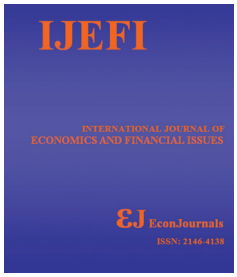

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Board Structure and Bank Performance: Evidence for the Greek Banking Industry during Crisis Period

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ABSTRACT

The recent financial crisis has heightened the research interest worldwide in the relationship between various corporate governance (CG) mechanisms and firm performance. Nevertheless, few published papers focus on investigating this nexus for the case of the banking industry. This study is the first that empirically assesses the impact of board structure on bank performance for the case of Greek banks using a variety of econometric methodologies. Exhaustive empirical findings are presented based on a sample of 13 Greek banks and for a period of severe sovereign debt crisis (2008-2014). Empirical findings support an inverted U-shaped relation between board size and bank performance and between the proportion of independent board members and performance of Greek banks. All empirical findings are generated after we control for mergers and acquisitions activity, bank size and capital adequacy of each bank. Overall, our results document the positive contribution of the implemented CG regulatory framework on the Greek bank value.

Keywords: Corporate Governance, Bank Performance, Board Structure
JEL Classifications: C52, G34, G21

1. INTRODUCTION

In the wake of the global financial crisis of 2008, numerous academics, scholars and practitioners have drawn the attention to the need to study and assess the effectiveness of corporate governance (CG) mechanisms and their contribution to banking efficiency. Auditing scandals, such as of Enron and WorldCom, raised questions and debates on the integrity of financial reporting and this failure has been attributed by the majority of market experts on poor compliance of firms with the relevant codes of CG.

The importance of CG is even more significant for the case of banking institutions. Banks operate as the main financial intermediaries in all modern economies. Therefore, long-term banking stability and prosperity is considered unanimously as a prerequisite in order for national economies to achieve and maintain positive growth rates. The Basel Committee on Banking Supervision (BCBS) (2006) highlights the importance of effective CG mechanisms in order for banking institutions to earn the trust and confidence of the society in the banking system. In addition, Caprio and Levine (2002) argue that banks help facilitate better firm governance either in their role as creditors or alternatively as shareholders. Therefore, CG mechanisms can also be seen as a safety net for all stakeholders through becoming a benchmark of accounting transparency, accountability and improved monitoring efficiency.

Although, the complexity of the banking system is an indisputable obstacle in reducing information asymmetry, there are mechanisms available that can be used to improve the better flow of information and the soundness of financial reporting. To this respect, the BCBS in the document entitled "Enhancing CG for Banking Organizations[1]" advises that the board structure plays an integral part in a bank's efforts in promoting transparency and efficient regulatory reforms. Moreover, the second pillar of Basel II (BCBS, 2005), also underlines the importance of board in order to minimize risk, while this view is also encountered in the Dodd-Frank Act[2],

1 Electronically. Available from: http://www.bis.org/publ/bcbs122.pdf, accessed on May 03, 2016.

2 Source: "Dodd-Frank Wall Street Reform and Consumer Protection Act." Available from: https://www.sec.gov/about/laws/wallstreetreform-cpa.pdf, accessed on May 05, 2016.

that among others emphasizes on the necessity to ensure that independent members are included in a bank's board of directors (BoD) playing a vital role in protecting the interests of stakeholders and reducing various types of costs for the society in general.

Therefore, considering the above it is evident that a bank's board structure can play an important role in ensuring transparency and good quality of accounting information. To date, although in the relevant literature there are many academic studies on the discipline of CG, few papers deal with the evaluation of the bank's CG mechanisms an important aspect of which is the board structure-performance nexus that this study chooses to focus its research subject. However, these few studies that argue on the board characteristics and bank performance provide contradictory results. For example, Sierra et al. (2006) by employing a three-stage least squares estimation method to control for simultaneity, suggest that small boards tend to improve bank performance. On the other hand, Adams and Mehran (2012), using a fixed-effects (within estimator) model to control for unobserved heterogeneity, support a positive relation between bank board size (BS) and performance, although they fail to identify any association between the percentage of independent board members and bank performance. However, they stress that the results could be different if they control for organizational structure, mergers and acquisitions (M&A) and other sources of endogeneity. Similarly, for a data set of 69 commercial banks from six OECD countries including the United States, Andres and Vallelado (2008) show that there is a positive but inverted U-shaped relation between bank BS and non-executive board members on bank performance. Nevertheless, their two-step system generalized method of moments[3] (system-GMM) estimates contradict their pooled ordinary least squares (pooled OLS) and fixed-effects (within estimator) estimates.

Our study is partially influenced by the previous works of Adams and Mehran (2005; 2012) and Andres and Vallelado (2008), while it aims to enrich the existing research on CG by investigating the board structure-bank performance nexus for the case of a European Monetary Union member state, Greece. The main purpose of this research is to assess the effectiveness of the Greek banks' BoD in monitoring and motivating managers in the Greek banking sector, taking as a fact that boards that are able to monitor and motivate managers more efficiently are better governed in the same time, which leads to increased bank performance. Second, this research aims to investigate the impact that the CG regulatory framework has on Greek bank performance for a representative sample of thirteen (listed and non-listed) Greek banking institutions[4].

This study contributes to the literature in the following aspects. First, it is the only research, to the best of our knowledge that focuses on the empirical investigation of the board structure-bank performance nexus for the case of Greek banking industry and for a period that is marked by the severe sovereign debt crisis (2008-2014). Other studies that investigate the characteristics of CG in Greece limit their findings in discussing the evolution and the level of compliance of the listed firms in the Athens stock market (Grose et al., 2014). These papers do not provide in-depth analysis at a sector level and more importantly there is a lack of empirical investigation using appropriate econometric models to trace any significant relationships between the CG mechanisms and firm performance. In addition, most of the earlier studies in the global literature narrow their research interest mainly on the banking sectors of highly developed or rapidly emerging economies (e.g., Liang et al., 2013; Bauer et al., 2008; Gupta et al., 2009). Therefore, this study aims to fill-in the gap of knowledge for the case of banks that are based in less developed economies, such as the Greek economy.

Second, this study contributes to the existing literature by checking the robustness of the findings with multiple proxies of bank performance ensuring as possible the validity of the empirical results. To achieve this goal we employ four different measures of bank efficiency (i.e., return on average assets, return on average equity [ROAE], net interest margin [NIM] and pre-tax operating income [PTOI]), which enables us to cross check the persistence of significant relationships between the board structure variables and bank performance.

Third, following the interesting work of Andres and Vallelado (2008) this study employs an appropriate econometric model, the two step system-GMM estimator, in order to assess the governance-bank performance relationships in the Greek banking industry. In addition, this study compares these results with two other widely used in the relevant literature econometric models (i.e., pooled OLS and within estimator) to empirically justify why only the application of system estimator can produce robust and trustworthy results. We conclude that the system-GMM estimator is the only of the selected methods that treats at the same time problems such as the unobserved heterogeneity, the endogeneity of explanatory variables and simultaneity for the case of dynamic panel data. Overall, from the application of the system-GMM estimator we managed to document an inverted U-shaped relation between BS and bank performance and the proportion of independent board members and bank performance, which is in line with similar studies (e.g., Andres and Vallelado; 2008).

Fourth, we take into account the fact that bank boards could also grow by incorporating directors after an M&A activity to include in the firm's CG system executives from the acquired/merged bank (Pathan and Skully, 2010; Adams and Mehran, 2012; Pathan and Faff, 2013). However, past experience has showed that M&A activity does not always result to more efficient banking institutions. To grasp the changes that occur in terms of board structure and bank performance, this study is one out of few that includes a dummy variable as a proxy for M&A activity in case such an event occurred in a year that is included in our period under research.

The remainder of the study is structured as follows; Section 2 reviews the related literature on CG and develops the main hypotheses that are tested. Section 3, introduces the data on Greek banks and the selected empirical methodology. Section 4, discusses the empirical findings, while Section 5 provides the concluding remarks and policy implications.

3 Originally introduced by Arellano and Bond (1998).

4 The sample banks account for over 85% of the total assets in the Greek banking sector throughout the period under study (2008-2014).

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1. CG and Firm Performance

This study adopts the definition of CG as provided by Zingales (1998), which describes CG as a group of mechanisms used by shareholders to monitor the efficient management of the company's resources by the directors, a task that includes the manner in which quasi rents are developed and allocated. A notable number of academic papers investigate the links between CG mechanisms and firm performance in non-financial institutions (Weir et al., 2002; Stanwick and Stanwick, 2010) providing however, controversial empirical results (Gani and Jermias, 2006; Larcker et al., 2007; Bauer et al., 2008; Stanwick and Stanwick, 2010). A part of the relevant literature supports the positive effect of various CG measures on the performance of non-financial firms (Lee et al., 1992). On the contrary, other studies, such as of Hutchinson (2002) concludes that a negative relation exists between CG and firm value, while others support the absence of significant relations between CG mechanisms and firm performance (e.g., Gupta et al., 2009). In conclusion, the literature appears to be divided on the impact of CG mechanisms on firm performance both in terms of significance and direction of this impact.

Given the core research subject of this study, the following sub-sections provide a brief review of the relevant literature with a special focus on the banking industry. For the sake of brevity, the scope of this review is limited to issues related to the development of hypotheses under investigation. Overall, the relevant null hypotheses (H_0) as presented at the end of each sub-section are designed in order to serve the primary focus of our study, which is to examine the impact of board structure and CEO-power on the performance of Greek banks.

2.2. BS and Bank Performance

In the literature on BS-firm performance relationship controversial findings are reported, that show that CG mechanisms present different forms of impact depending on the sectors, countries and regulatory framework. Therefore, it is not surprising that the case of bank governance does not differ much from any other type of commercial, industrial or services sector. However, numerous studies highlight that due to a number of factors, such as the complexity of bank operations, the variety of financial products offered and the strict regulatory environment, shareholders of banking institutions face additional difficulties in monitoring their bank (Prowse, 1997; Macey and O'Hara, 2003; Ciancanelli and Reyes, 2001; Levine, 2004).

A number of studies support that large boards tend to be less efficient. According to this body of literature firms with smaller boards tend to be more efficient due to lower coordination and communication costs, while each board member has more time to express their opinion considering the limited time available during board meetings (Lipton and Lorsch, 1992; Jensen, 1993; Yermack, 1996; Eisenberg et al., 1998). However, other studies support that larger boards may improve firm performance by increasing the number of board members that provide advice to the managers and by enabling more efficient management supervision (Dalton et al., 1999; Coles et al., 2008; Linck et al., 2008; Adams and Mehran, 2012). Finally, another group of literature provides empirical evidence suggesting that there must be an optimal BS that promotes firm performance (Andres and Vallelado, 2008; Raheja, 2005), while others support the absence of significant impact of CG mechanisms on firm performance (Wintoki et al., 2012; James and Joseph, 2015). Considering the above, our first two hypotheses in null form are the following:

H_{01}: There is no significant relationship between BS and bank performance.

H_{02}: There is no optimal BS that promotes bank performance.

2.3. Board Independence and Bank Performance

The role of independent directors[5] is of paramount importance in the literature of CG. It is widely believed that such type of directors are more effective and objective in their role, which is to monitor the management, since they do not have direct interests and benefits from the firm. Therefore, the appointment of independent directors can be seen as a potentially effective way to control the agency problems[6] that arise within a firm. Moreover, independent directors may bring a different and unbiased perspective on how the management can deal with the firm's problems, while lessening the conflicts of interest. A growing body of literature documents the positive effect that independent directors have not only on firm performance but also in terms of earnings quality and increasing interest and trust in the stock of a company that appoints more independent directors (Rosenstein and Wyatt, 1990; Klein, 2002; Nguyen and Nielsen, 2010).

Another stream of the literature, although it does not oppose to the argument that independent directors may increase the quality of management monitoring, however, it raises doubt whether independent directors have the necessary skills, knowledge, experience and familiarity to support the company through their advice. If this is the case, then the management may be driven towards less optimal decisions hurting the company's overall performance (Agrawal and Knoeber, 1996; Adams and Mehran, 2003; Raheja, 2005; Harris and Raviv, 2008). Other studies document a concave relation between the percentage of independent directors and firm performance (e.g., Andres and Vallelado, 2008; Adams and Mehran, 2012), while a different strand of literature argues that independent directors do not significantly affect firm performance (Hermalin and Weisbach, 2003; Coles et al., 2008; James and Joseph, 2015). However, the findings of such studies could be misleading if the empirical methods used do not adequately control for all relevant sources of endogeneity. Hence, our next two null hypotheses are the following:

H_{03}: There is no significant relationship between the proportion of independent directors and bank performance.

H_{04}: There is no optimal proportion of independent directors that promotes bank performance.

5 Independent directors are such directors who have no direct financial, family or interlock relationships with the firm's management.

6 Agency problems arise within a firm whenever managers have motives to pursue their own interests at shareholder's expense (Agrawal and Knoeber, 1996).

3. SAMPLE, DATA ANALYSIS AND EMPIRICAL FRAMEWORK

3.1. Sample

For the purpose of this study we build an unbalanced panel of 13 Greek banking institutions covering a period from 2008, which is the year that the severe sovereign debt and financial crisis emerged in Greece, until 2014. All data refer to the end of the year. The sample includes the so called as "big four" systemic commercial banks, four smaller commercial banks, two investment banks, two financial institutions specializing in factoring services and one cooperative bank. The four systemic banks of Greece represent a market share measured by total assets of about 94% at the end of 2014, which is the final year of our study. The banks included in our sample altogether own about 99% of the domestic market share in terms of banking assets. Therefore, our panel sample includes almost all banking institutions that are based in Greece at the end of 2014 with 91 bank-year observations. Thus, we conclude that our sample is strongly representative of the banking industry in Greece.

Financial information was exclusively obtained from the BANKSCOPE database, while board structure data and information on the company that serves as an external auditor were hand-collected from the individual bank's annual reports retrieved from the website of each bank and the official site of the Athens stock exchange. All banks included in our sample follow the International Accounting Standards (IAS) from the starting year of our sample. Moreover, it should be noted that Greece, as a member State of the European Union, is subject to the IAS Regulation adopted by the European Union in 2002. The EU IAS Regulation requires application of the International Financial Reporting Standards (IFRS) as adopted by the EU for the consolidated financial statements of European companies whose securities trade in a regulated securities market starting in 2005. Greece used the option under the IAS Regulation to require the application of the IFRS for both the consolidated and separate financial statements of banks and other financial institutions (as defined in articles 2.11 and 11 of Law 3601/2007) regardless whose securities are traded in a regulated market or not.

3.2. Data Analysis

Table 1 provides the definition for each variable and the relevant calculation formulae. Panel A lists the selected dependent variables that measure bank performance. Following previous literature we use multiple proxies of bank performance to validate our empirical results (Andres and Vallelado, 2008; Lin and Zhang, 2009; Berger et al., 2010; Liang et al., 2013; Pathan and Faff, 2013). Four alternative proxies of bank performance are employed to investigate the relation between board structure and bank value: Return of average assets (ROAA), ROAE, NIM and PTOI. ROAA is the net income before interest and tax as a percentage of the average book value of total assets. ROAE is the net income after tax as a percentage of the average book value of total equity. NIM is the net interest income (i.e., interest income minus interest expenses) as a percentage of average earnings assets. We define earnings assets as the group of loans used by the bank in order to generate interest income. PTOI is the pre-tax operating income as a percentage of the average book value of total assets.

Panel B presents the CG variables. The selected variables on board structure are BS, which is the number of directors in the board (BS) and the percentage of total directors who are independent (INDEP). Moreover, following the work of Andres and Vallelado (2008) we include in our models the squares of the variables BS (BS_SQ) and percentage of independent directors (INDEP_SQ) to test whether a U-shaped relationship exists between any of the selected board structure variables and bank performance. Andres and Vallelado (2008) uses squared values only for the variables of BS and independent board members.

Following previous literature (e.g., Mallin et al., 2014; James and Joseph, 2015) we construct a set of company specific variables (Panel C). One of these control variables is bank size (LNTA) as measured by the natural logarithm of the bank's total assets at the end of each fiscal year. The variable CAPITAL is calculated as the bank's total equity as a percentage of total assets, while MERGER and LISTED are dummy variables that equal 1 if the bank made an acquisition/merger in a year and is listed in the stock market respectively, and 0 otherwise.

3.3. Descriptive Statistics and Correlation Matrix

Table 2 reports the descriptive statistics for the dependent (Panel A), independent (Panel B) and control (Panel C) variables. The average ROAA and ROAE are −2.07% and −76.29% respectively, which is indicative of the downfall that Greek banks experienced due to the severe sovereign debt crisis plaguing the Greek economy since 2008, which coincides also with the starting year of our data sample. Similarly, the average PTOI is -1.69%, while the only barely positive mean calculation is 1.64% for the case of NIM. ROAE presents by far the highest standard deviation among the dependent variables, which documents the high uncertainty/risk associated with shareholders' returns due to the severe crisis.

Moreover, in regards with the independent variables employed, we notice that the average BS of our sample is 12.24, which is smaller compared to those as evidenced not only for the cases of highly developed economies (Adams and Mehran, 2012; Andres and Vallelado, 2008) but also for the cases of rapidly developing economies (Liang et al., 2013). On average, bank boards in Greece have 24.51% of directors who are independent, which significantly lower compared to those from similar studies. For example, Pathan and Faff (2013) in their study on the board structure of US bank holding companies find that these financial intermediaries have 70.91% of directors who are independent.

With regard to the results produced for the control variables, we find that the mean ratio of capital to bank assets is 14.77%, which is well above the required by bank regulators[7]. Thus, we conclude that although our sample period covers a time span of sovereign debt crisis, Greek banks are well capitalized. The control variable LISTED indicates that 54% of our bank sample is listed in a regulated stock market, while MERGER mean results indicate that

7 For information on the requirements of regulators, please see Pillar 1 of Basel Committee on Banking Supervision reforms - Basel III. Electronically available at: http://www.bis.org/bcbs/basel3/b3summarytable.pdf, accessed on July 10, 2016.

Table 1: Definition of variables

Notation	Variable name	Description
Panel A: Dependent variables (measures of bank performance)		
ROAA	Return on average assets	The net income before interest and tax as a percentage of average book-value of total assets
ROAE	Return on average equity	The net income after tax as a percentage of average book-value of total equity
NIM	Net interest margin	The net interest income as a percentage of average earning assets. Net interest income is the difference between interest income and interest expenses while earnings assets includes assets, such as loans, used to generate interest income
PTOI	Pre-tax operating income	The pre-tax operating income as a percentage of average book-value of total assets
Panel B: Corporate governance variables		
BS	Board size	The number of directors in the board
BS_SQ	Board size squared	The number of directors in the board squared
INDEP	Independent directors	The percentage of total directors who are independent
INDEP_SQ	Independent directors squared	The percentage of total directors who are independent squared
Panel C: Control variables (company specific variables)		
LNTA	Bank size	The natural logarithm of the total assets as at the end of each fiscal year
CAPITAL	Bank capital	The bank's total equity as a percentage of total assets
MERGER	Previous M&A	Dummy variable equals 1 if the bank made an acquisition/merger in a year and 0 otherwise
LISTED	Listed in the stock market	Dummy variable equals 1 if the bank is listed until the end of the year and 0 otherwise
Panel D: Instrumental variables (used in GMM models to cope with endogeneity)		
LAG_BS	Lag of board size	Lag of the number of directors in the board
LAG_INDEP	Lag of independent directors	Lag of the percentage of total directors who are independent

M&A: Mergers and acquisitions, GMM: Generalized method of moments

Table 2: Descriptive statistics

Variable	Mean	SD	Min.	Median	Max.	Skew.	Kurt.	JB	JB-Prob.
Panel A: Dependent variables (measures of bank performance)									
ROAA	−2.07	6.81	−34.02	0.06	5.82	−3.10	13.48	549.53	0.00***
ROAE	−76.29	290.64	−2131.00	0.54	55.45	−5.44	34.87	4204.89	0.00***
NIM	1.64	4.24	−18.93	2.53	4.43	−3.84	17.29	976.10	0.00***
PTOI	−1.69	5.86	−30.79	0.02	7.65	−2.63	11.91	397.59	0.00***
Panel B: Board structure variables and corporate governance mechanisms									
BS	12.24	3.62	7.00	12.00	21.00	0.42	2.46	3.73	0.15
BS_SQ	162.69	95.27	49.00	144.00	441.00	0.96	3.41	14.37	0.00***
INDEP	24.51	20.72	0.00	21.43	83.33	1.15	4.52	28.24	0.00***
INDEP_SQ	1025.38	1635.08	0.00	459.18	6944.44	2.73	9.72	277.90	0.00***
Panel C: Control variables									
LNTA	8.39	2.15	5.03	8.09	11.70	0.32	1.60	8.86	0.02**
CAPITAL	14.77	14.60	−5.45	9.50	59.17	1.38	4.43	35.83	0.00***
MERGER	0.26	0.44	0.00	0.00	1.00	1.10	2.22	20.34	0.00***
LISTED	0.54	0.50	0.00	1.00	1.00	−0.16	1.02	14.84	0.00***

This table presents the distribution of each variable by showing mean (mean), standard deviation (SD), minimum (Min.), median (Median), maximum (Max.), skewness (Skew.), kurtosis (Kurt.), Jarque-Bera test values (JB), and P values for the Jarque-Bera test (JB-Prob). ***.**: Are the levels of significance at 1% and 5%. ROAA: Return of average assets, ROAE: Return on average equity, NIM: Net interest margin, PTOI: Pre-tax operating income

26% of the included bank years where years that the bank made an acquisition/merger. Comparing the results for the MERGER dummy variable with those of Pathan and Faff (2013) we find that Greek banks present significantly higher percentage of merger years by 17%, which can be attributed to the restructuring process that has been followed by the Greek banking system as a result of the recent crisis. Finally, since our sample covers a crisis period, we observe some extreme values for our variables as indicated by minimum, maximum, skewness and kurtosis. Hence, the Jarque-Bera (JB) test rejects the null hypothesis of normal distribution for all variables at 1% significance level with the exception of BS, which is found to be normally distributed and female and LNTA for which the JB test rejects the null hypothesis of normality at 5% significance level. Overall, we conclude that the majority of our sample is leptokurtic and skewed.

Table 3 presents the Pearson pair-wise sample correlations between the selected variables. In regards with the board structure variables under study (Panel B), the correlations between BS and all bank performance measures except for ROAE are significantly negative, while INDEP is correlated in a significantly negative way only with ROAA and ROAE. In regards with the correlations between the explanatory variables, BS is significantly correlated with none of the selected independent variables, while INDEP is significantly correlated with MERGER (0.09) and LISTED (0.13). CAPITAL is also correlated with LISTED (−0.19) at 1% significance level. Considering the above correlations, we conclude that multicollinearity is not a serious concern since the maximum correlation between the above explanatory variables is just −0.19 (between CAPITAL and LISTED). However, Table 3 shows significantly positive and high correlation between LNTA

Table 3: Sample correlations

Variables	ROAA	ROAE	NIM	PTOI	BS	INDEP	LNTA	CAPITAL	MERGER	LISTED
ROAA	1.00	0.19	0.42	0.90	−0.17	−0.07	0.03	−0.15	−0.15	−0.22
ROAE		1.00	−0.04	0.23	−0.23	−0.08	−0.26	0.28	−0.11	−0.25
NIM			1.00	0.22	−0.08	−0.07	0.04	−0.29	−0.43	−0.23
PTOI				1.00	−0.26	−0.07	−0.10	−0.07	−0.14	−0.28
BS					1.00	0.15	0.32	−0.38	0.20	0.70
INDEP						1.00	0.15	−0.05	0.09	0.13
LNTA							1.00	−0.25	0.28	0.84
CAPITAL								1.00	0.07	−0.19
MERGER									1.00	0.29
LISTED										1.00

This table shows Pearson pairs-wise sample correlations. Bold text indicates statistically significant correlations at 1% significance level. ROAA: Return of average assets, ROAE: Return on average equity, NIM: Net interest margin, PTOI: Pre-tax operating income

and LISTED (0.84). Therefore, we are obliged to exclude the variable "LISTED" from our empirical applications to avoid any multicollinearity problems.

3.4. Empirical Framework

This study utilizes panel data analysis to assess the impact of board structure characteristics on bank performance. The relevant literature on CG employs panel data analysis, since it is considered the most efficient method to use especially when the data sample is characterized by a mixture of time series and cross-sectional data. Panel data technique enables us to take into account the unobservable and constant heterogeneity, in our case, the specific features of each bank (e.g., business strategy, management style and culture, variety of financial products offered to clients, bank structure, market perception etc.). Moreover, we have to deal with another issue, the problem of simultaneity, considering that there is a possibility that some or most of our CG proxies (e.g., BS, independent directors, female directors etc.) may be determined simultaneously with the dependent variable. Thus, in order to ensure the robustness of the empirical analysis we need to employ an econometric methodology that can deal not only with endogeneity issues but also with the presence of unobservable fixed effects that are associated with each bank included in our data sample and correlated with the rest of the independent variables.

Following the interesting methodological approach of Andres and Vallelado (2008) this study provides exhaustive empirical evidence through the application of three different econometric methodologies (i.e., pooled OLS, within estimator and two-step system-GMM estimator). This approach is followed in order not only to address the aforementioned econometric problems of endogeneity, unobservable heterogeneity and simultaneity but also to support through the empirical analysis the superiority of the GMM methodology to address these frequent econometric problems that become apparent when dealing with socio-economic variables. Therefore, the following regression model is specified that aims to empirically test our main hypotheses (H_{01} and H_{03}):

$$PERFORM_{i,t}=\beta_0+\beta_1*BS_{i,t}+\beta_2*INDEP_{i,t}+\beta_3*CONTROL_{i,t}+\beta_4*YEAR_{i,t}+u_i+\varepsilon_{i,t} \quad (1)$$

Where, the subscripts i denote individual commercial banks and t is the time period (t = 2008, 2009,…, 2014). The β parameters are the estimated coefficients for the constant and for each explanatory variable included in our models. CONTROL comprises the three control variables (LNTA, CAPITAL and MERGER), while YEAR[8] comprises the seven individual year dummies, which equal 1 or 0 for each year from 2008 to 2014. Finally, u is the "unobserved fixed effect" for bank i and ε denotes the remaining disturbance term.

Moreover, to test the non-linear relation between the board structure variables (BS and INDEP) and bank performance we included in our models their squared values (i.e., BS_SQ and INDEP_SQ). Therefore, Equations (2) and (3) allow us to test hypotheses H_{02} and H_{04}, respectively:

$$PERFORM_{i,t}=\beta_0+\beta_1*BS_{i,t}+\beta_2*BS\_SQ_{i,t}+\beta_3*INDEP_{i,t}+\beta_4*CONTROL_{i,t}+\beta_5*YEAR_{i,t}+u_i+\varepsilon_{i,t} \quad (2)$$

$$PERFORM_{i,t}=\beta_0+\beta_1*BS_{i,t}+\beta_2*INDEP_{i,t}+\beta_3*INDEP\_SQ_{i,t}+\beta_4*CONTROL_{i,t}+\beta_5*YEAR_{i,t}+u_i+\varepsilon_{i,t} \quad (3)$$

The first methodology that we utilize is the pooled OLS. However, considering that our data sample is in panel form, there is a possibility of correlation between the unobserved effect and our explanatory variables leading to biased and inconsistent estimations. The relevant literature proposes that in order to overcome this problem we can either employ the first differences or the fixed effects-within estimator (Andres and Vallelado, 2008). The fixed effects model eliminates the unobserved time-invariant individual effect by demeaning variables using the within transformation. However, considering that the board is determined endogenously, the strict exogeneity condition fails, leading both first differences and within estimator models to produce misleading empirical results. To overcome the problem of no strict exogeneity, Wooldridge (2002) proposes to use a transformation to eliminate the unobserved effects and instruments to solve the problem of endogeneity.

To take into account Wooldridge (2002) proposition we decide to use the two step system-GMM estimator with adjusted standard errors for potential heteroskedasticity initially proposed by Arellano and Bond (1998)[9]. This methodology

8 We included year dummies in all our estimations to control for time specific effects under the null hypothesis that time dummies have no effect on bank performance. We find no significant time specific effect in all models that we used. For the sake of brevity and readability, the analytical results for these dummies are not reported in Tables (4-8).

9 Our two-step system-GMM results are generated using Roodman's (2009) "xtabond2"command in STATA software.

takes into account the unobservable heterogeneity by transforming the original variables into first differences and addresses the endogeneity of explanatory variables using appropriate instruments. Using the GMM methodology we are allowed to employ instruments for our board structure variables that are potentially endogenous. The endogeneity of governance and specifically board structure variables is supported by the majority of the relevant literature, since it is accepted that firm performance dictates to some extent board structure (Hermalin and Weisbach, 1998; Hermalin and Weisbach, 2003).

Moreover, a key point in applying the GMM methodology is the appropriate selection of instruments. Assuming the endogeneity of the explanatory variables, it is crucial to use instruments that are not correlated with the error term. To ensure model specification validity we utilize the Hansen/Sargan test used for testing over-identifying restrictions, which enables us to examine the lack of correlation between the instruments and the error term, under the joint null hypothesis that the instruments are valid. Finally, we address the issue of instrument proliferation (i.e., the use of too many instruments in dynamic panel data GMM models). Roodman (2009) supports that system-GMM model on a small sample, such as the one that we use, creates a number of instruments that can be used in our calculations. However, the application of too many instruments may cause problems related to feasible efficient system-GMM in which sample moments are used to estimate an optimal weighted matrix for the identification of moments between instruments and errors, while over-fitted instruments may also cause bias to GMM results towards those of OLS. Therefore, the problem of instrument proliferation may lead to biased GMM results considering also that Hansen/Sargan test does not always guarantee instrument validity. To address these issues as highlighted by Roodman (2009) we use in our GMM models only certain lags instead of all available lags for the case of our instruments and we use the "collapse option" of Roodman's (2009) "xtabond2" command in STATA to reduce the number of instruments in order to generate "realistically" lower values for the Hansen/Sargan test[10].

The AR (1) and AR (2) statistics measure the first and second degree of serial correlations, respectively. Considering that the first difference transformations are required for the application of the GMM model, we expect some degree of first order serial correlation, which does not invalidate our results. However, the presence of second order of serial correlation does imply that significant variables have been omitted from the model. For the purpose of this study and following examples from past research on CG we use lags of our board structure variables (i.e. BS and INDEP) to deal with endogeneity[11]. The argument behind the selection of these variables as instruments is that board structure variables could not have resulted from bank performance in subsequent years and thus endogeneity is unlikely (Liang et al., 2013). Finally, since our sample is not large, we report all our two-step system-GMM applications with the robust adjustment for small samples proposed by Windmeijer (2000), which improves the robustness of our estimations and avoids any downward bias that might be present in the estimated standard errors.

10 Pathan and Faff (2013) follow a similar treatment to address the instrument proliferation issue.

11 Table 1 - Panel D, provides definitions for all variables selected as instruments.

4. EMPIRICAL RESULTS

The purpose of this section is to present the empirical analysis in regards with the impact of CG mechanisms on bank performance through the application of widely accepted in the governance literature econometric methodologies; pooled OLS, within estimator and two-step system-GMM. The exhaustive empirical evidence produced, facilitate not only the multi-dimensional and comparative analysis of the links between board structure characteristics and bank performance, but also enrich the existing literature that supports the superiority of the GMM methodology in solving fundamental weaknesses of traditional OLS methodologies, such as endogeneity, unobserved heterogeneity and simultaneity.

4.1. Pooled OLS and within Estimator Results

Table 4 presents the results for the pooled OLS and tests the non-linear relation of BS on the selected proxies of bank performance (ROAA, ROAE, NIM and PTOI). These findings, and for all dependent variables, support the non-linear relationship between BS (BS and BS_SQ) and bank performance. According to these results bank performance will decrease as BS increases until this relation hits to a minimum and thereafter bank performance will increase. These results are not only opposed to the relevant theory but are also against common logic, since it is very difficult to accept that continuously increasing BS will lead to higher bank performance. The literature recognizes that large boards face serious problems of coordination, cooperation, control and decisiveness. These misleading results are in line with Andres and Vallelado (2008) findings and can be attributed to the inconsistency of the pooled OLS models, since they do not take into account the unobservable heterogeneity of the commercial banks included in our sample and the endogeneity of the explanatory variables.

Moreover, according to pooled OLS results there is a significant and positive relation between the proportion of independent directors (INDEP) and bank performance. Finally, the F-test (F-stat) rejects the joint null hypothesis of non-significance for all independent variables at the 1% level and for all dependent variables.

The misleading pooled OLS results as analyzed in Table 4 could be attributed to the non-consideration of the fixed effect. To solve this unobserved time-invariant individual effect problem, Table 5 presents the results from the application of fixed effect model (with the non-linear relation on BS, as in Table 4), which eliminates fixed effect by demeaning the variables using the within transformation. However, the fixed effects model results are in line with the pooled OLS model findings, since they support that oversized boards promote bank performance. Thus, although we eliminate the fixed effect problem of the pooled OLS, the within estimator models fail

Table 4: Pooled OLS results with the non-linear relation on board size

D.V.:	ROAA		ROAE		NIM		PTOI	
exp.var.	Coefficients	P>t	Coefficients	P>t	Coefficients	P>t	Coefficients	P>t
BS	−2.314	(0.019)**	−2.971	(0.003)***	−0.916	(0.034)**	−2.768	(0.026)**
BS_SQ	0.092	(0.023)**	1.879	(0.042)**	0.030	(0.056)*	0.071	(0.055)*
INDEP	0.009	(0.074)*	−0.536	(0.035)**	0.002	(0.049)**	0.006	(0.074)*
LNTA	2.776	(0.002)***	1.222	(0.004)***	1.543	(0.001)***	2.141	(0.001)***
CAPITAL	0.051	(0.456)	8.219	(0.014)**	0.012	(0.743)	0.037	(0.543)
MERGER	0.475	(0.807)	−34.991	(0.710)	3.857	(0.026)**	1.338	(0.436)
CONSTANT	0.338	(0.000)***	2.830	(0.000)***	2.749	(0.000)***	3.208	(0.000)***
YEAR	Yes		Yes		Yes		Yes	
F-stat	6.65	(0.000)***	4.32	(0.000)***	7.82	(0.000)***	3.18	(0.001)***
Adj. R^2	0.249		0.398		0.360		0.214	

This table reports the pooled OLS estimations, where (D.V.) is the respected dependent variable and exp.var. stands for explanatory variables. (F-stat) and (Adj. R^2) are the F-statistic and the adjusted R^2 estimations of each model respectively. P values of coefficient significance are presented in parentheses. ***.**.*: Are the levels of significance at 1%, 5% and 10% respectively. Please see Table 1 for variable notations. ROAA: Return of average assets, ROAE: Return on average equity, NIM: Net interest margin, PTOI: Pre-tax operating income

Table 5: Fixed effects (within estimator) model results with the non-linear relation on board size

D.V.:	ROAA		ROAE		NIM		PTOI	
exp.var.	Coefficients	P>t	Coefficients	P>t	Coefficients	P>t	Coefficients	P>t
BS	−1.581	(0.011)**	−8.233	(0.006)***	−0.058	(0.037)**	−0.213	(0.015)**
BS_SQ	0.044	(0.091)*	2.087	(0.074)*	0.011	(0.082)*	0.062	(0.066)*
INDEP	0.087	(0.004)**	−2.829	(0.071)*	0.027	(0.069)*	0.210	(0.116)
LNTA	9.677	(0.000)***	7.836	(0.005)***	3.119	(0.000)***	8.509	(0.001)***
CAPITAL	0.226	(0.018)**	12.064	(0.019)**	0.212	(0.689)	0.113	(0.188)
MERGER	2.176	(0.330)	−5.638	(0.963)	3.890	(0.029)**	1.188	(0.560)
CONSTANT	9.309	(0.001)***	1.548	(0.000)***	3.598	(0.000)***	2.648	(0.000)***
YEAR	Yes		Yes		Yes		Yes	
F-stat	3.21	(0.002)***	4.99	(0.000)***	10.28	(0.000)***	2.59	(0.008)***
R^2 with.	0.027		0.131		0.109		0.056	
R^2 betw.	0.268		0.374		0.248		0.531	
R^2 overall	0.177		0.298		0.167		0.298	

This table reports the pooled OLS estimations, where (D.V.) is the respected dependent variable and exp.var. stands for explanatory variables. (F-stat) and (Adj. R^2) are the F-statistic and the adjusted R^2 estimations of each model respectively. P values of coefficient significance are presented in parentheses. ***.**.*: Are the levels of significance at 1%, 5% and 10% respectively. Please see Table 1 for variable notations. ROAA: Return of average assets, ROAE: Return on average equity, NIM: Net interest margin, PTOI: Pre-tax operating income

to correct the misleading suggestion that continuously increasing board members promote bank performance. The other results using the fixed effects models are similar with the pooled OLS findings. However, INDEP has a significantly positive impact on three out of four bank performance models. Therefore, the significantly positive impact of INDEP on PTOI as documented in Table 4 appears to fade when we test this relationship using the within estimator model. Finally, the F-stat supports the overall model significance at 1% level and for all four alternative measures of bank performance.

The analysis of Tables 4 and 5 show that both within estimator and pooled OLS methodologies fail to present consistent results especially for the case of oversized boards (Yermack, 1996). The failure of the fixed effects model can be attributed to the fact that our independent variables are not exogenous. The econometric theory supports that fixed effects models can produce robust results only in case we assume strict exogeneity of the explanatory variables. However, strict exogeneity condition cannot be supported for the case of CG variables. Our study is in line with a growing body in governance literature that proposes to treat board structure variables as endogenous considering that we cannot reject the fact that bank performance at least to some extend influences the bank's decisions in regards with the board structure (Adams and Mehran, 2005; Andres and Vallelado, 2008). Therefore, we conclude that neither pooled OLS nor fixed effects models are appropriate methodologies to produce robust empirical evidence[12].

Thus, to produce robust results we should employ an econometric methodology that can deal with the problems of heterogeneity and endogeneity simultaneously. The two step system-GMM estimator can produce robust results since it considers the unobserved individual characteristics of each bank by transforming the original variables into first differences and treats endogeneity issues provided that we employ appropriate instrumental variables.

4.2. Two Step System-GMM Results

Table 6 presents the system-GMM regression results for Equation (1). These findings support the significantly positive impact of BS and INDEP on all four accounting measures of bank performance. Moreover, the estimated coefficients on the "non-governance" bank characteristics also offer some

12 To further validate the inappropriateness of the OLS and within estimator methodologies to assess the impact of board structure characteristics on bank performance we also run our models with the non-linear relationship on the proportion of independent directors (INDEP and INDEP_SQ) leading to similar conclusions as for the case of board size. For the sake of brevity, we do not report the relevant results. However, these estimations are available on request.

Table 6: GMM-system results

D.V.	ROAA		ROAE		NIM		PTOI	
Exp.var.	Coefficients	P>t	Coefficients	P>t	Coefficients	P>t	Coefficients	P>t
BS	0.063	(0.009)***	0.049	(0.076)*	0.101	(0.046)**	0.023	(0.012)**
INDEP	0.003	(0.064)*	0.085	(0.052)*	0.002	(0.084)*	0.002	(0.066)*
LNTA	1.027	(0.002)***	1.896	(0.008)***	1.526	(0.001)***	2.103	(0.007)***
CAPITAL	0.044	(0.601)	7.913	(0.117)	0.007	(0.849)	0.025	(0.678)
MERGER	2.649	(0.581)	2.656	(0.806)	−0.008	(0.087)*	1.806	(0.292)
CONSTANT	0.774	(0.007)***	0.044	(0.069)*	−0.407	(0.035)**	−6.321	(0.211)
YEAR	Yes		Yes		Yes		Yes	
F-stat	40.23	(0.000)***	39.96	(0.000)***	23.04	(0.000)***	32.06	(0.000)***
AR (1)	−0.98	(0.334)	−0.94	(0.421)	−0.63	(0.314)	−0.86	(0.313)
AR (2)	−0.83	(0.401)	−0.91	(0.433)	−0.61	(0.319)	−0.80	(0.328)
Hansen test	69.79	(0.368)	65.46	(0.196)	60.56	(0.157)	73.96	(0.264)

This table reports the two-step system GMM estimator with the robust adjustment for small samples proposed by Windmeijer (2000). (D.V.) is the respected dependent variable and Exp.var. stands for explanatory variables. (F-stat) is the F-statistic of each model respectively. AR (1) and AR (2) are the first and second order correlation tests respectively. (Hansen test) is the Hansen/Sargan tests of instrument validity. P values of coefficient significance are presented in parentheses. ***.**.*: Are the levels of significance at 1%, 5% and 10% respectively. Please see Table 1 for variable notations. ROAA: Return of average assets, ROAE: Return on average equity, NIM: Net interest margin, PTOI: Pre-tax operating income, GMM: Generalized method of moments

interesting insights. LNTA (as it was expected) positively affects bank performance at 1% level and for all four alternative dependent variables. However, we find no significant impact of CAPITAL on bank performance, therefore we have no significant evidence to support that highly capitalized banks perform better. Furthermore, MERGER presents weakly significant and negative coefficient only for the case of NIM. A tentative explanation for this finding could be that merger and acquisition attempts of the Greek banks during the crisis period not only failed to promote bank performance but also according to our results they present a negative impact on NIM of Greek banks. The F-stat results reject the joint null hypothesis of non-significance for all alternative bank performance specifications at the 1% level. The first and second order correlation tests, AR (1) and AR (2) respectively, both confirm the absence of serial correlation, while from the application of the Hansen/Sargan test we validate the appropriateness of the selected instrumental variables that are used to address the endogeneity of the explanatory variables.

Table 7 reports the two step system-GMM results with the non-linear relation on BS (BS_SQ). In contrast to the pooled OLS (Table 4) and within estimator (Table 5) findings, the application of GMM models take into account the individual bank characteristics and the endogeneity of governance variables and manage to confirm our implied inverted U-shaped relation between BS and bank performance. The positive and statistically significant coefficient of BS and the significantly negative coefficient of BS_SQ imply that although the addition of new board members promotes the performance of Greek banks, there is a point at which continuous additions of new board members has a negative effect on bank performance. As analyzed in Section 3, the governance literature presents conflicting results whether BS has positive or negative impact on firm performance.

This study argues that regardless the positive/negative impact of BS it should be accepted that given the statistical significant relation (positive or negative) between BS and firm value there must in all cases be a point at which having continuously less or more board members will eventually affect in a negative way firm performance. Firms with very small boards are unable to reduce CEO's discretionary power and do not treat the agency problem. However, very large boards, although avoid the problems of small boards, they face serious communication and coordination issues leading to indecisiveness and they complicate the firm's decision-making process. The results for the remaining explanatory variables are in line with those presented in Table 5. F-stat rejects the joint null hypothesis of non-significant explanatory variables, while the AR (1) and AR (2) tests report no serial correlation. Finally, the Hansen/Sargan test does not reject the null hypothesis that our instruments are valid.

In conclusion, our findings as reported in Table 7 confirm the hypothesized inverted U-shaped relationship between BS and bank value. Therefore, it is logical to assess whether an optimum point exists also for the case of the proportion of independent directors where bank performance is maximized.

Table 8, presents our results from the application of system-GMM models introducing the non-linear relation on the proportion of independent directors in the BoD (INDEP_SQ), which replaces the BS one (BS_SQ). These findings show that an inverted U-shaped relation exists also for the case of INDEP, although none of these results is significant at 1% significance level. Therefore, based on these estimations it is safe to assume that there must be a limit beyond which adding new independent members in the BoD damages bank value. The governance theory backed by several empirical studies in this field supports that independent members add value to the firm by enabling more efficient monitoring of the executive member's decisions, while through their advisory role and non-dependent relation with the company they aid to the protection of shareholder's interests. The literature provides contradictory evidence whether non-executive and independent members affect positively, negatively or even not at all firm value.

Our results for the case of Greek banks show that although adding independent board members should enhance bank performance this does come with a limit beyond which leads in reducing bank value as evidenced by the significantly negative coefficient of INDEP_SQ. This diminishing marginal value added could be attributed to the fact that the appointment of too many independent

Table 7: GMM-system results with the non-linear relation on board size

D.V.	ROAA		ROAE		NIM		PTOI	
Exp.var.	Coefficients	P>t	Coefficients	P>t	Coefficients	P>t	Coefficients	P>t
BS	0.581	(0.008)***	0.059	(0.046)**	0.058	(0.067)*	0.013	(0.025)**
BS_SQ	−0.044	(0.071)*	−0.087	(0.037)**	−0.001	(0.042)**	−0.006	(0.076)*
INDEP	0.087	(0.056)*	0.029	(0.0317)**	0.027	(0.089)*	0.010	(0.016)***
LNTA	0.877	(0.000)***	0.836	(0.021)**	3.039	(0.000)***	2.509	(0.001)***
CAPITAL	0.226	(0.618)	2.064	(0.119)	0.212	(0.813)	0.113	(0.688)
MERGER	2.176	(0.330)	−5.638	(0.963)	−0.090	(0.129)	1.188	(0.560)
CONSTANT	0.309	(0.001)***	0.059	(0.081)*	−0.398	(0.074)*	−5.378	(0.186)
YEAR	Yes		Yes		Yes		Yes	
F-stat	46.25	(0.000)***	31.26	(0.000)***	29.80	(0.000)***	32.50	(0.000)***
AR (1)	−0.86	(0.314)	−0.75	(0.298)	−0.59	(0.329)	−0.97	(0.187)
AR (2)	−0.75	(0.349)	−0.71	(0.301)	−0.50	(0.346)	−0.78	(0.210)
Hansen test	78.59	(0.298)	68.48	(0.189)	55.21	(0.142)	63.21	(0.181)

This table reports the two-step system GMM estimator with the robust adjustment for small samples proposed by Windmeijer (2000). (D.V.) is the respected dependent variable and Exp. var. stands for explanatory variables. (F-stat) is the F-statistic of each model respectively. AR (1) and AR (2) are the first and second order correlation tests respectively. (Hansen test) is the Hansen/Sargan tests of instrument validity. P values of coefficient significance are presented in parentheses. ***.**.*: Are the levels of significance at 1%, % and 10% respectively. Please see Table 1 for variable notations. ROAA: Return of average assets, ROAE: Return on average equity, NIM: Net interest margin, PTOI: Pre-tax operating income, GMM: Generalized method of moments

directors as board members may lead the bank's BoD to lack the necessary experience, skills and in-depth knowledge of the bank's internal affairs. Executive members incorporate these characteristics through their dependent employment relationship with the bank. Therefore, their contribution should not be underestimated in our efforts to promote governance transparency and reduce the conflicts of interest among the firm's stakeholders.

Our results could also lead to the conclusion that board composition causes the inverted U-shaped relationship of BS, since as Table 8 shows, when we introduce INDEP_SQ in replacement of the BS squared variable (BS_SQ), the statistical significance of BS disappears[13]. These findings may suggest that board composition as reflected by the proportion of independent board members could be the reason behind the inverted U-shaped relationship between BS and bank value.

In regards with the control variables only LNTA appears to significantly promote bank performance, which is in line with the majority of previous literature findings. Finally, interpreting the various tests that validate the robustness of our estimations, the F-test rejects the joint null hypothesis that the estimated coefficients are equal to zero, while AR (1) and AR (2) tests confirm the absence of first and second order serial correlation. Finally, the Hansen/Sargan test results do not reject the null hypothesis that our instrumental variables are valid.

Overall, the two step system-GMM results as presented in Tables 6-8, show that CG mechanisms have significant impact on the value of Greek banks. Moreover, our study does not limit its research subject to finding significant positive/negative relations between board structure variables and bank performance. We extend our research to show that there is a limit where the problems from oversized boards and continuous additions of independent board members will at some point overmatch the benefits of adequate management monitoring, transparency in CG and solutions to agency problems, aspects that CG regulations aim to draw the attention of businesses worldwide.

5. CONCLUDING REMARKS AND POLICY IMPLICATIONS

The main objective of this paper is to investigate whether CG mechanisms help Greek banks to perform better and create shareholder value. In particular, this study enriches the limited bank governance literature by assessing the impact of two well-known in the governance literature proxies of board structure (i.e., BS and the proportion of independent board members in the BoD) on bank performance.

Our focus is mainly motivated by the fact that no previous research has been done in the governance literature for the case of Greek banks presenting exhaustive empirical evidence from the application of three widely accepted empirical methodologies (OLS, within estimator and system-GMM), to the best of our knowledge. Inspired by the interesting work of Andres and Vallelado (2008), this variety of methodological approaches is not only used for comparative purposes but also to demonstrate the theoretical and empirical superiority of system-GMM methodologies over OLS and within estimator models to generate robust results through the control of important econometric issues, such as heterogeneity and endogeneity that both OLS and within estimator fail to treat simultaneously. Furthermore, our sample covers a period from the beginning of the sovereign debt crisis in Greece (i.e., 2008) and extends until the last year that data were available (i.e., 2014) for all sample banks. Therefore, this study enriches the crisis literature also, by investigating a period that is marked by some of the most severe political, socio-economic and banking transformations that Greece experienced in its modern economic history.

Our analysis based on the two step system-GMM results, enables us to reject all four hypotheses that we test (H_{01}-H_{04}). We suggest that both BS and the proportion of independent board members

13 Andres and Vallelado (2008) highlights also the fading significance of board size when investigating the non-linear relation of non-executive directors on bank value in their research on six OECD countries and using different measures of bank performance.

Table 8: GMM-system results with the non-linear relation on independent directors

D.V.	ROAA		ROAE		NIM		PTOI	
Exp.var.	Coefficients	P>t	Coefficients	P>t	Coefficients	P>t	Coefficients	P>t
BS	−0.415	(0.131)	−0.003	(0.124)	−0.008	(0.136)	−0.006	(0.185)
INDEP	0.274	(0.044)**	0.365	(0.021)**	0.132	(0.055)*	0.354	(0.082)*
INDEP_SQ	−0.252	(0.079)*	−0.459	(0.052)*	−0.102	(0.012)**	−0.002	(0.067)*
LNTA	1.198	(0.000)***	0.477	(0.017)**	1.151	(0.000)***	3.798	(0.011)**
CAPITAL	0.234	(0.614)	0.411	(0.115)	0.211	(0.834)	0.124	(0.658)
MERGER	2.712	(0.179)	1.393	(0.850)	−0.870	(0.096)	0.097	(0.304)
Constant	−83.411	(0.000)	−1304.604	(0.282)	−25.867	(0.000)	−67.448	(0.002)
YEAR	Yes		Yes		Yes		Yes	
F-stat	86.59	(0.000)***	45.69	(0.000)***	29.97	(0.000)***	151.56	(0.000)***
AR (1)	−0.75	(0.289)	−0.89	(0.326)	−0.49	(0.268)	−0.96	(0.198)
AR (2)	−0.68	(0.324)	−0.65	(0.348)	−0.44	(0.289)	−0.84	(0.203)
Hansen test	50.56	(0.112)	56.84	(0.146)	68.55	(0.176)	79.96	(0.299)

This table reports the two-step system GMM estimator with the robust adjustment for small samples proposed by Windmeijer (2000). (D.V.) is the respected dependent variable and Exp. var. stands for explanatory variables. (F-stat) is the F-statistic of each model respectively. AR (1) and AR (2) are the first and second order correlation tests respectively. (Hansen test) is the Hansen/Sargan tests of instrument validity. P values of coefficient significance are presented in parentheses. ***.**.*: Are the levels of significance at 1%, 5% and 10% respectively. Please see Table 1 for variable notations. ROAA: Return of average assets, ROAE: Return on average equity, NIM: Net interest margin, PTOI: Pre-tax operating income, GMM: Generalized method of moments

significantly promote the efficiency of Greek banks (H_{01} and H_{03}). However, we highlight that this conclusion comes with a limit. Through the inclusion of the squared values of BS (BS_SQ) and independent directors (INDEP_SQ) we show that there is an optimum point beyond which the increase of BS and the continuous additions of new independent directors in the bank's board will eventually lead to opposite results than the desired ones. These statistically significant inverted U-shaped relations between these two board structure variables and bank performance are the evidence that support the rejection of hypotheses H_{02} and H_{04}.

Overall, our research findings can be a valuable source of knowledge for policy makers and regulators, particularly in the banking sector, in designing strategies that not only motivate financial institutions towards the conformity with the voluntary aspects of the CG regulatory framework but also to mitigate future financial crises. Our empirical findings, which are unique for the case of the Greek banking industry, contribute to the existing pool of knowledge by providing exhaustive evidence that lead us to conclude that the Greek banking sector can benefit from the adoption of the CG culture.

Moreover, these results have several policy implications. We provide robust evidence that BS plays a vital role in improving the governance of Greek banks. The optimal BS is not limited to ensuring shareholders' wealth and protecting stakeholders but also to promoting bank value. The proportion of the independent board members is another contributing factor of bank performance. We urge Greek banks to carefully increase the number of independent members in their boards. However, considering that these additions promote value up to a certain point, bank administrations should pay special attention not only into increasing the numbers of independent board members gradually but also into carefully assessing the profile of these independent directors. We propose that these members should have a solid banking background, are well informed about the individual bank characteristics and are aware of the particularities of the Greek banking industry as a whole. Considering that the ability and intelligence of each independent member is an "unobservable effect" we can assume that our empirical results on the contribution of independent board members on bank value consider as a prerequisite the familiarity of these directors with the banking environment.

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