKN Orlen, Royal Dutch Shell and Rio Tinto).

Research sample covers all commodity sector companies listed on European Union Member States financial markets, while the research period spans the years 2018–2021 and includes two sub-periods (before COVID-19 pandemic 2018–2019 and during COVID-19 pandemic 2020–2021). The choice of the sample is dictated by the fact, that their operations are highly exposed to ESG risks and were expected to suffer from COVID-19 pandemic as well. What is more, due to higher economic uncertainty during times of crisis, COVID-19 pandemic is expected to negatively impact rate of return of analysed companies, while sector leaders were expected to suffer from negative crisis outcomes to smaller extent than other companies of the sector.

Research results prove that in case of commodities sector, both ESG disclosure as well as high ESG scoring have negative impact on rate of return

of the company, while E, S and G scorings did not affect rate of return at all. Surprisingly, findings did not support the notion that crisis resulted negative rate of return, conversely, the impact was positive. Finally, sector leaders were documented as companies which suffered negative outcomes of COVID-19 pandemic to greater extent than other companies.

The paper is structured as follows. Next section includes literature overview which focused on understanding of the origins and determinants of ESG ratings and the importance of this area for companies. The data providers of the ESG segment and the differences in the metrics of individual entities preparing them were indicated, along with the role of data quality and the way ESG assessments are created. In the third section, we describe research sample and data used, and introduce research hypotheses as well as research methods. Fourth section presents the results of empirical study. Discussion on results is included in section five, while conclusions are presented in the sixth and last section of the paper.

## 2. Literature review

ESG rating (scoring) is an important economic measure. It includes an assessment of the financial situation and verifies the impact of firm activity in environmental, social and corporate governance areas (Mihalajmeno, 2015). ESG rating provides important message in the context of economic security and sustainable development. Dynamic degradation of the natural environment and assigning greater importance to Corporate Social Responsibility (CSR) increases the demand for ESG scoring among different stakeholders. The integration of ESG factors by an increasing number of economic operators provides an opportunity for economic development without destructive impact on the environment or society. The competitiveness of companies on a new level can generate not only material benefits, but also positively modify the rules of functioning of societies. In a growing economy, it is extremely important to take care of the natural environment and to protect it against excessive destruction. It is also crucial to pay attention to the development of enterprises in terms of taking care of social issues. Financial results are not the sole benchmark for assessing the effectiveness of companies activities. In the activities of large companies, including these of commodities sector, there is often no room for compromise between profitability and sustainability, meaning a business approach that creates long-term shareholder value by embracing opportunities and managing risk from economic, environmental, social and governance dimensions (Lo & Sheu, 2007). The obligation to meet the diverse expectations of stakeholders is associated with ESG challenges on various levels (Grygiel-Tomaszewska & Turek, 2021). It is worth paying attention main issues that are taken into account in ESG rating methodologies of different ESG rating agencies (see Table 1). ESG rating is the part of the competitiveness of many companies. The role of climate, environment social conditions and governance have transformed the entrepreneur-

ship of many. ESG rating is gaining on importance for shareholders (Tarmuji et al., 2016). The issue of market valuation of companies in the era of the pandemic confirms the need to study the impact of non-financial assessments of factors that are included in ESG reporting.

In the context of ESG analysis, it is worth distinguishing three key sub-groups of ESG information providers, i.e. providers of general data (both financial and ESG related), comprehensive ESG data providers and suppliers of each of individual ESG area only (see Table 2). The evaluation of companies in terms of their ESG performance is assessed by major data providers and ESG rating agencies. Among the providers of general data Refinitiv, MSCI and Bloomberg are leading entities, while among ESG data providers attention should be paid to Sustainalytics, while among of data providers of E, S and G areas individually, there are such entities as Ethifinance or Carbon Delta.

An important analysis of the impact of ESG rating on market results of the company was made by Halbritter and Dorfleitner (2015). In their article, they pointed out that the impact of ESG ratings on the performance of companies is largely dependent on the rating provider. Currently, there is a lack of consistent taxonomy for the compilation of the ESG ratings methodology (Matos et al., 2020). Given so, data providers and rating agencies prepare rankings based on their own ununified criteria, which on the one hand raises an issue for comparability of ESG ratings and scorings and the credibility of ratings (Amel-Zadeh & Serafeim, 2018; Escrig-Olmedo et al., 2010; Huber & Comstock, 2017). However, on the other hand, such situation should be treated as something natural and logic, as if all ESG rating agencies would provide ESG rating based on the same data, criteria and methodology, there would be no need for existence of more than one such entity. Nonetheless, in consequence, ESG ratings relate to different frameworks, measures, key performance indicators and data used as well as weighting of sub-categories (Fatemi et al., 2018). This issue highlights the role of data quality and the way ESG ratings are created (Halbritter & Dorfleitner, 2015). Various rating agencies creating such scorings should standardize some of the ESG assessment criteria making their results comparable. The difficulty of assessing non-financial performance of the company is one of the biggest challenges faced by ESG rating agencies (Grygiel-Tomaszewska & Turek, 2021). Many authors also pay attention to the ESG reporting process by companies (Gawęda, 2021). These are an important factor in the valuation of companies. Advanced activities in the area of ESG can affect better contact with the market and indirectly can be strong sides in the process of market valuation of the firm (Fatemi et al., 2018). Literature research does not indicate a conclusion on impact of companies activities under the ESG on their market results. However, there is a correlation between the adaptation of individual ESG areas and the value of the company and investment risk (Gillan et al., 2021). What is more, there are no direct legal regulations regarding the ESG area for listed companies yet in place. There are only general guidelines provided by European Commission on how to disclose ESG performance,

namely Non-Financial Reporting Directive (NFRD). No comprehensive treaty of ESG is included there and according to NFRD, stock companies should use one of many acceptable international, regional or national standards on non-financial reporting, which does not support the standardization of reported by companies information (Directive 2014/95/EU, 2014). Nonetheless, it is supposed to change by the new Directive of EU, namely Corporate Sustainability Reporting Disclosure (CSRD), which aims to eliminate all of the imperfections of NFRD.

The importance of ESG performance of companies was additionally highlighted during the COVID-19 crisis, thus an infectious respiratory disease that was diagnosed and described in November 2019, in central China. In turn, at the beginning of March 2020, the WHO declared a series of COVID-19 cases to be a pandemic. The impact of the pandemic on the international economy is enormous. According to many economists, the effects of the COVID-19 pandemic on the global economy will be greater than the 2008 financial crisis. The policy of quarantine and self-isolation has led to a significant reduction in global production and consumption (Clemente-Suárez et al., 2021). The effects of the COVID-19 outbreak include both the financial health of companies and global demand. It is important to take care of the adaptation of new technologies after the end of the pandemic, which are an opportunity for the market environment to increase productivity (Belitski et al., 2022).

The pandemic has had a multifaceted impact also on financial markets. One of the effects of the impact is an increase in price volatility. The largest declines in this matter were noted on the global market and attributed in the period from February 24, 2020 to March 23, 2020. February 24 corresponds to the announcement of 100 cases of SARS-CoV-2 infection and the first deaths in Italy. This information led to significant declines not only in global indices such as S&P500, DAX, Nikkei225 but also many commodities. Even the price of gold has fallen by 11%. The market situation stabilized when the Federal Reserve announced unlimited purchases of Treasury bonds and a credit line for companies was opened. After this crisis period, the prices of many assets continued to fluctuate. In April 2020, there was an exceptional situation when the price of the WTI crude oil futures contract was negative and amounted to –37.00 USD per barrel. The situation concerned crude oil contracts with physical delivery in May 2020. The lack of demand for the raw material led to anomalies in the market. During the coronavirus pandemic, a phenomenon called *contango* occurred on the market in an intensive way. Namely, a situation when the spot price is lower than the prices of futures contracts. During the pandemic, the phenomenon for the oil market and entities related to it was negative in nature. The analysis of selected commodity companies during the pandemic period brought important conclusions from the point of view of the price creation process on the securities market (Rozek & McQuinn, 2021).

### 3. Methods

Our paper contained three objectives. Firstly, purpose of the article was to assess the impact of ESG performance on the rate of return of commodity sector companies listed on financial markets of European Union Member States. Secondly, the paper was to determine the impact of the COVID-19 pandemic on the rate of return of analysed companies. The third and final objective was the impact assessment of sector leader status on the rate of return of these companies (i.e. KGHM, PKN Orlen, Royal Dutch Shell and Rio Tinto). For the purpose of achieving set goals research stated following hypotheses:

- H1: Good ESG performance has positive impact on the rate of return of analysed commodity sector companies;
- H2: Economic crisis caused by COVID-19 pandemic has negative impact on the rate of return of analysed commodity sector companies;
- H3: Commodity sector leaders suffer less from negative COVID-19 pandemic outcomes.

In order to verify the first main research hypothesis, we include three supportive hypotheses:

- H1.1: ESG disclosure has positive impact on the rate of return;
- H1.2: ESG scoring has positive impact on the rate of return;
- H1.3: E, S and G scorings has positive impact on the rate of return.

Research was conducted on the group of stock companies of commodities sector of financial markets of European Union Member States including United Kingdom (EU-28) for 2018–2021 period. Despite BREXIT in 2020, stock companies of London Stock Exchange were included in the research as UK has numerous similarities in terms of stock exchange regulations, as well as the financial and non-financial reporting standards, including in the field of ESG. The choice of EU-28 stock companies as the research sample was dictated by the fact, although not comprehensive and not standardized, European Union provides leading non-financial reporting regulations globally (Ahlström & Monciardini, 2021). Set period allowed to compare ESG and market performance of analysed companies as well as before and during COVID-19 pandemic, thus in years 2018–2019 and 2020–2021 respectively. In total, 280 companies of commodities sector were included in the research which resulted in 1,120 firm-year observations. Detailed sample composition presented in Table 3.

The analysed sector leader companies are one of the biggest companies involved in the trade of commodity operating in Europe. The choice of the sample was supported by the type and variety of raw materials that are the subject of trade worldwide. Two companies are linked to crude oil (PKN Orlen and Royal Dutch Shell), one to coal, iron ore, aluminium (Rio Tinto) and one to copper (KGHM). The importance of oil determined the choice of two companies from this industry, one from the Netherlands (Royal Dutch Shell), the other from Poland (PKN Orlen).

KGHM is one of the largest Polish companies. It is listed on the Warsaw Stock Exchange. KGHM conducts technologically advanced exploration, production and metallurgical activities. KGHM focuses on the extraction of ores, the production of copper and other non-ferrous metals. It is one of the leading producers of refined copper and silver in the world. Company produce on three continents — North and South America and Europe. It employs 34,000 people (KGHM, 2023).

PKN Orlen is one of the largest industrial concerns in Poland and Central Europe. The entity also operates in Canada. Orlen implements environmentally friendly technologies and energy based on low- and zero-emission generation sources. Activities are subordinated to the implementation of the strategy of achieving carbon neutrality by 2050. The company is engaged in hydrocarbon extraction, fuel retail, renewable energy sources, petrochemicals and refinery (Orlen, 2023).

Royal Dutch Shell is a global energy company that explores, manufactures, refines and markets crude oil and natural gas. The company was founded in 1907. Royal Dutch Shell (2023) employs around 82,000 people and operates in more than 70 countries. The company has committed to reducing overall carbon dioxide emissions by 45% by 2030 compared to 2019 (Mayer, 2022).

Rio Tinto is a British-Australian company mainly engaged in coal mining. It was founded in 1873. The company operates in 35 countries and employs 49,000 people. The company's activities include activities in mines, smelters, refineries, laboratories and research and development units. The company produces iron ore, aluminium, copper, borates, lithium, diamonds, salt, titanium dioxide.

Sector leaders reported on ESG matters in each year of 2018–2021 period, therefore these were parallelly included in the group of ESG companies, so the firms that reported on ESG matters each year of set research period. Following Dowell et al. (2000), such measures as descriptive statistics as mean, median, minimum, maximum and standard deviation were used in order to compare the ESG and financial performance of analysed companies. Pearson correlation coefficient was used in order to verify the correlation between variables, while the panel data regression was utilized to confirm results and to assess the impact of ESG performance on rate of return. Models used are:

$$R_{i,t} = \beta_0 + \beta_1 ESG\_D_{i,t} + \beta_2 LEADER_{i,t} + \beta_3 COVID_i + \beta_t X_{i,t} + \varepsilon_{i,t}, \quad (1)$$

$$R_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 LEADER_{i,t} + \beta_3 COVID_i + \beta_t X_{i,t} + \varepsilon_{i,t}, \quad (2)$$

$$R_{i,t} = \beta_0 + \beta_1 E_{i,t} + \beta_2 S_{i,t} + \beta_3 G_{i,t} + \beta_4 LEADER_{i,t} + \beta_5 COVID_i + \beta_t X_{i,t} + \varepsilon_{i,t}, \quad (3)$$

where: R is the annualized rate of return of the company, ESG\_D is the dummy variable equal 1 for companies reporting on ESG in each year of 2018–2021 period and 0 otherwise, ESG is the ESG scoring, E is the E (environmental) scoring, S is the S (social) scoring, G is the G (governance) scoring, LEADER



is the dummy variable equal 1 for sector leaders such as KGHM, PKN Orlen, Royal Dutch Shell and Rio Tinto and 0 otherwise, COVID is the dummy variable equal 1 for years of 2020–2021 and 0 otherwise, while X, stands for the set of control variables of firm characteristics such as shares liquidity (SV), firm size (BV), profitability (RoE), leverage (GDR), growth potential (SG) and dividend yield (DY).

Model (1) was used to evaluate the impact of ESG disclosure on rate of return. Models (2) and (3) assessed the impact of ESG and of each letter of ESG scoring on the rate of return in the group of companies disclosing ESG. Detailed description of variables we used in the paper defines Table 4.

Based on conducted correlation analysis (not reported), the strong correlations between ESG\_D and  $\ln(BV)$ , ESG and  $\ln(BV)$ , E and  $\ln(BV)$ , S and  $\ln(BV)$  variables were determined. The correlation coefficients were at least 0.7 and statistically significant at  $p < 0.05$ . Therefore, we decided to remove  $\ln(BV)$  from our models. What is more, correlation coefficient of 0.8 and statistical significance at  $p < 0.05$  was noted between E and S, therefore we decided to evaluate the impact of these variables on rate of return in separate models (equation 6 and 7), along with G variable in both cases, given variables E and G, as well as S and G were not strongly correlated. As the result our models had the following specification:

$$R_{i,t} = \beta_0 + \beta_1 ESG\_D_{i,t} + \beta_2 \ln(SV)_{i,t} + \beta_3 RoE_{i,t} + \beta_4 GDR_{i,t} + \beta_5 SG_{i,t} + \beta_6 DY_{i,t} + \beta_7 LEADER_{i,t} + \beta_8 COVID_{i,t} + \varepsilon_{i,t}, \quad (4)$$

$$R_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 \ln(SV)_{i,t} + \beta_3 RoE_{i,t} + \beta_4 GDR_{i,t} + \beta_5 SG_{i,t} + \beta_6 DY_{i,t} + \beta_7 LEADER_{i,t} + \beta_8 COVID_{i,t} + \varepsilon_{i,t}, \quad (5)$$

$$R_{i,t} = \beta_0 + \beta_1 E_{i,t} + \beta_2 G_{i,t} + \beta_3 \ln(SV)_{i,t} + \beta_4 RoE_{i,t} + \beta_5 GDR_{i,t} + \beta_6 SG_{i,t} + \beta_7 DY_{i,t} + \beta_8 LEADER_{i,t} + \beta_9 COVID_{i,t} + \varepsilon_{i,t}, \quad (6)$$

$$R_{i,t} = \beta_0 + \beta_1 S_{i,t} + \beta_2 G_{i,t} + \beta_3 \ln(SV)_{i,t} + \beta_4 RoE_{i,t} + \beta_5 GDR_{i,t} + \beta_6 SG_{i,t} + \beta_7 DY_{i,t} + \beta_8 LEADER_{i,t} + \beta_9 COVID_{i,t} + \varepsilon_{i,t}, \quad (7)$$

Following the approach in the literature, we excluded the observations of negative book values of equity (McLean et al., 2012). To mitigate the potential effects of outliers, we winsorised the data at the 5th and 95th percentile levels (Bajic & Yurtoglu, 2018). ESG related measures were extracted from Refinitiv Eikon as it offers one of the most comprehensive ESG databases covering over 80% of the global market capitalization across different ESG areas. Refinitiv calculates ESG scorings and ratings including more than 600 measures at the level of a given company, of which a subset of 186 most comparable from the sector point of view affects the overall assessment of the entity (Refinitiv, 2022). Met-



rics are grouped into ten ESG categories including 68 measures relating to environmental criteria (E), 62 to social (S), and 56 to corporate governance (G). Taken into account the total amount of non-financial information contained in the detailed metrics (sub-metrics), across different ESG ratings providers, Refinitiv analyse the largest number of ESG performance factors. For reference MSCI or Bloomberg analyse approximately 120 different factors and does not include sector or impact on the rating. What is more, Refinitiv does not presume to define what good ESG practice looks like; it lets data to determine industry-based relative performance within the construct of its criteria and data model. Financial data of companies were extracted from Refinitiv Eikon database as well. Control variables were calculated manually.

## 4. Results

Table 5 shows the percentage changes in the share prices of the surveyed sector leaders in the years 2018–2021. Before pandemic and during pandemic periods, similar price behaviour of companies related to fossil fuels (PKN Orlen and Royal Dutch Shell) is visible. The commodities they trade (oil and natural gas) clearly affect the share price of these companies. In 2021, after the greatest threats related to the pandemic (mainly caused by the spread of vaccines) have ceased to exist, an increase in industrial production is visible. At that time, the demand for copper and coal, which are traded by Rio Tinto and KGHM, increased. A similar behaviour of commodities prices is visible with the level of prices of companies listed on the stock exchange, which corresponds with the production and trade of these commodities. Since the beginning of the epidemic, stocks of Rio Tinto and KGHM increased, and the peak of price volatility took place in May 2021, as prices increased by over 100% and almost 80% compared to January 2018. The opposite was reported for PKN Orlen and Royal Dutch Shell, as stocks of these in December 2021 fell by above 30% in comparison to January 2018. Table 5 illustrates the evolution of stock prices over the 3 periods: pre-pandemic, pandemic and overall.

During COVID-19 pandemic period, Rio Tinto recorded the highest growth rate — nearly 20%. Other companies recorded declines (the highest PKN Orlen — over 18%). During the pandemic period, the highest increase in share prices concerned Rio Tinto and KGHM (65% and 46%). During the entire period under review, the highest price increases were recorded by Rio Tinto and KGHM. A similar decline in share prices was achieved by Royal Dutch Shell and PKN Orlen (a decrease of approximately 30%). In order to present the results of the study, firstly attention should be paid to the analysis of the financial results of analysed companies. Table 6 provides the descriptive statistics of the analysed variables. Sector leaders noted the lowest R by mean (median) at 0.02% (0.00%), while ESG companies and Other companies reached 0.03% (0.02%) and 0.14% (0.05%) respectively. On the one hand, Sector leaders provided lowest rate of return, however on the other hand, these were rela-

tively the most stable. Standard deviation of Sector leaders R was 0.12%, for ESG companies it was 0.18% and for and Other companies equalled 0.40%. SV proved stocks of Sector leaders as the most liquid ones with the mean (median) almost or at least two times higher than in other groups of companies. Sector leaders SV was 1,404.95 m (837.31 m), ESG companies 826.49 m (304.18 m) and Other companies 619.78 m (211.09 m). It should be also noted that, Sector leaders and ESG companies were mostly big firms with average BV of 1.404,95 m EUR and 826.49 m EUR, while Other companies were much smaller ones with mean book value of equity equal 91.00 m EUR. According to RoE ratio, only Other companies were not profitable on mean (−0.16). In contrast, Sector leaders and ESG companies reported profitability proxied by ROE on the average level of 0.15 and 0.03 respectively. In terms of GDR, ESG companies were on average the most in debt (0.59), however, these companies also proved the highest mean and median growth potential proxied by SG equal 0.14 and 0.08. At the same time, Other companies offered the highest DY by mean of 5.25. Table 7 includes comparison of financial performance of analysed firms before and during COVID-19 pandemic.

Surprisingly, during COVID-19 pandemic, all groups of companies noted higher R then in years 2018–2019. The highest on average improvement was observed for Other companies as their rate of return increased from 0.08% to 0.20%. It should be emphasized, that SV of only Sector leaders decreased during COVID-19 pandemic, as the daily traded volume fell to 1,400.04 m from 1,409.87 m. Conversely, during COVID-19 pandemic, size of Sector leaders, ESG companies and Other companies increased. As expected, COVID-19 had negative impact on profitability of companies, however only in the group of ESG companies. ESG companies RoE on mean (median) fell from 0.05 (0.09) to −0.01 (0.08), while Sector leaders and Other companies noted an increase from 0.14 (0.12) to 0.15 (0.18) and from −0.18 (−0.09) to −0.14 (−0.06) respectively. ESG performance of analysed companies was presented in Table 8.

Sector leaders were notable ESG leaders as well in each of ESG area both before and during COVID-19 pandemic. These companies on average resulted ESG scorings in of at least 70.00, which is an equivalent for ESG rating “B+”, so the proxy of good relative ESG performance and above average degree of transparency in reporting material ESG. Nonetheless, their ESG scorings decreased during pandemic. Worth emphasizing, in comparison to before pandemic period, ESG companies in each case improved its ESG performance during pandemic period by at least or almost a double of Sector leaders ESG scorings decrease. The effect of ESG disclosure on rate of return using model (4) was presented in Table 9.

ESG disclosure had negative impact on rate of return in each of analysed periods. What is more, the relationship was statistically significant at least  $p < 0.10$  level. Similar results were noted for  $\ln(SV)$ . In case of RoE, documented positive statistically significant effect on R, however only in the period before pandemic. Surprisingly, during COVID-19 pandemic RoE affected R negatively,

although the relation was not statistically significant same as in the whole period. In each period, GDR was not statistically significant and negative only in 2018–2021 period. Growth potential proxied by SG appeared to impact R negatively in 2018–2019 period, however the relationship was not statistically significant. Worth mentioning, during pandemic and in the whole period, this relationship has changed and SG effect on R was both positive and statistically significant at  $p < 0.05$  level. As expected, DY effect was negative and statistically significant. LEADER variable did not support the notion that sector leader status contributes to higher rate of return, while COVID variable was positive and statistically significant at  $p < 0.01$  level, which confirms previous findings of the paper. Reported adjusted  $R^2$  was in favour of model for period before pandemic or for the full period rather than for the model during COVID-19 pandemic. The results in Table 10 reported ESG scoring effect on rate of return utilizing model (5).

Conversely to ESG disclosure, ESG scoring had no impact on R before COVID-19 pandemic and in the full period. However, during COVID-19, the effect of ESG on R was similar to the one noted in case of ESG\_D. Same as before,  $\ln(SV)$  affected R negatively in all analysed periods at statistical significance of at least  $p < 0.10$ . Before pandemic and in the full period, RoE effect on R was positive and statistically significant only for 2018–2019 period. GDR affected R positively in all periods, however no statistical significance was documented. Supporting findings of model (4), SG was determined as the statistically significant variable of R, but only during pandemic and in the full period. DY, same as LEADER were destructors of rate of return, however only DY was statistically significant. COVID was statistically significant variable of positive effect on R, while model during COVID-19 pandemic resulted the lowest adjusted  $R^2$  value. Results of model (6), assessing the impact of each ESG letter on R was documented in Table 11.

Interestingly, in each case E, S and G scorings did not affect R of commodities companies at all. However, results are in line with previous findings. Shares liquidity proxied by  $\ln(SV)$ , was the destructor of rate of return, but statistically significant only before COVID-19. What is more, the leading and statistically significant variable across control variables, before COVID-19 and in the full period was RoE. Although, not statistically significant, GDR contributed to the decrease in R during COVID-19 period, and conversely an increase in other analysed periods. SG was one of the key determinants of R, but only during times of crisis caused by COVID-19 pandemic, thus years 2020–2021. As expected, DY effect was negative and statistically significant in each period. Finally, LEADER variable affected rate of return negatively in each scenario, while COVID impact was positive and statistically significant at  $p < 0.01$  level. Same as before, models during COVID-19 reported the lowest adjusted  $R^2$  values.

## 5. Discussion

Paper documented that companies of commodity sector suffer negative rate of return due to high shares liquidity ( $\ln(SV)$ ). Although shares liquidity offers possibility to sell the stocks at any time, which should be a value-increasing premise, liquidity may also be perceived by ones as higher volatility and risk for quicker value decrease, which provides to shares undervaluation. In accordance with the prior research (Durand et al., 2013), RoE effect on rate of return was positive, however interestingly, during time of crisis profitability impact was negative. The justification of such results from the fact that recession prompts investors to favour companies aptitudes for long-term growth and development rather than perspectives for short-term profit, which has its point in non-crisis period. Above presumption also is supported by documented evidence of positive and statistically significant relationship (only during COVID-19 period) between growth potential proxied by sales growth and rate of return, however only during times of crisis. Evidence of negative affect of leverage on market performance in years 2020–2021 is in the notion that during period of increased unpredictability investors tend to play safe rather than aggressively by including in portfolio firms of tending towards debt financing (Dowell et al., 2000). As expected, dividend yield was negatively related to rate of return. These findings support results of Lang and Stulz (1994), who concluded that firms of high dividend yield, are less likely to be capital constrained, thus may negatively affect market performance.

The discussion on the relation between the ESG and financial performance of the firm was repeatedly raised in the literature (Lueg et al., 2019), same as COVID-19 pandemic outcomes, but still no unified conclusion are made (Arora et al., 2021; Friede et al., 2015). Results of the paper are in line with the findings of Brammer et al. (2006) and Chollet and Sandwidi (2018) who reported negative impact of ESG disclosure on market performance of the firm, but conversely, in opposition to Stellner et al. (2015) and Velte (2017) who proved positive relation between ESG transparency and firm value. What is more, our findings support Folger-Laronde et al. (2020), and Yoo and Managi (2022) and their proof that ESG disclosure has the greater effect on market performance of the company than consolidated or individual ESG rating or scoring. Above supports Khan (2022), who stated that the relation between ESG and financial performance of the firm is dependent on the sector analysed companies belong to. This observation deserves also for broader comment, namely the character of analysed dependency results not only of the sector but the set of various macroeconomic determinants including country of operations, education, welfare and consciousness of society, as well as perception on regulation and development of financial markets.

With regards to the COVID-19 pandemic impact on returns of companies, our results are in opposition to prior research (Arora et al., 2021). Even though during time of crisis profitability of the company suffers the most (Pástor & Vor-

satz, 2020), some firms may benefit in terms of market valuation as investors focus more on rationale for overcoming times of recessions through non-financial outperformance.

## 6. Conclusions

There are many factors influencing the change in the price of shares of companies listed on the stock exchange. The COVID-19 pandemic has significantly affected many areas of the international economy. The impact of ESG performance is increasingly crucial in the process of shaping stock prices. The raw materials sector under investigation is an example of this.

The paper focused on defining the role of ESG ratings in the process of rate of return of commodity companies listed on stock exchanges. The additional purpose of the work was to determine the impact of the COVID-19 pandemic on the rate of return of the analysed companies. Finally, the paper aimed to assess the impact of sector leader status on the rate of return of these companies. Firstly, we hypothesised that good ESG performance measured by ESG disclosure, ESG and E, S and G scorings contribute to higher rate of return. Secondly, we expected that COVID-19 pandemic had negative impact on the rate of return of the examined commodity companies. Thirdly, we presumed given sector leader status, leading commodities companies shall not be negatively impacted by crisis as much as other companies of the sector. What is more, for the purpose of achieving set goals we utilized selected measures of descriptive statistics, Pearson correlation coefficient and panel data regression.

The paper documented that ESG disclosure is more important in terms of effect on rate of return than the ESG scoring or E, S and G scorings which remained neutral for the rate of return of analysed companies. Additionally, ESG disclosure and ESG scoring impacted rate of return negatively, thus falsified the first research hypothesis. Findings support the notion that economic crisis caused by COVID-19 pandemic brought the higher level of uncertainty to financial markets. Nonetheless, for companies of commodities sector this meant, on the one hand, higher rate of return (which falsifies the second set research hypothesis) and liquidity, increase of and improvement in ESG performance, while on the other hand, more debt in capital structure, and lower dividend yield. Although, findings proved that sector leaders suffered negative impact of economic crisis caused by COVID-19, the sector leader status was not a statistically significant variable affecting rate of return, which falsifies the third research hypothesis.

The novelty of the paper is that the valuation of shares of commodity companies listed on stock exchanges in the European Union is less and less dependent solely on financial factors. In turn, an increase in the importance of ESG scoring is observed. An additional fact that increases the knowledge about analysed commodity companies is the fact that the COVID-19 pandemic for these companies was not the cause of the decline in share prices, as in the case

of most listed companies, but a factor of a significant bull market. The growing role of crude oil, coal and natural gas makes commodity companies listed on the European market increasingly important financial instruments. The high linear relationship of these companies with commodity prices makes them an important amortization of shocks caused by various crises (pandemics, wars or recessions). Research also contributed to the literature by analysing ESG performance of public companies both by disclosure and consolidated as well as individual ESG scores in the individual sector level only.

The paper is useful for researchers focusing on ESG criteria, legislators providing non-financial information reporting regulation and especially for public and institutional investors who include ESG performance of the company in their investment decisions. Nonetheless, the research is burdened by the research sample size. As the paper focused only on companies of specific sector, limited number of observations was taken into account. Additional limitation was caused by data poorness caused either by low ESG ratings accessibility in Refinitiv Eikon or low quality of ESG reporting of companies of the sector. We state inclusion of data of companies utilizing ESG ratings of multiple providers or consideration of companies of different sectors as the area for future research.

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## Appendix

**Table 1.**  
**ESG rating determinants**

Environmental	Social	Governance
– water management	– respect for human rights	– avoidance of monopolistic practices
– CO <sup>2</sup> emissions	– talent development	– business ethics
– green construction	– development of human capital	– supply chain supervision policy
– emission of toxins	– product liability	– stable financing system
– re-use of resources	– privacy and data protection	– business reporting communication and cooperation with stakeholders
– waste management	– health and demographic risks	– executive compensation level
– green bonds	– access to communication services	– corporate social responsibility
– carbon footprint	– access to finance	– company management
– environmental innovation	– philanthropy	– tax transparency
– vulnerability to climate change	– safety	
– financing environmental impacts	– verified sources of supplier origin	
– renewable energy	– access to healthcare	
– packaging		
– biodiversity and land management		

Source: Own preparation based on RobecoSAM (2023).

**Table 2.**  
**Breakdown of ESG data providers**

General data providers	ESG data providers	Data providers specializing in the environmental, governance or social responsibility segments
– MSCI	– CSRHub	– EthiFinance
– Moody's	– Mrate	– Equileap
– Refinitiv	– Sustainalytics	– Carbon 4
– Bloomberg	– Oekom	– Four Twenty Seven
– S&P Global Ratings	– Ethos	– Carbon Delta
– FTSE Russel	– Covalence	– Trucost Solaron

Source: Own preparation based on Sia-Partners (2021).



**Table 3.**  
**Sample composition by company profile**

Profile of the company	Number of companies
sector leaders	4
ESG companies	70
other companies	206
total	280

Notes:

Sector leaders are KGHM, PKN Orlen, Royal Dutch Shell and Rio Tinto; ESG companies are the firms that reported on ESG matters each year in period 2018–2021, while other companies are firms that did not report ESG in a single in analysed period.

Source: Own preparation.

**Table 4.**  
**Variables definition**

Variable	Definition
R	rate of return is the annualized rate of return of the company
ESG	ESG scoring as the proxy of environmental, social and governance performance of the company
E	E scoring as the proxy of performance of the company in environmental area
S	S scoring as the proxy of performance of the company in social area
G	G scoring as the proxy of performance of the company in governance area
SV	share Volume as the annualized volume of shares (in m) of the company
ln(SV)	natural logarithm of SV as the proxy of the liquidity of shares of the company
BV	book value as the book value of total equity (in m EUR)
ln(BV)	natural logarithm of BV as the proxy of the size of the company
RoE	return on Equity as the proxy of the profitability of the company
GDR	general Debt Ratio as the proxy of the leverage of the company
SG	sales Growth as the proxy of the growth potential of the company
DY	dividend Yield as the annualized rate of return of dividend of the company
ESG_D	dummy variable equal 1 for the companies reported ESG in each of analysed years, otherwise 0
COVID	dummy variable equal 1 for the 2020–2021 period, otherwise 0
LEADER	dummy variable equal 1 for KGHM, PKN Orlen, Royal Dutch Shell and Rio Tinto, otherwise 0

Source: Own preparation.

**Table 5.**  
**Rate of return of sector leaders before and during COVID-19 pandemic (%)**

Company	Before COVID-19 (2018–2019)	During COVID-19 (2020–2021)	Full period (2018–2021)
KGHM	-12.6325	46.0033	27.5594
PKN Orlen	-18.6540	-14.9382	-30.8056
Royal Dutch Shell	-7.1340	-25.8560	-31.1460
Rio Tinto	19.3055	65.1422	33.0246

Source: Own preparation.



**Table 6.**  
**Financial and market performance of firms in 2018–2022 period**

Group of the companies	Variable	N	Mean	Median	Min.	Max.	Std. dev.
sector leaders	R (%)	16	0.02	0.00	-0.16	0.31	0.12
	SV	16	1,404.95	837.31	200.00	3,725.12	1,443.13
	BV	16	8,369.51	9,740.38	4,460.90	9,740.38	2,109.44
	RoE	16	0.15	0.13	-0.12	0.32	0.11
	GDR	16	0.51	0.51	0.44	0.59	0.04
	SG	16	0.10	0.07	-0.52	0.56	0.29
	DY	16	4.22	4.39	1.06	10.07	2.76
ESG companies	R (%)	280	0.03	0.02	-0.41	0.89	0.18
	SV	280	826.49	304.18	12.96	3,622.44	1,052.36
	BV	280	3,259.36	1,465.70	21.37	8,819.47	3,591.00
	RoE	280	0.03	0.09	-0.98	0.34	0.26
	GDR	280	0.59	0.58	0.12	1.00	0.22
	SG	280	0.14	0.08	-0.89	1.33	0.41
	DY	280	4.65	4.15	0.77	14.91	3.31
other companies	R (%)	824	0.14	0.05	-0.41	1.12	0.40
	SV	824	619.78	211.09	5.35	2,920.60	957.28
	BV	824	91.00	21.23	2.03	2,159.39	235.02
	RoE	824	-0.16	-0.08	-0.77	0.30	0.32
	GDR	824	0.38	0.26	0.02	1.00	0.34
	SG	824	0.02	-0.01	-1.00	1.12	0.61
	DY	824	5.25	4.03	0.65	12.87	4.16

Notes:

Sector leaders are KGHM, PKN Orlen, Royal Dutch Shell and Rio Tinto; ESG companies are the firms that reported on ESG matters each year in period 2018–2022; other companies are firms that did not report ESG in a single in analysed period, while all companies are constitute the group of all analysed companies of commodities sector. Variables definition as in Table 4.

Source: Own preparation.



**Table 7.**  
**Financial and market performance of analysed firms before and during COVID-19 pandemic**

Period	Group of the companies	Variable	N	Mean	Median	Min.	Max.	Std. dev.
before COVID-19	sector leaders	R (%)	8	0.03	0.01	-0.08	0.11	0.06
		SV	8	1,409.87	844.01	231.00	3,554.11	1,493.29
		BV	8	8,194.88	9,408.81	4,860.11	9,721.76	2,277.27
		RoE	8	0.14	0.12	0.07	0.32	0.08
		GDR	8	0.50	0.50	0.44	0.54	0.03
		SG	8	0.08	0.07	-0.09	0.33	0.12
		DY	8	3.83	4.08	1.06	6.07	1.98
	ESG companies	R (%)	140	-0.02	-0.01	-0.41	0.38	0.16
		SV	140	758.69	278.87	12.96	3,539.14	981.43
		BV	140	2,830.40	1,160.87	29.64	8,521.71	3,317.38
		RoE	140	0.05	0.09	-0.89	0.34	0.19
		GDR	140	0.57	0.57	0.13	0.94	0.21
		SG	140	0.15	0.08	-0.45	1.33	0.30
		DY	140	4.82	4.40	0.77	14.69	3.14
	other companies	R (%)	412	0.08	-0.01	-0.41	1.12	0.40
		SV	412	581.63	204.72	8.21	2,874.51	925.37
		BV	412	86.56	18.95	2.03	2,159.39	234.32
		RoE	412	-0.18	-0.09	-0.77	0.24	0.23
GDR		412	0.37	0.26	0.02	1.00	0.35	
SG		412	0.03	0.02	-0.89	1.12	0.54	
DY		412	5.78	4.63	0.65	12.20	4.17	
during COVID-19	sector leaders	R (%)	8	0.04	0.05	-0.16	0.31	0.16
		SV	8	1,400.04	837.31	200.00	3,725.12	1,494.26
		BV	8	8,544.14	9,740.38	4,611.70	9,740.38	2,068.69
		RoE	8	0.15	0.18	-0.12	0.30	0.14
		GDR	8	0.52	0.51	0.45	0.55	0.05
		SG	8	0.12	0.11	-0.52	0.56	0.40
		DY	8	4.60	4.71	1.08	10.07	3.58
	ESG companies	R (%)	140	0.08	0.08	-0.41	0.89	0.19
		SV	140	828.19	281.09	12.98	3,622.44	1,057.96
		BV	140	3,070.05	1,008.55	21.37	8,819.47	3,544.57
		RoE	140	-0.01	0.08	-0.98	0.34	0.32
		GDR	140	0.62	0.60	0.12	1.00	0.23
		SG	140	0.14	-0.01	-0.89	1.24	0.51
		DY	140	4.55	3.69	0.81	14.91	3.56
	other companies	R (%)	412	0.20	0.11	-0.37	1.10	0.40
		SV	412	656.51	221.44	5.35	2,920.60	986.79
		BV	412	96.82	23.97	2.03	1,813.35	236.24
		RoE	412	-0.14	-0.06	-0.65	0.30	0.28
GDR		412	0.39	0.27	0.04	1.00	0.33	
SG		412	0.01	-0.08	-1.00	1.05	0.59	
DY		412	4.64	3.86	0.78	12.87	4.11	

Notes:

Before COVID-19 stands for 2018–2019 period and during COVID-19 stands for 2020–2021 years. All designations as previously. Variables definition as in Table 4.

Source: Own preparation.



**Table 8.**  
ESG, E, S and G scorings before and during COVID-19 pandemic

Period	Group of the companies	Variable	N	Mean	Median	Min.	Max.	Std. dev.
before COVID-19	sector leaders	ESG	8	73.47	77.65	55.56	86.98	13.73
		E	8	75.34	76.36	60.12	90.12	11.24
		S	8	70.03	71.70	46.72	91.76	18.36
		G	8	76.66	78.11	45.30	94.04	15.84
	ESG companies	ESG	140	53.36	56.69	9.66	86.98	22.89
		E	140	51.25	56.00	2.46	90.12	27.40
		S	140	56.69	60.07	11.89	91.76	24.22
		G	140	51.34	51.49	9.30	94.04	25.96
during COVID-19	sector leaders	ESG	8	70.50	70.15	53.42	86.98	14.02
		E	8	74.07	72.33	58.98	90.12	12.12
		S	8	70.03	70.78	43.34	91.76	19.06
		G	8	66.67	70.87	32.17	94.04	22.88
	ESG companies	ESG	140	59.50	61.82	9.66	86.98	21.08
		E	140	55.80	57.41	2.46	90.12	25.19
		S	140	62.52	68.03	11.89	91.76	22.70
		G	140	59.82	66.59	9.30	94.04	25.05

Notes:

All designations as previously. Variables definition as in Table 4.

Source: Own preparation.

**Table 9.**  
ESG disclosure effect on the rate of return

Variable	Before COVID-19 (2018–2019)	During COVID-19 (2020–2021)	Full period (2018–2021)
intercept	-0.0016**	-0.0020**	-0.0020**
ESG_D	-0.0018**	-0.0007*	-0.0005*
ln(SV)	-0.0002*	-0.0002*	-0.0001*
RoE	0.0014*	-0.0003	0.0001
GDR	0.0013	-0.0003	0.0002
SG	-0.0002	0.0010**	0.0007**
DY	-0.0001*	-0.0001*	-0.0001**
LEADER	-0.0002	-0.0006	-0.0003
COVID	-	-	0.0009***
N	560	560	1,120
adjusted R <sup>2</sup>	0.1020	0.0576	0.0931

Notes:

Statistical significance at  $p < 0.10$ ,  $0.05$  and  $0.01$  marked as \*, \*\* and \*\*\* respectively. All designations as previously. Variables definition as in Table 4.

Source: Own preparation.





**Table 10.**  
**ESG scorings effect on the rate of return**

Variable	Before COVID-19 (2018–2019)	During COVID-19 (2020–2021)	Full period (2018–2021)
intercept	-0.0050**	-0.0020**	-0.0030**
ESG	0.0000	-0.0007*	0.0000
ln(SV)	-0.0003**	-0.0002*	-0.0001*
RoE	0.0028***	-0.0003	0.0003
GDR	0.0008	-0.0003	0.0007
SG	0.0002	0.0010**	0.0006*
DY	-0.0001**	-0.0001*	-0.0001**
LEADER	-0.0002	-0.0006	-0.0002
COVID	-	-	0.0009***
N	148	148	296
adjusted R <sup>2</sup>	0.1046	0.0576	0.1333

Notes:

Statistical significance at  $p < 0.10$ , 0.05 and 0.01 marked as \*, \*\* and \*\*\* respectively. All designations as previously. Variables definition as in Table 4.

Source: Own preparation.

**Table 11.**  
**E, S and G scorings effect on the rate of return**

Variable	Before COVID-19 (2018–2019)		During COVID-19 (2020–2021)		Full period (2018–2021)	
intercept	-0.0051**	-0.0049**	0.0029**	0.0003***	-0.0015**	-0.0013***
E	0.0000	-	0.0000	-	0.0000	-
S	-	0.0000	-	0.0000	-	0.0000
G	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ln(SV)	-0.0003**	-0.0002*	-0.0001	0.0000	-0.0001	-0.0001
RoE	0.0030***	0.0027***	-0.0004	-0.0005	0.0013**	0.0011*
GDR	0.0008	0.0008	-0.0005	-0.0012	0.0001	0.0000
SG	0.0001	0.0003	0.0008*	0.0009**	0.0005*	0.0005**
DY	-0.0001**	-0.0001**	-0.0001*	-0.0001*	-0.0001**	-0.0001*
LEADER	-0.0002	-0.0002	-0.0002	-0.0004	-0.0002	-0.0003
COVID	-	-	-	-	0.0010***	0.0010***
N	148		148		296	
adjusted R <sup>2</sup>	0.1036	0.0858	0.0397	0.0316	0.1186	0.1016

Notes:

Statistical significance at  $p < 0.10$ , 0.05 and 0.01 marked as \*, \*\* and \*\*\* respectively. All designations as previously. Variables definition as in Table 4.

Source: Own preparation.

