European Journal of Sustainable Development (2022), **11**, 4, 91-104 ISSN: 2239-5938
Doi: 10.14207/ejsd.2022.v11n4p91

ESG Rating and Market Valuation of the Firm: Sector Approach

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Abstract
The main aim of the study was to assess the impact of the ESG rating of the company on its market valuation. The research sample included stock companies of real economy sectors of financial markets of European Union Member States in years 2018-2020. The research hypothesis stated that across financial markets of European Union there are sectors in which there is a strong and positive correlation between high ESG rating of the company and its market value. The paper analysed selected measures of descriptive statistics of used variables, Pearson correlation coefficient, and constructed an Ordinary Least Squared model assessing the impact of ESG rating on the surveyed companies' market value. Both the composites of ESG rating (ESG and ESGC) and the individual components (E, S, G and C) were analysed. Financial data and ESG ratings were extracted from Refinitiv Eikon database. Undertaken research proved ESG disclosure and rating to be the determinant of the companies market value in specific sectors, while companies controversies appeared to be the destructors of market value of companies across all sectors. Undertaken study adds new insights to the debate on the relation between companies ESG and financial performance by applying sector approach to the analysis.

Keywords: ESG, ESG rating, Tobin's Q, financial performance, sustainable finance, non-financial information

1. Introduction

In the mainstream theory of finance one of the leading goals of the firm is to maximize shareholder wealth (Friedman, 1962; Jensen, 2001). In this concept, the purpose of a firm is not to act morally, but simply to profit. From a neoclassical point of view the firm should not take externalities into account since the costs of moral issues are the loss for shareholders (Egorova et al. 2022). However, the exacerbation of negative climate change, social disparities and cases of amoral actions of corporates (Dixon, 2019; Apostaie, 2020) raise the need to shift the paradigm in how business operates (Soppe 2004; Fatemi and Fooladi. 2013; Dziawgo, 2019) in order to focus on the environmental, social and governance (ESG) issues. In recent decades Ferri and Liu (2005), Escrig-Olmedo et al. (2013), and Schoenmaker and Schramade (2019) documented rapidly growing interest of investors in ESG performance of the firm proxied by ESG ratings, so the comprehensive and transparent measures of companies performance in ESG related areas (Avetisyan and Hockerts 2017). Increasing popularity of ESG ratings also proves the necessity of ESG integration into firm valuation (Giese et al. 2021), as:

- environmental (E) activities involve companies' efforts to make a positive impact on the environment, through compliance with existing regulations and recognition of future

impacts;

- social (S) activities refer to equitable treatment of stakeholders and protection of the social ecosystem in which the firm operates;
- governance (G) incorporates firm ethics, including principles such as transparency and fair dealing, and effective functioning of the board of directors.

Given not consistent ESG ratings reported by different rating agencies, the informational value of ESG ratings has been recently debated by Dimson et al. (2020) and Gyönyörová et al. (2021). Nevertheless, ESG ratings are important investment tools that allow investors to recognize opportunities and risks related to the operations of selected firms (Coleman et al. 2010; Amel-Zadeh and Serafeim 2018; Tucker and Jones, 2020).

The main aim of the study was to assess the impact of the ESG ratings of the company on firm value proxied by Tobin's Q. The research sample included stock companies of real economy sectors of financial markets of European Union Member States (EU-28) in years 2018-2020. Set research hypothesis stated that across financial markets of EU-28 there are sectors in which there is a strong and positive correlation between high ESG ratings of the company and its market value. The paper analysed selected measure of descriptive statistics of used variables, Pearson correlation coefficient, and constructed an Ordinary Least Squared (OLS) model assessing the impact of ESG ratings on firm value. Both the composites of ESG ratings (ESG and ESGC ratings) and the individual components (E, S, G and C ratings) were analysed. Financial data and ESG ratings were extracted from Refinitiv Eikon database. Undertaken research proved ESG disclosure and ratings to be the determinant of the companies market value of different strength and direction depending on the sector classification of companies.

The following structure of the paper was organized as follows. In the second section provided literature review on the relationship between ESG and market performance of the firm. In the third section explained research methodology, while in the fourth presented the results of empirical study. The culmination of the research were conclusions included in the fifth, thus the last section of the paper.

2. Literature Review

The search for a dependencies between ESG and market value of the firm can be traced back to the beginning of the 1970s (Friede et al. 2015). Prior research predominantly proxied ESG performance of the firm by its ESG ratings or scorings both on composite and individual level (Chow et al. 2014). What is more, different researchers used ratings provided by different rating agencies or data providers i.e. Refinitiv Eikon, Bloomberg, MSCI, Sustainalytics, Dow Jones and Corporate Knights (Huber et al. 2017). In terms of market performance, researchers typically used Tobin's Q (Lindenberg and Ross, 1981; Yoo and Managi, 2021), Book-to-Market Vale ratio (Pontiff and Schall, 1998; Donnelly, 2014) or Buy-and-Hold Abnormal Return (Ferrel et al. 2013; Janicka et al. 2020) in order to proxy firm value.

Hamilton (1995) documented that financial markets may respond to ESG performance of the firm in three different ways:

- the market does not value for ESG efficiently – investors find it complicated to value

potential benefits or costs of ESG (Derwall et al. 2005),

- the market value for ESG – investors link strong ESG performance with lower risk than ESG laggards (Spicer, 1978),
- the market does not value for ESG – investors tie ESG disclosure with higher exposure for risk (Richardson and Welker, 2001).

In the current state of the academic debate, authors found evidence of no statistically significant impact of ESG performance on market results of the firm (Halbitter et al, 2015; Naffa and Fain, 2021). Similar results were reported by Velte (2017), who proved no relationship between ESG performance and Tobin's Q of German stock companies. Nonetheless, Fama (1998) and Hang et al. (2019) pointed out that no relationship between ESG and market performance appears in the short term only, while in the long-run the relationship usually takes specified direction (Dorfleitner et al. 2018). While Brammer et al. (2006) Barnea and Rubin (2010), and Wong et al. (2021) proved negative effect of ESG ratings on firm value, Lo and Sheu (2007), Galema et al. (2008), and Guenster et al. (2011) reported that ESG disclosure of the firm results in higher valuation. What is more, higher ESG ratings are associated with higher market-based measures like Tobin's Q or Book-to-Market Value ratio (Durand et al. 2013), which is consistent with the findings of Khan (2019); Alda (2020) and Consolandi et al. (2020). Hubel and Scholz (2020) also documented that across firms with ESG rating, the low-ESG rated report higher firm value than high-ESG rated as low-ones posses the ability for improvement which is then positively reflected in an increase in firm value (Sandberg et al. 2009). Limkriangkrai et al. (2016) found evidence consistent with the notion that ESG creates shareholder value, while Orlitzky et al. (2003) indicates that the relationship between ESG ratings and value of the firm is more likely to be positive.

The literature has repeatedly examined the impact of ESG performance on the firm value (Dalton et al. 1999; Chong et al, 2006; Hong and Kacperczyk, 2009; Liston and Soydemir, 2010) and as concluded by Ferreira et al. (2016), Cunha et al. (2021) and Kumar et al. (2022), the nature of this relationship is heterogeneous in nature, while the cause of this phenomenon is unknown (Lins et al. 2017). Highlighting the lack of consensus Cornell (2021) also concedes "the jury is still out on whether there is an ESG risk factor". What is more, according to Yu et al. (2018) and Wong et al. (2021), as one of the reasons for no consensus in analysed area are the external determinants of the companies operations such as country in which company operates (Durand et al. 2013) or the sector to which it belongs to (Adams and Jiang 2016). Research gaps indicated by Baji cand Yurtoglu (2018) highlight that analysis of the effect of ESG ratings on firm value of group of companies of many countries does not tell for which countries and which firms the relationship matters. Also, according to Egorova et al. (2022), there are very few papers devoted to studying the ESG implications in sector perspective. Additionally, Friede et al. (2015) pointed out that no large scale comparison between the subgroups has been undertaken so far, while Albertini (2013) and Shanaev and Ghimire (2021) mention that key area for future research is whether any of the three ESG letters have a dominating effect on market performance. Undertaken study attempts to fill the research gap of impact of ESG performance effect on firm value across different sectors as well as detection of which "letter" of ESG (in fact ESGC) has dominant impact on the market performance.

3. Research Methodology

The objective of the paper was to assess the impact of the ESG ratings of the company on its market valuation. Research was conducted on the stock companies of real economy sectors (as in Table 1) of financial markets of European Union Member States including United Kingdom[1] (EU-28) for years 2018-2020. The choice of research sample was dictated by the fact European Union provides best in class non-financial reporting regulations for public companies globally (Ahlström 2019, 2021), while years 2018-2020 were documented to be of the highest growth of popularity of ESG ratings (Gawęda 2021). Research utilized financial data and ESG ratings of companies from Refinitiv Eikon database.

Table 1. Sector classification of Thomson Reuters Business Classification level 1 and sector abbreviations

Economic sector	Abbreviation
Basic Materials	BM
Consumer Cyclicals	CC
Consumer Non-Cyclicals	CN-C
Energy	E
Healthcare	H
Industrials	I
Real Estate	RE
Technology	T
Utilities	U

Source: Own research based on Refinitiv, The Refinitiv Business Classification, https://www.refinitiv.com/en/financial-data/indices/trbc-business-classification.

For the purpose of achieving the objective of the paper set the research hypothesis that across financial markets of EU-28 there are sectors in which there is a strong and positive correlation between high ESG rating of the company and its valuation. Following Dowell et al. (2000), in order to compare the profiles of companies of different sectors mean results were analysed. Pearson correlation coefficient was used to document the correlation between variables. The assessment of the impact of ESG rating on firm value utilized following OLS models:

$$Value_i = \beta_0 + \beta_1 ESG\_D_i + \beta_t X_i + \varepsilon_i \quad (1)$$

$$Value_i = \beta_0 + \beta_1 Comp\_ESGC_i + \beta_t X_i + \varepsilon_i \quad (2)$$

$$Value_i = \beta_0 + \beta_1 Sub\_ESGC + \beta_t X_i + \varepsilon_i \quad (3)$$

*Where: **Value** is the market value of the company proxied by Tobin's Q ratio, **ESG_D** is the dummy variable equal 1 for companies reporting on ESG in at least one year of 2018-2020 period, 0 otherwise, **Comp_ESGC** are the composite ESGC and ESG ratings, **Sub_ESGC**, are the individual E, S, G and C ratings, while **X**, stands for the set of control variables of firm characteristics such as profitability (RoA), leverage (GDR), size (ln(A)), and growth potential (SG) of the company.*

Model of equation (1) was used to analyse the impact of ESG disclosure on firm value. (2) and

[1] Despite BREXIT in 2020, companies of United Kingdom were included in the research sample, as they were part of the European Union for the majority of research horizon.

(3) assessed the impact of composite and each letter ESG ratings on the firm value in the group of companies disclosing ESG. Detailed description of used variables included in Table 2.

Table 2. Definition of variables

Variable	Definition
TQ	Simplified Tobin's Q ratio (market capitalization / total assets) proxies market valuation (Kaplan and Zingales, 1997; Zimmermann, 2004).
RoA	Return on Assets ratio (earnings after taxes / average total assets) proxies profitability.
GDR	General Debt Ratio (total debt / total assets) proxies the leverage.
A	Book value of total assets in bln EUR.
Ln(A)	Natural logarithm of total assets proxies the size.
SG	1-year Sales Growth proxies the growth potential.
ESG_D	Dummy variable equal 1 for companies reporting on ESG in at least one year, otherwise 0.
ESGC	ESGC combined score as the proxy of the ESGC rating obtained from Refinitiv Eikon.
ESG	ESG combined score as the proxy of the ESG rating obtained from Refinitiv Eikon.
E	Environmental score as the proxy of the E rating obtained from Refinitiv Eikon.
S	Social score as the proxy of the S rating obtained from Refinitiv Eikon.
G	Governance score as the proxy of the G rating obtained from Refinitiv Eikon.
C	Controversies score as the proxy of C rating obtained from Refinitiv Eikon.

Source: Own research

Following Bajic and Yurtoglu (2018) and Arora et al. (2021) in order to avoid the influence of extreme observations on the results, all variables were winsorized at 5th and 95th percentile.

4. Results

Table 3 presents characteristics of research sample in terms of number of analysed companies and their financial and market performance using three-year mean results.

Table 3. Research sample characteristics

Panel A: Profile of analysed firms										
Economic sector	**BM**	**CC**	**CN-C**	**E**	**H**	**I**	**RE**	**T**	**U**	**Total**
ESG_D	153	317	120	82	189	418	110	274	60	1 723
Other companies	260	565	224	132	313	525	324	517	55	2 915
All companies	413	882	344	214	502	943	434	791	115	4 638
Panel B: ESG companies financial performance (three-year mean results)										
Economic sector	**BM**	**CC**	**CN-C**	**E**	**H**	**I**	**RE**	**T**	**U**	**Total**
TQ	1.00	1.21	1.17	1.00	2.69	1.04	0.56	2.10	0.59	1.38
RoA	0.03	0.03	0.03	-0.03	-0.07	0.03	0.03	0.02	0.02	0.01
GDR	0.54	0.60	0.60	0.54	0.43	0.64	0.50	0.53	0.67	0.57
A	3.83	3.05	3.85	4.15	1.90	2.93	4.44	2.07	7.45	3.16
SG	0.03	0.01	0.05	0.04	0.11	0.03	0.10	0.10	0.03	0.05

Panel C: Other companies financial performance (three-year mean results)										
Economic sector	**BM**	**CC**	**CN-C**	**E**	**H**	**I**	**RE**	**T**	**U**	**Total**
TQ	1.13	0.95	1.02	1.14	2.67	1.09	0.71	1.90	0.82	1.33
RoA	-0.08	-0.03	-0.01	-0.12	-0.26	-0.04	0.01	-0.09	0.00	-0.07
GDR	0.46	0.55	0.50	0.45	0.41	0.53	0.47	0.50	0.53	0.50
A	0.16	0.17	0.30	0.25	0.07	0.13	0.42	0.07	0.46	0.18
SG	0.02	0.02	0.04	0.07	0.11	0.06	0.10	0.11	0.05	0.07

Notes: ***ESG companies*** *stands for companies with ESG scoring granted in at least one year in 2018-2020 period and* ***Other companies*** *stands for companies without ESG scoring. Economic sector abbreviations and variables definition as in tables 1 and 2 respectively.*
Source: Own research

Panel A of Table 3 presents that in years 2018-2020 1 723 firms (37.2%) out of 4 638 companies reported on its ESG performance in at least one year in analysed period. I and CC sectors included the highest number of companies disclosing on ESG matters, while U and I were the ones with the highest percentage of such companies in the number of all companies of the respective sector. On the contrary, the smallest sectors in this manner were U and E, while RE and T were the smallest if analysed percentage share. Panel B and C of Table 3 presents that ESG companies reached higher valuation, were more profitable and in debt than Other companies. What is more, ESG companies were bigger firms of smaller potential to grow proxied by sales growth. In sector perspective, ESG companies of only CC, CN-C, H and T sectors reached higher TQ than Other companies. Across all sectors, ESG companies reported higher RoA and GDR than Other companies. What is more, there was no sector in which ESG companies were smaller by assets than Other companies, however Other companies in most of sectors reached higher SG.
Table 4 includes the 3-year mean results of ESG performance proxied by ESGC, ESG, E, S, G and C scorings in analysed sectors.

Table 4. ESGP of companies per sector

Economic sector	BM	CC	CN-C	E	H	I	RE	T	U	Total
ESGC	53.39	52.09	52.07	49.90	47.10	49.34	54.27	46.08	55.81	50.38
ESG	56.13	54.03	54.75	54.16	48.84	51.13	54.56	47.41	59.31	52.38
E	53.07	49.16	52.32	49.38	33.75	44.96	54.21	36.15	59.70	46.12
S	55.47	52.49	54.49	53.85	48.49	49.86	52.12	47.70	56.28	51.40
G	59.51	57.41	56.46	58.61	56.80	56.32	56.50	52.27	60.44	56.62
C	91.14	92.37	90.06	86.83	93.20	93.63	99.62	94.43	86.70	92.75

Notes: Economic sector abbreviations and variables definition as in tables 1 and 2 respectively.
Source: Own research

The leaders in ESGC were companies of U and RE sectors, while those of T and H were documented as definite laggards. In terms of ESG, top performers were firms of U and additionally of BM sectors, while bottom ones unchangeably were the firms of T and H. Taking into consideration the sole results in (E)nvironmental area, firms of U and RE sectors were the leading ones, while firms of T and H fell behind. The firms of U and BM sectors are the ones that care the most about (S)ocial aspects and companies of T and H received the worst score in this area. Analysing (G)overnance score, companies of U and

BM reached the best results, in contrary to ones of T and I which reported the worst scores. Finally, the least (C)ontroversies were observed in firms of RE and T and the opposite was noted for U and E.
Correlation between ESG_D and TQ was analysed (not reported), however no unified conclusions were found. The relationship varied depending on the sector, while statistically significant correlations of $p < 0.05$ and of weak strength (0.13 at most) were recognized only in CC, RE, T and U sectors. The effect of ESG disclosure on firms market valuation proxied by TQ reported in Table 5.

Table 5. ESG disclosure effect on market value of the firm

Economic sector	BM	CC	CN-C	E	H	I	RE	T	U
Intercept	4.049***	5.030***	4.729***	6.814***	9.220***	4.914***	3.424***	7.278***	4.209***
	(10.307)	(19.100)	(11.723)	(11.695)	(17.624)	(20.346)	(16.151)	(19.801)	(8.048)
ESG_D	0.874***	1.014***	0.874***	1.090***	1.462***	0.802***	0.320***	1.276***	0.482***
	(8.933)	(15.141)	(8.616)	(8.007)	(11.663)	(12.944)	(5.618)	(13.309)	(3.758)
RoA	-	-0.236	-0.619**	-	-	-	-	-	-
	2.961***	(-1.257)	(-2.086)	1.467***	1.110***	1.244***	0.598***	0.610***	2.135***
	(-13.200)			(-4.669)	(-5.199)	(-7.454)	(-2.879)	(-3.380)	(-4.249)
GDR	-	-	-	-0.027	-	-	-	-	-
	0.758***	0.726***	1.302***	(-0.152)	1.341***	0.926***	0.722***	0.932***	0.645***
	(-5.750)	(-7.136)	(-8.062)		(-7.646)	(-9.075)	(-8.159)	(-6.600)	(-3.271)
ln(A)	-	-	-	-	-	-	-	-	-
	0.163***	0.211***	0.173***	0.330***	0.384***	0.197***	0.129***	0.304***	0.164***
	(-7.138)	(-13.953)	(-7.416)	(-10.291)	(-12.654)	(-13.657)	(-10.717)	(-13.923)	(-5.745)
SG	0.549***	0.983***	0.919***	0.274**	0.544***	0.507***	0.0190	0.992***	0.270*
	(4.500)	(12.421)	(6.274)	(2.221)	(4.735)	(6.545)	(0.392)	(9.654)	(1.721)
Adjusted R^2	0.305	0.175	0.199	0.288	0.247	0.164	0.186	0.166	0.219
N	1239	2646	1032	642	1506	2829	1302	2373	345

*Notes: Statistically significant correlations marked as ***, **, * for p < 0.01, 0.05 and 0,1. T-statistics reported in the parenthesis. Economic sector abbreviations and variables definition as in tables 1 and 2 respectively.*
Source: Own research

ESG disclosure by companies had the positive and statistically significant impact on TQ in all analysed sectors. H and T sectors were the ones in which ESG_D impacted valuation of the firms to the greatest extent, while in RE and U sectors this relationship was of the weakest strength. Surprisingly, accounting-based measures of financial performance of the firm such as RoA and ln(A) reported negative impact on TQ across all sectors and RoA was not statistically significant only in CC sector. Proxy variable of leverage, namely GDR, had a negative impact on the valuation of the firm as well ln(A) but only in E sector those variables were not statistically significant. Finally, SG had positive impact on TQ in all sectors, while statistical significance was not recognized only in RE. The key determinant of firms' market value in sectors CC, H and T was ESG_D, in sectors BM, E, I and U it was RoA ratio, while in CN-C and RE sector the key construct of TQ was GDR. Reported R^2 proves set model was the best fit for companies of BM.
Based on correlations analysis (not reported) between each ESG scoring and TQ in all sectors, ESGC, ESG, E, S and G scorings were the destructors of firm value, however in each case the relationship was of weak strength (at most 0.30). Mentioned relationships was not statistically significant only in CN-C sector. Consistently positive and statistically

significant correlation was found between C scoring and TQ, nonetheless the strength of this relationship was weak (0.27 at most) in each sector. What is more, across all sectors, between E and S scorings autocorrelation (on the level of at least 0,76) was found, thus these variables were analysed separately.
The effects of ESGC, ESG, and E, S, G and C scorings on market value of the firms were analysed on the sample of companies which reported ESG matters in at least one year of 2018-2020 period. The regression analysis results using ESGC, ESG, and E, S, G, and C scorings were reported in Table 6, Table 7 and Table 8.

Table 6. ESGC scoring effect on market value of the firm

Economic sector	BM	CC	CN-C	E	H	I	RE	T	U
Intercept	7.682***	4.620***	5.141***	10.123***	12.432***	4.896***	3.592***	7.041***	7.054***
	(10.761)	(7.799)	(4.741)	(8.854)	(12.008)	(11.350)	(9.246)	(8.571)	(7.726)
ESGC	0.015***	-0.002	0.013***	0.025***	0.022***	0.006***	0.000	0.005	0.007**
	(4.83)	(-0.703)	(2.732)	(4.457)	(3.726)	(2.853)	(0.350)	(1.007)	(2.208)
RoA	-0.642	5,248***	4,164***	0,021	0,630	2,235***	0,299	1,982***	-0,207
	(-1,095)	(9,485)	(4,721)	(0,036)	(1,419)	(6,422)	(1,188)	(3,663)	(-0,17)
GDR	-0,628**	-	-	-0,664*	-1,903***	-	-	-	-
	(-2,237)	1,254***	1,293***	(-1,798)	(-4,615)	1,663***	0,661***	1,545***	1,065***
		(-5,478)	(-3,189)			(-9,041)	(-6,299)	(-4,346)	(-3,435)
ln(A)	-	-	-	-0,476***	-0,507***	-	-	-	-
	0,337***	0,132***	0,192***	(-7,513)	(-8,41)	0,152***	0,126***	0,229***	0,277***
	(-8,351)	(-4,092)	(-3,213)			(-6,073)	(-6,438)	(-4,692)	(-5,744)
SG	0,338	0,672***	1,380***	0,443**	0,630***	0,470***	0,091	1,727***	0,253
	(1,599)	(3,361)	(4,275)	(1,996)	(2,633)	(3,269)	(1,409)	(6,163)	(1,085)
Adjusted R^2	0,226	0,283	0,215	0,325	0,290	0,232	0,281	0,174	0,327
N	459	951	360	246	567	1254	330	822	180

*Notes: Statistically significant correlations marked as ***, **, * for p < 0.01, 0.05 and 0,1. T-statistics reported in the parenthesis. Economic sector abbreviations and variables definition as in tables 1 and 2 respectively.*
Source: Own research

ESGC scoring – except CC and RE sectors where the relation was negative or neutral respectively – had positive impact on valuation of the firms across sectors and lack of statistical significance was noted only in T sector. RoA impacted TQ negatively only in BM and U sectors, however this relationship was not statistically significant. In each sector, GDR, same as ln(A) had a negative and statistically significant impact on firm value, while SG was proved to be a variable of positive character and lack of statistical significance in BM, RE and U sectors. RoA was the leading variable of firms valuation in CC, CN-C, I and T sectors, while in other sectors dominant variable was GDR. R^2 implied model using ESGC to be more fitted in most of sectors than the ESG_D one, while the highest results were observed in U (0.327) and E (0.325) sectors.

Table 7. ESG scoring effect on market value of the firm

Economic sector	BM	CC	CN-C	E	H	I	RE	T	U
Intercept	8.282***	4.540***	5.925***	12.298***	12.786***	5.051***	3.600***	6.838***	7.546***
	(10.74)	(7.275)	(5.060)	(9.518)	(11.809)	(11.100)	(9.231)	(7.948)	(7.909)
ESG	0.016***	-0.002	0.016***	0.032***	0.020***	0.006***	0.000	0.002	0.010***
	(5.073)	(-0.803)	(3.148)	(5.474)	(3.447)	(2.964)	(0.394)	(0.326)	(2.762)
RoA	-0.311	5.250***	4.287***	0.351	0.714	2.282***	0.301	2.017***	0.106
	(-0.523)	(9.505)	(4.878)	(0.594)	(1.611)	(6.537)	(1.195)	(3.732)	(0.088)

Economic sector	BM	CC	CN-C	E	H	I	RE	T	U
GDR	-0.593**	-	-	-0.592	-1.953***	-	-	-	-
	(-2.114)	1.255***	1.381***	(-1.641)	(-4.72)	1.680***	0.660***	1.558***	1.172***
		(-5.483)	(-3.398)			(-9.140)	(-6.286)	(-4.382)	(-3.758)
ln(A)	-	-	-	-0.604***	-0.522***	-0.16***	-	-	-
	0.371***	0.127***	0.235***	(-8.213)	(-8.151)	(-6.062)	0.126***	0.211***	0.304***
	(-8.412)	(-3.68)	(-3.609)				(-6.437)	(-4.099)	(-6.01)
SG	0.338	0.668***	1.427***	0.496**	0.641***	0.464***	0.092	1.707***	-0.201
	(1.605)	(3.332)	(4.422)	(2.296)	(2.673)	(3.22)	(1.415)	(6.087)	(-0.871)
Adjusted R^2	0.231	0.283	0.221	0.355	0.287	0.232	0.281	0.173	0.338
N	459	951	360	246	567	1254	330	822	180

*Notes: Statistically significant correlations marked as ***, **, * for p < 0.01, 0.05 and 0,1. T-statistics reported in the parenthesis. Economic sector abbreviations and variables definition as in tables 1 and 2 respectively.*
Source: Own research

The positive and statistically significant impact of ESG scoring on the market valuation of the firm was observed in BM, CN-C, E, H, I and U sectors, while in CC, RE and T sectors the relationship was negative, neutral and positive respectively, and statistically insignificant in each cases. In terms of the remaining variables of the model, results were similar as in Table 6, with the exception of RoA in U sector (changed from negative to positive relationship but still statistically insignificant), GDR in E sector (turned out to be statistically insignificant) and SG in U sector (relationship changed from positive to negative). What is more, R^2 indicates similar model results for BM, CC CN-C, I, RE and T sectors and more fitted for E and U sectors.

Table 8. E, S, G and C scorings effect on market value of the firm

Panel A: E, G and C scorings									
Economic sector	**BM**	**CC**	**CN-C**	**E**	**H**	**I**	**RE**	**T**	**U**
Intercept	7.735***	4.553***	5.686***	12.563***	11.005***	4.710***	3.527***	4.520***	7.674***
	(9.182)	(6.212)	(4.203)	(8.941)	(7.952)	(8.925)	(6.388)	(4.099)	(7.521)
E	0.007***	-0.001	0.008**	0.027***	0.002	0.001	-0.001*	-	0.005**
	(2.933)	(-0.559)	(2.193)	(6.524)	(0.414)	(0.885)	(-1.730)	0.010***	(2.086)
								(-2.594)	
G	0.007***	0.000	0.009**	0.002	0.014***	0.004**	0.001*	0.012***	0.001
	(2.812)	(0.012)	(2.463)	(0.57)	(3.245)	(2.39)	(1.658)	(3.021)	(0.456)
C	0.001	0.000	0.001	0.000	0.006	0.001	0.002	0.009**	0.002
	(0.362)	(0.128)	(0.174)	(0.086)	(1.233)	(0.365)	(0.64)	(2.096)	(0.98)
RoA	-0.543	5.218***	4.255***	0.266	0.883*	2.235***	0.286	1.797***	0.502
	(-0.897)	(9.432)	(4.809)	(0.455)	(1.907)	(6.356)	(1.134)	(3.309)	(0.400)
GDR	-0.680**	-	-	-0.539*	-1.838***	-	-	-	-
	(-2.415)	1.262***	1.351***	(-1.527)	(-4.380)	1.650***	0.706***	1.588***	1.107***
		(-5.498)	(-3.303)			(-8.898)	(-6.652)	(-4.525)	(-3.432)
ln(A)	-	-	-	-0.608***	-0.450***	-	-	-	-
	0.339***	0.131***	0.227***	(-8.279)	(-6.945)	0.144***	0.110***	0.145***	0.295***
	(-7.834)	(-3.734)	(-3.446)			(-5.492)	(-5.582)	(-2.809)	(-5.764)
SG	0.368*	0.670***	1.408***	0.434**	0.571**	0.485***	0.090	1.644***	-0.165
	(1.729)	(3.340)	(4.364)	(2.043)	(2.358)	(3.358)	(1.389)	(5.873)	(-0.693)
Adjusted R^2	0.218	0.281	0.220	0.389	0.285	0.230	0.288	0.194	0.324
N	459	951	360	246	567	1254	330	822	180

Panel B: S. G and C scorings									
Economic sector	**BM**	**CC**	**CN-C**	**E**	**H**	**I**	**RE**	**T**	**U**
Intercept	7.944***	4.383***	5.341***	10.652***	11.425***	4.796***	3.902***	4.659***	7.685***
	(9.594)	(6.151)	(4.048)	(7.511)	(8.266)	(9.433)	(7.096)	(4.256)	(7.801)
S	0.011***	-0.003	0.008*	0.020***	0.007	0.003	0.001	-0.010**	0.007**
	(3.769)	(-1.459)	(1.892)	(4.280)	(1.381)	(1.616)	(0.789)	(-2.409)	(2.526)
G	0.005***	0.000	0.008**	0.001	0.013***	0.003**	0.001*	0.012***	0.001
	(1.950)	(0.190)	(2.26)	(0.252)	(2.844)	(2.106)	(0.799)	(2.967)	(0.237)
C	0.001	0.000	0.001	0.000	0.006	0.001	0.002	0.010**	0.002
	(0.434)	(0.090)	(0.224)	(0.013)	(1.176)	(0.426)	(0.505)	(2.253)	(1.141)
RoA	-0.312	5.274***	4.197***	0.150	0.889**	2.234***	0.338	1.740***	0.375
	(-0.512)	(9.526)	(4.737)	(0.244)	(1.977)	(6.377)	(1.330)	(3.205)	(0.300)
GDR	-0.516*	-	-	-0.592*	-1.825***	-	-	-	-
	(-1.814)	1.248***	1.402***	(-1.593)	(-4.374)	1.652***	0.652***	1.579***	1.299***
		(-5.441)	(-3.406)			(-8.928)	(-6.295)	(-4.497)	(-3.961)
ln(A)	-	-	-	-0.503***	-0.483***	-	-	-	-
	0.363***	0.118***	0.210***	(-6.796)	(-7.239)	0.153***	0.135***	0.146***	0.294***
	(-8.298)	(-3.42)	(-3.27)			(-5.931)	(-7.062)	(-2.797)	(-6.064)
SG	0.360*	0.652***	1.421***	0.574**	0.581**	0.479***	0.100	1.725***	-0.135
	(1.705)	(3.249)	(4.382)	(2.563)	(2.414)	(3.32)	(1.546)	(6.229)	(-0.571)
Adjusted R^2	0.228	0.282	0.217	0.321	0.288	0.232	0.281	0.193	0.333
N	459	951	360	246	567	1254	330	822	180

*Notes: Statistically significant correlations marked as ***, **, * for p < 0.01, 0.05 and 0,1. T-statistics reported in the parenthesis. Economic sector abbreviations and variables definition as in tables 1 and 2 respectively.*
Source: Own research

Panel A of Table 8 reports that E scoring had positive impact on firms' valuation in BM, CN-C, E, H and U sectors, and negative in remaining ones, while statistically significant results were noted for BM, CN-C, E, RE, T and U sectors. G and C scorings impacted market value of the firm positively in each of analysed sectors, while G was statistically significant in BM, CN-C, H, I, RE and T sectors, however C was significant only in T sector. RoA affected positively TQ across all sectors except BM, and statistically significant results for CC, CN-C, H, I and T sectors. GDR and ln(A) were the destructors of market value of the firm in each sector, while SG was variable of negative character only in U sector. According to Panel B of Table 8, S scoring noted similar results as E scoring except for RE sector, as the impact of S on TQ was positive and statistically insignificant. The rest of the results for variables in Panel B were similar or the same as in Panel A.

5. Conclusions

Findings contribute to the debate on the relationship between ESG ratings and firm value by applying sector approach, utilizing ESGC and C ratings and by examining the impact of each rating component on the firm value. Conducted research proved cross-sectoral differentiation of dominancy of each letter of ESGC. Also, companies of H and T sectors were noted to be, on the one hand, of the highest value proxied by TQ, and on the other hand, to be the biggest ESG laggards in all ESGC areas. What is more, the research proved ESG disclosure as well as ESGC, ESG, E, S, G and C ratings to be statistically significant determinants of firm value in specific sectors, as presents Table 9.

Table 9. Impact of ESG performance on the marketed valuation of the firm in sector perspective

Economic sector	BM	CC	CN-C	E	H	I	RE	T	U
ESG_D vs TQ	+	+	+	+	+	+	+	+	+
ESGC vs TQ	+	0	+	+	+	+	0	0	+
ESG vs TQ	+	0	+	+	+	+	0	0	+
E vs TQ	+	0	0	+	+	0	–	–	+
S vs TQ	+	0	+	+	0	0	0	–	+
G vs TQ	+	0	+	0	+	+	+	+	0
C vs TQ	0	0	0	0	0	0	0	+	0

Notes: Positive, neutral and negative impact at statistical significance of $p < 0.1$ marked as "+", "0" and "–" respectively. Economic sector abbreviations and variables definition as in tables 1 and 2 respectively.
Source: Own research

Research confirmed that ESG disclosure impacts firm value more than each of analysed ratings as suggested by Dowell et al. (2000). Similarly to Yu at al. (2018), ESG_D turned out to be the construct of firm value across all sectors. As suggested by Arora et al. (2021), ESGC and ESG ratings affected firm value to almost the same extent. What is more, E is mostly the destructor of firm value, S remains neutral, G tends to have non-negative impact on TQ. These are in concur with findings of Ferrel et al. (2013), in contrast to research results of Derwall et al. (2005) and support general conclusion of Khan (2019) as the relationship between E, S and G, and TQ varies across different sectors. Finally, C was documented to affect firm value, but only in T sector.

Paper proved statistically significant relationship between ESG performance and the firm value of positive direction which is in line with , however, the impact of ESG performance (except ESG disclosure) was weaker than the impact of control variables, therefore results falsified set research hypothesis.

Worth of mentioning is the fact, that the limitation of this study is ESG transparency of public companies of European Union Member States. Only 37.2% out of 4 638 analysed companies reported on ESG in at least one year of 2018-2020 period which constrained the size of the research sample and did not allow to provide general conclusions on the dependency between ESG and market performance of the firm. Furthermore, obtained results using the sector approach may be distorted, as in sectors included were companies of extremely different specification and type of operations. A prime example is the energy sector as it includes both companies operating in fossil fuels and renewable energy industries which distorts the general results of the whole sector. Therefore, main area for future research is the analysis of impact of ESG performance on firm value on more analytical classification of companies.

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