

Research Article

<https://doi.org/10.32038/mbrq.2023.25.01>

Applying Polynomial Regression Modeling to Highlight the Relation Between Corporate Governance Characteristics and Performance

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KEYWORDS

Corporate Governance,
Entities Performance,
Polynomial Regression

ABSTRACT

The entities that carry out their activity in today's business environment, characterized to a great extent by uncertainty, are constantly facing new challenges. Whether they react to external stimuli or global pandemics, to new technologies or anticipate new trends, their ability to change or to be reactive or proactive is tested every day. In order to achieve performance and to ensure a sustainable development through an effective governance, the Corporate Governance Code provides support. In this context, the purpose of our research was to investigate the influence of corporate governance attributes on performance. Hence, the research question of our study aimed to determine the extent to which: (1) board size, (2) the number of non-executive directors, (3) CEO duality, (4) companies size, (5) gender diversity, (6) the existence of the audit committee, and (7) the qualified opinion expressed by the external auditor influenced firm performance measured through market capitalization indicator. We included in our study 102 entities, listed on two stock markets, namely Bucharest Stock Exchange (BSE) and ATHEX from two countries, namely Romania and Greece that registered in 2019 the highest growth from the European Union, taking into account the evolution of markets from 87 countries with available data. The econometric model developed in our study reflects the fact that non-executive directors, companies size and board sizes influenced performance measured through market capitalization indicator.

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Received 2 October 2022; Received in revised form 4 January 2023; Accepted 19 January 2023

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Introduction

Companies around the world are constantly facing new challenges. Whether they react to external stimuli or global pandemics, to new technologies or anticipate new trends, their ability to change or to be reactive or proactive is tested every day. Although an increasing number of regulations, including the Sarbanes Oxley Act, Dodd-Frank Act, and G20/OECD principles of corporate governance provide support on how a company can be managed and controlled and are pushing for higher and universal governance guidelines (Peng et al., 2021), a question, that may sound simple arises, namely *which internal corporate governance attributes increases the financial performance of a company?*

On the one hand, some authors (Peng et al., 2021; Ludwig & Sassen, 2022, Nguyen et al., 2014; De Andres et al., 2005; Guest, 2009) confirm the existence of a significant relationship between corporate governance characteristics and financial performance measured through various financial indicators.

On the other hand, some studies highlight no consistent impact of corporate governance variables on firm performance (Michelberger, 2016; Al-ahdal et al., 2020).

It seems that this topic is still a debated one, due to the fact that in the literature there isn't a consensus regarding the impact of governance attributes on performance. Hence, our paper wants to emphasize that it is necessary to identify the variables of corporate governance that help increase the performance of companies in order to obtain a sustainable development in an environment marked by uncertainty. Thus, we believe that both the authorities and regulators must be involved in outlining a robust monitoring and control framework, in order to evaluate in the same way for each listed company the compliance with the principles of a unitary Corporate Governance Code. In our opinion, an unitary Governance Code can create attractive capital markets at the international level, based on best practices, transparency and trust. But this cannot be done without the help of the companies management, which must closely ensure and monitor the compliance and, in the same time, the well-being of both shareholders and stakeholders.

In this context, the purpose of our research was to investigate the influence of corporate governance attributes on financial performance. Hence, the research question of our study aimed to determine the extent to which: (1) board size, (2) the number of non-executive directors, (3) CEO duality, (4) companies size, (5) gender diversity, (6) the existence of the audit committee, and (7) the qualified opinion expressed by the external auditor influenced firm performance measured through market capitalization.

In order to achieve the objective and to identify the impact of corporate governance attributes on financial performance needed for a sustainable development, we included in our study 102 entities, listed on two stock markets, namely Romania (BSE) and Greece (ATHEX). The data necessary for the analysis, related to the board structure (size, number of non-executive directors, CEO duality, gender diversity), audit committee and external auditor's opinion, and the indicators used to measure performance through Market capitalization were extracted manually from the Annual and the Sustainability Reports published by the analyzed entities in 2019, the year in which Romania and Greece registered the highest growth from the European Union, taking into account the

evolution of markets from 87 countries for which data are available (Bloomberg & Marketwatch, 2020).

The proposed research is structured in five sections. Thus, if this first section highlights the preliminary aspects of the undertaken scientific approach, the second section finds its correspondent in the analysis of the literature. The next two sections present the research methodology, respectively the results obtained and a discussion on them. Finally, the fifth section draws the final conclusions of our research.

Literature review

The big financial scandals that have destabilized the financial markets have highlighted the importance that must be given to the way companies are managed and controlled and the significance that also must be given to the corporate governance characteristics that can influence performance (Bhagat & Bolton, 2019).

In the current economic context, achieving financial performance is a goal for companies, which must pay attention to both the well-being of shareholders and how they ensure their long-term sustainability. For listed companies, the Corporate Governance Code, hereafter CGC, can be classified as a useful monitoring tool, meant to support through principles and recommendations the increase of trust, transparency and, implicitly, performance. Thus, in other words, the role of the GCC is to facilitate a good and efficient entrepreneurial management, which can ensure the long-term success of a company and to highlight how governance elements can increase performance (CGC of BSE, 2015).

But the way in which a company can be managed and controlled in order to obtain financial performance is a debated topic, studies highlighting both significant or not relationships between corporate governance characteristics and performance measured through various indicators.

Hence, in academia, there are researches that state that companies with good corporate governance mechanism can minimize the risk of not being successful over time (Ludwig & Sassen, 2022), improve their financial performance (Munir et al., 2019) and become more attractive to investors, gaining in the same time competitive advantages (CGC of BSE, 2015).

It seems that strong corporate governance practices implemented in the organizational culture of the company are crucial for achieving financial performance and ensure a sustainable development over time (Jan et al., 2021). However, what corporate governance attributes influence performance and how strong is the relationship between them?

In this sense, studies conducted by Ludwig and Sassen (2022) state that different internal corporate governance characteristics such as board diversity, board independence, board size, board-level sustainability committee, the role of the CEO, ownership concentration, and the disclosure and transparency practice, play an important role in achieving both financial performance and sustainable development. Also, it seems that board structure and the existence of an audit committee within the company greatly influences performance (Shakri et al., 2022).

Other empirical evidence that reveals a significant relationship between CGC characteristics and financial performance comes from a study conducted by Peng et al. (2021) based on the panel data of Chinese listed tourism companies. Their results, with important theoretical and practical

significance for studying the governance-performance relationship, indicate a positive linear relationship between board independence, ownership concentration and financial performance measured through Return on Assets (ROA) and Return on Equity (ROE) indicators. The results of another regression analysis confirm that board ownership, board leadership, board size, and firm size have significant impact on financial performance of shipping firms in Bangladesh (Sheikh & Alom, 2021).

But the research conducted in the academia show results that do not identify significant links between the elements of governance and financial performance (Michelberger, 2016). Al-ahdal et al. (2020) highlights that board accountability (BA) and audit committee (AC) have an insignificant impact on firms' performance measured through ROE and Tobin's Q indicators. Zabri (2016) also state that between board characteristics and performance an insignificant connection is established from the econometric point of view.

These discrepancies that appear in the studies undertaken over time allow us to study the impact of the attributes of corporate governance on the performance of the entities listed on the Bucharest Stock Exchange and Athex, namely on two attractive stock markets for investors.

Hence, our research seeks to investigate the extent to which board size, the number of non-executive directors, CEO duality, companies size, gender diversity, the existence of the audit committee, and the qualified opinion expressed by the external auditor influenced firm performance measured through market capitalization.

With these aspects under consideration, this research study proposes the following hypothesis:

H: *The corporate governance characteristics have a significant impact on firm performance*

Through polynomial regression our paper wants to highlight that it is necessary to identify the variables of corporate governance that increase company's performance in order to obtain a sustainable development in an uncertain environment.

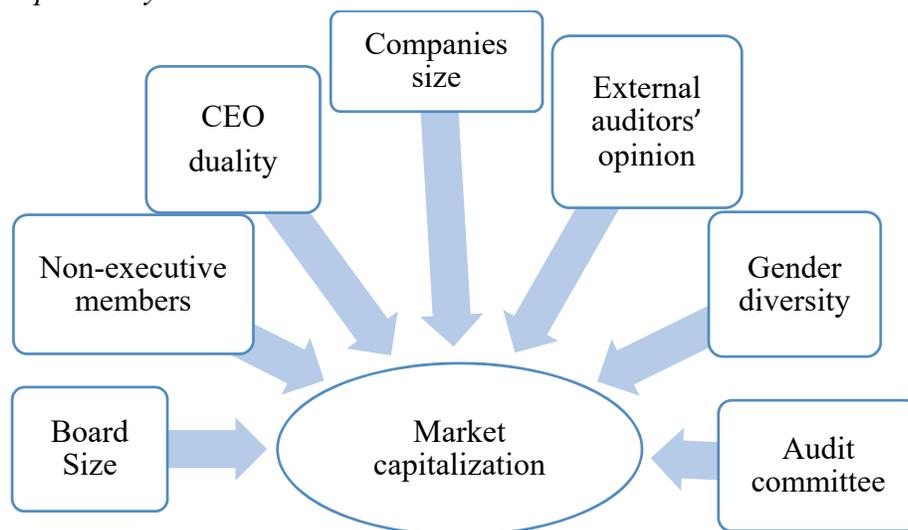
Data and research methodology

In this paper, we used the regression analysis in order to investigate the relationships between the variables proposed for the generation of mathematical models in which several variables are involved. Polynomial regression in the case of corporate governance and its relationship with performance is a particular form of multiple linear regression. We considered this modeling method as polynomial models are an efficient and flexible curve mounting technique.

We aimed to create an "optimal fit" line through all available data points, and parameter estimates are chosen to minimize the sum of square errors.

Polynomial regression models comprising dependent and explanatory variables included in Figure 1 usually use the smallest squares to estimate the coefficients of the model, by minimizing the square distance from the observation to the regression line.

From the total number of companies on each stock market we excluded those that registered losses in the year under study, namely 2019. We also excluded from the entities listed on the ATHEX main market those that did not publish on the official website the financial statements and the annual report in English. Thus, we kept a number of 62 entities listed on the BSE for Romania and 40 entities listed on the ATHEX main market for Greece.

Figure 1.*Dependent and explanatory variables**Source: authors own elaboration*

The multiple regression model used presents the entity's performance as a dependent variable, expressed through Market capitalization, while the total number of Board members, the number of non-executive directors on the Board, the CEO duality, the company's size, the type of audit opinion, the number of women on the board and the existence of the Audit Committee were used as explanatory variables.

For each stock market analyzed, BSE and ATHEX respectively, we built a regression model that included as dependent variables the indicator used to measure performance, namely Market capitalization, thus obtaining the following multiple regression model:

$$\text{Performance}_i = \beta_0 + \beta_1 \text{Board_size}_i + \beta_2 \text{Non_ex}_i + \beta_3 \text{CEO_duality}_i + \beta_4 \text{Company_size}_i + \beta_5 \text{External_Auditor_opinion}_i + \beta_6 \text{Gender_diversity}_i + \beta_7 \text{Audit_Committee}_i + \varepsilon_i \quad (1)$$

Where:

— Performance_i - expressed by Market capitalization, published on the website of each Stock exchange, respectively BSE and ATHEX. In order to ensure data comparability, the values were expressed in the same currency for both countries, namely EURO, and the exchange rate used was the one published by the NBR on 31.12.2019.

— β_0 - quantifies all factors that were not taken into account by using an explanatory variable in the analyzed model;

— $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$ - specific parameters of each factor of influence;

— Board_size_i - represents the total number of Board members for the entities listed on each of the two analyzed stock markets, and represent the authors own calculation after the companies Annual report;

— Non_ex_i - represents the number of non-executive members of the Board for the entities listed on each of the two analyzed stock markets, and represent the authors own calculation after the companies Annual report;

— CEO_duality_i - represents the CEO duality for the entities listed on each of the two analyzed stock exchanges that takes the value 1 if the CEO is also the President of the Board and the value 0 otherwise, and represent the authors own calculation after the companies Annual report;

— Company_size_i – reflects the size of the companies listed on the two exchanges, using as indicator the value of total assets. To reflect the size of the company we used the value of the total assets that was expressed in the same currency for both countries, respectively EURO. To ensure data comparability, the exchange rate used was the one published by the NBR on 31.12.2019;

— External_Auditors_opinion_i – value 1 if in the auditors opinion, the financial statements present fairly, in all material aspects, the financial position of the entity on December 31, 2019 and its financial performance and cash flows for the year then ended and value 0 in the case of a modified opinion;

— Gender_diversity_i - represents the number of female members of the Board for the entities listed on each of the two analyzed stock markets, and represent the authors own calculation after the companies Annual report;

— Audit_Committee_i - value 1 if an Audit Committee exists within the entity and value 0 otherwise;

— ε_i – reflects the residual term that quantifies the influence of random factors or any other that were not included in the analysis.

Results and discussions

Descriptive statistics

Descriptive statistics included in the regression models are presented in the following tables (1 and 2):

Table 1.

Descriptive statistics for the companies listed on the BSE

Variables	Mean	Median	Min	Max	Std
<i>Performance variables</i>					
Market capitalization*	17.73	17.43	14.27	23.24	2.07
<i>Corporate governance variables</i>					
Board size	5.30	5	3	9	1.56
Non-executive members	3.93	4	0	9	1.62
CEO duality	0.27	0	0	1	0.44
Companies size*	18.50	18.10	14.56	23.48	1.95
External auditors opinion	0.91	1	0	1	0.27
Gender diversity	0.91	1	0	3	0.91
Audit committee	0.83	1	0	1	0.37

Source: authors own elaboration

*to ensure data comparability, we used a natural logarithm to express the value of the variables Market capitalization and Companies' size.

The average market capitalization is 17.73%, out of which the average of the dual-board entities is 17.25%.

The average number of members of the Board of Directors is 5, in accordance with the provisions of the Corporate Governance Code issued by the BSE (CGC of BSE, 2015, section A3). Out of the 62 entities under analysis, 12 companies have the smallest number of persons on the board, namely 3 members and 3 entities present a board of 9 directors, the maximum value found in the study.

The average number of non-executive directors on the board is 4, which confirms the observance of the corporate governance principles recommending that the majority of the members of the Board of Directors should not hold an executive function (CGC of BSE, 2015, section A3). Out of the 62 entities, there is also a case where the Board does not include any non-executive director, thus resulting the minimum value 0 of the descriptive statistics, but also cases where all the directors of the board are non-executive, the maximum value of the indicator being 9.

Out of the 62 companies under analysis, in 45 the CEO is separate from the chairman, which means a percentage of 72.58%, thus confirming the recommendations of the BSE Code. In 17 entities the two functions are the same, which means a percentage of 27.42% out of the investigated sample.

In the vast majority of cases, 91.94%, representing 57 entities out of the 62 under analysis, the opinion expressed by the external auditor is that the financial statements reflect a faithful image of the position and financial performance and cash flows.

As for gender diversity on the Board of Directors, calculations show that the entities listed in Romania in the year under review do not comply with the provisions of the Parliament and of the European Council in terms of the objective that the number of women should represent 40% of the number of board members by 2020. The analysis reveals that out of the 62 companies, 24 have no female director, 23 entities have a single female employee on the board and 4 entities have 3 female directors, which represents the maximum value reached in the investigated sample.

Out of the 62 entities listed on the BSE and included in our study, the vast majority, namely 52 entities, which represent 83.87%, comply with the provisions of the Corporate Governance Code issued by the BSE (CGC of BSE, 2015, section B1) regarding the setting-up of the Audit Committee.

Table 2.

Descriptive statistics for the entities listed on the ATHEX

Variables	Mean	Median	Min	Max	Std
<i>Performance variables</i>					
Market capitalization*	19.76	19.70	16.70	15.00	1.63
<i>Corporate governance variables</i>					
Board size	9.75	9.50	5.00	15.00	2.52
Non-executive members	6.53	6.00	3.00	12.00	2.71
CEO duality	0.33	0.00	0.00	1.00	0.47
Companies size*	20.01	19.72	16.02	24.82	2.13
External auditors opinion	0.98	1.00	0.00	1.00	0.16
Gender diversity	0.95	1.00	0.00	4.00	1.08
Audit committee	0.98	1.00	0.00	1.00	0.16

Source: authors own elaboration

*to ensure data comparability, we used a natural logarithm to express the value of the variables Market capitalization and Companies' size.

The average market capitalization is 19.76%, out of which the average of dual-board entities is 19.09%.

The average number of Board members is 10. The Hellenic Corporate Governance Code (2013) does not set a maximum number for the board size, but it recommends a minimum of 3 persons and allows shareholders to establish the optimal structure of the board, created according to their own needs. Out of the 40 entities under analysis, 2 companies have the smallest number of people on the board, namely 5 members and in 2 entities the administration is performed by 15 directors, the maximum value found in the study.

The average number of non-executive directors on the board is 7, a result confirming the compliance with the corporate governance principles recommending that the majority of the members of the Board of Directors should not hold an executive function. The Law 3016/2002 imposes to listed companies that at least one third of the board's structure should be made up of non-executive members, out of whom at least 2 should be independent non-executives. In 7 of the 40 entities we find the minimum number of non-executive members, namely 3, and in 2 companies the maximum number, namely 12 persons.

Out of the 40 companies under analysis, 27 present the separation of the CEO from the chairman, which means a percentage of 67.50%, a result confirming the recommendations of the Code in terms of the cumulation of functions. 13 entities have dual boards, which means 32.50% of the investigated sample.

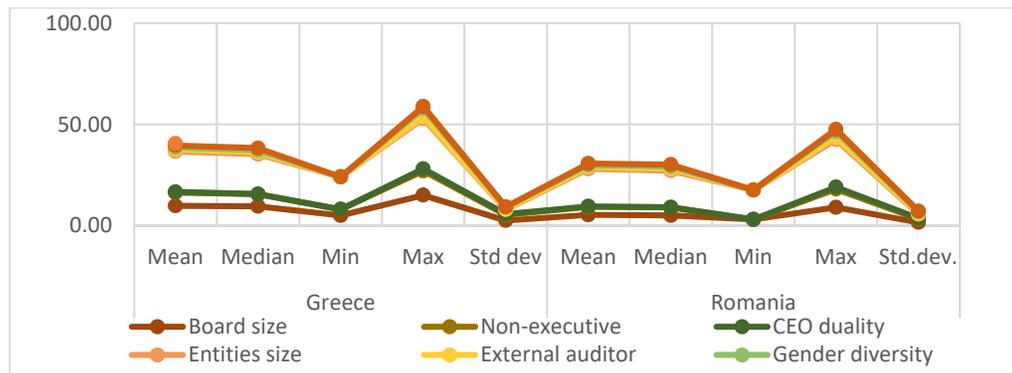
Compared to the other companies analyzed on the BSE, we notice that, on average, the companies listed on the ATHEX have a higher value of the total assets.

As for the opinion of the external auditor on the financial statements issued on December 31st, 2019, out of the 40 entities under study, only one case presents a modified opinion, while for the other 39 companies the audit opinion is that the financial statement reflects a faithful image of the position and financial performance of the companies under analysis.

Women are present on the Board of Directors in more than half (52.5%) of the studied Greek entities. Out of the 21 companies where the administrative structure presents gender diversity, 8 have a single female employee. The maximum number, four, of women with management positions is found in the entity with the largest Board of Directors, namely 15 members.

Out of the 40 entities listed on the main market ATHEX that we included in our study, 39 entities, which represent 97.50%, comply with the provisions of the Hellenic Corporate Governance Code in terms of setting-up the Audit Committee.

Descriptive statistics included in the regression models are presented in the following figure (figure 2):

Figure 2.*Descriptive statistics Romania vs. Greece*

Source: authors own elaboration

Regression models

For each stock market under analysis, namely the BSE and the ATHEX, we built a regression model with Market capitalization as dependent variable, used to measure performance, and seven corporate governance attributes as explanatory variables, thus obtaining the following regression model:

$$\text{Performance}_i = \beta_0 + \beta_1 \text{Board_size}_i + \beta_2 \text{Non_ex}_i + \beta_3 \text{CEO_duality}_i + \beta_4 \text{Company_size}_i + \beta_5 \text{External_Auditors_opinion}_i + \beta_6 \text{Gender_diversity}_i + \beta_7 \text{Audit_Committee}_i + \varepsilon_i \quad (2)$$

Our data analysis process comprised three stages:

a) we used multiple regression, backward selection procedure, and we obtained the optimal model containing the predictor variables Bs (Board size), Ne (Non ex) and Cs (Company size) for Romania and Ne (Non ex) for Greece. We observed a small value of the coefficient of determination R^2 and of adjusted determination R^2_a ;

b) multiple regression without intercept (no free term), the optimal model depends on the same predictor variables and P-values are below 0.02 (2% errors) for both countries;

c) the second order (parabolic) polynomial model, the optimal model depends on Bs, Ne, Cs and $(Bs)^2$, $(Cs)^2$, $Bs * Ne$, $Bs * Cs$ and $Ne * Cs$, for Romania and $Ne * Ne$ for Greece (which means that there are also interactions between variables) and P-values below 2%.

Our regression models and results are presented below, in detail:

Regression models for Romania

The analysis of the link between corporate governance attributes and the performance of the entities listed on the BSE implied a multiple regression, using backward selection procedure in R program. The second order (parabolic) polynomial model determines the optimal model which depends on Board size (BS), Non-executive members (Ne), Companies size (Cs) but also $(Bs)^2$, $(Cs)^2$, $Bs * Ne$, $Bs * Cs$ and $Ne * Cs$. The results of our research reflect that interactions between corporate governance attributes are established and these correlations influence the performance measured through the Market capitalization indicator (see table 3 and 4).

Table 3.*Correlation matrix of the BSE model*

	Bs	Ne	CEOd	Cs	EA	Gd	AC	MC
Bs	1.00							
Ne	0.735362	1.00						
CEOd	0.121429	-0.288836	1.00					
Cs	0.404749	0.3084870	-0.17486	1.00				
EA	0.058513	-0.011830	-0.08352	0.024320	1.00			
Gd	0.063678	-0.003565	0.014847	0.158774	0.104702	1.00		
AC	0.312805	0.1725390	-0.02536	0.142239	-0.12988	0.0093955	1.00	
MC	0.245915	0.3330764	-0.14080	0.753327	0.026663	0.1651043	0.1239705	1.00

Source: authors own elaboration in R software

The second order polynomial model reflects the following results:

Residuals:

Min	1Q	Median	3Q	Max
-2.205e+09	7.084e+07	1.386e+08	1.915e+08	2.073e+09

Table 4.*Market capitalization as dependent variable*

Variables	Estimate	Std.Error	t-static	Pr(> t)
Bs	-6.341e+08	2.463e+08	-2.574	0.012876*
Ne	8.037e+08	3.381e+08	2.377	0.021114*
Cs	2.462e+00	3.485e-01	7.064	3.55e-09***
Bss	1.718e+08	4.704e+07	3.652	0.000597***
Nee	1.072e+08	4.939e+07	2.170	0.034534*
Css	-5.438e-11	1.172e-11	-4.639	2.33e-05***
BN	-3.131e+08	8.694e+07	-3.601	0.000698***
BC	-2.620e-01	2.695e-02	-9.721	2.24e-13***
NC	1.046e-01	2.425e-02	4.313	7.04e-05***

Significance codes: 0 '***', 0.001 '**', 0.01 '*', 0.05 '.', 0.1 ''

Source: authors own elaboration in R software

Residual standard error: 605500000 on 53 degrees of freedom

Multiple R-squared: 0.8953

Adjusted R-squared: 0.8775

F-statistic: 50.37 on 9 and 53 DF, p-value: < 2.2e-16

By using Market capitalization as a dependent variable in the regression model, we obtained for the entities listed on the BSE three statistically significant coefficients for measuring performance, namely Board size – a significant and negative result, consistent with the one obtained by researchers such as Nguyen et al., (2014), De Andres et al., (2005) and Guest (2009), Non-executive members – consistent with the result obtained by researchers such as Chau and Grey (2010), Chan and Li (2008), Hussain et al., (2018) and Dahia and MC.Connell (2007) who stated that the performance of companies with independent directors is higher than the performance obtained by the entities where this type of directors is absent.

Another significant coefficient is Companies size, a significant and positive result, consistent with the one presented by authors such as Veprauskaite and Adams (2013) and Muller et al., (2014). The results of the research also reflect that between the corporate governance attributes are established interactions that can influence the performance measured through Market capitalization.

- The rest of the coefficients are statistically insignificant.

The second order polynomial model resulting from econometric modeling is:

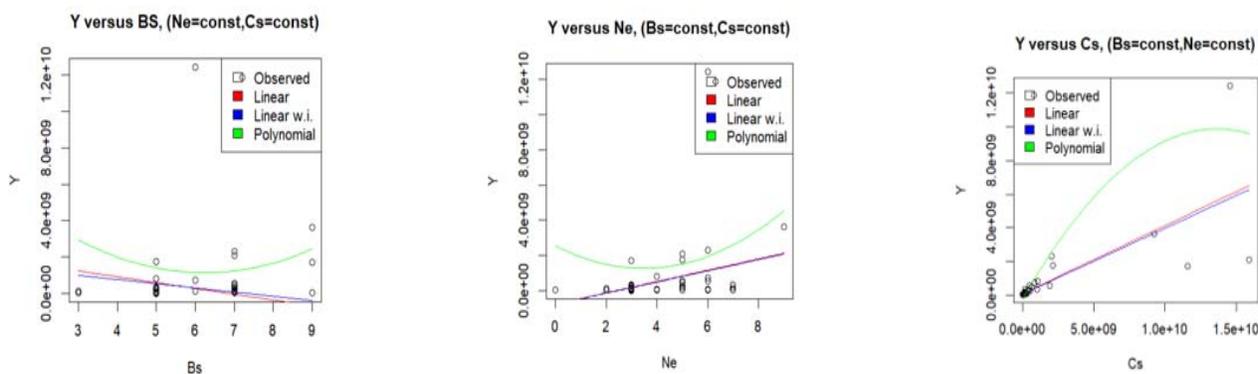
$$Y = -6.341e+08*Bs+8.037e+08*Ne+2.462e+00*Cs+1.718e+08*Bs*Bs+1.072e+08*Ne*Ne-5.438e-11*Cs*Cs-3.131e+08*Bs*Ne-2.620e-01*Bs*Cs+1.046e-01*Ne*Cs \quad (3)$$

Where: Y = Market capitalization

The optimal model for the entities listed on the BSE depends on the three variables as well as the interactions that are established between them. Thus, to represent the model from a graphic perspective, we will consider two of the three variables as constant, resulting a graph through sections, like the ones presented below, in the figure 3:

Figure 3.

Variables of the econometric model



Source: authors own elaboration in R software

As it can be noticed, board size, non-executive members and entities size represent the significant coefficients of the econometric model. An explanation of these results can be provided by the effects of the financial crisis over the period 2008-2012, which has taken over the global economy and has caused many bankruptcies in recent years, which should give greater importance to the way entities are managed and directed. Moreover, the financial-accounting frauds that may occur in the absence of an efficient business governance can have a major impact on the achievement of the economic-financial performance of the entities and, therefore, a meaningful and positive relationship is established between the three corporate governance attributes and the performance measured by Market capitalization.

The variable that reflects the size of the administrative Board has a statistically significant and negative coefficient, which reflects that those councils formed by a smaller number of members are more efficient.

The estimated coefficient for the variable represented by the number of non-executive members within the administrative Board has a significant and positive influence on the performance determined through the Market capitalization indicator.

The variable Entities size reflects a positive performance link for the investigated entities listed on the BSE which may reflect an efficient use of total assets.

Regression models for Greece

The analysis of the link between corporate governance attributes and the performance of the entities listed on ATHEX implied a multiple regression too. The second order (parabolic) polynomial model determines the optimal model which depends on Non-executive members (Ne). The results of our research reflect that interactions between corporate governance attributes are established and these correlations influence the performance measured through the Market capitalization indicator (see table 5 and 6).

Table 5.

Correlation matrix of the ATHEX model and residuals

	Bs	Ne	CEOd	CS	EA	Gd	AC	MC
Bs	1.00							
Ne	0.82411	1.00						
CEOd	-0.4452	-0.3558	1.00					
CS	0.27306	0.29693	-0.20778	1.00				
EA	0.24140	0.21110	0.11111	0.056222	1.00			
Gd	0.06367	-0.00356	0.01484	0.15877	0.104702	1.00		
AC	0.17702	0.15121	-0.2307	0.057154	-0.02564	0.009395	1.00	
MC	0.37180	0.45708	-0.10585	0.248564	0.085162	0.1651043	0.087242	1.00
<i>Residuals</i>								
	Min	1Q	Median	3Q	Max			
	-3.496e+09	-9.506e+08	-3.742e+08	1.979e+08	8.355e+09			

Source: authors own elaboration in R software

Table 6.

Market capitalization as dependent variable

Variables	Estimate	Std.Error	t-static	Pr(> t)
Nee	26320449	4876029	5.398	3.54e-06 ***

Significance codes: 0 '***', 0.001 '**', 0.01 '*', 0.05 '.', 0.1 ''

Source: authors own elaboration in R software

Residual standard error: 1.92e+09 on 39 degrees of freedom

Multiple R-squared: 0.4276,

Adjusted R-squared: 0.413

F-statistic: 29.14 on 1 and 39 DF, p-value: 3.545e-06

By using Market capitalization as a dependent variable, we obtained a single statistically significant coefficient for measuring performance, namely Non-executive members, which is

consistent with the one identified by Chau and Grey, (2010), Chan and Li., (2008), Hussain et al., (2018) and Dahia and MC. Connell (2007) in their research.

- The rest of the coefficients are statistically insignificant.

The second order polynomial model resulting from econometric modeling is:

$$Y=26320449*Ne*Ne \quad (4)$$

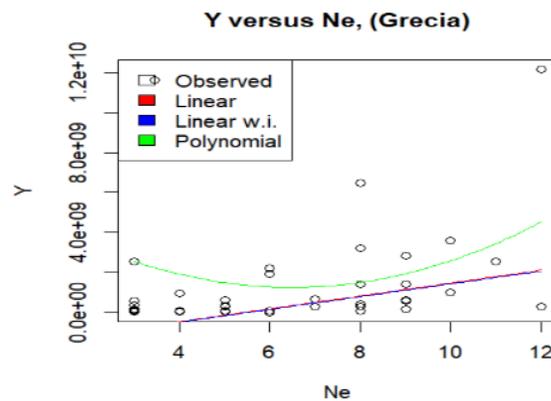
Where: Y = Market capitalization

The model implies the introduction of variables of the form $x_i * x_i$ because there are interactions between predictors, and the predictor non-executive members produces an influence of extreme value on the response variable measured through the Market capitalization indicator.

The graphic through sections of the model is presented below in the figure 3:

Figure 4.

Variables of the econometric model



Source: authors own elaboration in R software

The estimated coefficient for the variable represented by the number of non-executive members on the board has a significant and positive influence on the performance determined by the Market capitalization indicator.

The validation of the hypotheses including these variables aligns with the specialized literature and attests that the above-mentioned governance attributes are able to generate an increase in the entity's performance.

In this paper we aimed to investigate the relationship between the corporate governance characteristics and performance measured through Market capitalization of the entities listed on the BSE and the ATHEX. Based on the premise that corporate governance determines greater transparency, better accountability and fraud risk reduction, our econometric modeling results reflect that significant correlations between the predictor variables: Board size, Non-executive members, Company size and the response variable measured through the Market capitalization indicator exists. Also, corporate governance offers a greater assurance that an efficiently control system is implemented, thus ensuring that the business is managed in the interest of investors (shareholders) and all stakeholders (Albu et al., 2013). In the context of sustainable development, the concept of corporate social responsibility is gradually emerging, reflecting the voluntary

integration by entities a social and environmental concerns in the economic activity and in the relationship with interest groups (Achim et al., 2017).

Conclusions

Can corporate governance be a premise for increasing the performance of economic entities? The studies undertaken so far show inconclusive results that allow further research on this debated topic.

Hence, our intention in these paper was to investigate the way in which corporate governance characteristics influence performance of companies listed on two representative stock exchanges from Europe, namely BSE and ATHEX. The results reflect the fact that corporate governance characteristics, namely non-executive directors, companies size and board sizes greatly influence performance measured through the market capitalization indicator.

Nevertheless, our research has limitations. Our regression models relied on financial and non-financial information collected manually from the Annual reports and the inclusion in the sample, in the case of Greece only those companies that published their reports in English. Thus, future research directions may target larger data series in terms of the number of years under investigation, as well as other performance measurement indicators and methods of data collection.

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Acknowledgments

Not applicable.

Funding

Not applicable.

Conflict of Interests

No, there are no conflicting interests.