BOARD STRUCTURE, FIRM PERFORMANCE AND RISK: RECENT EVIDENCE FROM GREECE

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Abstract

This paper examines the relationship between the characteristics of the board and the performance and risk of a firm using data from forty-five Greek listed companies over the period 2015-2018. The analysis considers various alternative performance measures, both accounting-based and stock-based, as well as two measures for risk. The board characteristics considered are the size of the board, the number of female members on the board, the number of non-executive members on the board, and the duality regarding the roles of the chief executive officer (CEO) and the president of the board. As far as the board size is concerned, the results show no significant impact on performance. This finding is in line with past studies on Greek companies. On the contrary, the presence of women on the board seems to be negatively related to performance. The same seems to be the case for the non-executive members, especially when the stock returns are taken into consideration. Finally, when it comes to duality, the results indicate the occupation of the president and CEO roles by the same person exerts a positive impact on firm performance decreasing, at the same time, its risk. This study contributes to the literature in various ways. First, it uses the most recent data from the Greek market. Furthermore, from a political point of view, the study covers a very interesting period, given that during 2015-2018 Greece had for a first time a left-wing government, a factor that could possibly affect the conduction of business in Greece. In addition, the finding that the duality in the roles of CEO and president can lower the risk of a firm is a new finding. Finally, in general, the results confirm the conclusions of the previous studies on Greek companies about the poor impact of the board on firm performance.

Keywords: Board of Directors, Size, Female Members, Non-Executive Members, Performance, Risk

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1. INTRODUCTION

Given that, quite frequently, the administration of a modern company and its ownership are separated from each other, the various corporate governance codes and laws around the globe require that the board of a firm work in the best interest of the owners. In other words, the board should always seek to maximize the profit of the shareholders. From an empirical point of view, the separation of

the management and ownership in the modern firms has resulted in unpleasant phenomena such as conflicts of interests between the managers and the owners, misconducts, sub-optimization in the use of resources and corporate failures.

Various theories have been developed which try to answer several questions regarding the management of a company and the tools that can be used for the resolution of conflicts towards the fulfilment of the profit and utility maximization goal.

For instance, Alchian and Demsetz (1972) suggest that the development of comprehensive contracts that will describe in high detail the power and the actions permitted to each part of the contract could be effective in dealing with the conflicts of interest between the principals (owners) and the agents (managers) described in the agency theory of Berle and Means (1932).

On the other hand, the stakeholder theory of Mitroff (1983) and Freeman (1984) recommends that the interests of the owners are not the only ones that should be considered by the managers of a company. There are various other stakeholders (employees, customers, suppliers, bankers and other financial supporters, local and general government), who hold an interest in a company and, thus, should be taken into consideration by the management of the entity. The stakeholder theory concludes that the maximization of shareholders' profit is no longer the ultimate goal of a company.

In any case, and under each individual theoretical perspective, the role of the board in the operation of a company is crucial. Keeping this in mind, this paper examines the relationship between the performance and risk of an entity and the characteristics of its board. The analysis performed employs a sample of forty-five companies listed on the Athens Exchange. The study period spans from 2015 to 2018. Various measures of performance and two types of risk are computed with the use of accounting and stock data. The board characteristics assessed are the size of the board, the number of female and the number of non-executive members on the board, as well as the duality in the roles of the chief executive officer and the president of the board.

Similar to past studies on Greek companies, the empirical results obtained show no significant relationship between firm performance and board size. On the contrary, from a statistical point of view, the presence of women on the board is negatively related to performance. The same pattern seems to apply for the non-executive members, especially when the stock returns are considered as a proxy for performance. Finally, in regard to the occupation of the president and CEO roles by the same person, the results reveal that this duality causes a positive influence on the performance of a firm decreasing, at the same time, its risk.

The choice of studying the relationship between the performance of a company and the characteristics of its board relates to the vivid interest in the subject shown by the literature. In this respect, numerous international studies have examined the impact on firm performance by several factors such as board size, the presence of female and non-executive members, the duality in the role of CEO and the president of the board, the academic background of directors, and the number of board meetings.

Such studies have been conducted for the Greek companies too. However, an update on the matter with the usage of more recent data seems to be missing. This study seeks to fulfill this gap in the literature. In addition, the Greek case may stand as a unique case has given the protracted fiscal crisis over the last decade which led to the slumping of the domestic economic activity and the severe recession that ensued. Even though, the goal of the current study is not to accentuate the response to the crisis from the Greek companies, the examination of firm performance and risk vis-à-vis the board characteristics may provide some hints about the impact that can be made by the board of an entity within a tough fiscal and economic environment.

This study contributes to the literature in various ways. To begin with, to the best of our knowledge, the study uses the most recent data from the Greek companies. The comparison of our results to pre-crisis studies on Greek companies could detect any significant positive or negative changes in the relationship between boards and firm performance that could be attributed to the economic crisis.

Moreover, the study covers a very interesting period from a political point of view, given that during the interval 2015-2018 Greece had for the first time over the last two hundred years, after the establishment of the Greek State in the 19th century, a left-wing government. In addition to the economic crisis, a left-wing government might entail unfavorable conditions for conducting business in Greece. If this assumption is to be true, possible changes in the relationship between firm performance and board characteristics, to some degree, could be due to this political factor.

Another contribution of this study regards the examination of the impact caused by the board on the risk that a company bears as an investment opportunity. To the best of our knowledge, this issue has not been addressed in the literature yet, given that the majority of the relevant studies focus on performance. In this respect, the fact that the duality in the roles of CEO and president can lower the risk of a firm is a new finding in the literature.

Finally, our results confirm the general conclusions of the previous studies on Greek companies about the poor impact of the board on firm performance. The unique exception to this general inference concerns the positive correlation between the duality factor and firm performance accentuated by our study.

The remainder of this paper is structured as follows. The next section discusses the key findings of the literature on the subject. Section 3 develops the methodology used in our empirical investigation. Section 4 describes the data used in this study and provides various statistics on the sample. The empirical findings of our research are presented in Section 5 and the conclusions are discussed in Section 6.

2. LITERATURE REVIEW

There is a plethora of international studies that examine the relationship between the performance of a company and the characteristics of its board. In this literature review, the focus is paid to the studies concerning Greece, the European continent, and the United States.

In the case of Greece, Koufopoulos and Balta (2006) assess the impact on firm performance by factors such as the board structure and the independence of the CEO for a sample of 316 Greek listed companies finding no such a significant relationship. Tsifora and Eleftheriadou (2007) consider the size of the board and the ownership structure (i.e., number of shareholders) of the Greek industrial companies assuming that both factors should be positively related to firm performance. This assumption is not verified by the empirical results. Drakos and Bekiris (2010) also examine the size of the board along with the degree of independence of directors and the structure of authority within a company. The main significant finding is that the board size is negatively related to performance. This negative relationship implies that the bigger a board is, the slower the decision-making process will be. Slowness is a factor that could harm the performance of a company.

In other studies on Greek companies, Koufopoulos, Zoumbos, Argyropoulou, and Motwani (2008) take into consideration the demographical characteristics of the president of the board and other members. The main finding is that the older the president is, the better the performance of the firm is expected to be as a result of the amassed experience of the president reflected in their age. Syriopoulos and Tsatsaronis (2009) show that, in the case of Greek shipping companies which are listed in the United States, the presence on the board of directors who are also partial owners of the company, as well as the presence of a CEO who is related to the family which founded the company, are factors that are expected to contribute to performance in a positive way. Balta, Woods, and Dickson (2012) highlight the favoritism of directors towards the adoption of innovative initiatives and new technologies as a factor that could enhance performance.

In more recent studies on Greek companies, Georgantopoulos and Filos (2017) examine the performance of the Greek banking sector over the crisis period 2008-2014 vis-à-vis the size of the banks' board and the presence of independent members. The main inference drawn is that there is an optimal point up to which the increase in the size of the board and the occupation of board seats by independent directors exert a positive impact on performance. Beyond this point, any further increase in the size of the board and the number of independent members will cause the opposite results. Kyriazopoulos (2017) employs a sample of 203 Greek companies listed on the Athens Exchange to assess the relationship of their performance with best corporate governance practices regarding the size and the structure of the board over the period 2005-2014. Kyriazopoulos finds that the board size is constantly related to performance in a positive way. However, this is not the case for the number of independent members on the board. Finally, Constantatos (2018) finds that the positive relationship between best corporate governance practices and firm performance existed before the Greek fiscal crisis turned out to be counterproductive after the burst of the crisis.

In Europe, Bauer, Guenster, and Otten (2004) examine how the performance of the companies consisting the FTSE Eurotop 300 Index is affected by the adoption of best corporate governance practices, such as the separation of the CEO and president roles and the presence of independent board members, over the period 2000-2001. The findings show that the best corporate governance practices enhance stock returns and corporate evaluations. However, corporate governance seems to affect net profits and returns on equity (ROE) in a negative way. Busta (2007) shows that the independence of directors is positively related to performance for a sample of French, German, Italian, and Spanish banks. The opposite seems to be the case for banks in the UK.

Rose (2007) assesses the impact that female board members can make on the performance of Danish companies over the period 1998-2001 finding no such meaningful influence. This is also the case for the academic background of directors. In the same context, Marinova, Plantenga, and Remery (2016), Ionascu, Ionascu, Sacarin, and Minu (2018), and Martín and Herrera (2018) find no significant relationship between the gender of directors and firm performance, on average terms. On the other hand, Pasaribu (2017) provides some weak evidence of a positive relationship between firm performance and the presence of women on the board of small and flexible UK companies. This relationship is supported by the findings of Bennouri, Chtioui, Nagati, and Nekhili (2018) and Belhaj and Mateus (2016), too.

A wide body of European studies considers the size of the board as a major factor that can affect the performance of a company. In this respect, Guest (2009) shows a negative impact in the case of 2,746 UK-listed companies over the period 1981-2002. This finding is verified by Agoraki, Delis, and Staikouras (2010) in the case of 57 large European banks. On the contrary, Belhaj and Mateus (2016) conclude that the size of the board is positively related to firm performance. The same positive impact of board size on firm performance is accentuated by Scafarto, Ricci, Della Corte, and De Luca (2017) in the case of the Italian listed companies which are characterized by high ownership concentration over the period 2011-2015, and Alqatan, Chbib, and Hussainey (2019) in the case of the UK listed companies over the period 2012-2015.

When it comes to the relationship between firm performance and the independence of board members in Europe, Arosa, Iturralde, and Maseda (2013) report that the presence of independent directors affects performance in a negative fashion. This pattern is verified by Belhaj and Mateus (2016), and Scafarto et al. (2017) in the case of the Italian listed companies with lower ownership concentration, and Martín and Herrera (2018). The opposite conclusion is reached by Müller (2014). On the same subject, Napoli (2019) reports that in the case of the Italian listed companies, the number of independent members on the board of a family firm has no impact on the stability of firm performance.

Moreover, Braendle, Stiglbauer, Ababneh, and Dedousis (2020) examine whether the cultural distance in boards of directors has an influence on firm performance with a sample of 101 German publicly listed companies. The results show that cultural variety in boards of directors has a linear, negative influence on operational firm performance, as measured by ROI and ROE.

Finally, in another context, Ntoung et al. (2017) investigate how family ownership structure affects the corporate performance of Portuguese listed firms over the period 2006-2014. The main finding is that family firms outperform non-family in terms of productivity and profitability. In addition, family firms with a family member in the company acting either as the CEO or the Chairman create more value and are more profitable than non-family firms.

In the United States, the focus has been mainly paid to factors such as the independence of the board, the demographic characteristics of directors and their experience, the size of the board, and the duality in the roles of the CEO and the president of the board. As far as board independence is concerned, Bhagat and Black (1999, 2002) show that the US firms tend to increase the number of independent members on their boards, especially the firms with low profitability, without, however, being compensated with higher performance records. The opposite results are provided by Rutledge, Khondkar, and Siyu (2016) and Pan, Huang, and Gopal (2018).

The impact of directors' demographic characteristics on firm performance has been examined by Erhardt, Werbel, and Shrader, (2003) with a sample of 126 large US corporations over the period 1993-1998. The authors conclude that the presence of women and "minorities" on the board can be beneficial to firm performance. The same inference is drawn by Carter, Simkins, and Simpson (2003) and Miller and Triana (2009). The opposite seems to be the case according to Adams and Ferreira (2009), who claim that the presence of female board members results in worse firm performance. Mixed results on the matter are provided by Amore and Garofalo (2016). In particular, over periods of low competition, the presence of women on the board of the US banks can exert a positive impact on performance. However, during periods of intense competition, the opposite seems to be the case. Mixed results are provided by Pathan and Faff (2013), too.

On the question of how the experience of directors affect the performance of firms in the US, Van Ness, Miesing, and Kang (2010), by analyzing the 500 companies of the Standard and Poor's 500 Index over the period 2006-2007, show that the experience of directors significantly affects firm performance. The same inference is reached by Charas (2015), who reports that the experience of the board members along with their social networking and their ability to interact with their colleagues can enhance the profitability of the firms they run.

When it comes to the size of the board, several studies such as those of Van Ness et al. (2010) and Pathan and Faff (2013) accentuate a positive correlation between board size and firm performance. According to Van Ness et al. (2010), a similar positive correlation exists between the duality in the roles of the CEO and the president of the board with performance. The latter is also supported by Rutledge et al. (2016).

3. METHODOLOGY AND DATA

3.1. Data and statistics

The sample of the study includes 45 companies that were listed on the Athens Exchange over the four years 2015-2018[1]. In order for a company to be included in the sample, it should present a market capitalization at the beginning 2019 which exceeded 30 million euros. In addition, each company should have published audited annual financial statements for each single year during the study period.

Table 1 provides information about the characteristics of the sample over the study period. At first, the characteristics presented concern key accounting figures, which will be used in the calculation of performance financial ratios. In particular, the mean terms of assets, equity, turnover, profit before tax (PBT) and profit after tax (PAT) as of the 31st of December of each single year are provided in million euros for the 45 firms of the sample.

Moreover, information about the structure of the board is presented in Table 1. The structure of the board is exhibited in terms of size, that is the number of directors constituting the board, the number of men and women on the board, the number of executive and non-executive members on the board, and duality, which indicates that the positions of the board's chairman and CEO are held by the same person[2].

When it comes to assets, Table 1 shows that the amount of assets held by the average company of the sample during 2015-2018 approximate 1.6 billion euros. Focusing on the annual figures, we see that assets do not fluctuate significantly from year to year. This is also the case for equity, which amounts to about 580 million euros, on mean terms, over the study period. Turnover is quite high (for the Greek standards) and exceeds 1 billion euros in each single year during the period 2015-2018, with the exception of 2016, when average sales' volume approximated 995 million euros.

With respect to profitability, the average Greek listed company was profitable during the study period. In particular, the mean term of profits before tax over the entire study period amounts to 147 million euros. The corresponding profit after tax approximates 68 million euros. The less profitable year was 2015.

2015 was the year when the left-wing government of SYRIZA came to power (on the 25th of January). The new government tried unsuccessfully to make a favorable new deal for Greece with its lenders over its first six months in power. During these six months the economic uncertainty in Greece exploded, billions of euros were withdrawn from the Greek commercial banks and Greece was threatened with an exit from the Eurozone area until the government reached a painful compromise and a new bail-out agreement with the international lenders of Greece. All this uncertainty resulted in a further recession in the economic activity in Greece, which is reflected in the low profitability figures for 2015 shown in Table 1 (especially the profits before tax).

As far as the structure of the board is concerned, Table 1 reports that, on average, the board of Greek listed companies consists of ten members, with nine men and only one woman. This

[1] We note that, currently, there are 175 listed companies on the main market of Athens Exchange.

[2] The accounting data used as well as the board characteristics, i.e., board size, number of men and women on the board, number of executive and non-executive members on the board, and duality, have been manually collected from the annual published financial statements of each company in the sample over the period 2015-2018.

pattern shows that women in Greece are not trusted to conduct business as much as they should probably be. This trend might be the result of the fact that women in Greece started pursuing a university degree, or even a higher academic education, for a first time on a massive scale during 80's. The presence of women in the labor market also begun to be more intense during the same decade. It seems that the Greek business society, and in general, is still reluctant to entrust crucial positions of high authority to women.

Moreover, there are four executive and six non-executive members on the board of the average Greek company. To our view, 60% presence of independent members on the board seems to be satisfactory from a corporate governance perspective.

Finally, 40% (18/45) of companies entrust the role of the CEO and the president of the board to the same person. Therefore, duality seems not to be universal in Greece, possibly due to the family character of many Greek listed companies, where the major shareholder (individually or at the family level) of a company, who frequently is the founder of the firm, is considered by the other shareholders to be the most appropriate person to run the company.

Table 1. Sample characteristics

Panel A: Accounting figures						
Year	***Assets***	***Equity***	***Turnover***	***PBT***	***PAT***	
2015	1,547.43	583.39	1,006.43	72.68	56.86	
2016	1,596.75	586.90	995.36	90.80	71.79	
2017	1,580.54	592.26	1,075.64	202.92	84.68	
2018	1,545.51	559.87	1,176.20	220.79	57.39	
Average	*1,567.56*	*580.61*	*1,063.41*	*146.80*	*67.68*	
Panel B: Board characteristics						
Year	***Size***	***Men***	***Women***	***Executive***	***Non-executive***	***Duality***
2015	10	9	1	4	6	18/45 (40%)
2016	9	8	1	4	6	18/45 (40%)
2017	9	8	1	4	6	18/45 (40%)
2018	10	9	1	3	6	18/45 (40%)
Average	*10*	*9*	*1*	*4*	*6*	*18/45 (40%)*

Note: This table presents the characteristics of the sample over the period 2015-2018. The characteristics reported concern accounting figures and the structure of the board. In particular, the mean terms of assets, equity, turnover, profit before tax (PBT) and profit after tax (PAT) as of December 31 of every single year are provided for the 45 firms included in the sample (in million euros). The structure of the board is presented in terms of size (number of directors), number of men and women on the board, number of executive and non-executive members on the board, and duality, which indicates that the positions of the board's chairman and chief executive officer are held by the same person.

3.2. Performance evaluation

In this section, several measures of performance employed are presented. We then develop the hypotheses concerning the relationship between firm performance and board characteristics that will be tested and present the econometric model which will be used in the empirical testing of the hypotheses.

3.2.1. Performance measures

Several measures of performance will be used in our analysis. In particular, we calculate three alternative financial ratios concerning firm performance based on accounting figures. These ratios are the return on assets (ROA), return on equity (ROE) and return on sales/turnover (ROT). Two versions of each of these ratios are computed, that is, one having profit before tax (PBT) on the numerator and one having the profit after tax (PAT). Based on this variation, we actually obtain six financial ratios of firm performance.

Along with accounting-based measures of performance, we consider two types of stock returns, which are the average daily stock return of each company in the sample in each single year and the corresponding annual return of each company. Both types of stock returns are calculated in percentage terms.

3.2.2. Hypotheses about performance

Four individual hypotheses concerning performance are examined. The first one (*H1*) says that the size of the board should affect in some way the performance of a company. This hypothesis is shown as follows:

$H1_0$ (null hypothesis): The size of the board is significantly related to firm performance.

$H1_1$ (alternative hypothesis): The size of the board is not significantly related to firm performance.

As shown in the previous section, the findings of the literature on the relationship between board size and firm performance are not conclusive. Therefore, in our case, the relationship between the board size of the Greek companies and their performance, if any, is to be empirically determined.

The second hypothesis (*H2*) tested regards the presence of female members on the board and how they affect the performance of firms. Based on the findings of several studies in the literature, one could expect that the presence of women makes a positive impact on firm performance. The hypothesis concerning women serving as board members is shown as follows:

$H2_0$: The presence of female members on the board is related to firm performance in a significantly positive way.

$H2_1$: The presence of female members on the board is not related to firm performance in a significantly positive way.

If the findings of the literature referred to above hold true in the Greek case, the $H2_0$ will be verified.

The third hypothesis (*H3*) assesses the relationship between firm performance and the degree of independence of the board. According to the principles of corporate governance, the presence of independent members on the board can protect the interests of shareholders while enhancing the

performance of the companies. According to the findings reported in the literature review section, this assertion is verified in several cases from an empirical point of view. In summary, the *H3* regarding the correlation between firm performance and board independence is the following:

$H3_0$: The presence of independent non-executive members on the board is related to firm performance in a significantly positive way.

$H3_1$: The presence of independent non-executive members on the board is not related to firm performance in a significantly positive way.

If the corporate governance theory is correct and if the empirical findings of the literature apply to Greece too, the $H3_0$ will be confirmed.

The last hypothesis (*H4*) tested concerns the separation in the individuals who hold the roles of the CEO and the president of the board and whether this separation affects the performance of a company. According to the corporate governance theory, these roles should not be held by the same person and, if they are not, this duality in the roles of the CEO and the president contributes to the protection of shareholders' interests as well as the improvement in firm performance. The *H4* examined is shown as follows:

$H4_0$: The non-duality in the roles of the CEO and the president of the board is related to firm performance in a significantly negative way.

$H4_1$: The non-duality in the roles of the CEO and the president of the board is not related to firm performance in a significantly negative way.

If the assertions made by the corporate governance theory are true for the Greek case, the $H4_0$ will be rejected.

3.2.3. Performance model

The model used to assess the four hypotheses about performance presented above is the following:

$$Perf = \gamma_0 + \gamma_1(Size) + \gamma_2(Fem) + \gamma_3(Non-Exec) + \gamma_4(Non-Dual) + \varepsilon \quad (1)$$

where, *Perf* concerns firm performance, which will be successfully expressed by the several alternative performance measures presented above. The *Size* of the board refers to the number of directors on the board. *Fem* is the number of female members on the board. *Non-Exec* is the number of independent non-executive members on the board. Finally, *Non-Dual* is a dummy variable whose value is 1 when the CEO and the president of the board in a company is the same person and 0 otherwise.

Based on the assumptions made in the previous section, the coefficient of size is to be determined, the coefficients of the *Female* and *Non-executive* variables should be positive and statistically significant. The opposite should be the case for the *Non-duality* variable, that is, the γ_4 coefficient should be significantly negative.

3.3. Risk evaluation

Following the analysis above about performance, in this section, we present the risk measures that will be used in our investigation and then we develop corresponding hypotheses about the relationship between the risk of a firm and the characteristics of its board along with the econometric model that will be used.

3.3.1. Risk measures

Two alternative measures of risk are employed. The first concerns the standard deviation in daily stock returns for each individual company. This measure of risk is standard in financial literature. The second type of risk is the so-called "systematic risk", the well-known *beta*, which is obtained by regressing the daily stock return of a company on the corresponding return of the General Index of Athens Exchange. The model applied is the following:

$$R_{s,i} = \alpha_{s,i} + \beta_{s,i}R_m + u_{s,i} \quad (2)$$

where, $R_{s,i}$ denotes the daily return of the stock *i* and R_m represents the return of the General Index of Athens Exchange, which stands a = s a proxy for the stock market in Greece. The coefficient $\alpha_{s,i}$ is used to determine the above-market return (if any) of the stock *i*. The coefficient $\beta_{s,i}$ measures the systematic risk of the stock *i*, which will be used in our analysis about the relationship between firm risk and the characteristics of a firm's board.

3.3.2. Hypotheses about risk

The *H1* about risk says that the size of the board should be related in some way with the risk a company presents as an investment choice. Given that, generally speaking, the relationship between the risk of a company and the characteristics of its board has not been examined in the literature, there is no empirical evidence to base on our expectations about the impact of the board size on company risk. We could only assume that if increasing the size of the board works to the benefit of the company, this should be reflected in a lower company risk too. This hypothesis about risk and board characteristics is shown as follows:

$H1_0$: The size of the board is significantly related to firm risk in a negative way.

$H1_1$: The size of the board is not significantly related to firm risk in a negative way.

The *H2* assesses whether the presence of women on the board can affect the risk of a company and in what way. The hypothesis examined is the following:

$H2_0$: The presence of female members on the board is related to firm risk in a significantly negative way.

$H2_1$: The presence of female members on the board is not related to firm performance in a significantly negative way.

The $H2_0$ actually says that the more the women on the board are, the less the risk of the company should be.

Similarly to the presence of women on the board, the *H3* examines whether the presence of independent non-executive board members can lower the investment risk presented by a company. This hypothesis is shown as follows:

$H3_0$: The presence of independent non-executive members on the board is related to firm risk in a significantly negative way.

$H3_1$: The presence of independent non-executive members on the board is not related to firm risk in a significantly negative way.

If the assumption about a beneficial contribution to risk by the presence of independent non-executive members on the board is true, the $H3_0$ should be verified.

The last hypothesis (*H4*) tested assesses whether the duality in the persons who serve as the CEO and the chairman of the board can make an impact on the risk of a firm and in what way. If we follow the reasoning of the corporate governance theory about the benefits regarding the protection of shareholders' interests resulted from the separation of the CEO and president roles, we will assume that non-duality should be positively related to risk. Therefore, the null hypothesis is that non-duality is positively related to firm risk, while the alternative hypothesis is that non-duality is not positively related to this risk. The *H4* examined is shown as follows:

$H4_0$: The non-duality in the roles of the CEO and the president of the board is related to firm risk in a significantly positive way.

$H4_1$: The non-duality in the roles of the CEO and the president of the board is not related to firm risk in a significantly positive way.

If the assumptions made by the theory of corporate governance are true, the $H4_0$ will be confirmed.

3.3.3. Risk model

The model applied to assess the validity of the four hypotheses about risk discussed above is the following:

$$Risk = \gamma_0 + \gamma_1(Size) + \gamma_2(Fem) + \gamma_3(Non-Exec) + \gamma_4(Non-Dual) + \varepsilon \quad (3)$$

where, *Risk* relates to the risk a company presents as an investment choice. The independent variables of the model are defined as above. Following the assumptions in the previous section, the coefficient of *Size*, *Female,* and *Non-executive* variables should be negative and statistically significant. The opposite should be the case for the *Non-duality* variable, that is, the γ_4 estimate should be significantly positive.

4. EMPIRICAL RESULTS

4.1. Performance and risk measures

Table 2 reports the various mean estimates of performance and risk for the 45 Greek listed companies of our sample over the period 2015-2018. The table presents the six accounting-based financial ratios of performance along with the two types of stock returns for every single year of the study period. The two risk measures are presented on an annual basis, too. Finally, the table presents, for informational purposes, the *alpha* estimates derived from Model 2, which represent the above-market return achieved by the stock of the average company in the sample.

When it comes to ROA, both versions (ROA1 and ROA2), produce positive calculations, with those based on profits after tax being significantly inferior to those which are calculated with profits before tax. The average ROA1 during the period 2015-2018 is 5.32 and the average ROA2 is 3.25. The lower ROA1 and ROA2 measures are observed in 2016 and 2015, respectively. The estimates of the two versions of ROE are constantly positive in every single year of the study period, too, with the lowest of them being observed in 2015. The average ROE1 of the period is 10.91 and the average ROE2 is 6.49. The same pattern is detected when the ratio of profits to turnover is taken into consideration, namely, positive annual estimates are obtained with the lowest of them concerning 2015.

Overall, the main inference drawn from the presentation of the various financial ratios of performance is that, during the study period, and despite the severe Greek economic crisis, the average listed company in Greece managed to be in positive territory. Moreover, the lowest performance records achieved in 2015 confirm the conclusions reached in the previous section about the negative impact caused on the Greek economy, and on the Greek listed companies in particular, by the radical change in the economic policy adopted by the new government during the first six months of its administration. This fact highlights the strong interconnection between politics and business. This interconnection is especially applicable to Greece, where the portion of economic activity held or affected by the public sector and the decisions made by the government, directly or indirectly, is very high.

As far as stock returns are concerned, the average daily return of the period is positive and amounts to 8 basis points (pbs). The lowest average return was achieved in 2018 and the highest in 2017. In annual performance terms, the average estimate for the entire study period is significantly positive being equal to 15.28%. However, the estimates of 2015 and 2018 are negative. The negative sign of performance in 2015 was to be expected, given the uncertain political and economic environment in Greece during that year. However, the negative sign in the performance of 2018 is a bit of a surprise, given that, in August 2018, Greece successfully completed the bail-out agreement with its international lenders of July 2015 and some level of confidence and optimism about the future economic activity in Greece was restored.

With respect to the above-market stock return achieved by the Greek listed companies, Table 2 reports an average α estimate for the entire study period of 0.09%. All the annual averages are positive too, with the highest of them being observed in 2017. However, as indicated in the parentheses, the majority of individual estimates are not significant in statistical terms. Therefore, the α estimates obtained are not reliable and, thus, will not be used in the econometric analysis of the relationship between firm performance and board characteristics.

On the question of risk, the average period's standard deviation of daily stock returns is 2.84. The highest risk measure is observed in 2015 and the lowest in 2018 (3.76 and 2.24, respectively). Similar behavior is displayed by the systematic risk (β) of the sample's stocks. Overall, the risk is high

in 2015 as a result of the obscure political and economic scene during that year. On the other hand, risk drops in 2018. This has to be the result of the positive expectations about the Greek economy formed after the completion of the bail-out agreement in August 2018.

Table 2. Performance and risk

Panel A: Financial ratios						
Year	***ROA1***	***ROA2***	***ROE1***	***ROE2***	***PBT/Turnover***	***PAT/Turnover***
2015	4.16	2.40	5.90	3.92	4.65	0.61
2016	4.05	2.70	7.40	4.46	6.84	3.74
2017	6.09	3.78	15.47	9.22	10.83	6.81
2018	6.97	4.14	14.87	8.34	13.69	8.02
Average	*5.32*	*3.25*	*10.91*	*6.49*	*9.00*	*4.79*
Panel B: Stock returns and risk						
Year	***Daily Ret***	***Annual Ret***	***Alpha (α)***	***Risk***	***Beta (β)***	
2015	0.048	-2.647	0.093 (0/45)	3.755	0.596 (45/45)	
2016	0.075	12.344	0.061 (2/45)	3.037	0.584 (45/45)	
2017	0.190	53.674	0.146 (7/45)	2.345	0.509 (45/45)	
2018	0.004	-2.264	0.062 (3/45)	2.239	0.493 (45/45)	
Average	*0.079*	*15.277*	*0.091*	*2.844*	*0.546*	

Note: This table presents various measures of firm performance and risk for the sample' s firms over the period 2015-2018. In particular, six accounting-based financial ratios of performance are presented, which are the profit before tax/assets (ROA1), profit after tax/assets (ROA2), profit before tax/equity (ROE1), profit after tax/equity (ROE2), profit before tax/turnover (PBT/Turnover), and profit after tax/turnover (PAT/Turnover). Moreover, the sample's mean terms of the average daily stock returns, annual returns, risk in terms of the standard deviation in daily stock returns, the above-market return (alpha) and the systematic risk (beta) obtained by applying the single-factor market model for the stock daily returns of each individual firm in the sample on the corresponding return of General Index of Athens Exchange. The number of statistically significant alphas and betas are provided in the parentheses. All the figures based on stock returns are estimated for every single year as well as for the entire study period 2015-2018.

4.2. Performance evaluation results

In this section, we analyze the findings of the econometric analysis performed on the relationship between the performance of a company and the characteristics of its board. In particular, Table 3 reports the results of the cross-sectional Model 1, which assesses the impact exerted on firm performance factors such as the size of the board, the number of women on the board, the number of independent non-executive members on the board, and the non-duality in the roles of the board's chairman and the CEO.

Results presented concern the estimates of the model's constant term and independent variables, the T-statistics on the statistical significance of estimates, and the R-square, which assesses the explanatory power of the model. The model is successively performed for the eight alternative measures of performance. In addition, the model is performed for each individual year of the study period as well as for the entire period 2015-2018.

In the case of ROA1, the estimates about the size of the board, the number of women, and the number of independent non-executive members on the board are statistically insignificant. Based on these results, we can conclude that these elements of the board structure cannot affect firm performance. These results are in line with several findings in the literature, which show that the adoption of best corporate governance practices, such as the increased presence of women and the enhanced presence of independent members on the boards, does not necessarily contribute to strengthening the performance of companies. The similar inference applies to the size of the board.

When it comes to non-duality, the results in Table 3 indicate that this is a factor that may matter. More specifically, contrary to our expectations, the estimates of the *Non-duality* variable are positive and statistically significant in three of the four years of the period under investigation, as well as for the whole study period. Similar results are obtained when ROA2 is considered.

This evidence shows that holding the position of chairman of the board and the managing director by the same person works positively for firm performance. This contradiction to our expectations may be the result of the family nature of a significant part of the Greek listed companies. This claim implies that having the person who may have founded the company (or their descendants) in both roles can ultimately be more beneficial to the company than separating the roles of the CEO and the president.

The results obtained by using ROE1 as the proxy for firm performance are statistically insignificant, with the exception of two estimates regarding the *Non-duality* variable that are significantly positive. This is another indication that non-duality may work in the interest of the company's shareholders and not vice versa. The results of ROE2 are all insignificant.

When the two versions of the ratio of profits to turnover are taken into consideration, the performance evaluation model derives five out of ten negative and statistically significant estimates for the variable of women. These results indicate that the presence of women on the board of a company may be against the interests of the company. This finding is in line with some evidence in the literature (e.g., Adams & Ferreira, 2009), which show that the presence of female board members can be associated with worse performance records for companies. This finding might explain why the presence of women on the boards of the Greek companies is limited.

Similarly negative seems to be the role of independent non-executive members on the board when stock returns are examined. More specifically, by considering daily and annual returns together, the model produces six out of ten significantly negative estimates for the *Non-executive* variable. These results contradict the corporate governance theory, which asserts that the presence of an increased number of independent members on the board of a company works to the benefit of shareholders. This finding is not new in the literature.

Several studies, such as those of Arosa et al. (2013), Belhaj and Mateus (2016), and Martín and Herrera (2018), have already detected such a relationship between firm performance and board independence.

With respect to the previous studies on Greek companies, our findings are comparable to those reported by Koufopoulos and Balta (2006), Tsifora and Eleftheriadou (2007) on the impact of the board size, and Kyriazopoulos (2017) and Constantatos (2018), for the period after the burst of the Greek economic crisis, on the relationship between firm performance and board independence.

Table 3. Board structure and performance

Dep. Variable: ROA1	***2015***		***2016***		***2017***		***2018***		***2015-2018***	
Indep. Variables	***Coef.***	***T-stat***	***Coef.***	***T-stat***	***Coef.***	***T-stat***	***Coef.***	***T-stat***	***Coef.***	***T-stat***
Constant	4,744	1,314	2,269	0,726	3,422	0,870	4,158	0,768	4,166	1,337
Size	-0,527	-1,072	0,356	0,866	-0,035	-0,069	0,009	0,011	-0,084	-0,196
Female	0,124	0,149	-0,525	-0,978	-0,045	-0,068	-1,239	-1,271	-0,371	-0,628
Non-Executive	0,589	1,104	-0,396	-0,866	0,198	0,358	0,427	0,508	0,117	0,254
Non-Duality	2,233	1,228	3,123[y]	2,077	4,736[y]	2,581	4,097[z]	1,819	3,806[y]	2,615
R^2	0,086		0,116		0,154		0,102		0,164	
Dep. Variable: ROA2										
Constant	2,779	0,885	1,008	0,377	4,447[z]	1,825	4,636	1,321	3,308	1,358
Size	-0,473	-1,106	0,293	0,834	0,062	0,194	0,259	0,475	0,067	0,202
Female	0,202	0,281	-0,271	-0,590	-0,171	-0,418	-0,743	-1,176	-0,290	-0,628
Non-Executive	0,553	1,191	-0,305	-0,777	-0,324	-0,946	-0,373	-0,686	-0,205	-0,568
Non-Duality	1,769	1,119	2,375[z]	1,843	2,072[z]	1,822	0,823	0,471	2,053[z]	1,804
R^2	0,083		0,087		0,107		0,049		0,091	
Dep. Variable: ROE1										
Constant	-464,02	-0,578	1,214	0,127	7,766	0,522	1,954	0,141	3,784	0,506
Size	111,02	1,016	1,645	1,309	-0,378	-0,193	0,322	0,150	0,617	0,602
Female	-64,366	-0,349	-1,996	-1,216	-1,426	-0,572	-2,231	-0,895	-1,321	-0,933
Non-Executive	-148,91	-1,255	-1,649	-1,177	1,757	0,841	1,207	0,562	-0,091	-0,083
Non-Duality	407,26	1,007	5,485	1,192	6,654	0,958	12,614[z]	1,829	8,362[y]	2,396
R^2	0,053		0,078		0,062		0,111		0,139	
Dep. Variable: ROE2										
Constant	-782,93	-0,583	-0,628	-0,069	10,583	1,095	9,801	0,988	8,881	1,294
Size	186,67	1,022	1,178	0,985	-0,117	-0,092	1,259	0,817	-0,294	-0,313
Female	-109,04	-0,354	-1,103	-0,706	-1,344	-0,830	-2,159	-1,209	-1,324	-1,018
Non-executive	-250,58	-1,263	-1,164	-0,873	0,153	0,113	-1,629	-1,060	0,377	0,371
Non-duality	676,44	1,001	4,450	1,016	1,017	0,225	-1,270	-0,257	1,172	0,366
R^2	0,053		0,044		0,021		0,057		0,042	
Dep. Variable: PBT/Turnover										
Constant	13,259	1,141	11,013	1,572	12,492	0,907	-12,478	-0,741	12,003	1,257
Size	-2,731[z]	-1,727	0,053	0,058	0,019	0,010	0,743	0,284	-0,705	-0,539
Female	1,113	0,417	-3,035[y]	-2,524	-6,419[y]	-2,783	0,009	0,003	-3,326[z]	-1,837
Non-executive	2,539	1,478	-0,481	-0,469	0,253	0,131	2,367	0,906	0,932	0,658
Non-duality	3,984	0,681	3,320	0,985	10,258	1,596	9,739	1,161	6,255	1,402
R^2	0,102		0,164		0,216		0,100		0,152	
Dep. Variable: PAT/Turnover										
Constant	9,561	0,607	9,025	1,546	14,993	1,271	-8,372	-0,712	10,680	1,504
Size	-2,973	-1,386	-0,280	-0,365	1,044	0,673	1,442	0,789	-0,227	-0,234
Female	1,709	0,473	-2,009[z]	-2,005	-6,740[x]	-3,410	1,530	0,722	-2,905	-2,158
Non-executive	2,749	1,181	-0,296	-0,346	-1,958	-1,181	0,036	0,020	-0,081	-0,077
Non-duality	4,275	0,539	3,048	1,085	2,913	0,529	0,387	0,066	2,271	0,685
R^2	0,070		0,146		0,228		0,066		0,126	
Dep. Variable: Daily Stock Return										
Constant	-0,013	-0,160	0,066	0,465	0,286[x]	3,370	0,073	1,001	0,101[z]	1,770
Size	0,002	0,227	0,008	0,407	0,013	1,185	0,011	0,975	0,010	1,268
Female	0,010	0,565	0,027	1,094	-0,007	-0,467	0,011	0,865	0,007	0,606
Non-executive	0,004	0,325	-0,015	-0,715	-0,033[x]	-2,789	-0,032[x]	-2,781	-0,020[y]	-2,349
Non-duality	0,009	0,217	-0,015	-0,217	-0,049	-1,234	0,023	0,627	-0,009	-0,333
R^2	0,020		0,057		0,216		0,249		0,172	
Dep. Variable: Annual Stock Return										
Constant	-13,782	-0,757	9,593	0,398	58,074[z]	1,687	16,064	0,887	74,641	1,334
Size	1,075	0,434	-0,155	-0,049	10,43[y]	2,304	3,115	1,107	17,08[y]	2,227
Female	-0,552	-0,132	5,556	1,344	-2,609	-0,452	1,900	0,582	-1,134	-0,107
Non-executive	-0,365	-0,136	-0,008	-0,002	-16,85[x]	-3,484	-8,537[x]	-3,040	-29,05[x]	-3,504
Non-duality	8,776	0,958	-4,154	-0,358	-4,172	-0,260	7,973	0,884	20,596	0,788
R^2	0,025		0,049		0,245		0,279		0,262	

Notes: [x]: Statistically significant at 1%; [y]: Statistically significant at 5%; [z]: Statistically significant at 10%. *This table presents the results of a cross-sectional regression of firms' performance on selected variables representing the structure of their board of directors. Eight alternative performance measures are used, namely the profit before tax/assets (ROA1), profit after tax/assets (ROA2), profit before tax/equity (ROE1), profit after tax/equity (ROE2), profit before tax/turnover (PBT/Turnover), profit after tax/turnover (PAT/Turnover), average daily stock returns and annual returns. The variables relating the board structure which are used as the independent variables of the model are the size of the board (number of directors), the number of female members (women) on the board, the number of non-executive members on the board, and a dummy variable called non-duality, whose value is 1 when that the positions of the board's chairman and chief executive officer in a sample firm are held by the same person. The R-square on the explanatory power of the model is presented too. The model is performed for each individual year as well as for the entire study period 2015-2018.*

In summary, the results of the performance evaluation revealed some interesting contradictions. In particular, non-duality in the roles of chairman and CEO can be favorable to a company rather than negative. On the other hand, the increased number of women and independent members on the boards can harm the interests of shareholders rather than protecting them. However, it should be pointed out that these results are not universal, that is, they do not apply to all the alternative performance measures and all the single years of the study period.

4.3. Risk evaluation results

This section discusses the findings of the last empirical issue examined, which concerns the relationship between the risk presented by a company as an investment choice and the structure of its board. The relevant regression results of Model 3 are presented in Table 4. The table reports the estimates of the independent variables of the model, which are the size of the board, the number of women and non-executive members on the board, and the *Non-duality* variable, along with their T-statistics. The R-square of the model is reported, too. Model 3 is performed for the two types of risk used, namely the standard deviation of daily stock returns in each year of the study period and the respective *beta* obtained from the Market Model 2. Model 3 is also run for the entire study period 2015-2018.

Table 4. Board structure and risk

Dep. Variable: St. Dev. of Daily stock returns	*2015*		*2016*		*2017*		*2018*		*2015-2018*	
Indep. Variables	***Coef.***	***T-stat.***	***Coef.***	***T-stat.***	***Coef.***	***T-stat.***	***Coef.***	***T-stat.***	***Coef.***	***T-stat.***
Constant	3,424[x]	4,986	4,479[x]	4,693	3,782[x]	4,280	3,040[x]	5,737	3,855[x]	5,479
Size	-0,011	-0,120	-0,225[z]	-1,792	-0,160	-1,378	-0,103	-1,252	-0,160	-1,656
Female	0,277[z]	1,755	0,113	0,687	-0,001	-0,009	0,131	1,377	0,136	1,022
Non-executive	0,079	0,779	0,181	1,295	0,070	0,566	0,027	0,328	0,132	1,269
Non-duality	-0,804[y]	-2,326	-1,176[y]	-2,561	-0,824[z]	-1,998	-0,357	-1,353	-0,849[y]	-2,581
R^2	0,180		0,164		0,114		0,114		0,168	
Dep. Variable: Stock beta										
Constant	0,067	0,291	0,141	0,725	0,347[y]	2,236	0,211	1,131	0,024	0,122
Size	0,048	1,544	0,008	0,324	0,010	0,497	0,009	0,310	0,033	1,229
Female	-0,007	-0,130	-0,023	-0,691	-0,002	-0,064	0,006	0,177	-0,009	-0,233
Non-executive	0,009	0,273	0,055[z]	1,934	0,014	0,626	0,042	1,442	0,040	1,392
Non-duality	0,038	0,328	-0,003	-0,037	-0,058	-0,800	0,035	0,379	-0,004	-0,047
R^2	0,170		0,212		0,072		0,167		0,256	

Notes: [x]: Statistically significant at 1%; [y]: Statistically significant at 5%; [z]: Statistically significant at 10%. This table presents the results of a cross-sectional regression of firms' risk on selected variables representing the structure of their board of directors. Two alternative performance measures are used, namely, the risk expressed in terms of the standard deviation in daily returns of stocks and the systematic risk of each firm obtained by applying the single-factor market model for the stock daily returns of each individual firm in the sample on the corresponding return of General Index of Athens Exchange. The variables relating the board structure which are used as the independent variables of the model are the size of the board (number of directors), the number of female members (women) on the board, the number of non-executive members on the board, and a dummy variable called non-duality, whose value is 1 when that the positions of the board's chairman and chief executive officer in a sample firm are held by the same person. The R-square on the explanatory power of the model is presented too. The model is performed for each individual year as well as for the entire study period 2015-2018.

When the first risk measure is examined, i.e., the standard deviation of daily stock returns, the estimates of the board's size are all negative. This could mean that, in agreement with our expectations, the bigger the board is, the lower the risk of the company should be. However, the estimates of size lack in statistical significance (just one statistically significant is observed in 2016) and, thus, solid inferences about the impact of the board's size on the investment risk of a company cannot be reached. This is also the case about the female and independent non-executive members on the board, whose estimates are statistically insignificant (with just one exception for the *Female* variable in 2015).

On the other hand, the non-duality in the roles of the CEO and the chairman of the board seems to hold a significant relationship with the risk of a company expressed by the standard deviation in the returns of its stock. All the relevant estimates are negative and four out of five of them are statistically significant at the 10% level of acceptance or better. This finding contrasts our expectations about a negative impact on firm risk by the *Non-duality* variable. The main inference drawn is that if a company chooses to entrust the role of the CEO and the president of its board to the same person, this is a decision that can be beneficial to the company and its shareholders in terms of risk.

The results obtained having systematic risk (*beta*) as the dependent variable of the model are insignificant in any economic and statistical way. Therefore, we cannot make any conclusions about whether the structure of a company's board can affect the systematic risk of its stock shouldered to investors.

Overall, the examination of the correlation between company risk and board characteristics resulted in a strong negative relationship between risk and non-duality and a much weaker negative relationship between risk and the size of the board. These conclusions apply to the risk expressed by the standard deviation of stock returns but not to the systematic risk. In regard to non-duality, we remind that, in the previous section, this factor was seen to exert a positive impact on firm performance.

The empirical evidence which combines higher performance and lower risk with the occupation of the two more powerful positions in a company by the same person seems to be a rejection to the common belief in the corporate governance theory and legislation that having two different people to serve as the CEO of the company and the president of its board is a choice which should benefit

shareholders. The opposite seems to be the case for the Greek companies, at least during the period of our investigation.

5. CONCLUSION

The relationship between the structure of a company's board with its performance was examined in this study with a sample of 45 companies listed on the Athens Exchange over the period 2015-2018. The key characteristics of the board structure assessed are the size of the board, the presence of women and independent members on the board, and the duality in the roles of the CEO and board's chairman. Furthermore, several accounting-based and stock-based measures of performance have been considered, as well as two alternative estimates of risk.

With respect to performance, the main inference drawn is that non-duality can be beneficial to a company. In particular, we found that, when the return on assets (ROA) is the proxy for performance, the occupation of the CEO and board's chairman positions by the same person is a factor that can contribute to firm performance in a positive way. This finding contradicts the principles of the corporate governance theory about the necessity of separating these roles in order for the interests of shareholders to be protected.

Going further, some evidence is obtained on a negative relationship between firm performance and the presence of women and independent members on the board. In particular, the former applies to performance expressed by the ratio of profits to turnover and the latter applies to stock returns. Again, both findings contrast the requirements of the corporate governance codes about the adoption of best practices concerning the presence of women on boards as well as the enhancement of the board's degree of independence by increasing the number of independent non-executive members.

As far as company risk is concerned, the empirical results accentuated a mighty negative correlation between risk expressed in return standard deviation terms and non-duality in the roles of the managing director (CEO) and the president of the board. This pattern, combined with the positive relationship between non-duality and performance, indicates that what sounds to be good in theory is not necessarily true in practice. In the case of the Greek listed companies, it seems that non-duality works in the best interest of shareholders since this factor is positively related to performance decreasing at the same time the risk a company presents as an investment choice.

The results above, though being quite interesting, should be taken into account in combination with certain limitations they are subject to. At first, the sample of the study consists of 45 out of the 170 companies listed on the Athens Exchange. Therefore, generalizations based on the results concerning the companies of the sample might be inappropriate for the entire population of the Greek listed companies. In addition, the results might be affected by the studying period selected. This could mean that the selection of another period, with Greece passing through different economic and political conditions, might result in different empirical results. Finally, there may be other factors and board characteristics, such as the academic background or other biographical features of the board members, that could be added in the empirical analysis and result in interesting findings. All these limitations should be kept in mind when interpreting the results of our study.

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