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# Corporate Governance Ratings and Firm Value: Empirical Evidence from the Bucharest Stock Exchange

**Ştefan Cristian Gherghina**
Bucharest University of Economic Studies, Department of Finance,
6 Romana Square, 1st district, Bucharest, 010374 Romania.
Email: stefan.gherghina@fin.ase.ro

**ABSTRACT:** This paper aims at assessing corporate governance by the instrumentality of ratings for a sample of 68 companies listed on the Bucharest Stock Exchange (BSE) over the year 2011. Therewith, current research has the goal of investigating the empirical relationship between the corporate governance ratings and firm value. There were considered both accounting-based firm value measures (return on assets, ROA, as well as return on equity, ROE) and market-based firm value measures (earnings per share, EPS), all being industry-adjusted. The novelty of this study is emphasized by the corporate governance ratings developed for the companies listed on the BSE by using multidimensional data analysis techniques, namely principal component analysis (PCA). By employing PCA for a suite of seven variables (the sum of holdings corresponding to the first three shareholders, the number of shareholders having holdings over 5%, board size, the number of independent directors, the number of non-executive directors, the number of women on board, and CEO duality) there ensued three specific ratings (board independence rating, ownership concentration rating, and board diversity rating), alongside a global rating. Subsequently, by estimating multivariate linear regression models, there was noticed the lack of a statistically significant relationship between the governance global rating and firm value as proxied by ROA, ROE, and EPS, all being industry-adjusted. The lack of a statistically significant relationship was reinforced also for the specific governance ratings. The utility of current research is underlined by the information related to governance ratings towards investors globally, thus being supported the investment decision making.

**Keywords:** corporate governance ratings; firm value; principal component analysis; multivariate linear regression models
**JEL Classifications:** C38; G32; G34

## 1. Introduction

Corporate governance depicts 'the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment' (Shleifer and Vishny, 1997). Likewise, through a good corporate governance the agency costs brought about by the division of ownership and control are mitigated, as well as the time and resources on monitoring management teams assigned by investors are narrowed (Drobetz, 2002). Ongore and K'Obonyo (2011) shown that managers work best when they have sufficient latitude for innovation and creativity, that is, less monitoring by principals. In fact, by taking into account the fundamental aim consisting in maximizing shareholder return, the investors should consider the governance profile of a certain company within the process of setting the way in which the available capital will be apportioned. Lee et al. (2013) reinforced the fact that better corporate governance can reduce the agency and information asymmetry between management and investment. However, corporate governance is influenced both by country-level governance mechanisms, as well as internal governance mechanisms. Thereby, the country-level governance mechanisms cover the country's laws, its culture, and norms, alongside the institutions that enforce the laws (Aggarwal et al., 2009). Furthermore, the internal governance mechanisms comprise overseeing by the board of directors, internal control and audit, balance of power, remuneration, monitoring by large shareholders and/or by banks and other large creditors.

Current paper aims at assessing corporate governance related to the companies listed on the Bucharest Stock Exchange (hereinafter 'BSE') by the instrumentality of ratings. Therewith, there will

be empirically investigated the relationship between these aggregated measures and firm value. The novelty of this study is emphasized by the corporate governance ratings developed for the companies listed in Romania by employing multidimensional data analysis techniques, namely principal component analysis (hereinafter 'PCA'). The utility of this investigation is underlined by the information related to governance ratings towards investors globally, thus being supported the investment decision making. Nevertheless, according to Bhagat et al. (2008) there is no consistent connection between governance indices and measures of corporate performance, such ratings being highly imperfect instruments. Withal, Bhagat et al. (2008) noticed the fact that there is no one 'best' measure of corporate governance, the most effective governance system depending on context and on firm's specific circumstances.

The rest of the paper is organized as follows: the following section reviews the growing literature on corporate governance ratings and firm valuation, being established the hypothesis of the study. The third section describes the research sample, variables, and quantitative methods, whereas the fourth section shows the empirical results. Final section concludes the manuscript and provides avenues of future research.

## 2. Literature Review and Hypothesis Development

Based on the data provided by Investor Responsibility Research Center (IRRC), Gompers et al. (2003) developed a 'Governance Index', denoted as G, to proxy for the level of shareholder rights at about 1,500 large firms from September 1990 to December 1999, by considering the incidence of 24 distinct corporate-governance provisions. Furthermore, there was conceived an investment strategy that purchased shares in the lowest-G firms ('Democracy' firms with strong shareholder rights) and sold shares in the highest-G firms ('Dictatorship' firms with weak shareholder rights) which earned abnormal returns of 8.5 percent per year. Also, there was noticed that the firms with stronger shareholder rights had higher firm value, higher profits, higher sales growth, lower capital expenditures, and made fewer corporate acquisitions. Foerster and Huen (2004) concluded that markets react statistically significantly, but only marginally economically to 'news' related to corporate governance rankings, by using the Canadian governance index presented in a Globe and Mail Report on Business article investigating Canadian corporate governance, for 270 of Canada's largest firm over the year 2002. By constructing a broad corporate governance rating for 91 German public firms, Drobetz et al. (2004) provided evidence that better corporate governance is highly correlated with better operating performance, higher stock returns, and higher market valuation. Likewise, an investment strategy similar to Gompers et al. (2003), that bought high-corporate governance rating firms and shorted low-corporate governance rating firms earned abnormal returns of around 12% on an annual basis

Carvalhal da Silva and Leal (2005) developed a rating towards quality of a firm's corporate governance practices for 131 companies listed at the São Paulo Stock Exchange, during the 1998-2002 period and found a positive and statistically significant relationship between firm performance, as measured by return on assets and better corporate governance practices, although the results were not statistically significant when Tobin's Q ratio was employed as a proxy for market valuation. According to Durnev and Kim (2005), investment opportunities, external financing, and ownership structure are related to the quality of governance and disclosure practices, likewise the companies with higher governance and transparency rankings being highly valued. Bai et al. (2006) constructed a corporate governance index (G-index) by employing principal component analysis for a sample of 1,004 companies listed on the Shanghai Stock Exchange and Shenzhen Stock Exchange over the year 2000 and found a statistically and economically significant negative effect on market valuation, as measured by Tobin's Q ratio, as well as market-to-book ratio. For Russian companies, Black et al. (2006) established that a worst-to-best improvement in governance represented by a combined governance index (comprising the ratings Brunswick UBS Warburg - Brunswick, Troika Dialog - Troika, S&P Corporate Governance - S&P Governance, S&P Transparency and Disclosure - S&P Disclosure, Institute of Corporate Law and Governance - ICLG, Russian Institute of Directors/Expert - RID) predicted a 0.45 change in ln(Tobin's Q) or an 81% increase in share price; for the Brunswick index, a worst-to-best change predicted an 0.70 increase in ln(Tobin's Q) or about a 143% change in share price.

Brown and Caylor (2006) created Gov-Score rating based on 51 firm-specific provisions, the data being provided by Institutional Shareholder Services Inc. (ISS) for 1,868 US firms as of February 1, 2003 and found out seven governance measures that are key drivers of the positive relationship with firm valuation. By selecting a sample of 2,106 firm observations for the fiscal year ending 06/30/2002 through 05/31/2003 for which corporate governance information from Equilar Inc. and TrueCourse Inc. was available, abreast 39 structural measures of corporate governance, Larcker et al. (2007) employed exploratory principal component analysis and revealed that 14 factors characterize the dimensionality of the individual governance indicators. Withal, there was found that the governance indices are related to future operating performance and excess stock returns, even though there was ascertained a very modest and mixed association with abnormal accruals and almost no relation with accounting restatements. Similar to Gompers et al. (2003), as well as Drobetz et al. (2004), for a sample consisting of Japanese firms and using a unique data set provided by Governance Metrics International (GMI), Bauer et al. (2008) developed a global overall index and conceived portfolios of well-governed and poorly governed firms, thereby reporting that well-governed firms significantly outperform poorly governed firms by up to 15% a year. Bhagat and Bolton (2008) noticed that better governance as measured by the corporate governance ratings (GIM and BCF indices), alongside stock ownership of board members, as well as CEO-Chair separation is significantly positively correlated with better contemporaneous and subsequent operating performance.

By using the corporate-governance data of Deminor Rating for 1,199 companies comprised in the FTSEurofirst 300, out of 14 European countries, from 1999 to 2003, Renders et al. (2010) provided evidence for a significant positive relationship between corporate-governance ratings and performance. Cheung et al. (2011) established a positive relationship between the CLSA's (Credit Lyonnais Securities Asia) corporate governance score and firm value for ten Asian emerging markets (China, Hong Kong, India, Indonesia, Korea, Malaysia, the Philippines, Singapore, Taiwan, and Thailand), over the three years, 2001, 2002, and 2004. For the corporations listed in Thailand, over the period from 2001 through 2006, Hodgson et al. (2011) found consistent positive relationships between corporate governance levels, proxied by the Thai Institute of Directors (IOD) corporate governance index and accounting and market-based performance metrics.

Lazarides and Drimpetas (2011) designed an index of corporate governance quality for a sample comprising 60 firms ranked among the two major stock indexes (FTSE-20 and FTSE-40) of the Greek capital market, the study's time horizon being from 2001 to 2006 and emphasized the main drivers of corporate governance quality namely firm size, leadership, or power concentration, as well as board characteristics. Tariq and Abbas (2013) noticed a positive impact of compliance with the Code of Corporate Governance revealed through the Corporate Governance Compliance Index (CGCI) and financial performance, as measured by return on assets, return on equity, and return on capital employed, for a sample of 119 non-financial firms that are commonly listed on at least any of two stock exchanges out of three (Karachi Stock Exchange, KSE; Lahore Stock Exchange, LSE; Islamabad Stock Exchange, ISE), over eight years, from 2003 to 2010. Tariq and Abbas (2013) suggested that compliance is not linearly linked with financial performance, being established that high compliant firms are less profitable than average or low compliant firms. Based on the 'comply or explain' corporate governance disclosure regime out of 655 Canadian-only listed companies, Luo and Salterio (2014) developed a board score measure based on the Canadian code's 47 'best practices' and found a strongly and positively relationship with higher firm value as proxied by Tobin's Q ratio, but weakly and positively associated with better operational performance, as proxied by return on equity.

Based on the aforementioned evidence there is stated the following hypothesis: **There is a positive empirical relationship between corporate governance ratings and firm value.**

## 3. Data and Methodology

### *3.1. Research sample and variables definition*

Baseline, there were selected all the companies listed on the BSE over the year 2011, respectively 79 companies. However, there were not considered the companies out of financial intermediation sector (summing up 11 companies), thus being removed three credit institutions, five financial investment companies, and three financial investment services companies since these companies are regulated by specific rules. Therefore, the final research sample covers 68 listed companies on the BSE over the year 2011 (the list of the companies listed on the BSE covered in the

empirical research is provided in Annex A. Moreover, the industry membership of selected sample is multifarious as following: wholesale/retail (4), construction (8), pharmaceuticals (4), manufacturing (19), plastics (3), machinery and equipment (8), metallurgy (4), food (3), chemicals (4), basic resources (4), transportation and storage (2), tourism (3), and utilities (2).
Table 1 reveals the description of all the variables employed in the empirical research.

**Table 1. Description of all the variables employed in the empirical research**

| Variable | Definition |
|---|---|
| **Variables regarding firm value** | |
| ROAadj | Industry-adjusted return on assets. |
| ROEadj | Industry-adjusted return on equity. |
| EPSadj | Industry-adjusted earnings per share. |
| **Variables regarding corporate governance** | |
| CGGR | Corporate governance global rating. |
| **Firm-level control variables** | |
| Size | The annual average number of employees (logarithmic values). |
| Lev | Leverage, computed as the company's total debt to its total assets. |
| Growth | Sales growth, as the relative increase of sales from the previous year (%). |
| Years | The number of years since listing on the BSE (logarithmic values). |
| **Variables employed towards corporate governance global rating development** | |
| SSh3 (v1) | The sum of holdings corresponding to the first three shareholders (%). |
| NSh5(v2) | The number of shareholders having holdings over 5%. |
| BS (v3) | Board size. |
| NID (v4) | The number of independent directors. |
| NED (v5) | The number of non-executive directors. |
| Women (v6) | The number of women on board. |
| Dual (v7) | Dummy variable:<br>If the CEO holds simultaneously the positions of CEO and Chairman = 1;<br>If the CEO does not hold simultaneously the position of CEO and Chairman = 0. |

*Source:* Author's processing.

There are considered both accounting-based firm value measures - return on assets (hereinafter 'ROA') and return on equity (hereinafter 'ROE'), as well as market-based firm value measures - earnings per share (hereinafter 'EPS'), all being industry-adjusted similar to Eisenberg et al. (1998), due to the sundry industry membership. Thus, the difference between ROA of a certain company and industry' median ROA is ΔROA. The industry-adjusted measure of ROA (ROAadj) is defined as follows: ROAadj = sign(ΔROA)*sqrt(|ΔROA|), where sign(ΔROA) is the sign of difference between ROA of a certain company and industry' median corresponding to ROA, whereas sqrt(|ΔROA|) is the square root of absolute value of ΔROA. There was used median instead of mean because our data did not follow a normal distribution. Furthermore, in order to compute ROEadj and EPSadj, there was followed a similar procedure. In order to design the corporate governance global rating (hereinafter 'CGGR') there were considered the following types of variables: variables as regards ownership concentration (SSh3 and NSh5), variable as regards board size (BS), variables as regards board independence (NID and NED), variables as regards board diversiy (Women), as well as variables as regards balance of power (Dual). The source of our data are the annual reports of the selected companies.

In addition, there were included several firm-level control variables in order to control for firm size, indebetedness level, growth opportunities, and firm tenure. Therefore, firm size is controlled through the annual average number of employees (logarithmic values). Fama and Jensen (1983) argued that large companies are more diversified than small companies, large companies showing a lower failure risk. Similar Morck et al. (1988), McConnell and Servaes (1990), and Short and Keasey (1999), there has been selected a control variable towards indebtedness. Thus, there was included leverage as the ratio between the company's total debt and its total assets. Large companies could use more debt than small companies due to the transparency related to the information flow towards creditors. Also, indebtedness could generate the 'overinvestment problem' (Jensen, 1986) or the

'underinvestment problem' (Myers, 1977). The relative increase of sales from the previous year is used in order to control for growth opportunities. McConnell and Servaes (1995) estimated leverage as the market value of long-term debt divided by the replacement value of assets and noticed that for low-growth firms an increase in leverage is related with an increase in value, whereas for high-growth firms an increase in leverage is linked with a decrease in value due to the monitoring function caused by indebtedness (the firm's price-to-operating-earnings, P/E ratio, was used to distinguish between these two types of firms). As well, firm tenure is controlled through the number of years since listing on the BSE (logarithmic values). Black et al. (2006) and Balasubramanian et al. (2010) stated that younger companies are likely to be faster growing and perhaps more intangible asset intensive, which can lead to higher Tobin's Q ratio.

*3.2. Empirical methods*

The corporate governance global rating related to the companies listed on the BSE will be developed by employing PCA. In fact, PCA depicts a multidimensional data analysis technique which ensures the decomposition expressed through a lower number of components (Han and Kamber, 2006) and non-redundant of the total variability out of the initial causal space (Jolliffe, 2002). The principal components are orthogonal vectors which capture as much from the variance related to the original vector variables as following: the first principal component catches the maximum possible from the variance related to the original vector variables, the second principal component catches the maximum possibile from the variance related to the original vector variables, but after is removed the variance captured by the first principal component, and so on (Hand et al., 2001; Han and Kamber, 2006; Hastie et al., 2009). The initial causal space is determined by the seven explanatory variables selected in order to create the corporate governance global rating (v1, v2, ..., v6, v7), each of the 68 companies listed on the BSE covered within current empirical investigation being characterized by seven variables (Witten and Frank, 2005).

The principal components corresponding to the examined causal space are described as a vector with seven dimmension, as noted with w:

$$w = \begin{pmatrix} w_1 \\ w_2 \\ \dots \\ w_6 \\ w_7 \end{pmatrix} \quad (1)$$

Each coordinate $w_i$ of the aforementioned vector signifies a principal component defined in relation to the original variables through the following linear combination:

$$w_i = \alpha_1^{(i)} * v_1 + \alpha_2^{(i)} * v_2 + \dots + \alpha_6^{(i)} * v_6 + \alpha_7^{(i)} * v_7 \quad i = 1, 2, \dots, 6, 7 \quad (2)$$

The coefficients $\alpha_j^{(i)}$ are the coordinates of the eigenvectors corresponding to the covariance matrix related to the original variables v1, v2, ..., v6, v7, whereas the variances of the principal components are the eigenvalues of the covariance matrix. Furthermore, the aim is to solve the following extreme problem, the optimum criterion being maximum or minimum depending on the nature of function $\phi$:

$$\begin{cases} \text{opt}\, \phi(v, w) \\ w = A^t * v \end{cases} \quad (3)$$

There will be considered the fact that the vectors $\alpha^{(i)}$ are the columns of the matrix A of dimension 7×7 as following:

$$A = \begin{pmatrix} \alpha_1^{(1)} & \alpha_1^{(2)} & \dots & \alpha_1^{(6)} & \alpha_1^{(7)} \\ \alpha_2^{(1)} & \alpha_2^{(2)} & \dots & \alpha_2^{(6)} & \alpha_2^{(7)} \\ \dots & \dots & \dots & \dots & \dots \\ \alpha_6^{(1)} & \alpha_6^{(2)} & \dots & \alpha_6^{(6)} & \alpha_6^{(7)} \\ \alpha_7^{(1)} & \alpha_7^{(2)} & \dots & \alpha_7^{(6)} & \alpha_7^{(7)} \end{pmatrix} \quad (4)$$

There is supposed the fact that v is the vector whose coordinates are the original variables $v_1$, $v_2$, …, $v_6$ , $v_7$, whilst w is the vector whose coordinates are the principal components $w_1$, $w_2$, …, $w_6$ , $w_7$. Therefore, the linear combinations which define the principal components could be described as following:

$$\begin{cases} w_1 = \alpha_1^{(1)} * v_1 + \alpha_2^{(1)} * v_2 + \cdots + \alpha_6^{(1)} * v_6 + \alpha_7^{(1)} * v_7 \\ w_2 = \alpha_1^{(2)} * v_1 + \alpha_2^{(2)} * v_2 + \cdots + \alpha_6^{(2)} * v_6 + \alpha_7^{(2)} * v_7 \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ w_6 = \alpha_1^{(6)} * v_1 + \alpha_2^{(6)} * v_2 + \cdots + \alpha_6^{(6)} * v_6 + \alpha_7^{(6)} * v_7 \\ w_7 = \alpha_1^{(7)} * v_1 + \alpha_2^{(7)} * v_2 + \cdots + \alpha_6^{(7)} * v_6 + \alpha_7^{(7)} * v_7 \end{cases} \quad (5)$$

Afterwards, in order to empirically investigate the relationship between the corporate governance ratings and the value of the BSE listed companies there will be estimated several multivariate regression models by considering the following general form (Baltagi, 2005):

$$Company\_value_i = \beta_0 + \beta_1 X_i + \beta_2 Z_i + u_i \quad i = 1, ..., 68 \quad (6)$$

where for the company i, there is set as dependent variable company value as measured by both industry-adjusted accounting-based firm value measures (ROAadj and ROEadj) and industry-adjusted market-based firm value measures (EPSadj), considered within distinct equations, as well as explanatory variables $X_i$ reflecting the corporate governance ratings and $Z_{it}$ being the vector of firm-level control variables.

## 4. Empirical Results

### *4.1. Univariate analysis and correlation analysis*

Table 2 provides descriptive statistics of all the variables employed in the empirical research.

**Table 2. Descriptive statistics of all the variables employed in the empirical research**

| Variable | N | Mean | Median | Min | Max | Std. Dev. |
|---|---|---|---|---|---|---|
| **Variables regarding firm value** | | | | | | |
| ROAadj | 68 | -0.063290 | -0.088308 | -1.11607 | 0.518879 | 0.297605 |
| ROEadj | 62 | -0.097283 | -0.087856 | -3.46817 | 0.554805 | 0.555367 |
| EPSadj | 68 | 0.107271 | -0.082900 | -1.41389 | 5.567611 | 0.794993 |
| **Firm-level control variables** | | | | | | |
| Size | 68 | 2.62733 | 2.64785 | 1.146128 | 4.343448 | 0.585335 |
| Lev | 68 | 0.420012 | 0.318909 | 0.011785 | 1.696471 | 0.344727 |
| Growth | 68 | 0.054277 | 0.09298 | -0.91361 | 0.643134 | 0.267035 |
| Years | 68 | 1.05803 | 1.146128 | 0.477121 | 1.20412 | 0.184196 |
| **Variables employed towards corporate governance global rating development** | | | | | | |
| $v_1$ | 68 | 0.707153 | 0.739782 | 0.128421 | 0.996345 | 0.193368 |
| $v_2$ | 68 | 1.852941 | 2.000000 | 1.000000 | 4.000000 | 0.851070 |
| $v_3$ | 68 | 4.838235 | 5.000000 | 3.000000 | 9.000000 | 1.560810 |
| $v_4$ | 68 | 0.764706 | 0.000000 | 0.000000 | 4.000000 | 1.038335 |
| $v_5$ | 68 | 2.750000 | 3.000000 | 1.000000 | 8.000000 | 1.479966 |
| $v_6$ | 68 | 0.735294 | 1.000000 | 0.000000 | 3.000000 | 0.821677 |
| $v_7$ | 68 | 0.352941 | 0.000000 | 0.000000 | 1.000000 | 0.481438 |

*Source:* Author's calculations. *Notes:* Description of the variables is provided in Table 1.

Table 3 shows the correlation coefficient matrix related to the original variables. Thereby, there is noticed a high positive correlation coefficient between v3 and v5 (0.8674).

However, by taking into consideration that there are differences as regards the order of magnitude, as well as the units of measurement related to the variables employed towards corporate governance global rating development, there will be applied the procedure of data standardization. Therefore, data standardization implies running the following steps: centering the data (this step entails replacing the original variables with their deviation from the mean value) and data reduction (this step implicates dividing the variables' values to their standard deviation, being applied to the centered variables).

Unfortunately, the high correlations between the variables selected in current empirical investigation mitigate the individual significance of these variables and emphasizes the emergence of several informational redundancy. Hence, by employing PCA our aim is to reduce the dimensionality related to the initial causal space under a minimum loss of information.

**Table 3. The correlation coefficient matrix**

| V | $v_1$ | $v_2$ | $v_3$ | $v_4$ | $v_5$ | $v_6$ | $v_7$ |
|---|---|---|---|---|---|---|---|
| $v_1$ | 1 | -0.0545 (.659) | 0.0103 (.934) | 0.1265 (.304) | 0.0851 (.490) | -0.0194 (.875) | **-0.2962 (.014)** |
| $v_2$ | -0.0545 (.659) | 1 | 0.2178 (.074) | 0.0616 (.618) | **0.2548 (.036)** | 0.1356 (.270) | -0.0536 (.664) |
| $v_3$ | 0.0103 (.934) | 0.2178 (.074) | 1 | **0.5195 (.000)** | **0.8674 (0.00)** | 0.0825 (.504) | -0.0222 (.857) |
| $v_4$ | 0.1265 (.304) | 0.0616 (.618) | **0.5195 (.000)** | 1 | **0.5536 (.000)** | 0.1708 (.164) | -0.2195 (.072) |
| $v_5$ | 0.0851 (.490) | **0.2548 (.036)** | **0.8674 (0.00)** | **0.5536 (.000)** | 1 | 0.0307 (.804) | -0.1885 (.124) |
| $v_6$ | -0.0194 (.875) | 0.1356 (.270) | 0.0825 (.504) | 0.1708 (.164) | 0.0307 (.804) | 1 | -0.1376 (.263) |
| $v_7$ | **-0.2962 (.014)** | -0.0536 (.664) | -0.0222 (.857) | -0.2195 (.072) | -0.1885 (.124) | -0.1376 (.263) | 1 |

*Source:* Author's calculations. *Notes:* Bold correlations are statistically significant for $p < .05000$. Description of the variables is provided in Table 1.

*4.2. Principal component analysis*

Table 4 provides the eigenvalues of the correlation matrix Table 3 and related statistics, the principal components being descending ordered based on the retained information as percentage out of the total variance. Likewise, there is showed the percentage out of the initial information related to each variable of the seven examined variables which is synthesized within the extracted principal components. Thus, the first principal component explains 35.28337% of the total variance, the second principal component explains 18.58581% of the total variance, whereas the third principal component explains 15.48651% of the total variance. In fact, the first three principal components cumulate 69.3557% of the total information.

**Table 4. The eigenvalues of the correlation matrix, and related statistics**

| Value number | Eigenvalue | % Total variance | Cumulative Eigenvalue | Cumulative % |
|---|---|---|---|---|
| **1** | **2.469836** | **35.28337** | **2.469836** | **35.2834** |
| **2** | **1.301007** | **18.58581** | **3.770843** | **53.8692** |
| **3** | **1.084056** | **15.48651** | **4.854898** | **69.3557** |
| 4 | 0.885509 | 12.65012 | 5.740407 | 82.0058 |
| 5 | 0.669214 | 9.56020 | 6.409621 | 91.5660 |
| 6 | 0.478680 | 6.83829 | 6.888301 | 98.4043 |
| 7 | 0.111699 | 1.59570 | 7.000000 | 100.0000 |

*Source:* Author's calculations.

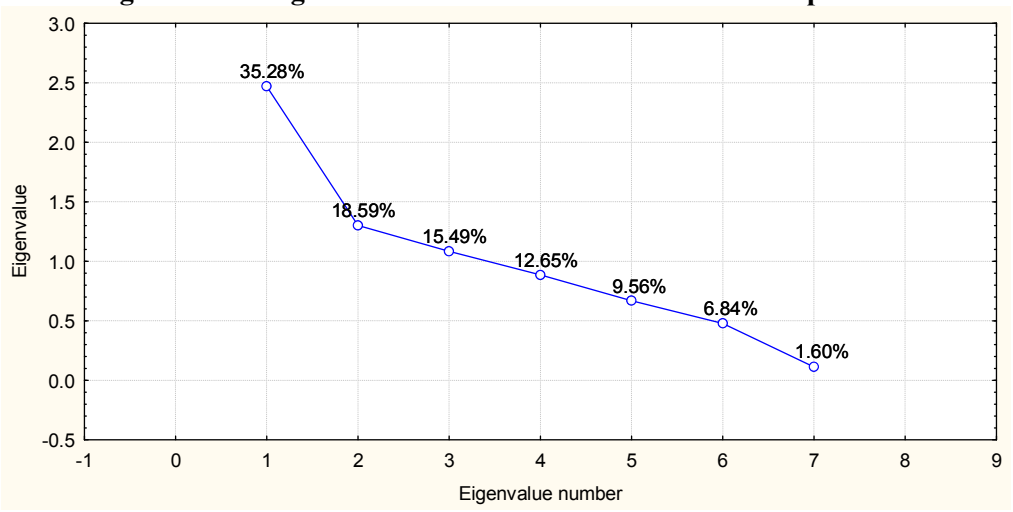
Figure 1 reveals the scree plot related to the eigenvalues of the correlation matrix (table 3) proposed by Cattell (1966).

Thus, there is noticed the fact that after the third point out of the graph, which depicts the third principal component, the slope is decreasing. By taking into consideration the criterion established by Kaiser (1960), there are retained only the principal components corresponding to the eigenvalues greater than unit. Hence, based on the graph and criterion of Kaiser (1960), there will be stored three principal components.

Table 5 shows the factor matrix, its elements being the correlation coefficients between the original variables and the principal components. Thus, the strong relationship expressed by the fifth correlation coefficient (-0.916072) emphasizes the fact that the first principal component states the informational content of the original variable $v_5$ (the number of non-executive directors). Also, the second principal component conveys the informational content of the original variable $v_1$ (the sum of holdings corresponding to the first three shareholders), whilst the third principal component indicates the informational content of the original variable $v_6$ (the number of women on board). Accordingly, the first principal component reveals a specific governance rating towards board independence (hereinafter '$F_1$'), the second principal component depicts a specific governance rating towards

ownership concentration (hereinafter '$F_2$'), and the third principal component shows off a governance rating towards board diversity (hereinafter '$F_3$').

**Figure 1. The eigenvalues of the correlation matrix scree plot**




*Source:* Author's processing.

**Table 5. The factor coordinates of the variables, based on correlations**

| V | $F_1$ | $F_2$ | $F_3$ |
|---|---|---|---|
| v1 | -0.171168 | **-0.752121** | 0.234855 |
| v2 | -0.345152 | 0.250031 | -0.530623 |
| v3 | -0.876756 | 0.287802 | 0.166017 |
| v4 | -0.755513 | -0.113715 | 0.079651 |
| v5 | **-0.916072** | 0.146518 | 0.179994 |
| v6 | -0.214810 | -0.143957 | **-0.806438** |
| v7 | 0.310768 | 0.731336 | 0.175192 |

*Source:* Author's calculations. *Notes:* Description of the variables is provided in Table 1.

Table 6 discloses the coefficients related to the linear combinations which define the principal components, describing the eigenvectors of the correlations matrix (Table 3).

**Table 6. The eigenvectors of the correlation matrix**

| V | $F_1$ | $F_2$ | $F_3$ |
|---|---|---|---|
| $v_1$ | -0.108915 | -0.659398 | 0.225566 |
| $v_2$ | -0.219622 | 0.219207 | -0.509636 |
| $v_3$ | -0.557885 | 0.252321 | 0.159451 |
| $v_4$ | -0.480737 | -0.099696 | 0.076501 |
| $v_5$ | -0.582902 | 0.128455 | 0.172875 |
| $v_6$ | -0.136685 | -0.126210 | -0.774543 |
| $v_7$ | 0.197743 | 0.641176 | 0.168263 |

*Source:* Author's calculations. *Notes:* Description of the variables is provided in Table 1.

Consequently, based on the principal components' coefficients, there were computed the scores of the observations within the principal components' space (Annex B). Moreover, the coordinates of the objects within the new space, namely the objects' projections on its axes are the assessments of the objects in relation with the new variables, being entitled principal components' scores. Afterwards, by taking into account the informational content there will be computed the coefficients of importance (hereinafer 'CI') for each of the three retained principal components. Thus, by marking the coefficient of importance for the first principal component by $CI_1$, respectively the variance of the first principal component by $var(w_1)$, then $CI_1 = var(w_1)/\sum_{j=1}^{3} var(w_j)$, therefore ensuing the following values related to the coefficients of importance: $CI_1 = 0.508731$; $CI_2 = 0.267978$; $CI_3 = 0.223291$. Further, the values of the corporate governance global rating for each

selected BSE listed company will be gathered based on the following formula CGGR = $\sum_{j=1}^{3} C_i(j)*F_j$, being reported in Annex C.

*4.3. Regression analysis*

Table 7 reveals the estimations' results as regards the influence of corporate governance global rating, as well as the specific ratings, on the BSE listed companies' value, ROAadj as proxy for firm value being the dependent variable. Therefore, the estimations' results show the lack of a statistically significant relationship between the CGGR and firm value (model 1), likewise between the specific ratings towards board independence, ownership concentration, and board diversity, and ROAadj (models 2-4), decision taken based on the t test (Student).

Besides, the results related to the four estimated models out of Table 7 support the fact that firm size and growth opportunities positively and statistically significant influence firm value, whereas the indebtedness level negatively and statistically significant influence firm value. The adjusted coefficient of determination emphasizes that about 59% of firm value' variance is explained through the estimated equations.

**Table 7. Estimations' results towards the influence of corporate governance ratings on firm value for the companies listed on the BSE (ROAadj - proxy for firm value)**

| Variable | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Intercept | -0.279868<br>(-1.574374) | -0.279223<br>(-1.531011) | -0.272166<br>(-1.541182) | -0.262744<br>(-1.393373) |
| CGGR | 0.010617<br>(0.354775) | | | |
| $F_1$ | | 0.002449<br>(0.135575) | | |
| $F_2$ | | | 0.010614<br>(0.510539) | |
| $F_3$ | | | | 0.003942<br>(0.160615) |
| Size | **0.099037*<br>(2.229249)** | **0.096186*<br>(2.013661)** | **0.092462*<br>(2.265924)** | **0.091028*<br>(2.147050)** |
| Lev | **-0.589019***<br>(-8.180791)** | **-0.584295***<br>(-7.986310)** | **-0.577470***<br>(-8.459554)** | **-0.582692***<br>(-8.413818)** |
| Growth | **0.409218***<br>(4.599042)** | **0.408427***<br>(4.587498)** | **0.416572***<br>(4.614897)** | **0.406219***<br>(4.508024)** |
| Years | 0.171601<br>(1.342105) | 0.176236<br>(1.385320) | 0.175686<br>(1.386592) | 0.172945<br>(1.330834) |
| N | 68 | 68 | 68 | 68 |
| F-statistic | **20.36000*** | **20.30333*** | **20.43108*** | **20.30724*** |
| Adj R-sq | 0.590965 | 0.590256 | 0.591850 | 0.590305 |

*Source:* Author's calculations. *Notes:* †p < .10; *p < .05; **p < .01; ***p < .001. The t-statistic for each coefficient is reported in parentheses. Description of the variables is provided in Table 1.

Table 8 shows the estimations' results towards the influence of corporate governance ratings on firm value for the companies listed on the BSE, the dependent variable being ROEadj as proxy for firm value. Alike the empirical results reported in Table 7, there is ascertained a positively impact of governance ratings on firm value, nevertheless the empirical relationship was not statistically validated by anyone of the estimated models. Withal, firm-level control variables exhibit a similar influence on ROEadj with those out of Table 7. Likewise, firm value' variance is explained approximately between 26% and 29% by the estimated equations.

Table 9 provides the estimations' as regards the influence of corporate governance ratings on EPSadj as proxy for firm value related to the companies listed on the BSE. The empirical results provide support for a lack of any statistically significant relationship between corporate governance measures and firm value. Therewith, firm size positively and statistically significant impact on EPSadj, whilst leverage negatively and statistically significant influences firm value.

Moreover, from Table 9 is acknowledged a negatively and statistically significant relationship between firm tenure proxied through the number of years since listing on the BSE (logarithmic values)

and firm value (model 2). Also, the adjusted coefficient of determination reveals that about between 16% and 17% of firm value' variance is explained by the estimated equations.

**Table 8. Estimations' results towards the influence of corporate governance ratings on firm value for the companies listed on the BSE (ROEadj - proxy for firm value)**

| Variable | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Intercept | -0.219052<br>(-0.454155) | -0.339428<br>(-0.690949) | -0.202745<br>(-0.418254) | -0.227661<br>(-0.427986) |
| CGGR | 0.074087<br>(0.893223) | | | |
| $F_1$ | | 0.061889<br>(1.281750) | | |
| $F_2$ | | | -0.021449<br>(-0.398314) | |
| $F_3$ | | | | -0.010044<br>(-0.153772) |
| Size | **0.240865**$^{\dagger}$<br>**(1.988026)** | **0.288662**$^{*}$<br>**(2.200662)** | **0.196444**$^{\dagger}$<br>**(1.777913)** | **0.201256**$^{\dagger}$<br>**(1.713172)** |
| Lev | **-1.189192**$^{***}$<br>**(-4.392058)** | **-1.214334**$^{***}$<br>**(-4.585892)** | **-1.086875**$^{***}$<br>**(-4.295875)** | **-1.090071**$^{***}$<br>**(-4.257946)** |
| Growth | **0.419677**$^{\dagger}$<br>**(1.787798)** | **0.411422**$^{\dagger}$<br>**(1.765016)** | **0.425394**$^{\dagger}$<br>**(1.795754)** | **0.443028**$^{\dagger}$<br>**(1.847053)** |
| Years | -0.109353<br>(-0.316004) | -0.102516<br>(-0.301689) | -0.047858<br>(-0.139906) | -0.037821<br>(-0.106780) |
| N | 62 | 62 | 62 | 62 |
| F-statistic | **5.733830**$^{***}$ | **5.985771**$^{***}$ | **5.543259**$^{***}$ | **5.503008**$^{***}$ |
| Adj R-sq | 0.279549 | 0.290110 | 0.271349 | 0.269593 |

*Source:* Author's calculations. *Notes:* †p < .10; *p < .05; **p < .01; ***p < .001. The t-statistic for each coefficient is reported in parentheses. Description of the variables is provided in Table 1.

**Table 9. Estimations' results towards the influence of corporate governance ratings on firm value for the companies listed on the BSE (EPSadj - proxy for firm value)**

| Variable | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Intercept | 0.520487<br>(0.768373) | 0.389878<br>(0.564770) | 0.532627<br>(0.795539) | 0.423511<br>(0.590566) |
| CGGR | 0.030929<br>(0.271213) | | | |
| $F_1$ | | 0.061223<br>(0.895342) | | |
| $F_2$ | | | -0.072450<br>(-0.919200) | |
| $F_3$ | | | | -0.043757<br>(-0.468806) |
| Size | **0.305144**$^{\dagger}$<br>**(1.802494)** | **0.370824**$^{*}$<br>**(2.050961)** | **0.289630**$^{\dagger}$<br>**(1.872154)** | **0.307144**$^{\dagger}$<br>**(1.904913)** |
| Lev | **-0.892703**$^{**}$<br>**(-3.253722)** | **-0.958957**$^{**}$<br>**(-3.462810)** | **-0.890242**$^{**}$<br>**(-3.439890)** | **-0.845961**$^{**}$<br>**(-3.211981)** |
| Growth | 0.352100<br>(1.038452) | 0.349109<br>(1.035948) | 0.294506<br>(0.860566) | 0.374748<br>(1.093536) |
| Years | -0.811977<br>(-1.666549) | **-0.825173**$^{\dagger}$<br>**(-1.713629)** | -0.782947<br>(-1.629906) | -0.745002<br>(-1.507447) |
| N | 68 | 68 | 68 | 68 |
| F-statistic | **3.699227**$^{**}$ | **3.888060**$^{**}$ | **3.899287**$^{**}$ | **3.737150**$^{**}$ |
| Adj R-sq | 0.167662 | 0.177311 | 0.177878 | 0.169618 |

*Source:* Author's calculations. *Notes:* †p < .10; *p < .05; **p < .01; ***p < .001. The t-statistic for each coefficient is reported in parentheses. Description of the variables is provided in Table 1.

**Consequently, the hypothesis of current research is rejected since the empirical relationship between the developed corporate governance ratings and firm value was not statistically validated.**

## 5. Concluding Remarks and Avenues of Future Research

Current paper employs PCA as multidimensional data analysis technique for a sample of companies listed on the BSE being developed a global rating of corporate governance, as well as several specific ratings towards board independence, ownership concentration, and board diversity. Subsequently, by estimating several multivariate linear regression models, there was documented the lack of any statistically significant relationship between the governance global rating and firm value as proxied by ROA, ROE, and EPS, all being industry-adjusted, contrary to previous studies (Bai et al., 2006; Larcker et al., 2007). Likewise, the lack of a statistically significant relationship was reinforced also for the specific governance ratings.

The limits of this manuscript are depicted by the reduced number of statistical observations, as well as by the short period of investigation. As avenues of future research there is pursued at expanding the research sample, alongside the number of variables selected in order to develop the global corporate governance rating. In addition, the empirical research will be continued by conceiving an investment strategy similar to Gompers et al. (2003).

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## Annexes

### Annex A. The list of the companies listed on the BSE covered in the empirical research

| Stock ticker symbol and company name | Stock ticker symbol and company name |
|---|---|
| **ALU** (ALUMIL ROM INDUSTRY S.A.) | **VNC** (VRANCART S.A.) |
| **CAOR** (CALIPSO S.A. ORADEA) | **MJM** (MJ MAILLIS ROMANIA S.A.) |
| **PEI** (PETROLEXPORTIMPORT S.A.) | **ROCE** (ROMCARBON S.A. BUZAU) |
| **RPH** (ROPHARMA S.A. BRASOV) | **TRP** (TERAPLAST S.A.) |
| **CEON** (CEMACON S.A. ZALAU) | **ARM** (ARMATURA S.A.) |
| **CMCM** (COMCM S.A. CONSTANTA) | **CMF** (COMELF S.A.) |
| **ENP** (COMPANIA ENERGOPETROL S.A.) | **CGC** (CONTOR GROUP S.A. Arad) |
| **COFI** (CONCEFA S.A. SIBIU) | **ELMA** (ELECTROMAGNETICA S.A. BUCURESTI) |
| **COMI** (CONDMAG S.A.) | **MECF** (MECANICA CEAHLAU) |
| **IMP** (IMPACT DEVELOPER & CONTRACTOR S.A.) | **RTRA** (RETRASIB S.A. SIBIU) |
| **PREH** (PREFAB S.A. BUCURESTI) | **UCM** (UCM RESITA S.A.) |
| **COTR** (SC TRANSILVANIA CONSTRUCTII S.A.) | **UZT** (UZTEL S.A.) |
| **ATB** (ANTIBIOTICE S.A.) | **ALR** (ALRO S.A.) |
| **BIO** (BIOFARM S.A.) | **COS** (MECHEL TARGOVISTE S.A.) |
| **RMAH** (FARMACEUTICA REMEDIA S.A.) | **ART** (TMK - ARTROM S.A.) |
| **SCD** (ZENTIVA S.A.) | **ZIM** (ZIMTUB S.A.) |
| **ARS** (AEROSTAR S.A.) | **BRM** (BERMAS S.A.) |
| **ALT** (ALTUR S.A.) | **SPCU** (BOROMIR PROD SA BUZAU (SPICUL)) |
| **ARTE** (ARTEGO S.A. Tg. Jiu) | **MPN** (TITAN S.A.) |
| **CBC** (CARBOCHIM S.A.) | **AMO** (AMONIL S.A.) |
| **CMP** (COMPA S.A.) | **AZO** (AZOMURES S.A.) |
| **ELJ** (ELECTROAPARATAJ S.A.) | **OLT** (OLTCHIM S.A. RM. VALCEA) |
| **ELGS** (ELECTROARGES S.A. CURTEA DE ARGES) | **STZ** (SINTEZA S.A.) |
| **EPT** (ELECTROPUTERE S.A.) | **DAFR** (DAFORA S.A.) |
| **ECT** (GRUPUL INDUSTRIAL ELECTROCONTACT S.A.) | **SNP** (OMV PETROM S.A.) |
| **MEF** (MEFIN S.A.) | **RRC** (ROMPETROL RAFINARE S.A.) |
| **PPL** (PRODPLAST S.A.) | **PTR** (ROMPETROL WELL SERVICES S.A.) |
| **SNO** (SANTIERUL NAVAL ORSOVA S.A.) | **OIL** (OIL TERMINAL S.A.) |
| **SRT** (SIRETUL PASCANI S.A.) | **SOCP** (SOCEP S.A.) |
| **STIB** (STIROM S.A. Bucuresti) | **BCM** (CASA DE BUCOVINA-CLUB DE MUNTE) |
| **TBM** (TURBOMECANICA S.A.) | **TUFE** (TURISM FELIX S.A. BAILE FELIX) |
| **UAM** (UAMT S.A.) | **EFO** (TURISM, HOTELURI, RESTAURANTE MAREA NEAGRA S.A.) |
| **VESY** (VES S.A.) | **TEL** (C.N.T.E.E. TRANSELECTRICA) |
| **APC** (voestalpine VAE APCAROM S.A.) | **TGN** (S.N.T.G.N. TRANSGAZ S.A.) |

*Source:* Author's processing.

**Annex B. The factor coordinates of cases, based on correlations**

| C | $F_1$ | $F_2$ | $F_3$ | C | $F_1$ | $F_2$ | $F_3$ |
|---|---|---|---|---|---|---|---|
| **ALU** | 0.72392 | 0.58171 | -0.13222 | **VNC** | 2.11965 | 0.08929 | 0.08552 |
| **CAOR** | 1.36677 | -0.90829 | -0.52758 | **MJM** | 0.13805 | -1.15896 | 0.31536 |
| **PEI** | 2.27483 | 0.17527 | 1.05128 | **ROCE** | 1.00498 | -0.24670 | -0.48437 |
| **RPH** | -1.44087 | 1.59639 | -0.34128 | **TRP** | -1.50980 | 2.06620 | 0.04955 |
| **CEON** | 0.25821 | 1.42199 | 0.46848 | **ARM** | 0.64910 | 0.43012 | 0.10974 |
| **CMCM** | -0.44263 | -1.03474 | -0.74856 | **CMF** | -0.49677 | -0.67748 | 1.33317 |
| **ENP** | 2.26558 | 0.97274 | -0.21669 | **CGC** | 2.19440 | 0.54180 | -0.06928 |
| **COFI** | 0.30314 | -0.15947 | -0.02655 | **ELMA** | -1.71158 | 2.55318 | 0.26272 |
| **COMI** | -0.64891 | -0.30728 | -1.54671 | **MECF** | -1.08591 | -0.71737 | -1.15426 |
| **IMP** | 2.15182 | 2.13752 | 0.42087 | **RTRA** | 1.24766 | -0.59738 | 0.14630 |
| **PREH** | -0.85479 | -1.02516 | 0.94139 | **UCM** | 2.14566 | -0.60680 | 1.31881 |
| **COTR** | -0.89215 | -0.43143 | -1.80361 | **UZT** | 1.30011 | -1.39187 | -0.05543 |
| **ATB** | -2.87792 | 0.11657 | 0.09873 | **ALR** | -0.23172 | -1.34206 | -0.23839 |
| **BIO** | -0.09203 | 1.78647 | 0.12746 | **COS** | -1.20324 | -1.39410 | 0.62396 |
| **RMAH** | 1.24045 | -1.40531 | -1.71418 | **ART** | -1.04824 | -1.30921 | 1.59010 |
| **SCD** | 0.04442 | -0.52378 | 0.47687 | **ZIM** | 0.75660 | -0.89695 | -1.25711 |
| **ARS** | -1.09607 | 1.01052 | 1.36502 | **BRM** | 1.46764 | 1.14088 | -1.62264 |
| **ALT** | -0.26673 | 0.68158 | -0.67846 | **SPCU** | 0.75455 | 0.80075 | 1.33957 |
| **ARTE** | 0.80974 | 0.89921 | 1.41156 | **MPN** | 0.24389 | -1.37168 | 1.38330 |
| **CBC** | -0.86196 | 2.74198 | -2.43734 | **AMO** | -0.24922 | 0.13620 | -1.14911 |
| **CMP** | 0.43374 | 1.32983 | 1.30509 | **AZO** | -3.10419 | -0.28696 | 0.72124 |
| **ELJ** | 1.59669 | -0.95558 | 0.12233 | **OLT** | -1.93512 | -1.09605 | -1.60027 |
| **ELGS** | 2.15070 | 0.57864 | 0.10822 | **STZ** | -0.54461 | -0.76501 | -0.28928 |
| **EPT** | 0.32442 | 0.43229 | 1.71778 | **DAFR** | 1.21906 | 1.10803 | -0.45876 |
| **ECT** | 0.05333 | -0.81838 | -0.79633 | **SNP** | -5.49042 | 0.03855 | 1.40514 |
| **MEF** | 1.68125 | -1.41001 | -0.20668 | **RRC** | 1.07695 | -1.39522 | 0.31356 |
| **PPL** | 0.62971 | -0.57600 | -2.46775 | **PTR** | 0.33720 | 0.74535 | 1.50503 |
| **SNO** | -0.52897 | 0.06035 | 0.01852 | **OIL** | -3.41229 | 0.33056 | -0.03835 |
| **SRT** | 1.88372 | 1.44717 | -0.40522 | **SOCP** | -0.25844 | 2.21747 | -0.41406 |
| **STIB** | -0.91045 | -1.00204 | 1.61261 | **BCM** | -1.93412 | -1.16926 | -1.50815 |
| **TBM** | 0.25184 | 2.04845 | 0.54855 | **TUFE** | 1.02687 | -1.08056 | -0.68359 |
| **UAM** | 1.65968 | -0.57424 | -0.00811 | **EFO** | 1.46403 | -1.10731 | 0.83145 |
| **VESY** | -2.35897 | 0.51772 | -1.62605 | **TEL** | -2.84717 | -0.55079 | 1.32220 |
| **APC** | 0.66402 | -1.29945 | 1.21209 | **TGN** | -1.57910 | -1.14190 | -0.95724 |

*Source:* Author's calculations. *Notes:* Stock ticker symbol and company name are provided in Annex A.

**Annex C. The corporate governance global rating for the companies listed on the BSE**

| C | CGGR | C | CGGR | C | CGGR | C | CGGR |
|---|---|---|---|---|---|---|---|
| **ALU** | 0.49464 | **ALT** | -0.10454 | **VNC** | 1.12136 | **SPCU** | 0.89756 |
| **CAOR** | 0.33411 | **ARTE** | 0.96810 | **MJM** | -0.16993 | **MPN** | 0.06538 |
| **PEI** | 1.43899 | **CBC** | -0.24795 | **ROCE** | 0.33700 | **AMO** | -0.34687 |
| **RPH** | -0.38142 | **CMP** | 0.86844 | **TRP** | -0.20332 | **AZO** | -1.49505 |
| **CEON** | 0.61703 | **ELJ** | 0.58353 | **ARM** | 0.46999 | **OLT** | -1.63550 |
| **CMCM** | -0.66961 | **ELGS** | 1.27336 | **CMF** | -0.13659 | **STZ** | -0.54666 |
| **ENP** | 1.36486 | **EPT** | 0.66445 | **CGC** | 1.24608 | **DAFR** | 0.81466 |
| **COFI** | 0.10555 | **ECT** | -0.36999 | **ELMA** | -0.12787 | **SNP** | -2.46906 |
| **COMI** | -0.75783 | **MEF** | 0.43130 | **MECF** | -1.00241 | **RRC** | 0.24400 |
| **IMP** | 1.76148 | **PPL** | -0.38503 | **RTRA** | 0.50731 | **PTR** | 0.70734 |
| **PREH** | -0.49938 | **SNO** | -0.24879 | **UCM** | 1.22343 | **OIL** | -1.65592 |
| **COTR** | -0.97221 | **SRT** | 1.25563 | **UZT** | 0.27604 | **SOCP** | 0.37030 |
| **ATB** | -1.41080 | **STIB** | -0.37162 | **ALR** | -0.53076 | **BCM** | -1.63404 |
| **BIO** | 0.46038 | **TBM** | 0.79955 | **COS** | -0.84639 | **TUFE** | 0.08019 |
| **RMAH** | -0.12830 | **UAM** | 0.68863 | **ART** | -0.52906 | **EFO** | 0.63372 |
| **SCD** | -0.01128 | **VESY** | -1.42443 | **ZIM** | -0.13616 | **TEL** | -1.30081 |
| **ARS** | 0.01799 | **APC** | 0.26023 | **BRM** | 0.69004 | **TGN** | -1.32309 |

*Source:* Author's calculations. *Notes:* Stock ticker symbol and company name are provided in Annex A.