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The Value Relevance of Non-Financial Reporting in Determining the Market Value of Equity

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Abstract

The value relevance of non-financial reporting is a topic of interest in the academic literature, the results of empirical research being often contradictory. In this context, the research objective is analysing the extent to which the disclosure of non-financial information related to sustainable development in the contents of sustainability reports published by companies listed on the regulated market of the Bucharest Stock Exchange (BSE) is influencing their market value. To conduct the analysis, the present study involves the application of multiple linear regression models developed based on the Ohlson (1995) model for a sample of 34 companies listed on BSE between 2015-2019, forming a number of 166 firm-year observations. The research methodology is based on the association between the firm market value and its equity book value, as well as its net income and other relevant information. Therefore, the value relevance is investigated through their impact on the market value. The findings emphasise an increase in relevance in terms of the influence exerted on the market value of capital as a result of reporting on sustainability issues. Moreover, the study highlights an increase in the impact of equity book value and net income on firms' market value in the period after the adoption of Directive 2014/95/EUD (2017-2019), compared to the previous period (2015-2016). This research complements the literature in the field of sustainability reporting and value relevance, providing empirical evidence on the importance of publishing non-financial information in relation to their market value impact.

Key words: *sustainability; Sustainable Development Goals (SDG); value relevance; market value; listed companies; empirical research*

JEL Classification: *M40, M41, Q56*

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Introduction

Requirements for reporting non-financial information are spreading worldwide, being included in the legislative provisions of an increasing number of states (de Klerk and de Villiers, 2012). In this regard, in the European Union (EU), starting from January 1, 2017 publicly-traded companies that exceed an average of 500 employees have the obligation to report non-financial information (EU, 2014).

This research aims to analyse the extent to which the publication of non-financial reports on sustainable development by companies listed on the Bucharest Stock Exchange (BSE) on the regulated market influences investors' perception in terms of the value relevance of book values and non-financial aspects, by reflecting their impact on the market value for the period 2015-2019. The investigation is based on a development of the Ohlson (1995) model previously used in the literature dealing with the value relevance of accounting values by analysing the impact on firms' market value (Hassel *et al.*, 2005; Baboukardos and Rimmel, 2016; Baboukardos, 2018; Tlili *et al.*, 2019; Grassmann, 2021; Landau *et al.*, 2020).

To conduct the analysis, the study applies multiple linear regression models based on the assumption that after including variables related to non-financial information, the models' goodness of fit (reflected by the coefficient of determination, R^2) is higher for companies that publish sustainability reports. Another research hypothesis estimates that the coefficients obtained for the independent variables included in the regression models will be significantly different from 0, thus emphasizing the association between the book values and the market capitalization of the companies. It is also assumed that the value relevance of the information disclosed from the perspective of the influence on the market value is higher in the period following the adoption of Directive 2014/95/EU (2017-2019) compared to the previous period (2015-2016).

The results of the research validate most of the hypotheses, highlighting that the reporting of non-financial information on sustainable development by BSE listed companies on the regulated market in the period 2015-2019 has led to an increase in the value relevance in terms of the influence on firms' market value. Furthermore, the findings show an increase in the influence of independent financial variables (equity book value and net income) used in the regression model on the market value in the period after the adoption of Directive 2014/95/EUD (2017-2019), compared to the period preceding the directive (2015-2016).

This research complements the literature in the field of sustainability reporting and value relevance, providing empirical evidence on the importance of publishing non-financial information in relation to their market value impact.

The remainder of the paper is structured as follows, starting with the presentation of the current context regarding sustainable development, then the research methodology that provides details on the sample, the variables used and the construction of the regression model applied. This is followed by the third section revealing and discussing the results and the conclusions of the study, respectively.

1. The current context on sustainability reporting and sustainable development goals

1.1. The legislative context regarding the reporting of non-financial information

For the presentation of non-financial information and, in particular, for reporting on sustainability aspects, as well as on the Sustainable Development Goals (SDGs) adopted by the United Nations in 2015 (UN, 2015), companies have the following reporting frameworks to choose from (Dima *et al.*, 2015; Albu *et al.*, 2013; ACCA, 2017):

- Global Reporting Initiative – GRI;
- The five-step approach <IR> framework of the International Integrated Reporting Council (IIRC);
- United Nations Global Compact – UNGC;
- The standards issued by the Sustainability Accounting Standards Board – SASB;
- SDG Compass, developed by GRI, UNGC and the World Business Council for Sustainable Development (WBCSD);
- GRI / UNGC Business Reporting on the SDG guide, designed as a supporting instrument to the SDG Compass;
- UNCTAD ISAR Core Indicators;

– Climate Disclosure Standards Board (CDSB) framework.

The variety of conceptual and reporting frameworks makes it difficult to ensure the comparability of non-financial information reported by companies, as well as of the tools used to comprehend and communicate their impact and contribution to the achievement of the SDGs.

At the European Union level, the options with respect to reporting non-financial information are specified in Directive 2014/95/EU (EU, 2014). Thus, the Directive provides that "in order to enhance the consistency and comparability of non-financial information disclosed throughout the Union" (art. 6, p. 2), large companies which are publicly traded entities exceeding on the balance sheet date the average number of 500 employees during the financial year "should prepare a non-financial statement containing information relating to at least environmental matters, social and employee-related matters, respect for human rights, anti-corruption and bribery matters" (art. 6, p. 2). For disclosing these aspects, companies "may rely on national frameworks, Union-based frameworks such as the Eco-Management and Audit Scheme (EMAS), or international frameworks such as the United Nations (UN) Global Compact, the Guiding Principles on Business and Human Rights implementing the UN 'Protect, Respect and Remedy' Framework, the Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises, the International Organisation for Standardisation's ISO 26000, the International Labour Organisation's Tripartite Declaration of principles concerning multinational enterprises and social policy, the Global Reporting Initiative, or other recognised international frameworks." (art. 9, p. 2). The Directive is transposed into national law by Orders no. 1938/2016 and no. 2844/2016, coming into effect from January 1, 2017 (O.M.P.F. 1.938/2016, art. III, p. 9).

1.2. Reporting on sustainability aspects by publicly traded companies

Non-financial reporting is attracting increasing attention among researchers, practitioners, and regulators internationally. In some cases, capital market regulators require listed companies to provide information on sustainable development through the publication of sustainability reports, which relate to reporting on environmental, social, and governance issues (ESG), as well as occupational safety, either in a separate (independent) report or in a separate section of the annual report (Baboukardos and Rimmel, 2016).

Capital market regulators play a key role in encouraging good corporate governance and transparency by requiring listed companies to comply with sustainability reporting regulations. In this direction, the Bucharest Stock Exchange launches in September 2020 the first initiative focused on reporting ESG indicators for the Romanian capital market (BSE, 2020). The purpose of this approach is to provide quality ESG information on listed companies through Sustainalytics ESG risk ratings. Thus, local issuers will benefit from an initial assessment, with the objectives of promoting responsible investment and highlighting the importance of ESG standards among local participants. The initiative also aims to encourage local companies to align their standards with ESG best practices, which have seen spectacular growth globally in recent years.

1.3. Analysis of the relationship between non-financial reporting and the market value of listed companies

The academic literature identifies two research currents regarding the analysis of the relationship between non-financial reporting and the market value of listed companies, namely researchers who support the cost-concerned school approach, according to which the publication of non-financial information is mainly a costly aspect, rather than an advantage, respectively researchers who support the value-creation school perspective, according to which non-financial reporting brings more value relevance. In this context, empirical studies lead to mixed and sometimes even contradictory results (Grassmann, 2021; Landau *et al*., 2020).

Value relevance can be defined as the ability of book values and non-financial information to influence the market value of companies (Grassmann, 2021; Hassel *et al.*, 2005).

Results of previous research highlight the existence of a positive relationship between sustainability reporting and the market value of a company, as well as the fact that the disclosure of non-financial information increases the quality of results, as an effect of increasing information transparency (Swarnapali, 2020; Grassmann, 2021; Tlili *et al*., 2019). Moreover, companies involved in sustainability efforts have a significantly higher level of profitability indicators among the industrial sector in which they operate (DiSegni *et al.*, 2015).

In addition, Baboukardos and Rimmel (2016) provide mixed results in terms of the influence of sustainability performance indicators, highlighting both a greater value relevance of the net income for companies characterised by a higher level of sustainability performance indicators and the existence of a negative association between the equity book value and the market value for these companies.

On the other hand, Landau *et al.* (2020) and Hassel *et al.* (2005) support the cost-based approach, reflecting evidence on the fact that the performance of environmental indicators and the presentation of non-financial information have a negative influence on the firm market value.

This research aims to investigate whether the publication of non-financial information on sustainable development by BSE listed companies on the regulated market in the period 2015-2019 leads to an increase of the value relevance for investors in terms of the influence exerted on the market value or not.

2. Research methodology

Following the example of previous research (Ohlson, 1995; Hassel *et al.*, 2005; Baboukardos and Rimmel, 2016; Tlili *et al.*, 2019; Landau *et al.*, 2020; Grassmann, 2021), the study aims to determine the extent to which disclosing non-financial information on sustainable development by companies listed on the Bucharest Stock Exchange leads to an increase in value relevance for investors in terms of impact on the market value. Hereinafter, the research methodology sets out the selection criteria of the analysed sample and the procedures applied for data collection, continuing with the definition of variables and the construction of the econometric models underlying the study.

2.1. Sample selection criteria and data collection

Sustainable development is a constituent of the public policy, academia, and civil society in Romania, the main approach considered in this regard being highlighted by the National Strategy for Sustainable Development over the horizon 2013-2020-2030 (Ministry of Environment, 2008).

Given the measures taken at the national level towards achieving sustainability, the research aims to analyse whether the market value is influenced by reporting non-financial information related to sustainable development for companies listed on the Bucharest Stock Exchange or not. The data related to accounting indicators presented in the corporates' financial statements used in the study were collected from the S&P Capital IQ database (Compustat, 2021). Thus, at the date the study was conducted (January-February 2021), out of the total number of 80 companies having their shares traded on BSE on the regulated market in the Premium and Standard tiers, 46 companies were excluded from the sample, as a result of applying the selection criteria presented in **Table no. 1**.

Table no. 1. Details on applying the sample selection criteria

Description	Number of companies	Number of firm-year observations
Initial sample	80	400
Excluding financial institutions	-12	-60
Excluding firms undergoing liquidation	-2	-10
Excluding firms with suspended activity	-4	-20
Excluding firms with unavailable data	-26	-130
Excluding observations with negative equity	-2	-10
Excluding observations showing outliers	0	-4
Final sample	**34**	**166**

Source: Author's processing, 2021

Similar to previous research, financial companies (banks and non-bank financial institutions) were excluded from the sample, as they might be subject to specific regulations and differ in terms of their structure of assets and liabilities (Grassmann, 2021; Tlili *et al.*, 2019). Companies undergoing the process

of liquidation were also excluded from the analysis, as well as the firms having their shares suspended from trading, and those for which there was no information available in the period 2015-2019. According to the study conducted by Baboukardos and Rimmel (2016), the observations that presented negative values of equity were eliminated from the sample. Moreover, following the application of statistical tests meant to verify that the necessary conditions for the use of econometric models are fulfilled, 4 observations were identified and truncated, as they consisted of outliers that presented a level of studentized residuals higher than 3 in absolute value (Hassel *et al.*, 2005).

The companies included in the resulting sample are disclosed in the table presented in the **Appendix**, and **Table no. 2** highlights the classification of companies by industry based on the Global Industry Classification Standard (GICS), a taxonomy developed in 1999 by to the MSCI and S&P Dow Jones Indices (MSCI, 2021) and applied in similar studies (Hassel *et al.*, 2005).

Table no. 2. Industry classification of BSE listed companies forming the analysed sample

Primary industry sector	No. of companies	Percentage of observations
Consumer staples	1	3.01%
Consumer discretionary	6	18.07%
Energy	7	21.08%
Industrials	5	14.46%
Real estate	1	3.01%
Materials	7	21.08%
Health care	3	7.23%
Information technology	1	3.01%
Utilities	3	9.05%
Total	**34**	**100%**

Source: Author's processing, 2021

Regarding the collection of information related to the reporting of non-financial aspects used in the applied research models, the data were extracted from the GRI Sustainability Disclosure Database (GRI, 2021), similar to previous research (Grassmann, 2021; Landau *et al.*, 2020). Taking into account the fact that the database centralises the information provided voluntarily by the companies, the collected data were subjected to additional inspection by accessing the non-financial reports published on the firms' web pages. Similar to the methodology used by Landau *et al.* (2020), in case the sustainability reports or other non-financial reports were available on the company's website, but they were not found in the GRI database, the data were hand-collected from the reports published by the company.

To determine the extent to which companies refer to the Sustainable Development Goals (SDGs) in the analysed reports, information was collected based on the textual content analysis of the reports (Hummel, 2019; Li, 2010), by conducting search queries for keywords such as "sustainability", "sustainable development", "goals", "2030 Agenda".

With respect to the time frame, the period included in the analysis is 2015-2019, as a consequence of the following aspects:

- the SDGs have been adopted by the UN in 2015;
- the first reporting year in accordance with the provisions of the 2014/95/EU Directive related to the disclosure of non-financial information is 2017;
- the most recent annual reports published by the BSE listed companies are available for the financial year 2019.

Following the selection, the resulting final sample includes a number of 166 firm-year observations corresponding to the 34 companies included in the study for the period 2015-2019.

2.2. Presentation of the econometric models and definition of the variables

To shed light on the research question proposed by the paper, an extended version of the Ohlson (1995) model is applied, which is based on the assumption that the

market value is determined by the opening equity book value, the net income, and other relevant non-financial information (Grassmann, 2021; de Klerk and de Villiers, 2012; Baboukardos, 2018; Ohlson, 1995). According to the study conducted by Hassel *et al.* (2005), following an adaptation of the model used by Ohlson (1995), the value relevance of environment performance indicators from the market value standpoint is empirically investigated through the variable based on other non-financial information, v_t, as shown in the regression model in equation (1):

$$MV_t + DI_t = \beta_0 + \beta_1 BV_{t-1} + \beta_2 NI_t + \beta_3 v_t + \varepsilon_t, \quad (1)$$

where MV is the firm's market value, DI is the value of dividends, thus MV + DI is the cum-dividend adjusted market value for financial year t, while BV is the equity book value for financial year t-1 and NI is the variable based on the net income for financial year t.

According to more recent research, the model presented in equation (1) is adapted to the context of non-financial reporting, in particular integrated reporting (Grassmann, 2021; Landau *et al.*, 2020; Tlili *et al.*, 2019; Baboukardos şi Rimmel, 2016). Similar to these studies, the proposed multiple regression model is given by equation (2):

$$\frac{MV_{i,t} + DI_{i,t}}{BV_{i,t-1}} = \beta_0 \frac{1}{BV_{i,t-1}} + \beta_1 + \beta_2 \frac{NI_{i,t}}{BV_{i,t-1}} + \beta_3 GRIREP_{i,t} + \beta_4 SREP_{i,t} + \beta_5 SDG_{i,t} + \beta_6 LOSS_{i,t} + \beta_7 EUD_{i,t} + \sum_{j=1}^{8} \beta_{8j} IND_{i,t} + \sum_{y=1}^{4} \beta_{9y} FY_{i,t} + \varepsilon_{i,t}, \quad (2)$$

For the comparative analysis on the value relevance of published information in terms of their impact on the market value before and after the adoption of the EU Directive related to the mandatory disclosure of non-financial information, the multiple regression model applied is provided by equation (3):

$$\frac{MV_{i,t} + DI_{i,t}}{BV_{i,t-1}} = \beta_0 \frac{1}{BV_{i,t-1}} + \beta_1 + \beta_2 \frac{NI_{i,t}}{BV_{i,t-1}} + \beta_3 GRIREP_{i,t} + \beta_4 SREP_{i,t} + \beta_5 SDG_{i,t} + \beta_6 LOSS_{i,t} + \sum_{j=1}^{8} \beta_{7j} IND_{i,t} + \sum_{y=1}^{4} \beta_{8y} FY_{i,t} + \varepsilon_{i,t}, \quad (3)$$

The variables used in equations (2) and (3) are defined in **Table no. 3**.

Table no. 3. Defining the variables used in the multiple regression models

Variable	Description
$MV_{i,t}$	Market value of firm i in financial year t
$DI_{i,t}$	Dividends distributed by firm i in financial year t, computed as value of dividend per share multiplied by the total number of shares
$BV_{i,t-1}$	Equity book value of firm i in financial year t-1
$NI_{i,t}$	Net income of firm i in financial year t
$GRIREP_{i,t}$	Dichotomous variable that equals 1 if company i published a sustainability report in accordance with GRI standards for financial year t, and 0 otherwise

Variable	Description
$SREP_{i,t}$	Dichotomous variable that equals 1 if company i published a sustainability report or other type of non-financial report for financial year t, and 0 otherwise
$SDG_{i,t}$	Dichotomous variable that equals 1 if company i mentioned the SDGs in the sustainability report published for financial year t, and 0 otherwise
$LOSS_{i,t}$	Dichotomous variable that equals 1 if company i obtained a negative net income (loss) for financial year t, and 0 otherwise
$EUD_{i,t}$	Dichotomous variable that equals 1 for the period following the adoption of the EU Directive on the disclosure of non-financial information (2017-2019), and 0 for the period preceding this Directive (2015-2016)
$IND_{i,t}$	Dummy binary variable based on 8 of the 9 industries under GICS classification; the variable equals 1 if firm i operates in industry j for financial year t, and 0 otherwise (where j takes values from 1 to 8, one for each of the 8 primary industry sectors)
$FY_{i,t}$	Dummy binary variable based on 4 of the 5 analysed financial years; the variable equals 1 for firm i in financial year y, and 0 otherwise (where y takes values from 1 to 4, one for each of the 4 financial years)

Source: Author's processing, 2021

Thus, the cum-dividend adjusted market value, $MV_{i,t} + DI_{i,t}$, is the dependent variable of the multiple linear regression model, where the market capitalization is measured 4 months after the end of the financial year and considering a time gap of 10 days after the publication deadline, to include the impact of the information on the market. The timing with respect to collecting the market value data varies from one study to another, from 10 days after the first quarter following the end of the financial year (Hassel *et al.*, 2005), to 3 months after the end of the financial year (Grassmann, 2021; de Klerk and de Villiers, 2012), up to 6 months after the financial year end (Landau *et al.*, 2020; Baboukardos and Rimmel, 2016). These approaches differ depending on the date on which the companies' reports are published and become available to investors and stakeholders. The choice for this research is based on the provisions of Law no. 297/2004 related to the capital market, as well as on the Bucharest Stock Exchange Code (2019 updated edition), according to which "the company admitted to trading on a regulated market shall make available to the public, within maximum 4 months from the end of the financial year, the annual financial statements, together with the annual report, approved by the general meeting of shareholders" (Parliament of Romania, 2004 - Law no. 297, art. 227, par. 4, pp. 53-54).

The equity book value (BV) and net income (NI) are the independent variables based on financial indicators included in the regression model, estimating a positive relationship between these two variables and the market capitalization (MV). To mitigate the effect that the firm size might have on the results of the analysis, according to previous research (Hassel *et al.*, 2005; de Klerk and de Villiers, 2012; Grassmann, 2021), monetary variables were scaled by the opening equity book value ($BV_{i, t-1}$). All financial variables (MV, DI, BV şi NI) were collected from the Compustat database (S&P Capital IQ).

Variables GRIREP, SREP and SDG complete the list of independent variables, this time the ones capturing non-financial aspects. According to similar studies, the data underlying the construction of the 3 binary variables was collected from the GRI Sustainability Disclosure Database (which centralizes information voluntarily transmitted by companies) and complemented or double-checked through the textual analysis of the non-financial reports' contents published by companies on their own websites (Landau *et al.*, 2020; Grassmann, 2021; Baboukardos şi Rimmel, 2016). GRIREP indicates the extent to which companies publish non-financial reporting prepared in accordance with GRI standards (Kuzey and Uyar, 2017; de Klerk and de Villiers, 2012), while SREP reflects whether companies publish separate (independent) non-financial reports, regardless of applied framework (Landau *et al.*, 2020; Swarnapali, 2020; Baboukardos, 2018; Kuzey and Uyar, 2017). The SDG variable highlights whether firms refer in the content of their non-financial reports to the sustainable development goals adopted by the UN in 2015.

The control variables included in the regression model are LOSS, EUD, IND and FY.

LOSS is the dichotomous variable that captures the influence of reporting a negative net income on the market capitalization (Baboukardos, 2018; Baboukardos and Rimmel, 2016).

The binary variable EUD analyses the extent to which the adoption of Directive 2014/95/EU, applicable from 1 January 2017, influences the relationship between the market value and the book values included in the model (Baboukardos and Rimmel, 2016; Tlili *et al.*, 2019).

Being consistent with most research papers applying a similar methodology, dummy control variables have been included in the regression model to eliminate possible effects of industry (IND) and differences between financial years (FY) (Hassel *et al.*, 2005; Baboukardos and Rimmel, 2016; Baboukardos, 2018; Tlili *et al.*, 2019; Grassmann, 2021; Swarnapali, 2020).

Although used in regression models applied by similar studies (Baboukardos and Rimmel, 2016; Baboukardos, 2018; Tlili *et al.*, 2019; Swarnapali, 2020), no variables to control for the firms' size were included, as the monetary variables that might have been influenced by the size were scaled by the equity book value of the previous financial year (Hassel *et al.*, 2005; Grassmann, 2021).

Based on research investigating value relevance, "an accounting amount is defined as value relevant if it has a predicted association with equity market values" (Barth *et al.*, 2001, cited by Baboukardos and Rimmel, 2016, p. 442). Consequently, it will be considered that the equity book value (BV) and the net income (NI) are value relevant for investors in terms of the market value (MV) if after applying the regression models the resulting coefficients for these variables will be significantly different from 0. In addition, it is estimated that the two independent variables (BV and NI) will show higher values of their associated coefficients in the post-EUD period (2017-2019), compared to the pre-EUD period (2015-2016).

Furthermore, another worth mentioning aspect refers to the fact that throughout the entire examined period companies listed on the Bucharest Stock Exchange prepared their financial statements in accordance with the same accounting standards, namely the International Financial Reporting Standards. Hence, similar to the study conducted by Baboukardos and Rimmel (2016), it is expected the results obtained not to be influenced by changes in accounting regulations.

In order to compile the multiple regression models, as well as to apply all statistical procedures necessary for data processing, IBM SPSS Statistics 27 was used as a software resource.

3. Findings and discussions on the value relevance of sustainability reporting in terms of the influence exerted on the firms' market value

The results obtained following the application of the multiple regression models presented in the methodology section by equations (2) and (3) are highlighted below, in the form of descriptive statistics, multicollinearity analysis and the analysis of the determination coefficient, as well as the resulting coefficients for each variable.

The regression models were applied both on the entire sample for the full analysed period (2015-2019) – equation (2), and for the period prior to the application of the EU Directive on mandatory reporting of non-financial information (pre-EUD, 2015-2016), compared to the subsequent period (post-EUD, 2017-2019) - equation (3).

3.1. Descriptive statistics and multicollinearity analysis

Table no. 4 highlights the mean, median, standard deviation, and minimum and maximum values of the independent, dependent, and control variables for the entire sample under examination, after removing the outliers.

Table no. 4. Descriptive statistics

Variable	Mean	Median	Standard deviation	Minimum	Maximum
$(MV_{i,t} + DI_{i,t}) / BV_{i,t-1}$	0.9287	0.7777	0.6934	0.1475	5.4458
$1 / BV_{i,t-1}$	0.0344	0.0210	0.0426	0.0001	0.2415
$NI_{i,t} / BV_{i,t-1}$	0.0939	0.0799	0.1101	-0.1828	0.7156
$GRIREP_{i,t}$	0.2108	0.0000	0.4091	0.00	1.00
$SREP_{i,t}$	0.2711	0.0000	0.4459	0.00	1.00
$SDG_{i,t}$	0.0723	0.0000	0.2597	0.00	1.00
$LOSS_{i,t}$	0.1145	0.0000	0.3193	0.00	1.00
$EUD_{i,t}$	0.5964	1.0000	0.4921	0.00	1.00
N	166	166	166	166	166

Source: Author's processing, 2021

The descriptive statistics reflect a mean value of the dependent variable, $(MV_{i,t} + DI_{i,t}) / BV_{i,t-1}$, of approximately 0.93, indicating a cum-dividend market value with 7.13% lower on average than the equity book value. On the other hand, the maximum level reached by the dependent variable highlights a market value about 5.45 times higher than the book value. At the same time, the sampled companies are characterised by an average return on equity ratio, $NI_{i,t} / BV_{i,t-1}$, of 9.39% and a median of 7.99%, while slightly over 10% of firms recorded a loss (mean value of the variable $LOSS_{i,t}$ being 0.1145). With respect to the non-financial variables, only a quarter of the companies published stand-alone non-financial reports (variable $SREP_{i,t}$ registering a mean value of 0.2711), while non-financial reports prepared in accordance with the GRI standards are found only for 21.08% of the analysed firms during the period 2015-2019 (variable $GRIREP_{i,t}$).

To determine the associations between variables, as well as to conduct the multicollinearity analysis, **Table no. 5** discloses the Pearson coefficients correlation matrix for the variables included in the regression model.

Table no. 5. Pearson coefficients correlation matrix

Variable	$(MV_{i,t} + DI_{i,t}) / BV_{i,t-1}$	$1 / BV_{i,t-1}$	$NI_{i,t} / BV_{i,t-1}$	$GRIREP_{i,t}$	$SREP_{i,t}$	$SDG_{i,t}$	$LOSS_{i,t}$
$(MV_{i,t} + DI_{i,t}) / BV_{i,t-1}$	1.000						
$1 / BV_{i,t-1}$	-0.066	1.000					
$NI_{i,t} / BV_{i,t-1}$	0.827***	0.092	1.000				
$GRIREP_{i,t}$	0.043	-0.302***	-0.089	1.000			
$SREP_{i,t}$	0.025	-0.352***	-0.077	0.848***	1.000		
$SDG_{i,t}$	-0.038	-0.160**	-0.086	0.540***	0.458***	1.000	
$LOSS_{i,t}$	-0.213***	0.029	-0.449***	0.092	0.079	0.119*	1.000
$EUD_{i,t}$	0.006	-0.078	0.044	0.215***	0.308***	0.135**	-0.013
***. Correlation is significant at the 0.01 (1%) level.							
**. Correlation is significant at the 0.05 (5%) level.							
*. Correlation is significant at the 0.1 (10%) level.							

Source: Author's processing, 2021

In addition, **Table no. 6** presents the correlation matrix based on the Spearman's rho coefficients related to the variables included in the regression model.

Table no. 6. Spearman's rho coefficients correlation matrix

Variable	$(MV_{i,t} + DI_{i,t}) / BV_{i,t-1}$	$1 / BV_{i,t-1}$	$NI_{i,t} / BV_{i,t-1}$	$GRIREP_{i,t}$	$SREP_{i,t}$	$SDG_{i,t}$	$LOSS_{i,t}$
$(MV_{i,t} + DI_{i,t}) / BV_{i,t-1}$	1.000						
$1 / BV_{i,t-1}$	-0.066	1.000					
$NI_{i,t} / BV_{i,t-1}$	0.796***	0.013	1.000				
$GRIREP_{i,t}$	0.123	-0.418***	-0.048	1.000			
$SREP_{i,t}$	-0.008	-0.467***	-0.116	0.848***	1.000		
$SDG_{i,t}$	0.018	-0.241***	-0.065	0.540***	0.458***	1.000	
$LOSS_{i,t}$	-0.252***	0.070	-0.551***	0.092	0.079	0.119*	1.000
$EUD_{i,t}$	-0.008	-0.055	0.001	0.215***	0.308***	0.135**	-0.013
***. Correlation is significant at the 0.01 (1%) level.							
**. Correlation is significant at the 0.05 (5%) level.							
*. Correlation is significant at the 0.1 (10%) level.							

Source: Author's processing, 2021

Based on the coefficients in the two tables, there is no evidence on the existence of multicollinearity issues, as the correlation coefficients among independent variables are below the conventional threshold of 0.7 (Grassmann, 2021; Landau *et al.*, 2020), except for $GRIREP_{i,t}$ and $SREP_{i,t}$ coefficients. Although both Pearson and Spearman's rho coefficients are 0.848, statistically significant at the 1% level, the additional analysis of the tolerance and variance inflation factor (VIF) shows that the variables are not affected by multicollinearity. Details in this regard can be found in section 3.3.

Furthermore, the correlation coefficients signal a positive above average association, significant at the 1% level, between the dependent variable, $(MV_{i,t} + DI_{i,t}) / BV_{i,t-1}$, and the return of equity ratio, $NI_{i,t} / BV_{i,t-1}$ (Pearson coefficient of 0.827, and Spearman's rho coefficient of 0.796), consistent with the results obtained by Grassmann (2021). Additionally, there is a negative association between reporting a negative net income for the financial year, variable $LOSS_{i,t}$, and the cum-dividend market capitalization, $(MV_{i,t} + DI_{i,t}) / BV_{i,t-1}$, significant at the 1% level, similar to the study conducted by Baboukardos and Rimmel (2016).

3.2. Results of the multiple regression models

3.2.1. Regression results for the entire analysed period (2015-2019)

Table no. 7 highlights the results of applying the multiple regression model given by equation (2) for the entire analysed period (2015-2019), in terms of the coefficients of determination and the coefficients related to the variables.

The research is based on the assumption that the publication of non-financial information on sustainable development leads to an increase of the value relevance for investors from the perspective of the market value of companies listed on the BSE during the period 2015-2019. In line with Hassel *et al.* (2005), the regression model was applied in 3 steps, each of their findings being disclosed in columns A-C of **Table no. 7**, as follows:

(A) – regression of the dependent variable $(MV_{i,t} + DI_{i,t}) / BV_{i,t-1}$ on the financial variables $1 / BV_{i,t-1}$ and $NI_{i,t} / BV_{i,t-1}$, without including the non-financial variables related to sustainability and the control variables;

(B) – regression of the dependent variable $(MV_{i,t} + DI_{i,t}) / BV_{i,t-1}$ on the financial variables $1 / BV_{i,t-1}$ and $NI_{i,t} / BV_{i,t-1}$, as well as the control variables $LOSS_{i,t}$, $EUD_{i,t}$, $IND_{i,t}$ and $FY_{i,t}$, without including the non-financial variables related to sustainability;

(C) – regression of the dependent variable $(MV_{i,t} + DI_{i,t}) / BV_{i,t-1}$ on the financial variables $1 / BV_{i,t-1}$ and $NI_{i,t} / BV_{i,t-1}$, the control variables $LOSS_{i,t}$, $EUD_{i,t}$, $IND_{i,t}$ and $FY_{i,t}$, as well as the non-financial variables related to sustainability $GRIREP_{i,t}$, $SREP_{i,t}$ and $SDG_{i,t}$.

Table no. 7. Results of the multiple regression model - equation (2) - period 2015-2019

Indicators	Model (2) without non-financial and control variables (A)		Model (2) without non-financial variables, but including control variables (B)		Model (2) with both non-financial and control variables (C)	
Model goodness of fit – dependent variable $(MV_{i,t} + DI_{i,t}) / BV_{i,t-1}$						
R^2	0.705		0.792		0.799	
Adjusted R^2	0.701		0.771		0.774	
F-stat	194.438***		38.129***		32.445***	
Coefficients	*B*	*t-stat*	*B*	*t-stat*	*B*	*t-stat*
Constant	0.512	11.538***	0.326	3.459***	0.330	3.511***
$1 / BV_{i,t-1}$	-2.325	-3.340***	-2.457	-3.359***	-2.312	-3.143***
$NI_{i,t} / BV_{i,t-1}$	5.294	19.659***	5.747	19.410***	5.765	19.482***
$LOSS_{i,t}$			0.515	5.432***	0.506	5.325***
$EUD_{i,t}$			-0.024	-0.293	-0.022	-0.266
$GRIREP_{i,t}$					0.244	1.753*
$SREP_{i,t}$					-0.090	-0.702
$SDG_{i,t}$					-0.204	-1.588
Dummy $IND_{i,t}$ (industry control)	No		Yes		Yes	
Dummy $FY_{i,t}$ (control for years)	No		Yes		Yes	
No. of firms	34		34		34	
No. firm-year observations	166		166		166	
***. Statistically significant at the 0.01 (1%) level.						
**. Statistically significant at the 0.05 (5%) level.						
*. Statistically significant at the 0.1 (10%) level.						

Source: Author's processing, 2021

Following the application of the multiple regression model, the coefficient of determination R^2 increases from 70.5% to 79.2% after the inclusion of the control variables. Moreover, R^2 records a further increase to 79.9% by including non-financial variables related to the presentation of sustainability information. Thus, the results highlight an increase in value relevance with respect to the impact on the firms' market value after the publication of sustainability reports by companies listed on the BSE during the period under examination. Also, the F-test statistics emphasise that the model goodness of fit is significant at the 1% level.

Regarding the variables coefficients, their values are significantly different from 0, at 1% level, for the intercept and the financial variables in all 3 stages, as well as for the variable $LOSS_{i,t}$. Therefore, as expected, there is a positive relationship between the cum-dividend market value and the equity book value (a negative coefficient significantly different from 0 for the reversed value of equity, $1 / BV_{i,t-1}$), along with a positive relationship between the dependent variable $(MV_{i,t} + DI_{i,t}) / BV_{i,t-1}$ and the net income scaled by the opening book value of equity (a positive coefficient significantly different from 0 for $NI_{i,t} / BV_{i,t-1}$). These findings are consistent with previous studies using a similar methodology (Hassel *et al.*, 2005; Landau *et al.*, 2020; Grassmann, 2021; Baboukardos and Rimmel, 2016).

Furthermore, GRIREP is the only variable based on non-financial data that exerts a positive influence on the investigated phenomenon, statistically significant at the 10% level, with a coefficient of 0.244. This result emphasises that preparing and publishing stand-alone sustainability reports in accordance with the GRI standards by companies listed on the BSE during 2015-2019 determines a positive impact on the market value. The findings are in line with those obtained by Kuzey and Uyar (2017), as well as de Klerk and de Villiers (2012).

3.2.2. Regression results for the comparative analysis pre-post adoption of EU Directive on reporting of non-financial information

Table no. 8 reflects the results of applying the multiple regression model given by equation (3), in terms of the coefficients of determination and coefficients related to variables, for the comparative analysis pre-post adoption of Directive 2014/95/EU on the reporting of non-financial information.

Table no. 8. Results of the multiple regression model – equation (3) – comparative analysis pre-EUD (2015-2016) / post-EUD (2017-2019)

Indicators	Pre-EUD (2015-2016)		Post-EUD (2017-2019)	
Model goodness of fit – dependent variable ($MV_{i,t}$ + $DI_{i,t}$) / $BV_{i,t-1}$				
R^2	0.796		0.816	
Adjusted R^2	0.740		0.780	
F-stat	14.449***		22.753***	
Coefficients	*B*	*t-stat*	*B*	*t-stat*
Constant	0.240	1.970**	0.371	3.065***
1 / $BV_{i,t-1}$	-2.338	-2.399**	-2.450	-2.059**
$NI_{i,t}$ / $BV_{i,t-1}$	5.738	11.425***	5.943	15.231***
$LOSS_{i,t}$	0.547	3.482***	0.474	3.624***
$GRIREP_{i,t}$	-	-	0.257	1.555
$SREP_{i,t}$	0.206	1.153	-0.127	-0.830
$SDG_{i,t}$	-0.353	-1.324	-0.193	-1.161
Dummy IND (industry control)	Yes		Yes	
Dummy FY (control for years)	Yes		Yes	
No. of firms	34		34	
No. of firm-year observations	67		99	
***. Statistically significant at the 0.01 (1%) level.				
**. Statistically significant at the 0.05 (5%) level.				
*. Statistically significant at the 0.1 (10%) level.				

Source: Author's processing, 2021

In line with expectations, the obtained R^2 for the period 2017-2019 is 81.6%, greater than the coefficient of determination of 79.6% corresponding to the period 2015-2016, reflecting a higher value relevance with respect to the impact on the market value of companies listed on the BSE in the post-EUD period (2017-2019), compared to the pre-EUD time frame (2015-2016), with the probability of error at the 1% level.

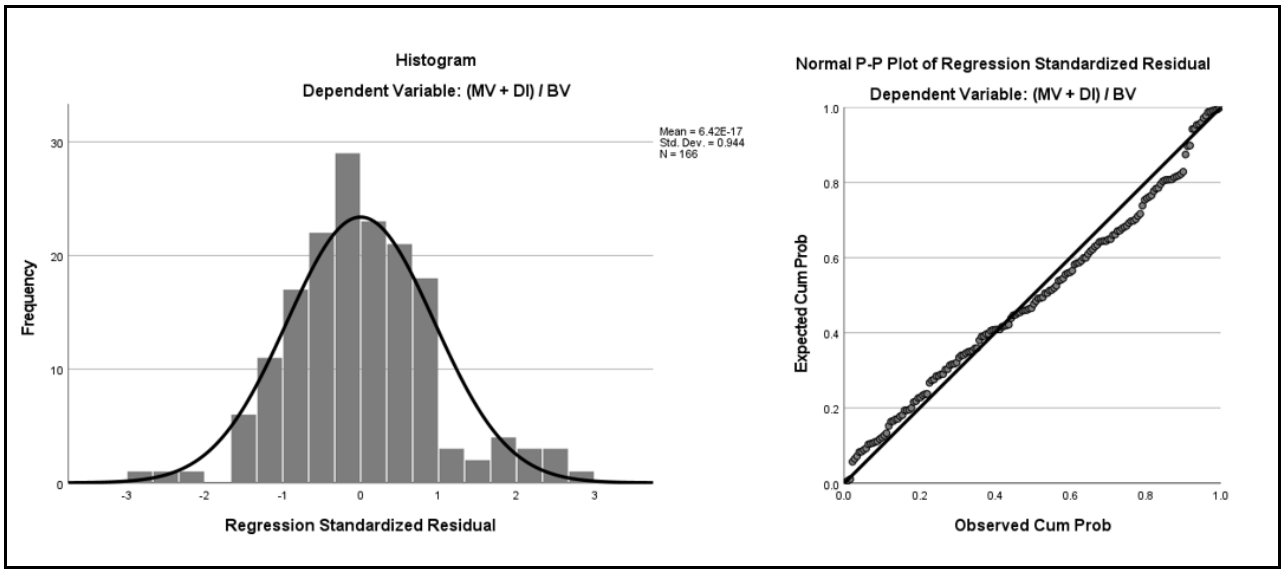
This result is also confirmed by the values of the coefficients corresponding to the intercept and the variables based on financial data. Thus, both the equity book value and the net income exert a greater influence on the market value during 2017-2019, in comparison to 2015-2016. The findings are statistically significant at the 5% level for variable 1 / $BV_{i,t-1}$ and at the 1% level for variable $NI_{i,t}$ / $BV_{i,t-1}$ and are similar to those highlighted by Baboukardos and Rimmel (2016), and Tlili *et al.* (2019) respectively.

3.3. Additional checks applied for testing the statistical validity of the models

To verify the statistical validity of the regression models used in the research, several procedures were applied to assess whether the criteria related to the normal distribution of residual values, multicollinearity, and dealing with outliers are met.

Figure no. 1 reflects the histogram and the P-P plot of the standardized residual values. Following the visual inspection of the two graphs, the normal distribution of the standardized residuals is observed.

Figure no. 1. Histrogram and P-P plot of standardised residuals obtained for the regression model on equation (2)



Source: Author's processing, 2021

In order to detect a possible multicollinearity issue between the independent variables included in the multiple regression model presented in equation (2), in addition to the analysis of Pearson and Spearman's rho coefficients, the statistical indicators of tolerance and variance inflation factors (VIF) were generated, as disclosed in **Table no. 9**.

Table no. 9. Tolerance and variance inflation factor (VIF) for the regression model on equation (2)

Variable	Tolerance	VIF
$1 / BV_{i,t-1}$	0.670	1.493
$NI_{i,t} / BV_{i,t-1}$	0.620	1.613
$GRIREP_{i,t}$	0.203	4.933
$SREP_{i,t}$	0.202	4.944
$SDG_{i,t}$	0.589	1.698
$LOSS_{i,t}$	0.715	1.399
$EUD_{i,t}$	0.385	2.594

Source: Author's processing, 2021

Given that all indicators are within accepted limits (tolerance greater than 0.1 and VIF lower than 10), it can be concluded that the data are not affected by multicollinearity (Hassel *et al*., 2005; Baboukardos and Rimmel, 2016).

Following the application of all procedures, the test results showed that all assumptions were verified and all statistical criteria were met to allow the use of the multiple linear regression models.

The main statistically significant research findings obtained after the application of the regression models on the sample of 34 BSE listed companies on the regulated market, consisting of 166 firm-year observations, are summarised in **Table no. 10**.

Table no. 10. Summary of research results

Analysed statistical indicator	Hypothesis	Findings	Validated
Equation (2) model			
R^2 of the regression without non-financial variables – step (B)	R^2 step (B) < R^2 step (C)	0.792 (F-stat 38.129***)	Yes
R^2 of the regression with non-financial variables – step (C)		0.799 (F-stat 32.445***)	
1 / $BV_{i,t-1}$ coefficient – step (B)	β_0 step (B) < β_0 step (C)	-2.457***	Yes
1 / $BV_{i,t-1}$ coefficient – step (C)		-2.312***	
$NI_{i,t}$ / $BV_{i,t-1}$ coefficient – step (B)	β_2 step (B) < β_2 step (C)	5.747***	Yes
$NI_{i,t}$ / $BV_{i,t-1}$ coefficient – step (C)		5.765***	
GRIREP $_{i,t}$ coefficient – step (C)	β_3 step (C) ≠ 0	0.244*	Yes
Equation (3) model – pre-post EUD analysis			
R^2 pre-EUD	R^2 pre-EUD < R^2 post-EUD	0.796 (F-stat 14.449***)	Yes
R^2 post-EUD		0.816 (F-stat 22.753***)	
1 / $BV_{i,t-1}$ coefficient – pre-EUD	β_0 pre-EUD < β_0 post-EUD	-2.338**	No
1 / $BV_{i,t-1}$ coefficient – post-EUD		-2.450**	
$NI_{i,t}$ / $BV_{i,t-1}$ coefficient – pre-EUD	β_2 pre-EUD < β_2 post-EUD	5.738***	Yes
$NI_{i,t}$ / $BV_{i,t-1}$ coefficient – post-EUD		5.943***	
***. Statistically significant at the 0.01 (1%) level.			
**. Statistically significant at the 0.05 (5%) level.			
*. Statistically significant at the 0.1 (10%) level.			

Source: Author's processing, 2021

Conclusion

The research investigates the value relevance of accounting values and non-financial information related to sustainability in terms of their impact on the market value of companies listed on the Bucharest Stock Exchange on the regulated market during 2015-2019. Starting from the Ohlson (1995) model, the analysis was conducted by applying multiple regression models based on the relationship between the equity market value as a dependent variable and the independent variables represented by the equity book value, net income and non-financial information related to sustainable development (Hassel *et al*., 2005; Baboukardos and Rimmel, 2016; Grassmann, 2021).

According to the results that are summarised in **Table no. 10**, it can be concluded that the reporting of non-financial information on sustainable development by companies listed on the BSE in the period 2015-2019 has led to an increase in value relevance with respect to the influence exerted on the firms' market value. In addition, the findings show an increase in the influence of the independent variables based on financial data (equity book value and net income) used in the regression model on the market value in the period after the adoption of Directive 2014/95/EU (2017-2019), compared to the period preceding the EU Directive (2015-2016).

The main limitation of the research refers to the small number of companies selected for analysis, and observations that formed the sample respectively, this being specific to studies conducted at a single country level, especially in the case of emerging economies. Given the reduced sample size and the relatively short time frame under examination, the research results should be interpreted with caution (Hassel *et al*., 2005; Landau *et al*., 2020). As future research directions, including other companies with similar characteristics from different countries, as well as developing of the regression models by adding variables based on ESG indices measured at the international level (MSCI ESG Index, S&P Dow Jones ESG Index etc.) are to be considered.

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Appendix. List of companies included in the final sample		
No.	**Company name (Compustat code)**	**Industry code***
1	Alro S.A. (BVB:ALR)	7
2	Altur S.A. (BVB:ALT)	1
3	Alumil Rom Industry S.A. (BVB:ALU)	7
4	Antibiotice S.A. (BVB:ATB)	4
5	Biofarm S.A. (BVB:BIO)	4
6	Casa de Bucovina - Club de Munte S.A. (BVB:BCM)	1
7	CNTEE Transelectrica SA (BVB:TEL)	9
8	Compa S.A. (BVB:CMP)	1
9	Electromagnetica S.A. (BVB:ELMA)	6
10	IAR S.A. (BVB:IARV)	5
11	Impact Developer & Contractor S.A. (BVB:IMP)	8
12	Oil Terminal S.A. (BVB:OIL)	3
13	OMV Petrom S.A. (BVB:SNP)	3
14	Rompetrol Rafinare S.A. (BVB:RRC)	3
15	Rompetrol Well Services SA (BVB:PTR)	3
16	S.C. Aerostar S.A. (BVB:ARS)	5
17	S.C. Electroarges S.A. (BVB:ELGS)	1
18	S.C. Prebet Aiud S.A. (BVB:PREB)	7
19	S.C. Romcarbon S.A. (BVB:ROCE)	7
20	S.C. Ropharma S.A. (BVB:RPH)	2
21	S.C. Santierul Naval Orsova S.A. (BVB:SNO)	5
22	S.C. Turism Felix S.A. (BVB:TUFE)	1
23	S.N. Nuclearelectrica S.A. (BVB:SNN)	9
24	S.N.T.G.N. Transgaz S.A. (BVB:TGN)	3
25	S.C. Cemacon SA (BVB:CEON)	7
26	SNGN Romgaz SA (BVB:SNG)	3
27	SOCEP S.A. (BVB:SOCP)	5
28	Societatea Conpet S.A. (BVB:COTE)	3
29	Societatea Energetica Electrica S.A. (BVB:EL)	9
30	Teraplast S.A. (BVB:TRP)	7
31	Turbomecanica SA (BVB:TBM)	5
32	Turism, Hoteluri, Restaurante Marea Neagra S.A. (BVB:EFO)	1
33	Vrancart S.A. (BVB:VNC)	7
34	Zentiva S.A. (BVB:SCD)	4

**where: Consumer discretionary = 1, Consumer staples = 2, Energy = 3, Health care = 4, Industrials = 5, Information technology = 6, Materials = 7, Real estate = 8, Utilities = 9*

Source: Author's processing, 2021