Environmental, social and governance disclosure associated with the firm value. Evidence from energy industry

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Abstract

Research Question: Is there an association between ESG factors disclosure and the firm's value for the companies acting in energy sector?

Motivation: Identifying whether a connection exists between the ESG factors disclosure and firm's value is a current and much debated matter, with a focus on the presentation of non-financial information. The necessity of demonstrating the existence of an association is based on the inclusion of non-financial information in the company's corporate reporting combined with financial information. Non-financial information presents the long-term prospects of a company and is focused on the value creation process, as opposed to financial information which is limited to historical data and short-term goals such as profit maximisation. In order to describe the value creation process, the company is analysed from different stakeholders' points of view (customers, suppliers, employees, local community, government, environments activists, etc.) and the interdependencies created between the company and these stakeholders. Therefore, by choosing to present a more holistic view of a company, the management of the company may attract new capital from investors by showing that there is a positive association between ESG factors and firms' value (Sadiq *et al.*, 2020; Wong *et al.*, 2020).

Idea: This paper assesses the possibility of an association between ESG factors and firm's value by developing two linear regression models.

Data: The data used for the research was collected from Thomson Reuters platform based on Top 100 Global Energy Leaders established by the analysists from Thomson Reuters.

Tools: The SPSS statistic program was used to apply the two research models on the data collected.

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Findings: The main findings of the research is that there is an association between ESG factors disclosure and firm's value, and based on the type of the connection (positive or negative), companies may include aspects regarding non-financial information, namely ESG factors, which could attract new capital.

Contribution: This paper contributes to the previous research conducted on the disclosure of ESG factors and its influence on firm's value by showing that there is an association between ESG factors disclosure and the value of the company. The evidence obtained based on the two research models applied to the dataset may persuade the management of the companies to include non-financial information in their corporate reporting.

Keywords: Environmental, social, and corporate governance (ESG), firm's value, corporate performance, Energy industry.

JEL codes: M14

1. Introduction

The past decades have showed that there is an increasing interest in the presentation and inclusion of non-financial information in the company's corporate reporting. The enhanced attention given to the presentation of non-financial information is a result of the last financial crisis (2007-2008) and the accelerated development of technology. Investors are no longer interested only in the financial aspects related to a company, they are looking at the company's possibilities for value creation and sustainable development. ESG factors are representative aspects of non-financial information towards which companies, markets and investors have focused (Setyahuni & Handayani, 2020).

The disclosure of ESG factors provides a new and complex insight into a company's activity as compared with the one offered by the financial information. The presentation of financial information discloses historical data and it is focused on short-term goals, such as the maximisation of shareholders' wealth seen as the major stakeholder of the company which is achieved through the interaction between shareholders and the management of the company (Anning, 2018; Li *et al.*, 2018). The increased pressure of the stock markets and investors encourages companies to provide additional non-financial information focusing on ESG factors disclosure.

Underlying on the increasing focus on the long-term goals of the business detrimental to short-term goals, the paper explores the possible association between ESG factors and firm's value. The long-term goals move the focus of the company from the profit maximisation to the performance measured through EGS factors. This research considers individual dimensions of ESG factors (environment, social, and corporate governance), along with the combined score. The environment factor

describes the relation between the organisation, its activity and environment represented by natural resources (water, air, soil, vegetation, and fauna etc.). The impact produced by the business activities on the environment and the manner in which the company is managing to limit its negative effects on environment are considered. The social factor refers to the connection between the organization and its employees, customers, suppliers, and the communities in which the company is conducting its business activity. The corporate governance factor relates to the company's leadership system, the implemented controls systems, the relationship with the shareholders, and the connection between shareholders and executives. The investors and other stakeholders (clients, suppliers, banks, local communities, governments, employees, and others) consider ESG factors to improve the firm's financial performance (Zhao *et al.*, 2018).

The aim of this research is to investigate possible associations between environmental, social and governance (ESG) factors' disclosure and the value of companies from energy industry. It contributes to a better understanding of the specific characteristics of energy industry in terms of ESG-related policies. Arguments for choosing energy industry start with the pioneering sustainability-oriented activities (Hughey & Sulkowski, 2012) and relay on the increasing importance conferred by researchers and scientific journals' editors, overtime (Soytas *et al.*, 2017; Patari *et al.*, 2014; Lu *et al.*, 2014), as highlighted by Lungu *et al.* (2019).

Considering the last decades, numerous studies investigating the relationship between the ESG factors and the firm's value have been published. Regardless of the great number of papers on this matter, the results are conflicting. Evidence is provided for the existence of a positive association of the ESG factors on the firm's value (Sadiq *et al.*, 2020; Wong *et al.*, 2020; Yoon *et al.*, 2018; Yu *et al.*, 2018; Friede *et al.*, 2015), while others report a negative association (Friede *et al.*, 2015; Horváthová, 2010; Brammer *et al.*, 2006; Richardson & Welker, 2001) or even no influence at all (Friede *et al.*, 2015) when various measures are used for ESG factors and firm's value.

The present paper is based on one main hypothesis in determining whether there is an association between ESG factors disclosure and the firm's value for the companies activating in energy sector.

> *H1: There is an association between ESG factors disclosure and the firm's value for the companies activating in energy sector.*

Several secondary assumptions result from the main hypothesis, such as:

> *H1.1: There is an association between environment disclosure and the firm's value for the companies activating in energy sector.*
> *H1.2: There is an association between social disclosure and the firm's value for the companies activating in energy sector.*

*H1.3: There is an association between corporate governance disclosure
and the firm's value for the companies activating in energy sector.*

In order to develop a research design to address the hypotheses, ESG scores
available on Thomson Reuters Eikon platform were used to measure the disclosure
of ESG factors, as for the firm's value, market value and Tobin's Q were
considered. The initial sampling size consisted of the top 100 companies from
energy industry classified by Thomson Reuters, whilst the final sample was
diminished to 67 companies with data over a period of four years (2015-2018),
because of unavailability of data.

The results obtained are similar with other studies that investigated the relationship
between ESG factors disclosure and firm's value (Sadiq *et al.*, 2020; Wong *et al.*,
2020; Li *et al.*, 2018; Fatemi *et al.*, 2018; Horváthová, 2010) and they are
providing additional evidence supporting the existence of a relationship for
companies within Energy sector.

The remainder of this paper advances as follows: the second section reviews the
prior research, while the third section presents the research design, referring to
sample and data, variables, and research method. The fourth section is dedicated to
the research results. Conclusions are provided in the fifth section.

2. Literature review

The literature has integrated countless studies regarding the relationship between
ESG factors and the company's value in the last decades. Some of these studies
present a positive impact of the ESG factors on the firm's value (Sadiq *et al.* 2020;
Wong *et al.*, 2020; Yoon *et al.*, 2018; Yu *et al.*, 2018; Friede *et al.*, 2015), while
others report a negative association (Friede *et al.*, 2015; Horváthová, 2010;
Brammer *et al.*, 2006; Richardson & Welker, 2001) or even no influence at all
(Friede *et al.*, 2015). Considering the increased implication of accounting
associations, such as ACCA, militating for the inclusion of integrated reporting as
part of the corporate reporting, environment organisations, climate and human
rights activists, but also the interest manifested for ESG factors by stock markets
and investors, further studies on the relationship between ESG factors and
company's value are expected to be generated, but not limited to this relation only.

Wong *et al.* (2020) conducted a research on the impact between ESG certification
and firm's value for Malaysian listed companies over the period 2005 to 2018.
Their results showed positive impact of ESG certification on firm's value
(measured by Tobin's Q) and benefits to shareholders. Thus, the authors encourage
organisations to report aspects related with ESG factors and to focus on long-term
goals for the companies, instead of short-term goals which bring little value to the
company. The adoption on long-term objective may help the company to create

value for all its stakeholders by combining non-financial information presenting aspects about ESG factors with financial information.

Another study concentrated on the impact of ESG factors disclosure on firm value for Malaysian companies is the one prepared by Sadiq *et al.* (2020). The authors have applied the regression model on a dataset of 122 listed companies on Malaysia Stock Exchange for a period of 9 years (2011-2019). Their results are consistent with the ones obtained by Fatemi *et al.* (2018), and state that ESG strengths increase firm's value while ESG weaknesses decrease it. Sadiq *et al.* (2020) and Fatemi *et al.* (2018) asserted that the disclosure of ESG factors has a moderating role in diminishing the negative effects of weaknesses and reducing the positive effect of strengths.

A recent research on the association between ESG factors and performance of the company is the one conducted by Alareeni and Hamdan (2020). The study is focused on a dataset of US S&P 500 listed companies during a 10-year period (from 2009 to 2018) on which the authors have used a panel regression analysis. Their outputs show a positive impact of ESG factor's disclosure on firm's performance represented by Tobin's Q. The study analysis the outputs for each individual factor demonstrating that there is a positive association between individual environment, corporate governance factors and Tobin's Q. A notable observation of the paper is that combined and individual ESG factors have higher scores for stable and financially sane companies.

The current serious climate matters and the increased power of the employees have shifted the attention of the company's management and investors from financial aspects to aspects focusing on preserving the environment and enhancing the support delivered by companies to their employees. De Lucia *et al.*, (2020) have conducted an investigation on whether good ESG scores lead to a better financial performance for public companies from Europe. The results of the regression models applied show that there is a positive relation between ESG practice and financial performance, connection that is enhanced by the investment in environment and social aspects. Therefore, as a positive relation is demonstrated between ESG factors and financial performance, it may be possible for the financial performance to influence in a positive manner the value of the company.

Li *et al.* (2018) has also investigated whether the disclosure of ESG factors may have an influence on the firm's value. They used a database of 350 FTSE listed companies and concluded based on two regression models used that there is a positive association between ESG disclosure and firm's value. Furthermore, the authors demonstrate that the firms with a CEO delegated with a higher level of power present an enhanced influence of ESG disclosure on company's value.

The sustainability evaluated through ESG factors was found to have a positive and significant impact on market value for companies activating in an emerging market

(Yoon *et al.*, 2018). The study is based on a sample of 705 companies in South Korea, of which 190 firms from environmentally sensitive industries such as energy (equipment and services, oil and gas, consumable fuel industries), material (chemicals, construction materials, containers and packaging, metals and mining industries) and utility sector (producers of electricity, gas, water, renewable energy). Results show that the impact is influenced by the attributes of the firm. Thus, for environmentally sensitive industries the impact of ESG factors on firm's value is less significant as compared to the non-sensitive industries. Yoon *et al.* (2018) have also stated that the corporate governance has a negative impact on firm's value for those companies belonging to sensitive industries.

Positive association between ESG factors disclosure and firm's value was also found in Yu *et al.* (2018) research, for 1996 companies from 47 developed and emerging countries. Authors militate for the implementation of ESG disclosure in case of average listed companies in order to enhance the firm's value measured by Tobin's Q. The costs related to the implementation may be recovered in time, and the companies financially sound will achieve a better transparency in ESG disclosure.

Friede *et al.* (2015) reviewed more than 2200 individual studies concentrated on the relation between environmental, social and governance (ESG) and corporate financial performance, being one of the first investigations to gather aggregated evidence from a significant number of earlier studies. By applying vote-counting and meta-analysis techniques, their results showed that almost 90% of the studies demonstrates a non-negative relation between ESG and corporate financial performance along with the fact that the mainstream of the studies considered show positive findings related to studied association. The authors obtained supporting evidence that investing in ESG and long-term goals will bring added value to the company and additionally the positive impact of ESG on financial performance seems to be steady over time.

The interdependency between environmental performance and financial performance was explored by Liu (2020) for different industries by performing a multilevel longitudinal analysis. The results present an overall positive relationship between environment performance and financial performance. Regardless of the positive connection identified, a negative association between environment performance and financial performance is demonstrated for sensitive industries and is based on a general lack of trust between major stakeholders from these sensitive sectors.

Richardson and Welker (2001) have studied the relationship between ESG disclosure and market value for a sample of Canadian companies in the yearly 90's. The results suggest a negative association between ESG disclosure and market. The same type of relation between social performance and stock returns was identified

by Brammer *et al.* (2006) for UK companies. Moreover, the investigation of Horváthová (2010) shows a possible negative association between environmental and financial performance, enhanced by using correlation coefficients and portfolio studies, as opposed of using multiple regressions and panel data technique. Horváthová (2010) suggested that the time framework plays a major role in determining the relationship between environment and financial performance, as it takes some time for the environmental regulations to have an influence in financial performance.

3. Research design

3.1 Sample and data

To investigate the association between the ESG factors disclosure and firm's value for companies within energy industry, the latest top (2017) established by the analysts from Thomson Reuters (Top 100 Global Energy Leaders https://www.thomsonreuters.com/en/products-services/energy/top-100.html) was used. The analysts from Thomson Reuters have created the *Top 100 Global Energy Leaders* based on eight criteria (https://www.thomsonreuters.com/en/products-services/energy/top-100/methodology.html): *management & investor confidence; legal compliance; financial performance; innovation; risk and resilience; people and social responsibility; reputation; and environmental impact.*

Out of 100 companies from the Thomson Reuters classification, for 33 companies, no information at all (financial information or ESG related - 5 companies), no ESG scores data (27 companies), or only partial ESG scores (1 company) were found at the time of data collection. For the remaining 67 companies, with the required data available on Thomson Reuters site or in their annual reports, a total sample of 266 company-year observations, grouped on 4 years (2015 – 2018), was tested. The companies were also classified in 4 sub-categories of the Energy industry (Oil and Gas, Oil & Gas Related Equipment and Services, Multiline Utilities, Renewable Energy and Uranium), for six geographical regions (Table 1).

Table 1. Description of the database

Geographical region / Industry sub-category	Africa	Asia	Australia	Europe	North America	South America	Total
Panel A. Number of companies included in the analysis							
Multiline Utilities				6	4		10
Oil & Gas	1	17	2	17	4	2	43
Oil & Gas Related Equipment and Services				6	3		9

Geographical region / Industry sub-category	Africa	Asia	Australia	Europe	North America	South America	Total
Renewable Energy				2	2		4
Uranium					1		1
Total countries	**1**	**17**	**2**	**31**	**14**	**2**	**67**
Panel B. Number of company-year observations included in the analysis							
Multiline Utilities				24	15		39
Oil & Gas	4	68	8	68	16	8	172
Oil & Gas Related Equipment and Services				23	12		35
Renewable Energy				8	8		16
Uranium					4		4
Total country-year observations	**4**	**68**	**8**	**123**	**55**	**8**	**266**

Thomson Reuters Eikon platform was used to collect the scores for the combined and individual ESG factors presented as numerical values for the period 2015 - 2018. The 4-year period was selected since most companies selected have the scores available for this period. The financial information measuring the firm's value for the companies in the sample was also obtained from the Thomson Reuters Eikon platform, and, where the information was not available on the platform (total assets and cash and cash equivalents), it was collected from the company's published annual reports. All the figures taken into consideration are presented in US dollars as it represents a main global currency.

3.2 Variables

Details related to the variables used in this research are summarised in Table 2. To have a holistic approach on the dependent variable measuring the firm's value, two financial indicators were considered: the market value (also used by Fatemi *et al.*, 2018 and Brammer *et al.*, 2006) included in the regression model as natural logarithm (LNMV) and TOBIN's Q (considered also in Li *et al.*, 2018; Fatemi *et al.*, 2018; and Yu *et al.*, 2018 studies) computed as market value scaled by total assets.

The ESG score available on Thomson Reuters Eikon platform is considered to be the independent value agreed for the linear regression models. The scores vary from 0 to 100% and are computed based on data concerning corporate governance, economic, environmental, and social aspects. Thomson Reuters ESG scores were utilized because the information on the basis of which they are computed comes directly from the companies, hence, there is a high degree of reliability and

originality for these scores. ESG scores are variable used in numerous studies which investigates the connection between the ESG factors disclosure and firm's value (Li *et al.*, 2018; Fatemi *et al.*, 2018; Yoon *et al.*, 2018), regardless of the source from which they have been extracted (Bloomberg; Kinder, Lydenberg and Domini; Thomson Reuters). For the detailed scenarios analysed in the paper, the environment, social and corporate governance pillars were also considered.

Table 2. Variables used in the linear regression model

Variable	Type of variable	Description	Referenced studies/research
LNMV	dependent	Natural logarithm of market value available on Thomson Reuters platform	Fatemi *et al.* (2018); Li *et al.* (2018); Brammer *et al.* (2006)
Tobin's Q	dependent	Computed as the report between market value and total assets	Alareeni & Hamdan (2020); Li *et al.* (2018); Fatemi *et al.* (2018); Yu *et al.* (2018)
ESG	independent	ESG scores available on Thomson Reuters	Li *et al.* (2018); Fatemi *et al.* (2018); Yoon *et al.* (2018)
ENV	independent	Environment score available on Thomson Reuters	Fatemi *et al.* (2018); Yoon *et al.* (2018)
SOC	independent	Social score available on Thomson Reuters	Fatemi *et al.* (2018); Yoon *et al.* (2018)
GOV	independent	Corporate Governance score available on Thomson Reuters	Fatemi *et al.* (2018); Yoon *et al.* (2018)
CASH_TA	control	Computed as the report between cash and cash equivalents value and total assets, both publish on Thomson Reuters	Li *et al.* (2018)
LNTR	control	Natural logarithm of total revenues related with the business activities of the company, available on Thomson Reuters	Fatemi *et al.* (2018)

Apart from ESG combined and individual scores, which is set as the independent variable in the linear regression models, data for the following control variables identified by the literature to be noteworthy in identifying the relationship between the ESG factors disclosure and firm's value: total revenues from business activity (Fatemi *et al.*, 2018), for which it was applied a natural logarithm function for comparability purposes (LNTR), and CASH_TA ratio (Li *et al.*, 2018) computed as the value of cash and cash equivalents scaled by total assets (CASH_TA).

To open the discussion for the research's sub-hypothesis, *Figure 1* shows the differences at the region level, for companies from Energy sector regarding the dependent and independent variables considered for this study. Asia and Europe are leading the top, being the regions with the greatest average of ESG combined and individual scores. However, North America and South America are following shortly behind. Australia and Africa are the regions occupying the last two positions. This may come as a surprise for Africa as it is mandatory for companies listed on Johannesburg Stock Exchange to prepare an integrated report through which aspects related to environment, social and corporate governance factors are presented. As for the Tobin's Q indicator, the highest value per region was recorded in South America and the lowest in Europe. Natural logarithm of market value is approximatively the same in all the above regions, the highest value been recorded in Asia and the lower in Europe.
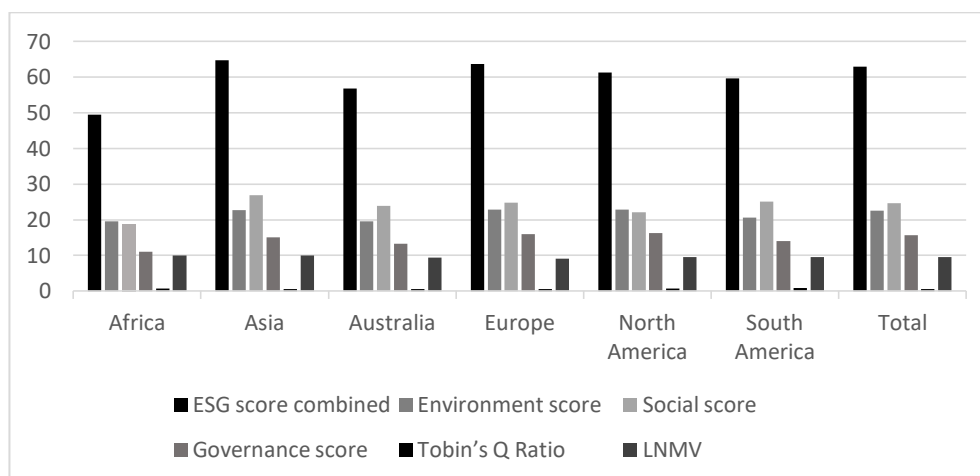

**Figure 1. ESG scores combined and individual, Tobin's Q and market value
by geographical region**

The average values showed by the comparative graphic analysis highlighted the need for an in-depth testing, with details for the possible associations generated for each geographical region and a related interpretation.

3.3 Research method

The linear regression analysis was used to estimate the type of relationship between the dependent variable (firm's value) and the independent variable (ESG factors). Regression analysis was widely used in other research studies on a fixed dataset (Fatemi *et al.*, 2018; Li *et al.*, 2018) to infer on the casual relationship between the ESG factors disclosure and firm's value. The SPSS statistical program was used to run the regression models to the selected sample. The regression models were applied to the ESG combined score and to the score of each individual factor

(environment, social and corporate governance) to better observe the impact of ESG factors disclosure to firm's value.

The primary research hypothesis on the association between ESG factors disclosure and the firm's value for international companies within Energy sector is tested within two main scenarios. Thus, two linear regression models were created, one using natural logarithm of market value to represent the dependent variable, and the other one using Tobin's Q for the dependent variable:

Scenario 1 $\quad$ $LNMV_t = \beta_0 + \beta_1 ESG + \beta_2 CASH\_TA_t + \beta_3 LNTR_t + \varepsilon_t$

Scenario 2 $\quad$ Tobin's $Q_t = \beta_0 + \beta_1 ESG_t + \beta_2 CASH\_TA_t + \beta_3 LNTR_t + \varepsilon_t$

Furthermore, each main scenario is disaggregated in three secondary scenarios which assesses the model for the three pillars of ESG factors: environment, social, and governance:

Scenario 1.1 $\quad$ $LNMV_t = \beta_0 + \beta_1 ENV_t + \beta_2 CASH\_TA_t + \beta_3 LNTR_t + \varepsilon_t$

Scenario 1.2 $\quad$ $LNMV_t = \beta_0 + \beta_1 SOC_t + \beta_2 CASH\_TA_t + \beta_3 LNTR_t + \varepsilon_t$

Scenario 1.3 $\quad$ $LNMV_t = \beta_0 + \beta_1 GOV_t + \beta_2 CASH\_TA_t + \beta_3 LNTR_t + \varepsilon_t$

Scenario 2.1 $\quad$ Tobin's $Q_t = \beta_0 + \beta_1 ENV_t + \beta_2 CASH\_TA_t + \beta_3 LNTR_t + \varepsilon_t$

Scenario 2.2 $\quad$ Tobin's $Q_t = \beta_0 + \beta_1 SOC_t + \beta_2 CASH\_TA_t + \beta_3 LNTR_t + \varepsilon_t$

Scenario 2.3 $\quad$ Tobin's $Q_t = \beta_0 + \beta_1 GOV_t + \beta_2 CASH\_TA_t + \beta_3 LNTR_t + \varepsilon_t$

The regression models have been created based on key dependent and independent variables identified in the specialized literature to reveal the type of association between ESG factors disclosure and firm's value. The subscript allocated to each variable within the model represents the company-year observation. The independent variable of the research model is exemplified by the combined, or individual ESG factors scores, a frequent choice in the prior literature. The numerical values for the scores were downloaded for Thomson Reuters platform, where the information was available. As for the dependent variable, representing the firm's value, two variables were used for a holistic understanding: market value and Tobin's Q, the data was also obtained from the Thomson Reuters platform, or when not available, company's annual reports. Additionally, the following controls variables, identified to be pertinent from previous studies were included: cash and cash equivalents scaled by total assets, and total revenues from business activities.

4. Research results

4.1 Descriptive statistics and correlation analysis

Prior to analyse the coefficients of the two regression models which are based on estimates of scenarios resulting from different combinations of independent and

dependent variables, the data used for the research has been assessed. Descriptive statistics are computed for the regression variables in SPSS software (Table 3) and addressed the assumption that the data is normally distributed, and the regression models based on these variables are valid. As a result of a high skewness, the variables, market value and total revenues, were transformed using natural logarithms.

Assessing the Pearson correlation coefficient (Table 4, above the diagonal), it can be observed that corporate governance score (GOV) is positively correlated with Tobin's Q ratio, at a significance level of 0.05, but at the same time, the corporate governance score is negatively correlated with natural logarithm of market value, at a significance level of .05, providing evidence in the support of the research hypothesis H1.3. According to Pearson correlation, different and conflicting results are obtained for each of the two research models used. In addition to Pearson results, the correlation obtained for corporate governance score in relation with natural logarithm of market value is also validated by the Spearman correlation (Table 4, below the diagonal), with a negative coefficient of 0.127 (p<0.05), which shows a higher significant association between governance score and market value.

Table 3. Descriptive statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
ESG	266	35.2	90.8	63.616	12.2987	151.259	-0.215	0.149	-0.712	0.298
ENV	266	11.7	34.2	22.885	4.7654	22.709	-0.003	0.149	-0.639	0.298
SOC	266	12.3	37.4	24.929	5.6400	31.810	-0.068	0.149	-0.711	0.298
GOV	266	7.9	27.1	15.806	3.7491	14.055	0.518	0.149	0.351	0.298
LNMV	266	6.57	12.54	9.5468	1.2926	1.671	0.064	0.149	-0.622	0.298
Tobin's Q Ratio	266	0.1	2.8	0.625	0.3970	0.158	1.900	0.149	5.144	0.298
Cash_TA	266	0.0	0.3	0.079	0.0782	0.006	0.912	0.149	0.665	0.298
LNTR	266	6.75	12.92	9.7773	1.3195	1.741	0.290	0.149	-0.518	0.298

Notes: The variables listed are defined in Table 2.

Table 4. Pearson/Spearman correlation matrix

Variables	ESG	ENV	SOC	GOV	Tobin's Q Ratio	CASH_TA	LNMV	LNTR
ESG	1	0.894**	0.854**	0.859**	0.045	0.070	-0.012	-0.032
ENV	0.902**	1	0.587**	0.780**	0.064	0.058	-0.045	-0.135*
SOC	0.841**	0.594**	1	0.550**	-0.044	-0.022	0.113	0.193**
GOV	0.897**	0.813**	0.636**	1	0.133*	0.187**	-0.151*	-0.225**
Tobin's Q Ratio	0.000	-0.012	-0.045	0.019	1	0.259**	0.083	-0.224**
CASH_TA	0.062	0.046	-0.008	0.143*	0.143*	1	-.254**	-0.154*
LNMV	0.006	-0.004	0.116	-0.127*	0.154*	-0.251**	1	0.739**
LNTR	-0.043	-0.121*	0.169**	-0.206**	-0.169**	-0.129*	0.739**	1

Notes: In the above table, Pearson (Spearman) correlations are presented above (below) the diagonal of the matrix.
**Significance at the 0.001 level. *Significance at the 0.05 level.

4.2 Discussion on the research hypotheses

When assessing the association between ESG factors disclosure and firm's value, the correlation has been analysed for the full sample considered, and for each of the five regions (Africa, Asia, Australia, Europe, North America, and South America). The significant econometric models in terms of sample size and F statistics were identified for the three regions presented in Table 5 and Table 6. Thus, the regions selected are North America, Europe, and Asia, based on the outputs resulted from SPSS software.

The relationship between ESG combined scores and firm's value represented by market value, overall and per each of the three regions, is analysed in the first main scenario (Scenario 1), presented in Table 5. The regression model is the following: $LNMV_t = \beta_0 + \beta_1 ESG_t + \beta_2 CASH\_TA_t + \beta_3 LNTR_t + \varepsilon_t$. Three sub-scenarios are disaggregated from Scenario 1 to assess the association between each of the ESG factors (environment, social and corporate governance) and firm's value, represented in this scenario by natural logarithm of market value.

Table 5. The impact of market value on ESG factors' disclosure

Dependent Variable: LNMV	Overall sample		North America		Europe		Asia	
	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Scenario 1	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**
(constant)	2.384	0.466	0.891	0.665	-0.149	0.774	2.416	1.065
ESG	0.002	0.004	0.014	0.006	0.009	0.005	-0.009	0.009
CASH_TA	-2.315	0.642	-2.635	0.968	-1.765	0.856	3.598	1.445
LNTR	0.736	0.038	0.881	0.064	0.923	0.061	0.756	0.076
F statistic	139.963		78.755		91.098		33.617	
Durbin-Watson	2.023		1.937		1.619		1.168	
Adjusted R-square	0.611		0.812		0.689		0.594	
Scenario 1.1	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**
(constant)	2.050	0.478	0.697	0.810	-0.240	0.720	1.843	1.105
ENV	0.018	0.010	0.026	0.017	0.029	0.013	-0.001	0.028
CASH_TA	-2.332	0.638	-2.468	0.996	-1.714	0.849	3.295	1.523
LNTR	0.744	0.038	0.928	0.066	0.922	0.059	0.760	0.077
F statistic	142.187		75.288		93.485		32.852	
Durbin-Watson	2.014		1.980		1.576		1.155	
Adjusted R-square	0.615		0.805		0.695		0.588	
Scenario 1.2	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**
(constant)	2.676	0.413	1.698	0.573	0.850	0.724	2.662	1.027
SOC	-0.008	0.009	-0.045	0.016	-0.006	0.012	-0.031	0.021
CASH_TA	-2.286	0.640	-2.206	0.957	-1.893	0.869	3.567	1.405
LNTR	0.743	0.039	0.774	0.076	0.894	0.060	0.758	0.076
F statistic	140.443		84.320		88.317		34.676	
Durbin-Watson	2.002		1.946		1.562		1.175	
Adjusted R-square	0.612		0.822		0.682		0.601	
Scenario 1.3	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**
(constant)	2.196	0.479	1.058	0.715	-0.868	0.750	2.543	1.047
GOV	0.016	0.014	0.026	0.020	0.054	0.017	-0.047	0.039
CASH_TA	-2.413	0.647	-3.086	1.040	-2.011	0.830	3.599	1.424
LNTR	-0.745	0.039	0.911	0.065	0.967	0.061	0.757	0.076
F statistic	140.903		73.916		99.398		34.074	
Durbin-Watson	2.030		2.016		1.698		1.171	
Adjusted R-square	0.613		0.802		0.708		0.597	

The regression analysis results for the first scenario indicate that a percentage between 58% and 81% of the total variation in the market value of the companies acting in energy industry, both globally and per region, may be explained by combined and specific ESG factors' disclosure, when controlling for revenues and cash scaled by total assets.

The results presented in Table 5 supports both a positive and a negative association between the combined and individual ESG factors disclosure and firm's value measured by market value. The findings are consistent with the main hypothesis developed in the research model, assuming that there is an association between ESG factors disclosure and the firm's value for international companies within Energy industry. Previous studies (Sadiq *et al.*, 2020; Li *et al.*, 2018; Fatemi *et al.*, 2018; Yoon *et al.*, 2018; Yu *et al.*, 2018; Wong *et al.*, 2020; Horváthová, 2010) found similar results in what concerns the relationship between ESG factors disclosure and firm's value.

Considering the significance of the influence, the impact of the independent variables (combined ESG factors and individual factors – ENV, SOC and GOV) on the market value become significant for the overall sample and for each region analysed. Disaggregating the statistic outputs on each region and scenario, it can be observed that for the overall sample, North America, and Europe regions, there is a positive and significant association between the combined ESG factors, individual factors (ENV and GOV) and firm's value represented by market value. A negative and significant connection has been developed between the individual social factor (SOC) and the value of the company. As for the influence of the control variables used in the research model, only total revenues (LNTR), for the overall sample only, have a significant influence on the dependent variable (positive for scenario 1, scenario 1.1 and scenario 1.2, and negative for scenario 1.3). For Asia region, the statistics outputs show a negative and significant connection between the combined and individual ESG factors' disclosure and the firm's value represented by natural logarithm of market value.

The association between ESG combined scores and firm's value represented by Tobin's Q on regions is assessed in the second main scenario (Scenario 2) presented in Table 6. The regression model is the following: *Tobin's $Q_t = \beta_0 + \beta_1 ESG_t + \beta_2 CASH\_TA_t + \beta_3 LNTR_t + \varepsilon t$.* Three sub-scenarios are disaggregated from Scenario 2, to evaluate the correlation between each of the ESG factor (environment, social and corporate governance) and firm's value, represented in this scenario by Tobin's Q. The regions selected are North America, Europe and Asia based on the outputs resulted from SPSS software.

For the second research model applied to the data set, only a percentage between 1% and 40% of the total variation in firm's value (dependent variable – Tobin's Q) for companies acting in energy industry may be explained by the combined and

individual ESG factors' disclosure (considered as independent variable, ESG combined score – scenario 2, environment score – scenario 2.1, social score – scenario 2.2 and corporate governance score – scenario 2.3), explaining on a very limited degree the total variation in firm's value for the overall sample and the three main regions analysed (Asia, Europe and North America).

Table 6. The impact of Tobin's Q on ESG factors' disclosure

Dependent Variable: Tobin's Q	Overall sample		North America		Europe		Asia	
Scenario 2	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**
(constant)	1.040	0.219	0.311	0.551	0.553	0.363	1.780	0.396
ESG	0.001	0.002	0.011	0.005	0.000	0.002	-0.002	0.004
CASH_TA	1.157	0.301	0.380	0.802	1.284	0.401	2.205	0.537
LNTR	-0.057	0.018	-0.026	0.053	-0.010	0.028	-0.114	0.028
F statistic	9.949		1.449		3.915		16.016	
Durbin-Watson	2.103		2.281		2.062		2.116	
Adjusted R-square	0.092		0.024		0.067		0.402	
Scenario 2.1	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**
(constant)	1.031	0.225	0.197	0.672	0.640	0.340	1.460	0.408
ENV	0.002	0.005	0.020	0.014	-0.003	0.006	0.007	0.010
CASH_TA	1.160	0.301	0.503	0.826	1.270	0.401	1.985	0.562
LNTR	-0.056	0.018	0.010	0.055	-0.013	0.028	-0.111	0.028
F statistic	9.960		0.738		4.011		16.035	
Durbin-Watson	2.104		2.346		2.070		2.161	
Adjusted R-square	0.092		-0.015		0.069		0.402	
Scenario 2.2	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**
(constant)	1.092	0.194	0.901	0.497	0.560	0.336	1.932	0.381
SOC	0.000	0.004	0.021	0.014	-0.001	0.006	-0.011	0.008
CASH_TA	1.165	0.301	0.560	0.830	1.280	0.403	2.229	0.521
LNTR	-0.057	0.018	-0.069	0.066	-0.010	0.028	-0.114	0.028
F statistic	9.892		0.808		3.918		16.933	
Durbin-Watson	2.101		2.304		2.061		2.079	
Adjusted R-square	0.091		-0.011		0.067		0.416	
Scenario 2.3	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**	**Coefficient**	**Sig.**
(constant)	0.976	0.225	0.003	0.559	0.391	0.362	1.864	0.389
GOV	0.005	0.006	0.044	0.016	0.005	0.008	-0.015	0.015
CASH_TA	1.125	0.304	-0.333	0.813	1.269	0.400	2.229	0.529
LNTR	-0.054	0.018	0.006	0.051	-0.003	0.029	-0.114	0.028
F statistic	10.152		2.639		4.070		16.405	
Durbin-Watson	2.104		2.175		2.061		2.097	
Adjusted R-square	0.094		0.083		0.070		0.408	

The results presented in Table 6 show a similar impact of ESG factors' disclosure on the firm's value, when using Tobin's as the dependent variable as compared to the market value of the company. Even though it may seem that the combined and individual ESG factors may have a significant impact on firm's value ($p<0.05$), Adjusted R-square should be considered when performing this assessment (with a maximum significance level of 95%). Advancing the analysis on regions and secondary scenarios, for the overall sample and North America, there is a positive and significant association between the combined and individual ESG factors and the value of the company. Regarding Europe region, the outputs obtained show

both a positive (scenario 2 – ESG as independent variable; scenario 2.3 – GOV as independent variable) and negative (scenario 2.1 – ENV and scenario 2.2 – SOC) significant connection between the combined and individual ESG factor's disclosure and firm's value.

The Asia region has registered the highest value of Adjusted R-square (approximatively 40%), nonetheless, a limited variation of the dependent variable (Tobin's Q) is explained though the independent variables (ESG factors). The results obtained for Asia present a negative and significant association between the combined ESG factors, social factor (SOC – scenario 2.2) and corporate governance (GOV – scenario 2.3) and Tobin's Q representing the value of the company. In what concerns the relation between the environmental pillar and firm's value, a positive and significant relation was obtained for companies from Asia. The lack of significance resulted for the second linear regression model related to the main and the three sub-scenarios makes impossible for the hypotheses to be validated.

The impact of the control variable LNTR on the dependent variable, Tobin's Q is negative and significant for the overall sample, for companies from Asia and Europe when considering both combined and individual ESG scores. As for the trend, an increase of the firm's value measured by Tobin's Q, may be associated with an increase in cash ratio, but with a decrease in total revenues, both globally and regionally.

5. Discussion and conclusion

This research investigates the associations between ESG factors disclosure and firm's value for companies acting in energy sector. Previous empirical evidence supports mixed results when unidirectional linear relationships are tested. Based on the findings of this research, particular discussion is conducted for three geographical regions. Thus, the results support the hypothesis that there is an association between ESG factors disclosure and firm's value for companies from energy industry. The results are similar with other studies (Sadiq *et al.*, 2020; Li *et al.*, 2018; Fatemi *et al.*, 2018; Horváthová, 2010) investigating this relationship.

The regression models were designed for the combined ESG factors and then extended by replicating them for each factor (environment, social and corporate governance). Findings confirm that both the individual (environment – ENV, social – SOC, and corporate governance) and the combined ESG factors are significantly connected with the value of the company measured in the first regression model by market value and in the second model by Tobin's Q.

Displaying the results obtained for each research model, scenario, and region it can be noticed that for the first regression model (market value used as the dependent

value), both a positive and negative significant connection has been obtained between ESG factors disclosure and firm's value. Consequently, there is a positive and significant association between the combined ESG factors, individual factors (ENV and GOV) and firm's value for the overall sample, North America, and Europe regions. A negative association has been identified between the social factor (SOC) and firm's value, for the overall sample and the three regions analyzed (North America, Europe, and Asia). Concluding on the outputs obtained for Asia region, a negative and significant association exists between individual and combined ESG factors disclosure and market value.

The second research model applied reveals that a limited percentage of the total variation in firm's value for companies acting in energy industry, both globally and per region, may be explained by combined and specific ESG factors' disclosure, when controlling for revenues and cash scaled by total assets. The low levels of Adjusted R-square make impossible the validation of the main and secondary hypotheses for the second regression model. Nonetheless, for the overall sample and North America, a positive and significant association between the combined and individual ESG factors and the value of the company exists. The outputs obtained for Europe present both a positive (scenario 2 – ESG as independent variable; scenario 2.3 – GOV as independent variable) and a negative (scenario 2.1 – ENV and scenario 2.2 – SOC) significant connection between ESG factor's disclosure and the value of the company. Energy companies from Asia present a negative and significant association between the combined ESG factors, social factor (SOC – scenario 2.2) and corporate governance (GOV – scenario 2.3) and Tobin's Q representing the value of the company. A positive and significant correlation exists between the environmental pillar and firm's value.

The main contribution of this investigation to the literature consists of the evidence obtained about the association between ESG factors disclosure and firm's value by using two different dependent variables that have enhanced the certainty regarding the evidence obtained for the investigated association. The positive relationship may encourage executives to adopt an ESG disclosure policy in order to enhance the value of the company and thus, attract new investors and capital, but not limited to this. By presenting aspects related with the environment and human capital, the management of the company show its serious consideration and commitment to these aspects.

Future research may be extended into determining whether an association between ESG factors disclosure and firm's value exists for companies from other sensitive industries, but also for companies from non-sensitive industries. In addition, a comparison between companies from different regions may also discovered different attitudes towards the ESG factors disclosure and their impact on the value of the company. A difference in difference analysis may also be conducted on a generalized sample including companies from all industries. Particularities of the

companies from sensitive industries as compared to companies from non-sensitive industries may be identified.

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