

Corporate Governance Mechanisms and Firm Performance in Greece during the debt sovereign crisis

1. INTRODUCTION

This paper investigates the relation between firm performance and corporate governance in a Greek context, examining non-financial firms listed on the Athens Stock Exchange (ASE) from 2006-2012. The basic premise underlying the relationship between these two variables is that firms with stronger corporate governance have better performance, thus a positive relationship is expected to exist between them. This research examines whether corporate governance attributes are more effective in helping Greek firms maintain this positive relationship during the Greek debt sovereign crisis, which began in 2010. The research takes advantage of two settings: 2006/2008/2009 (pre-crisis setting) and 2010/2011/2012 (financial crisis setting) with a final sample of 1205 firm year observations with complete data. The CG-performance relationship is moderated by using a crisis period dummy variable. A crisis years dummy variable equaling one is given to the crisis years and zero to the non-crisis years. The purpose of the use of this dummy variable is to examine the effect of corporate governance variables on firm performance before and during the Greek crisis. For this reason, the use of interaction variables is implemented in this study between the dummy variable and the corporate governance index used in the regressions. The coefficients of such interaction variables show the marginal effect of corporate governance variables, before and during the Greek crisis. It is expected that firms with stronger

governance quality will continue to have a higher firm performance during the crisis years.

Greek businesses are mainly family-oriented and there is generally poor legal protection for investors (Sikalidis and Leventis, 2016). The expansion of ASE in the late 1990's, followed by the crash of 2000-2001, made the need for effective corporate governance mechanisms imperative. The year 2002 was a critical year for corporate governance in Greece. In May 2002, the first law was created that mandated Greek listed companies to enforce a set of governance guidelines. Based on an effort of continuous improvement, other corporate governance laws were also established, such as the mandatory creation of an audit committee from 2008, as well as other corporate governance laws in 2010. The establishment of laws concerning corporate governance mechanisms provided a stimulus for Hellenic Federation of Industries to prepare an updated Corporate Governance Code for listed companies as of December 2010, so as to educate and guide Greek listed companies on governance best practice. Motivated by these developments, this study proxies corporate governance through the creation of a corporate governance index. The use of an index as a proxy for governance quality captures the multidimensional nature of corporate governance and its use is complimentary to the use of individual corporate governance items to measure governance quality.

Firm performance is measured using a common market-based performance measure, Tobin's Q. An alternative accounting performance measure, Return on Assets (ROA), is also implemented to measure firm performance.

An important issue considered in the analysis is that of controlling for the possible endogeneity of the variables that could bias the results obtained. According to Hermalin and Weisbach (2003) and Carcello et al. (2011) an OLS regression analysis in governance research can lead to endogeneity between corporate governance variables and other variables of interest, in this case firm performance. For example, while it is possible that well governed firms have higher performance, it is also possible that firms change their governance structure in response to firm performance. If this is so, the relationship between firm performance and corporate governance could be endogenous. Additionally, the optimum choice of debt can differ among shareholders and managers. On the one hand, research indicates that a negative relationship exists between leverage and performance, however there are cases where larger levels of debt force managers to work harder so as to create higher levels of cash flows, thus increasing firm performance. Therefore it is needed to examine the inter-relationship between governance, firm performance and leverage. For this reason a system of simultaneous equations using GMM is applied in this study to examine the hypotheses.

Data for corporate governance characteristics is hand-collected from annual reports found on the ASE website, while firm performance is calculated based on data obtained from DataStream. The sample consists of all firms listed on the ASE for the years 2006, 2008, 2009, 2010, 2011 and 2012, excluding only firms in financial, real estate and insurance industries since they require additional governance regulations and it is often difficult to calculate Tobin's Q.

2. THE INSTITUTIONAL SETTING OF GREECE

Greece is a country with the characteristics of a Continental European corporate governance system. Nevertheless, the characteristics of the Greek Corporate Governance law, are influenced by the US Sarbanes-Oxley (SOX) Act of 2002. SOX was seen by legislators as a medicine for CG problems and a way of creating a more stable international business environment by enforcing the same rules and regulations, so as to help capital movement (Lazarides, 2010).

Greece is classified by Weimer and Pape (1999) as part of the Continental European model based on its legal framework structure (civil not common law) and corporate governance. The legal system in Greece is a mix of German and French law. According to La Porta et al. (1998) countries that follow English law (common law), have the strongest legal protection for minority shareholders, French law has the weakest protection, and Germany falls in between. The Continental European system is characterized by highly concentrated ownership, a board of directors controlled to a great extent by large shareholders, a less liquid capital market and banks that play a key role in corporate governance through equity stakes and proxies given to them by small investors (Baums, 1993;Kester, 1997;Cuervo, 2002). The main differences between Greece and the aforementioned model is that banks play a passive rather than an interventionist role, the board of directors and the general shareholder meeting is considered ineffective, since Greece is characterized by family owned companies, who often find these management instruments as having no essential value (Lazarides, 2010). Despite the use of IPO's in the late 1990's and the transformation of some

private-family owned companies to public listed companies, the main shareholder of Greek firms is still a family member (Lazarides, 2010). As a result of the family-oriented character of Greek firms, CG mechanisms created are aimed at aligning the interests of controlling shareholders with those of minority interests. It is important that family members do not abuse their power and take advantage of company resources for their own benefit.

Other types of shareholders found in Greek companies are the state, institutional and individual investors. Although many state-owned companies have become listed, the state remains the major shareholder, owning at least 50% of those company's shares. In these companies identifying and communicating with the major shareholder is a great problem. Institutional investors are another important investor group, who make up 30%-40% of the shareholders of all listed firms. They want a corporate governance framework that gives them the information and control they need (Lazarides, 2010). Although their presence promotes the adoption of CG mechanisms, they have not played an active role in monitoring the actions made by the controlling group (Lazarides and Drimpetas, 2011). Finally an important investor group in the Greek market are individual shareholders. The law on corporate governance is aimed at protecting individual shareholders' interests who many times are cut-off from the decision-making process (Spanos, 2005). Although improvements have been made in the governance of Greek firms, many still do not comply with the substance, but only the form of CG rules (Tsalavoutas and Evans, 2010)

The Board of Directors (BOD) of Greek listed firms have one tier. The existence of large dominant shareholders, which are often family members, have strong ties with the

management team. Board committees, board independence and board members' education and qualification criteria are often not adequately established. Many BOD have a passive role and follow the decisions set by management. The role of non-executive members, which is to look after shareholders' interests, are often compromised and therefore management supervision is inefficient (Lazarides and Drimpetas, 2011). Despite the governance rule on board independence, it is difficult to identify whether boards really practice this rule (Spanos, 2005). The existence of large dominant shareholders that often control managers and expropriate minority shareholders is the basic characteristic of Greek firms, thus the agency problem that should be addressed in a Greek context is that of aligning the interests of strong block holders with that of weak minority shareholders, known in the literature as a Type II agency problem (Lazarides, 2010). This clearly shows the need for a different legal objective in Greece and in other countries where the agency problem exists between strong major shareholders and minority shareholders (Type II agency problem), rather than that of the Anglo-Saxon corporate governance model where the agency problem is between managers and shareholders (Type I agency problem) (Lazarides, 2010). If the real CG issue in Greece is not addressed, compliance will be denied or ignored using various excuses or counter-mechanisms (Lazarides and Drimpetas, 2011). External mechanisms in Greece are not as effective as in other Anglo-Saxon countries, as stated by LaPorta (2002; 2000), thus the CG problem of protecting minority interests is a difficult one to solve (Nerantzidis, 2015).

The improvements of the CG system in Greece have come about through the enforcement both of laws and specific codes of good governance. All Greek CG laws

and codes are aimed at increasing investor confidence and establishing the long-term success and competitiveness of Greek firms (Nerantzidis and Filos, 2014). Greek CG laws are either national laws or laws created to implement European directives. As for CG codes, Greek firms have the option to either adopt the voluntary national Greek code created or generate their own CG code, since an institutional and mandatory Greek Code does not exist (Nerantzidis and Filos, 2014). CG codes aim at creating a framework for a set of best practices in terms of good governance and address deficiencies directly related to the country's legal system. Hence, different attributes are found in CG codes created for countries that follow the common-law based system compared to those that follow the civil-law based system, as is the case of Greece.

Although the legal framework in Greece has fully complied with EU guidelines and directives, the question of whether this synchronization of legal frameworks has led to the successful strengthening of minority rights has not yet been completely answered (Spanos, 2005; Nerantzidis, 2015).

3. THE FINANCIAL CRISIS IN GREECE

Eighty years after the financial crisis of 1929 and forty years after the end of the dictatorship in Greece, Greece faces a severe financial crisis that began in 2008 (Nerantzidis and Filos, 2014). The government-debt crisis that Greece is currently facing is one of the current European sovereign-debt crises, which are caused as a result of the global economic recession of October 2008. The lagged impact of the global crisis brought forth pre-existing structural problems and macroeconomic imbalances of the Greek economy, leading the country to recession (Repousis, 2015).

In 2009, a reported increase in the government debt levels led investors to doubt Greece's ability to meet its debt obligations, mirrored in a steep increase in bond yield spreads (Repousis, 2015; Kosmidou et al., 2015). The peak of the crisis was in April of 2010 when Greece's access to international markets was blocked and it was unable to service its debt, as a result of integral issues of the Greek economy that made the markets lose confidence in it. Financial problems, as a result of high public debt and primary deficits, the lack of competitiveness and structural problems due to a bureaucratic, inflexible and over-expanded public sector, are issues that led to Greece's current crisis (Nerantzidis and Filis, 2014). As a result Greece was forced to sign a memorandum to obtain a support system in May 6, 2010 directed by the International Monetary Fund (IMF), the European Commission and the European Central Bank (ECB), known as the Troika partners. The memorandum implemented was aimed at restructuring the Greek economy in terms of public expenditure and public property (Nerantzidis and Filis, 2014; Repousis, 2015; Kosmidou et al., 2015).

The crisis, which continues to exist, is a result of the country failing to address problems affecting the public sector and policies created that resulted in its continued difficulties. The crisis has clearly shown that the development model followed by the country all these years has led to its deterioration and loss of creditworthiness and thus an increase in the bond yield spreads, leading to the continuous support of the IMF, ECB and the EU (Nerantzidis and Filis, 2014).

4. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Corporate governance is a set of internal and external mechanisms aimed at reducing agency costs and aligning the interests of managers and shareholders. Internal mechanisms include ownership structure, board composition and committees, executive remunerations and disclosure of information. External mechanism include shareholder rights, anti-takeover measures and the market for corporate control (Denis and McConnell, 2003).

Extensive research has studied the relationship between firm performance and governance mechanisms with mixed and inconclusive results. Many studies have focused on one aspect of corporate governance, such as ownership, board size and/ or board composition. However recent studies have acknowledged that corporate governance quality cannot be exhibited solely on individual governance mechanisms but a more holistic approach is needed where several governance mechanisms simultaneously should be examined. Thus, several studies have created indices that incorporate several elements of corporate governance and test its influence on firm performance.

Gompers et al. (2003) was one of the first that constructed an index assessing governance quality for a large number of publicly traded US firms. They used data from the Investor Responsibility Research Center (IRRC)¹ and created a “Governance Index” named G-index², which measures corporate governance characteristics based on 24

¹ IRRC is a nonprofit research group that serves institutional investors and publishes detailed listings of CG provisions for individual firms in *Corporate Takeover Defenses*. This data come from a broad set of public sources such as corporate bylaws and charters, proxy statements, annual reports and 10-K and 10-Q documents filed with SEC.

² In the most of the analysis of the paper, the IRRC data was matched to data obtained from the Center for Research in Security Prices (CRSP) and to the Standard and Poor’s Compustat database.

distinct corporate governance provisions classified into five groups: tactics for delaying hostile takeovers; voting rights; director/officer protection; other takeover defenses; and state laws. Gompers et al. (2003) found that higher quality governance, proxied by their index, resulted in improved future stock performance. Gompers et al. (2003)'s G-index has been used by many studies, such as Klock et al. (2005), Villalonga et al. (2006), Perez-Gonzalez (2006), Dittmar et al. (2007) and Harford et al. (2008) to represent governance quality, even though it is considered more an anti-takeover protection index rather than a broad index of corporate governance (Cremers and Nair, 2005; Brown and Caylor, 2006).

Drobetz et al. (2004) created a broad corporate governance rating (CGR) for German public firms and examined its relationship to firm valuation, documenting a positive relationship between governance practices and firm value. CGR was created based on responses to 30 survey questions, divided into five categories: corporate governance commitment, shareholder rights, transparency, management and supervisory matters and auditing.

Alves and Mendes (2004) developed a CG index incorporating items included in the code of best practice issued by the Portuguese Securities Market Commission (CMVM) in October 1999. CMVM issued 17 non-mandatory recommendations on corporate governance, classified into the following groups: recommendations regarding disclosure of information, recommendations regarding voting and shareholder representation, a set of recommendations on the adoption of certain corporate internal rules of best practice, recommendations on the structure and functioning of the board of directors. CMVM sent out three questionnaires to 82 companies listed on the Lisbon

Stock Exchange (BVL) in 1999, 2000 and 2001 so as to enquire which firms comply with the code of best practice. Alves and Mendes (2004) use the responses to the questionnaires sent by CMVM to create their CG index. This index, which acts as a proxy for the CG quality of Portuguese firms, was found to be positively correlated with company performance.

Brown and Caylor (2006) created the Gov-score, a simple summary governance index measure based on 51 firm-specific provisions obtained from Institutional Shareholder Services (ISS), representing both internal and external governance items and examined its effect on firm performance. The 51 provisions were classified into eight categories: audit, board of directors, charter/bylaws, director education, executive and director compensation, ownership, progressive practices and state of incorporation. The Gov-score was created based on 1868 US listed firms as of February 1, 2003 and they illustrate that only seven of the 51 provisions are the essential drivers of the positive relationship between governance and firm performance results found.

Black et al. (2006c) constructed a Korean CG index (KCGI) based on a survey of CG practices by the Korea Stock Exchange (KSE) sent to all Korean listed firms in Spring 2001, as well as corporate governance data that was hand collected by the researchers. The index created used 38 variables extracted from the survey classified into four categories: Shareholder Rights, Board Structure, Board Procedure, and Disclosure, as well as a fifth category, ownership parity, which was hand-collected by the researchers. Black et al. (2006c) examined the relationship between KCGI and the market value of Korean public firms and found that higher values of KCGI indicate better governed firms.

Following the work of Gompers et al. (2003), Bebchuk et al. (2009) investigated the importance of the 24 IRRC provisions included in the G-index that Gompers et al. (2003) developed. According to Bebchuk et al. (2009), there is no reason to believe that all 24 IRRC provisions contribute to a firm's value. They developed an entrenchment index (i.e. the E-Index) based on six of the 24 IRRC provisions and examined its relationship to firm value. The six provisions they chose were considered to contribute the most to managerial entrenchment and consist of the following: staggered boards; limits to shareholder amendments of the bylaws; supermajority requirements for mergers; supermajority requirements for charter amendments; poisons pills; and golden parachutes arrangements. Their study included information for 1400 to 1800 US firms, for which information on their corporate governance arrangement was published by IRRC from 1990 until 2002. Bebchuk et al. (2009) examined the relationship between the E-index and firm valuation and found significant reductions in firm valuation and large negative abnormal returns when the index level increases.

Aggarwal et al. (2009) used the ISS governance attributes to form their own CG index, also named the GOV index. In 2005, ISS compiled 64 governance attributes for US firms and 55 for foreign firms. The research of Aggarwal et al. (2009) excludes 11 attributes of the 55 foreign firm attributes and therefore their index includes 44 individual attributes applying the same relevant criteria to both US and foreign firms.³ The 44 attributes cover four broad subcategories: the board; audit; anti-takeover provisions; and compensation & ownership. Aggarwal et al. (2009) examine the GOV

³ This is a similar approach to the construction of the index of Brown and Caylor (2006) who also use ISS governance data for US firms.

index of 2234 foreign firms compared to that of 5296 US firms for 2005 and both are positively related to firm value.

Ammann et al. (2011) created two alternative additive CG indices using data from Governance Metrics International (GMI).⁴ Their indices include 64 governance attributes which are sub-categorized by GMI into six categories: board accountability; financial disclosure & internal control; shareholder rights; remuneration; the market for corporate control; and corporate behavior. They examine the relationship between their governance indices and firm value, including 6663 firm-year observations from 22 developed countries, such as Japan, UK and Canada from 2003 to 2007 and find a strong and positive relation between the two variables.

Black and Kim (2012) created a Korean CG index (KCGI) based on the work of Black et al. (2006c). Their index consists of five equally weighted categories: board structure, disclosure, shareholders' rights; board procedures; and ownership parity from 1998-2004. They examine how a 1999 Korean CG law for large public firms affects firm market value. They find a positive relationship between the Korean CG index and firm market value.

Black et al. (2015) constructed a Korean corporate governance index (KCGI) for all public firms listed on the Korea Stock Exchange, based on the work of Black and Kim (2012) from 1998-2004. KCGI consists of five equally weighted categories: board structure, disclosure, shareholders' rights; board procedures; and ownership parity. A positive relationship with firm value is observed for better governed firms.

⁴ Ammann et al. (2011) constructed an additional CG index derived from principal component analysis.

Based on the existing studies that examine utilize CG indices, as a proxy for governance quality, it is expected that firms that have higher scores in their CG index will also have higher firm performance.

The vital role of corporate governance in determining firm value becomes particularly important in times of financial crisis. Independent directors, board committees, CEO duality, and transparency & disclosures issues can improve firms' governance and essentially aid firms in dealing with financial crisis problems. Better governed firms contribute to effective decision making, thus contributing to firms' performance (Yeh et al., 2011).

Thus the following hypothesis is developed:

H1. Firms with higher CG index scores perform better during the debt sovereign crisis, compared to those with smaller CG index scores.

5. RESEARCH DESIGN

Introduction

This section describes and analyzes how the data was collected and prepared to test the relationship between corporate governance and financial performance of Greek listed firms during the Greek debt-sovereign crisis. This study focuses on the differences in the CG-performance relationship during a pre-crisis period vs. a crisis-period.

Variables used in this study

The aim of this research is to examine the influence of corporate governance mechanisms on firm performance during the Greek debt-sovereign crisis. The following regression model will be used:

$$FP = \beta_0 + \beta_1(\text{governance quality})_{it} + \beta_2(\text{controls})_{it} + \varepsilon_{it}$$

a. Firm performance measures (measurement of dependent variable)

Corporate governance affects many aspects of firm performance, such as operating performance, market value and stock returns, whereby these can act as measures of firm performance. Examining firm performance by looking at its operating performance, measures profitability through either ROA (return on assets) and/or ROE (return on equity). Market value measures calculate firm performance by examining market capitalization in relation to the firm's book value, measured principally through Tobin's Q. Finally stock returns, as a measure of firm performance, looks at the firm's change in stock prices over time measured through the use of return on investment, controlled for various factors such as risk that affect stock returns (Love, 2011).

This study examines the relationship between firm performance and corporate governance using market-based and accounting based measures. In order to examine the relationship between firm performance and corporate governance, the commonly used market-based performance measure, Tobin's Q is utilized in this study as a measure of firm performance. Tobin's Q is considered a good measure of firm value

since it reflects the market's perceptions of the firm's past, current and future earnings, focusing on expectations of future performance (Kaczmarek et al., 2012). Although many studies use only accounting measures, such as ROA, this is not adequate since data used to calculate ROA is based on past events and thus it incorporates solely a viewpoint of the past (Demsetz and Villalonga, 2001). Additionally, Tobin's Q calculation provides the advantage of not being affected by financial reporting misrepresentations due to tax laws and accounting practices, as is the case in accounting performance measures such as ROA (Campbell and Mínguez-Vera, 2008). The value of Tobin's Q ratio provides a clear picture of a firm's performance. A Tobin's Q ratio of greater than one, indicates investors' expectations that the firm is able to effectively utilize resources, while a ratio of less than one, indicates the need for more asset utilization (Campbell and Mínguez-Vera, 2008).

Following Beiner et al. (2006), Campbell and Mínguez-Vera (2008), Jackling and Johl (2009) and Drakos and Bekiris (2010) Tobin's Q is defined as follows:

$$Tobin's\ Q = \left(\frac{MV\ of\ Equity + Debt^5}{Total\ Assets} \right)$$

A number of concerns have been expressed relating to the use of only Tobin's Q. Figures that include firm market value can be undermined and thus produce invalid results due to the high noise component of stock-price fluctuations. Additionally, market value of equity may reflect a company's future growth opportunities that can be a result of factors independent of managerial decisions (Bozec et al., 2010). Furthermore, according to Jackling and Johl (2009) capital markets not well-developed,

⁵ Total debt represents all interest-bearing and capitalized lease obligations. It is the sum of long and short-term debt.

such as the case of the Greek capital market, market-based performance measures, such as Tobin's Q, may not accurately reflect firm performance. Thus, an alternative accounting performance measure, Return on Assets (ROA), is also implemented, as in studies such as Bhagat and Bolton (2008) and Drakos and Bekiris (2010).

ROA is measured as follows:

$$\text{Return on Assets} = \left(\frac{\text{Net Income before extraordinary items}}{\text{Total Assets}} \right)$$

b. Governance quality measures (measurement of independent variable)

Governance quality is measured through the use of individual corporate governance items, such as board size, board independence and board committees or through the use a wide-ranging scope of governance variables incorporated in CG indices. The use of indices includes relevant governance mechanisms and provides a broader range of a firm's governance quality. This study will examine governance through the use of CG indices so as to include complementary elements of governance to proxy for CG quality.

Construction of CG index

The Corporate Governance index constructed for this research draws upon three sets of regulations/best practice guidance and thus is separated in three corresponding categories: (a) requirements drawn from Greek law (No.3016/2002), which obliges Greek firms to apply a set of governance guidelines, such as the participation of non-executives and independent non-executives on Greek companies' boards, the

establishment of an internal control function and the adoption of internal charters (b) the Greek law on audit committees (No.3693/2008), which requires the creation of audit committees and (c) voluntary best practice items that are included in the *Greek Corporate Governance Code* created by the Hellenic Federation of Industries in 2010, hereafter the Greek Code, as an effort to promote the continuous enhancement of the Greek corporate institutional framework and the broader business environment. This approach is in accordance with other studies that also use national corporate governance regulations and codes such as Alves and Mendes (2004), Drobetz et al. (2004), and Florou and Galarniotis (2007).⁶

The CG index constructed for this study includes 40 items of which 13 are based on the Greek Law of Corporate Governance (No.3016/2002), three are based on the Greek Law concerning audit committees (No.3693/2008) and 24 are based on voluntary items of the Greek Code. These 40 items of the CG index are placed in the following four broad CG categories: (i) *Board of directors*, (ii) *Internal Auditing & Corporate Services*, (iii) *Board Committees*, and (iv) *Disclosure & Transparency*.

These categories were selected based on the work of Tsipouri and Xanthakis (2004) and Florou and Galarniotis (2007). The variables were first sorted by source (that is, the Greek law on corporate governance, the Greek law on audit committees and then the Greek Code) and then by governance dimensions (that is, board of directors, internal auditing). Additionally, although no theoretical background provides guidance on what

⁶ Florou and Galarniotis (2007) incorporate in their index voluntary the *Greek Corporate Governance Code* developed by the Committee on Corporate Governance in 1999, as well as additional international best practices. Therefore some items included in the Florou and Galarniotis (2007) index were optional and considered best practice, whereby in the CG index constructed for this study they are compulsory.

exact items to include in an index, it is essential that all non-mandatory items be verifiable through annual reports. CG items included in indices need to be quantifiable and as inclusive as possible in terms of diversity in the number and nature of governance items. The main effort of the CG index created is to include all important corporate governance variables.

The creation of the CG index for this study was constructed by manually recording each CG variable as disclosed in the annual reports of Greek listed firms. The rating procedure is consistent with previous work on CG indices. The recording process applied a binary classification to all variables, whereby a point of one is awarded when the governance variable was met and zero otherwise. Non-disclosed or missing variables are documented as n/d and non-applicable variables are disclosed as n/a. This led to the creation of two types of CG indices, the *penalized* version where non-disclosed or missing values are considered to be absent from the annual reports of the companies analyzed and the *non-penalized* version missing values are excluded from the analysis. In both, non-applicable variables are excluded from the analysis. This process is consistent with previous work of Florou and Galarniotis (2007), Bekiris and Doukakis (2011) and Ammann et al. (2011).

An important issue considered in the analysis is the weighting of the variables that comprise the CG index. Arguably, some variables could deserve more weight than others, while assigning appropriate weights might depend on the presence or absence of other variables (Bebchuk et al., 2009). Although studies such as Tsipouri and Xanthakis (2004) assign different weightings to various company attributes and governance items, this approach is not preferred due to evident lack of objectivity and

consistency (Florou and Galarniotis, 2007). For simplicity, transparency and objectivity, and in line with other studies such as LaPorta et al. (1998), Gompers et al. (2003), Alves and Mendes (2004), and Drobetz et al. (2004), the standard equal-weight (unweighted) construction approach is used. Although the use of equal weighting has the disadvantage of not reflecting the relative importance of each governance variable, the use of weights can lead to inconsistency since the criteria applied for weighting the governance items can be subjective. Additionally, Van den Berghe and Levrau (2003) who reviewed and analyzed corporate governance ratings systems, state that the application of research methodology such as questionnaires and interviews, relies on key representatives of the company for weighing corporate governance criteria. They potentially could have limited theoretical background on which variables and/or dimensions are more important in evaluating corporate governance quality. Additionally, studies based on questionnaires may suffer from a potential self-selection bias, where firms that have poor governance mechanisms may choose not to answer the questionnaire. Furthermore, the data collected from respondents of the questionnaire may also suffer from self-reporting bias where respondents answer the questionnaire on how they would like their governance mechanisms to be and not on how they actually are. For these reasons, equal weighing was chosen for this study since the advantage of being transparent and relatively objective outweighs the disadvantage of not reflecting accurately the relative importance of each governance item (Florou and Galarniotis, 2007; Van den Berghe and Levrau, 2003; Jiang et al., 2008; Bekiris and Doukakis, 2011; Alves and Mendes, 2004).

This study estimates the CG indices using both the *Dichotomous_item* and the *Dichotomous_category* method. In the *Dichotomous_item* method, each item of the CG index is weighed equally, while in the *Dichotomous_category* method, each category is weighted equally irrespective of the number of items incorporated in each category. Both approaches concerning non-disclosed items (*penalized* and *non-penalized* version) are implemented under the both the *Dichotomous_item* and *Dichotomous_category* method, thus four CG indices are constructed: *cgpentotal* and *cgnonpentotal* applying the *Dichotomous_item* approach and *cg2pentotal* and *cg2nonpentotal* applying the *Dichotomous_category* approach. Table 1 lists the items in each category of the CG index for the estimation of the CG indices.

Table 1 Categories of the CG index for the estimation of CG indices

<u>Board of Directors</u>	
1.	Board of directors consists of both executives and non-executives
2.	Non-executive directors are $\geq 1/3$ of the total board size
3.	Board of directors includes at least two independent non-executives
4.	Board size should be between 7 and 15
5.	Board should consist of a majority of non-executives
6.	Board should consist of at least 2 executive members
7.	Independent members are at least 1/3 of the members of the board
8.	Split between the chairman and the CEO roles
9.	If CEO duality does not exist, an independent vice-chairman exists
10.	A financial chief executive officer is appointed to the management team
<u>Internal Auditing & Corporate Services</u>	
11.	Internal auditors are independent
12.	Internal auditors are supervised by the board
13.	Internal auditors are appointed by the board
14.	Internal auditors are full-time employees of the company
15.	Internal auditors are not members of the board
16.	The company has an internal audit function
17.	The company has an investor relations function

18. The company has a corporate announcements function

Board Committees

19. Mandatory existence of an audit committee

20. Audit committee consists of 3 non-executives, of which 1 is an independent non-executive

21. The independent non-executive member of the audit committee has financial/accounting expertise

22. The company has a nomination committee

23. The nomination committee has at least 3 members

24. The majority of the nomination committee should be non-executive

25. The nomination committee should be chaired by an independent non-executive member

26. The audit committee should be composed exclusively of non-executive board members

27. The audit committee is chaired by an independent non-executive member

28. The company has a remuneration committee.

29. The remuneration committee should be composed of entirely non-executive members.

30. The majority of the remuneration committee should be independent

31. The members of the remuneration committee should be at least 3

32. The chair of the remuneration committee should be an independent- non-executive member

Disclosures and Transparency

33. Separate disclosure of the remuneration of non-executive directors in the account notes

34. Disclosure of the ownership structure (from Law2190/1920)

35. Disclosure of corporate targets and prospects

36. The corporate governance statement discloses the term of appointment of each board member and contains their brief biographies.

37. The work of the nomination committee and the number of meeting is described in the corporate governance statement.

38. The annual corporate governance statement illustrates how the performance evaluation of the board and its committees has been conducted.

39. The annual corporate governance statement describes the work of the audit committee and the number of meetings held during the year.

40. The annual corporate governance statement summarizes the work of the remuneration committee and the number of meetings held during the year.

c. Measurement of Control Variables

In addition to the main variables tested in the study, the use of variables that prior studies have found to be associated with firm performance and corporate governance are also controlled for (Black et al., 2006a;Durnev and Kim, 2005;Dah, 2016). The following control variables are utilized in this study: concentrated ownership, leverage, firm size, growth opportunities and free cash flow. Industry dummy variables are also

included to control for differences in asset structure, government regulations and competitiveness among firms. Each of these elements could potentially affect firm's performance and corporate governance (Durnev and Kim, 2005;Beiner et al., 2006).

Empirical Research Model

The study will test the role of governance on firm performance during the Greek debt-sovereign crisis. In order to examine the impact of the Greek debt-sovereign crisis on the CG-performance relationship a crisis period dummy variable is implemented, as in the research of Yeh et al. (2011). The data is decomposed into two periods- the non-crisis sample in 2006, 2008, 2009 and the crisis sample in 2010⁷, 2011 and 2012. A crisis years dummy variable equaling one is given to the crisis years and zero to the non-crisis years. The purpose of the use of this dummy variable is to examine the effect of corporate governance variables on firm performance before and during the Greek debt-sovereign crisis. For this reason, the use of interaction variables is implemented in this study between the dummy variable and the corporate governance index used in the regressions. The coefficient of such interaction variables shows the marginal effect of corporate governance variables, before and during the Greek debt-sovereign crisis. It is expected that firms with stronger governance quality will have a higher firm performance during the crisis years.

⁷ 2010 is considered the first year of the Greek crisis for this study since it is the official year that Greece entered the current debt-sovereign crisis signing its first memorandum on May 6, 2010 so as to obtain financial support by the International Monetary Fund (IMF), the European Commission (EC) and the European Central Bank (ECB).

Statistical Properties & Econometric Issues

Univariate Analysis

Data is analyzed through statistical methods, classified as either parametric or non-parametric. Parametric tests are used when data are normally distributed, while non-parametric tests are used in instances where normality does not necessarily exist. The Kolmogorov-Smirnov test is implemented on all variables used in the study to test for normality. Since some variables are not normally distributed, both parametric tests, focusing on mean values, and non-parametric tests, focusing on median values are used in the analysis.

Differences in years are examined using *t*-tests, focusing on mean values and Mann-Whitney tests, focusing on median values. Differences in subsamples, such as industries, are tested with the use of both mean and median differences, using the ANOVA F-test / Welch F-test⁸ and the Kruskal-Wallis test.

Multivariate Analysis

Data is analyzed through the use of panel data estimation which allows for examination of a time series for each cross-sectional variable in the data. Panel data allows for individual and time effects in the panel data regressions (Ducassy and Guyot, 2017).

⁸ Before finding the ANOVA F-test/Welch F-Test, Levene's test for homogeneity of variances is employed. If the assumption of homogeneity of variance is not violated, the ANOVA F-test is suitable to examine the mean differences among the subsamples, otherwise the Welch F-test is preferable when the assumption of homogeneity of variance is violated.

The relationship between firm performance and governance is tested applying the following model

$$\begin{aligned} FP = & c(1) + c(2) * \textit{governance quality} + c(3) * \textit{ownconc} + c(4) * \textit{ta} + c(5) * \textit{lev} \\ & + c(6) * \textit{prior} + c(7) * \textit{growth} + c(8) * \textit{industry dummies} + c(9) \\ & * \textit{dummy crisis year} + c(10) * \textit{governance quality} \\ & * \textit{dummy crisis year} \\ & + \varepsilon \end{aligned}$$

An important issue considered in the analysis is that of controlling for the possible endogeneity of the variables that could bias the results obtained (Campbell and Mínguez-Vera, 2008). According to Hermalin and Weisbach (2003) and Carcello et al. (2011), an OLS regression analysis in governance research can lead to endogeneity between corporate governance variables and other variables of interest, in this case firm performance. The existence of at least one source of endogeneity will cause the estimates to be biased and could potentially lead to spurious results (Schultz et al., 2010).

According to Wintoki et al. (2012), three sources of endogeneity are possible in corporate governance research, *dynamic endogeneity*, *simultaneity* and *unobserved heterogeneity*.

Dynamic endogeneity exists if current governance characteristics, control variables and performance are determined by previous performance. For example, poor previous performance could potentially lead firms to replace the current BOD with more

independent board members, thus applying stricter governance controls and therefore a negative relationship could exist between past performance and board independence.

Another source of potential endogeneity is *simultaneity*. For example, while it is possible that well governed firms have higher performance, it is also possible that firms change their governance structure in response to firm performance (Brown et al., 2011). If this is so, the relationship between firm performance and corporate governance could be endogenous. A possible solution to this problem is the use of the instrumental variables approach through the use of simultaneous equations, where one equation examines the effect of corporate governance and control variables on firm performance and in the other equations performance and control variables effect on corporate governance, is examined. The difficulty faced in this solution is the identification and justification of exogenous instrumental variables (Wintoki et al., 2012). An ideal instrument that deals with the potential endogeneity between governance and performance is a variable that does not directly affect performance, but affects performance indirectly through its impact on governance (Love, 2011). Various studies use different instruments to deal with the endogeneity issue. The choice of instrumental variables is essential since almost any instrument identified for a specific endogenous variable can plausible be related to one or more endogenous variables based on the existing literature. Thus careful consideration when choosing instruments is necessary (Ashbaugh-Skaife et al., 2006;Bhagat and Bolton, 2008). Durnev and Kim (2005) for example, apply a 3SLS where they omit industry variables, two parameters of Capital Asset Pricing Model (alpha and beta) and firm size from Tobin's Q. They assume that governance does not vary according to the industry it belongs to. However these

exclusions are considered arbitrary and suspicious. According to the work of Black et al. (2006c) and Black et al. (2006b) industries do affect governance, thus they are not accurate instrumental variables. Another approach that deals with this issue of endogeneity is the use of lagged values of governance as instruments for current governance, as in the work of Coles et al. (2008) and Chhaochharia and Laeven (2009). The idea behind this is that current governance might be influenced by current firm performance, however previous year's governance has already been predetermined, thus is not affected by current firm performance. However this method also has drawbacks since governance variables are considered slow-moving and thus it is difficult to predict firm performance with past governance data. Additionally, long time-series data is needed for such studies which have the potential to be affected by weak instruments (Love, 2011). The use of lagged variables as instruments is common in the literature, however as the number of lags increases, the potential problems of 'weak' instruments also increase. Thus a trade-off exists between larger lags, which make the instruments more exogenous and the possibility of 'weaker' instruments due to the increased lags (Wintoki et al., 2012).⁹

The last source of endogeneity is *unobserved heterogeneity*. This type of endogeneity exists if unobservable factors exist in the governance-performance context. For example, the competence and risk level of a CEO could potentially affect firm performance, but cannot be quantified, thus is not included in the regression. If the unobserved variables are constant over time for each firm, a potential solution to this

⁹ The effectiveness of instrumental approach remains disputed. Many times it is considered a complement to OLS regressions, which are often preferred to the instrumental variable approach in cases of 'weak' instrument selection (Larcker and Rusticus, 2010).

type of endogeneity is the use of the fixed-effects panel model (Love, 2011). This model can produce consistent parameter estimates that are robust to unobservable heterogeneity if the panel dataset includes a small time series and a large cross section, since unobserved variables are unlikely to change over a small period of time (Petersen, 2009). This methodology has been used by Erickson et al. (2005) in Canada, Black et al. (2006a) in Russia and Black et al. (2015) & Black and Kim (2012) in Korea.

To deal with potential endogeneity, a system of simultaneous equations is used in this study to examine the hypotheses. Similar to the work of Bhagat and Bolton (2008) and Jackling and Johl (2009), who examine the relationship between governance, performance, capital structure and ownership, the analysis is carried out using three simultaneous equations. Three equations are chosen so as to account for not only governance and performance but also the relationship between leverage and performance. Research basically indicates that a negative relationship exists between leverage and performance, however there are cases where larger levels of debt force managers to work harder so as to create higher levels of cash flows, thus increasing firm performance (Kowalewski, 2016). Leveraged firms are highly scrutinized by creditors, thus limiting managerial misbehavior and signaling high quality management (Campbell and Mínguez-Vera, 2010). Therefore, it is necessary to examine not only the inter-relationship between governance and firm performance, but also the inter-relationship of these two variables with leverage as well (Jackling and Johl, 2009).

The Generalized Methods of Moments (GMM) specification is utilized in this study to account for both *dynamic endogeneity* and *unobserved heterogeneity* in panel data models (Duru et al., 2016). GMM is chosen over IV since it is more efficient in cases

of heteroskedasticity than the simple IV estimate, without producing inferior results in the absence of heteroskedasticity (Andrikopoulos et al., 2013).

The analysis is carried out using GMM as follows:

$$\begin{aligned}
 FP = & c(1) + c(2) * governance\ quality + c(3) * ownconc + c(4) * ta + c(5) * lev + \\
 & c(6) * prior + c(7) * growth + c(8) * industry\ dummies + c(9) * \\
 & dummy\ crisis\ year + \varepsilon
 \end{aligned}
 \tag{Eq 1}$$

$$\begin{aligned}
 governancy\ quality = & c(1) + c(2) * fp + c(3) * ownconc + c(4) * ta + c(5) * lev + \\
 & c(6) * growth + c(7) * pshare + c(8) * industry\ dummies + c(9) * \\
 & dummy\ crisis\ year + \varepsilon
 \end{aligned}
 \tag{Eq 2}$$

$$\begin{aligned}
 leverage = & c(1) + c(2) * governance\ quality + c(3) * ownconc + c(4) * ta + c(5) * \\
 & growth + c(6) * fcf + c(7) * zscore + c(8) * industry\ dummies + c(9) * \\
 & dummy\ crisis\ year + \varepsilon
 \end{aligned}
 \tag{Eq 3}$$

The measurement of the variables used in the analysis is as follows:

Firm Performance

FP firm performance using Tobin's Q and ROA

Governance Quality

cgpentotal	CG index (all items included in calculation of index), whereby the non-disclosed values were considered as nonexistent, therefore firms were penalized in the rating procedure. The <i>dichotomous</i> weighting approach is utilized.
cgnontotal	CG index (all items included in calculation of index), whereby the non-disclosed values were excluded in the rating procedure. The <i>dichotomous</i> weighting approach is utilized.
cg2pentotal	CG index (all items included in calculation of index), whereby the non-disclosed values were considered as nonexistent, therefore firms were penalized in the rating procedure. The <i>PC unweighted</i> weighting approach is utilized.
cg2nontotal	CG index (all items included in calculation of index), whereby the non-disclosed values were excluded in the rating procedure. The <i>PC unweighted</i> weighting approach is utilized.

Control Variables

ownconc	the percentage owned by the largest shareholder of the firm
ta	natural log of total assets

lev	total debt over total assets
growth	growth opportunities calculated as capital expenditures scaled by net sales
fcf	free cash flow is calculated as funds from operations - capital expenditures + cash dividends paid scaled by total assets

Unique Exogenous Variables

prior	prior year performance calculated as the prior year's Tobin's Q or return on assets
pshare	powerful CEO, measured as the percentage of ownership held by the CEO
zscore	Altman's Z score (1968), as a proxy for financial distress

Dummy Variables

crisis year	an indicator variable taking the value of zero for 2006, 2008 and 2009 and one for 2010, 2011 and 2012
-------------	--

The basic concern is to be certain that a given variable is a proper instrument. Such an instrument is a variable that is correlated with the regressors and uncorrelated with the error terms (Tsionas et al., 2012). Based on the research of Bhagat and Bolton (2008) and Jackling and Johl (2009) the exogenous variables chosen are prior year performance in equation 1¹⁰, powerful CEO in equation 2 and Altman's z-score in equation 3. Instruments implemented in this study will be deviations from their mean. A major advancement in GMM has been provided by Lewbel (1997). He illustrated that valid instruments are not only the predetermined instruments but also the cross-products of each instrument with the dependent variables. In cases where no "genuine" predetermined variables are available, the cross-products of such variables can be considered as valid instruments, so as to at least satisfy the order condition for identification (Tsionas et al., 2012). Lewbel (1997) theory is based on the assumption that all variables are 'potentially' endogenous and no 'outside' variables can be determined to act as an instrument (Tsionas et al., 2012). As such the entire set of

¹⁰ In Bhagat and Bolton (2008) the level of treasury stock to assets was used as an instrument for performance. They included the use of lagged performance as an instrument only in their tests for robustness. The results in both cases were consistent. Therefore in this study, as in Jackling and Johl (2009), lagged performance is used as the instrumental variable for performance.

instruments consist of the predetermined variables and the cross-products of all with the dependent variables.

It is also essential to examine if the instruments are ‘weak’, leading to bias results under GMM, even in large samples, where the distribution can be far from normal. This issue has been examined by Stock et al. (2002), who propose various tests to examine the issue of ‘relevant’ instruments (Tsonas et al., 2012). Stock and Watson, 2003: 350 state that running a first-stage regression and examining the F-statistic, is a perfect guide to examining if instruments are weak. If F is greater than 10, the choice of instrument is fine and GMM results are accurate (Verbeek, 2008:157).

The primary variables examined in this analysis are the CG indices and firm performance before and during the debt-sovereign crisis in Greece. Initially the relationship between CG and firm performance is tested, where a positive relationship between the two variables is expected. In order to highlight the role of corporate governance during the Greek debt-sovereign crisis, the governance-performance relationship is tested through the use of a crisis year dummy variable. The data will be broken into two sub-samples, the pre-crisis period sample (2006, 2008, 2009) and the crisis period sample (2010, 2011, 2012). It is expected that firms with stronger corporate governance are able to resolve crisis problems, thus efficiently improve their firm’s financial performance.

Sample Selection and Data Collection Procedures

This study covers all non-financial Greek listed companies for the fiscal year ends 2006, 2008, 2009, 2010, 2011 and 2012. Financial firms are excluded from the sample since

they require additional governance regulations and it is often difficult to calculate Tobin's Q (Jackling and Johl, 2009). The sample consists of all firms listed on the ASE for the years 2006, 2008, 2009, 2010, 2011 and 2012, excluding only firms in financial, real estate and insurance industries. The firms in these industries not included in the total sample consist of approximately 28% of the total listed firms on the ASE.

Data for corporate governance items is hand-collected from annual reports found on the ASE website, while firm performance is calculated based on data obtained from DataStream. Firms' websites are not used to collect corporate governance data because most firms' websites only include corporate governance information of recent years.

Additionally, companies for which no financial data is available and for which no annual reports are available for the collection of corporate governance data are also excluded, and represent approximately 20% (242/1205) of the total sample. Moreover, firms for which data is not available in all six years were included in the analysis, resulting in a different number of observations for each of the years. This procedure resulted in a final sample of 1205 firm year observations with complete data, ranging from 65% (206/316) of ASE firms in 2006 to 73% (187/256) of ASE firms for 2012.

Table 2 illustrates the sample selection procedure.

Table 2 Sample Selection Procedure

	2006	2008	2009	2010	2011	2012	Total
No. of firms listed on the ASE	316	290	283	273	266	256	1,684
Firms in financial, real estate and insurance industries	(47)	(42)	(42)	(41)	(31)	(34)	(237)
Firms with missing values (financial or corporate governance)	(63)	(40)	(32)	(38)	(34)	(35)	(242)
Total	206	208	209	194	201	187	1,205

The final sample is disaggregated across industries based on the ICB classification scheme. However, some industries are combined, so as to avoid having industries with few firms. More specifically, Oil & Gas is combined with Industrials, Utilities and Telecommunications is combined with Consumer Services and Healthcare is combined with Consumer Services and Consumer Goods. Firms in the final sample are classified as belonging to: Basic Materials (11% of the sample); Consumer Goods (31% of the sample); Consumer Services (22% of the sample); Industrials (26% of the sample); and Technology (10% of the sample) as shown in Table 3.

Table 3 Distribution of sample firms across industries

Industry Classification	Based on ICB						Combined Industries						Total
	2006	2008	2009	2010	2011	2012	2006	2008	2009	2010	2011	2012	
Basic materials (6)	22	23	22	24	22	22	22	23	22	24	22	22	135
Consumer goods (4)	63	65	62	59	59	52	65	67	64	61	61	53	372
Consumer services (2)	34	37	35	32	32	29	46	49	46	42	44	40	266
Healthcare (3)	9	9	8	7	8	7							
Industrials (1)	52	48	54	46	53	50	54	50	56	48	55	52	315
Oil & Gas (7)	2	2	2	2	2	2							
Technology (8)	19	19	21	19	19	20	19	19	21	19	19	20	117
Telecommunications (9)	2	1	1	1	2	1							
Utilities (5)	3	4	4	4	4	4							
Total	206	208	209	194	201	187	206	208	209	194	201	187	1,205

Industry classification was initially based on DataStream & ICB. However, in order to incorporate all firms in the sample, each firm classified in an industry that had few firms was examined separately and was placed in the another appropriate industry.

6. DATA ANALYSIS AND DISCUSSION

This section presents the analysis and discussion of the data examining the effect of corporate governance mechanisms in Greece on firm performance during the debt sovereign crisis.

In this section, the hypotheses formulated in the previous section is tested using a multi-dimensional governance mechanism in the form of a corporate governance index. Firm performance is measured using a market-based performance measure, Tobin's Q and an accounting-based performance measure, Return on Assets. The statistical analysis begins with univariate tests and continues with multivariate tests.

Descriptive Statistics and Univariate Analysis

The univariate analysis begins with descriptive statistics for each variable during the pre-crisis and crisis years, as well as analysis of the pooled sample. Differences of the variables, before and during the crisis period, are also examined and analysed.

To reduce the impact of outliers on the results, observations that fall in the top 1% and bottom 1% of the empirical distribution of each variable are winsorized (Black and Kim, 2012;Renders and Gaeremynck, 2012)

Descriptive Statistics

a. Corporate Governance indices

The model examines the effect of a corporate governance index on firm performance. Greek CG indices were created based on CG laws and best practice items as per the Greek Code. The non-disclosed items are recorded as either missing (penalized CG index) or non-applicable (non-penalized CG index) and thus two indices are created. Additionally, these two CG indices are measured using two rating methods, the *Dichotomous_item* and the *Dichotomous_category* method, thus four CG indices are generated.

The differences in the scores of all CG indices between the pre-crisis and crisis years are reported in Table 4, where it is evident that the differences in the mean and median values are significantly different at the 1% level, for all CG indices.

As seen in Table 4 the mean (median) of the penalized CG index, using the *Dichotomous_item* rating scheme (*cgpentotal*) for the pre-crisis period is 0.30 (0.28), while the crisis period exhibits a mean (median) of 0.65 (0.67). Similar results are seen in the penalized CG index, using the *Dichotomous_category* rating scheme (*cg2pentotal*), where in the pre-crisis period the mean (median) is 0.34 (0.32), and in the crisis period the mean (median) is 0.66 (0.67). As for the non-penalized CG index, using the *Dichotomous_item* method (*cgnontotal*), the pre-crisis mean (median) is 0.57 (0.58) and the mean (median) of the crisis period is 0.76 (0.77). The non-penalized index, using the *Dichotomous_category* method (*cg2nontotal*), has a mean (median) of 0.52 (0.50) during the pre-crisis period and a mean (median) of 0.77 (0.78) during the crisis period.

Greater values are evident for the non-penalized indices (for both rating schemes) compared to the respective penalized indices of firms. The reason for this is that in the non-penalized indices non-disclosed items are excluded in the calculation of the index, while in the penalized indices, non-disclosed items are considered as non-existent and are scored as zero. Additionally, the trend is for more firms to comply with disclosure of corporate governance items over the years, whereby the CG indices in the crisis years (2010, 2011, 2012), for both rating schemes, is much higher than in the pre-crisis years (2006, 2008, 2009). One reason for this increase is the implementation of Law 3296/2008, which requires all listed firms to have an audit committee and to disclose

information in relation to ownership and governance. Additionally in 2010, Law 3873/2010 obligated listed firms to disclose annual information about their corporate governance in a statement in a specific and clearly identifiable section of the annual report; this resulted in more firms disclosing more corporate governance information and having higher values for the CG indices after 2010. Additionally, more sample firms comply with best practice corporate governance items after 2010 (crisis years) as a result of implementing the voluntary, best practice corporate governance items suggested by the Greek Code created by Hellenic Federation of Industries in 2010.

b. Firm Performance

Firm performance is measured using Tobin's Q, a market-based performance measure, and Return on Assets (ROA), an operating performance measure. Table 4 shows the descriptive statistics for both performance measures. Examining the differences among the pre-crisis and crisis years, there are significant differences in both the mean and median value of both performance measures at the 1% level.

Firm Performance – Tobin's Q

Firm performance estimated using Tobin's Q has a mean (median) of 0.36 (0.36) in the pooled sample, whereby the minimum value is 0.00 and the maximum is 1.17. More specifically, in the pre-crisis years the mean (median) is 0.33 (0.33), while in the crisis years it is 0.39 (0.39). Larger values of Tobin's Q are observed in the crisis years due to the increase in debt during the crisis years.

Firm performance - ROA

Firm performance estimated by ROA shows a mean (median) value of -0.02 (0.00) for the pooled sample, ranging from -0.56 to a maximum value of 0.16. The mean (median) values of the pre-crisis years are 0.00 (0.01), and for the crisis years are -0.05 (-0.03). As expected ROA decreased during the crisis period due to a decline in net income of firms.

c. Control Variables

This study employs the following control variables: ownership concentration, leverage, firm size, growth opportunities and free cash flow.

Ownership Concentration

No significant differences are observed in the mean and median values of ownership concentration (*ownconc*) between the years.

The mean (median) of ownership concentration is 40% (36%) in the pre-crisis years and 41% (38%) in the crisis years. This indicates that the dispersion of ownership slightly decreased from 2006 to 2012.

Total Assets

No significant differences are observed between the mean and median scores of total assets (*ta*) during the pre-crisis and crisis years.

Total assets, as an indicator of size, and measured as the natural logarithm of total assets, has a mean (median) score of 11.76 (11.66) in the pre-crisis years and a mean (median) score of 11.76 (11.67) in the crisis years.

Leverage

Significant differences in the mean and median, at the 1% level, are seen between the pre-crisis and crisis years, where leverage (*lev*) increased from a mean (median) of 32% (33%) in the pre-crisis years, to 39% (39%) in the crisis years. The increase in leverage is logical since more Greek firms are covering their financing needs through the use of debt during the debt sovereign crisis.

Growth opportunities

Significant differences, at the 1% level, in the mean and median scores are evident for growth opportunities (*growth*) between the years.

The mean (median) score of growth opportunities decreased from 9% (4%) in the pre-crisis years to 6% (3%) in the crisis years. Although the minimum value (0.00) is the same for the pre-crisis and crisis period there is a decrease in the maximum value between the pre-crisis (1.16) and crisis period (0.74). During the crisis years firms are spending less on capital expenditures, thus growth opportunities are smaller compared to the pre-crisis years.

Free cash flow

No significant differences for free cash flows (*free_cf*) in the mean and median values is evident between the years. The mean (median) score of free cash flows in the pre-crisis period are -0.02 (-0.01) and -0.03 (-0.02) in the crisis years.

d. Unique instruments

The study also employs prior year performance measures, powerful CEO and z-score of firms, as unique instruments in the regressions to test the hypotheses.

Prior year performance – Lag Tobin's Q

Significant differences, at the 1% level, in the mean and median is evident for prior year's Tobin's Q between the years. The mean (median) score of prior year's Tobin's Q for the pre-crisis period is 0.31 (0.32) and for the crisis period it is 0.36 (0.37). The results are similar to Tobin's Q for the current year.

Prior year performance – Lag ROA

Significant differences, at the 1% level, in the mean and median scores for prior year's ROA are evident between the years. The mean (median) score of prior year's ROA is 0.01 (0.02) and -0.03 (-0.01) for the pre-crisis and crisis period respectively. The results, as in the case of Tobin's Q, are similar to the current year's ROA results.

Powerful CEO

Powerful CEO (*pshare*) is estimated as a CEO who also owns shares of the sample firm. The percentage of CEO ownership did not change significantly from 2006 until 2012, as is evident from the insignificant differences in the mean and median scores. More specifically, the mean (median) of CEO share ownership is 17% (7%) and 16% (6%) for the pre-crisis and crisis periods respectively.

Z-score

Altman's z-score (*zscore*) is an indicator of the probability of bankruptcy for a firm. Significant differences exist between the pre-crisis and crisis period in the mean scores (at the 5% level) and the median scores (at the 1% level). The mean (median) scores for the pre-crisis period are 0.79 (0.62) and for the crisis period are 0.74 (0.53). The decrease in Altman's z-score during the crisis period is as expected, since more firms have a greater probability for bankruptcy during the crisis years compared to the pre-crisis ones.

Table 4– Descriptive Statistics

	Pooled sample n=1114					Pre-crisis years (2006/2008/2009) n=576					Crisis years (2010/2011/2012) n=538					Pre-crisis years / Crisis years	
	mean	median	min	max	sd	mean	median	min	max	sd	mean	median	min	max	sd	t-test	Mann-Whitney
Tobin's Q	0.36	0.36	0.00	1.17	0.22	0.33	0.33	0.00	0.85	0.18	0.39	0.39	0.00	1.56	0.25	-5.54***	4.90***
ROA	-0.02	0.00	-0.56	0.16	0.10	0.00	0.01	-0.27	0.21	0.07	-0.05	-0.03	-0.80	0.14	0.12	9.94***	11.15***
cgpentotal	0.47	0.46	0.00	0.90	0.22	0.30	0.28	0.00	0.62	0.13	0.65	0.67	0.00	0.95	0.15	-39.4***	26.26***
cgnontotal	0.66	0.68	0.31	0.93	0.14	0.57	0.58	0.29	0.80	0.12	0.76	0.77	0.00	0.95	0.11	-32.28***	24.66***
cg2pentotal	0.49	0.51	0.00	0.90	0.21	0.34	0.32	0.12	0.64	0.13	0.66	0.67	0.27	0.94	0.14	-40.76***	26.53***
cg2nontotal	0.64	0.70	0.29	0.92	0.17	0.52	0.50	0.24	0.82	0.13	0.77	0.78	0.44	0.95	0.08	-39.71***	25.36***
ownconc	0.41	0.36	0.00	0.90	0.19	0.40	0.36	0.10	0.89	0.19	0.41	0.38	0.10	0.91	0.20	-0.78	0.40
ta	11.76	11.66	8.48	15.86	1.46	11.76	11.66	8.99	15.91	1.43	11.76	11.67	8.31	15.88	1.50	-0.54	0.76
lev	0.36	0.36	0.00	1.06	0.21	0.32	0.33	0.00	0.82	0.18	0.39	0.39	0.00	1.27	0.24	-5.76***	5.01***
growth	0.08	0.03	0.00	1.04	0.15	0.09	0.04	0.00	1.16	0.17	0.06	0.03	0.00	0.74	0.11	3.56***	5.22***
free cf	-0.03	-0.01	-0.36	0.11	0.07	-0.02	-0.01	-0.33	0.13	0.07	-0.03	-0.02	-0.47	0.10	0.08	1.28	1.25
lag Tobin's Q	0.33	0.34	0.00	0.83	0.19	0.31	0.32	0.00	0.70	0.17	0.36	0.37	0.00	0.91	0.20	-4.22***	3.87***
lag ROA	-0.01	0.01	-0.31	1.76	0.07	0.01	0.02	-0.24	0.20	0.06	-0.03	-0.01	-0.39	0.14	0.08	10.75***	11.26***
pshare	0.17	0.07	0.00	0.76	0.21	0.17	0.07	0.00	0.72	0.21	0.16	0.06	0.00	0.77	0.20	0.05	0.00
zscore	0.77	0.58	-0.01	5.90	0.81	0.79	0.62	0.00	5.10	0.73	0.74	0.53	-0.01	6.52	0.90	1.97**	4.57***

Variables: *Tobin's Q* market based measure of firm performance; *ROA* operating performance measure of firm performance; *cgpentotal* penalized total CG index using the *Dichotomous_item* method; *cgnontotal* non-penalized total CG index using the *Dichotomous_item* method; *cg2pentotal* penalized total CG index using the *Dichotomous_category* method; *cg2nontotal* non-penalized total CG index using the *Dichotomous_category* method; *ownconc* ownership concentration; *ta* total assets; *lev* leverage; *growth* growth opportunities; *free cf* free cash flow; *lag Tobin's Q* previous year Tobin's Q; *lag ROA* previous year ROA; *pshare* powerful CEO; *zscore* Altman's z-score

Correlations Coefficients

In this section the bivariate correlations among the variables is examined using the Pearson and Spearman rank correlation coefficients. A correlation coefficient of 0.8 or more is considered to be a very high, correlation coefficients ranging from 0.6-0.8 are considered to be high, correlation coefficients ranging from 0.4-0.6 are considered to be medium, correlation coefficients ranging from 0.2-0.4 are considered to be low and finally, correlation coefficients under 0.2 are considered to be very low.

Examining the bivariate correlation between firm performance using Tobin's Q and the independent governance variable measured through CG indices, included in H1, there are significant positive correlations, at the 1% level of significance, observed based on the Pearson product moment correlation, ranging from +0.078 to +0.106. Similar results are also evident for the Spearman rank-order correlation, where significant positive correlations exist ranging from +0.076 (at the 5% level of significance) to +0.093 (at the 1% level of significance).

Observing the bivariate correlation between the second proxy for firm performance, ROA and the CG indices, there is a significant negative correlation between the two variables ranging from -0.097 to -0.141 at the 1% level of significance as per the Pearson product moment correlation and a range of -0.158 to -0.188 at the 1% level of significance as per the Spearman rank-order correlation

The findings of Tobin's Q and CG indices align with H1, whereby a positive relationship is proposed between corporate governance and firm performance.

However when ROA is used as a proxy for firm performance, a negative relationship is observed between firm performance and corporate governance, contradicting H1.

No correlation coefficients or VIF values are high enough in this model to suggest that multicollinearity issues might affect the interpretation of the results.

Table 5 Pearson product moment correlation coefficient (*right*) Spearman rank-order correlation (*left*) – Pooled sample

	Tobin's Q	ROA	cgpentotal	cgntotal	cg2pentotal	cg2nontotal	ownconc	ta	lev	growth	free_cf	lagtobin	lagroa	pshare	zscore
Tobin's Q		-0.443***	0.102***	0.078***	0.092***	0.106***	-0.070**	0.103***	0.963***	-0.013	-0.276***	0.858***	-0.411***	-0.005	-0.078***
ROA	-0.388***		-0.121***	-0.097***	-0.115***	-0.141***	0.054*	0.213***	-0.440***	0.039	0.534***	-0.301***	0.610***	0.049	0.174***
cgpentotal	0.088***	-0.171***		0.885***	0.950***	0.811***	-0.046	0.096***	0.100***	-0.088***	0.038	0.086***	-0.159***	-0.090***	-0.023
cgntotal	0.076**	-0.158***	0.910***		0.935***	0.880***	-0.020	0.125***	0.079***	-0.081***	0.045	0.076**	-0.141***	-0.155***	0.007
cg2pentotal	0.081***	-0.164***	0.963***	0.946***		0.844***	-0.043	0.103***	0.089***	-0.09***	0.045	0.080***	-0.148***	-0.096***	-0.012
cg2nontotal	0.093***	-0.188***	0.815***	0.903***	0.844***		-0.004	0.090***	0.108***	-0.092***	0.036	0.101***	-0.178***	-0.101***	0.003
ownconc	-0.049	0.095***	-0.038	-0.028	-0.032	-0.016		0.102***	-0.060**	0.072**	0.017	-0.062**	0.048	0.090***	0.036
ta	0.167***	0.192***	0.083***	0.115***	0.094***	0.102***	0.130***		0.122***	0.108***	0.137***	0.146***	0.224***	-0.304***	0.045
lev	0.986***	-0.383***	0.087***	0.076**	0.079***	0.094***	-0.041	0.178***		-0.005	-0.277***	0.893***	-0.428***	-0.010	-0.073**
growth	-0.028	0.198***	-0.113***	-0.099***	-0.106***	-0.113***	0.084***	0.232***	-0.041		-0.377***	-0.024	0.071**	0.013	-0.185***
free_cf	-0.293***	0.557***	0.038	0.046	0.043	0.039	0.080***	0.105***	-0.288***	-0.162***		-0.155***	0.339***	0.049*	0.129***
lagtobin	0.890***	-0.305***	0.080***	0.076**	0.076**	0.094***	-0.031	0.189***	0.902***	-0.021	-0.185***		-0.380***	-0.009	-0.052*
lagroa	-0.353***	0.740***	-0.197***	-0.188***	-0.188***	-0.215***	0.083***	0.187***	-0.366***	0.219***	0.389***	-0.359***		0.049	0.218***
pshare	-0.022	0.027	-0.09***	-0.150***	-0.098***	-0.124***	-0.034	-0.343***	-0.028	-0.019	0.053*	-0.025	0.022		-0.014
zscore	-0.056*	0.336***	-0.064**	-0.045	-0.045	-0.046	0.087***	0.068**	-0.051*	-0.193***	0.260***	-0.031	0.343***	0.035	

Variables: *Tobin's Q* market based measure of firm performance; *ROA* operating performance measure of firm performance; *cgpentotal* penalized total CG index using the *Dichotomous_item* method; *cgntotal* non-penalized total CG index using the *Dichotomous_item* method; *cg2pentotal* penalized total CG index using the *Dichotomous_category* method; *cg2nontotal* non-penalized total CG index using the *Dichotomous_category* method; *ownconc* ownership concentration; *ta* total assets; *lev* leverage; *growth* growth opportunities; *free cf* free cash flow; *lagtobin* previous year Tobin's Q; *lagroa* previous year ROA; *pshare* powerful CEO; *zscore* Altman's z-score
 *** significant at level 1%; ** significant at level 5%; *significant at level 10%

Multivariate Analysis

Introduction

In this section regression tests are employed to examine the effect of multiple independent variables on firm performance. Panel data regression analysis is applied, utilizing the Generalized Methods of Moments (GMM) specification to account for both *dynamic endogeneity* and *unobserved heterogeneity* in panel data models, as discussed in the research design section. To account for endogeneity various instruments are implemented when running the regressions.

Initially the ‘validity’ of the instruments is tested so as to exclude weak instruments. A first stage regression is conducted for each potential instrument used in the study and its F-statistic is examined. According to Stock and Watson, 2003:350, if the F-statistic is greater than 10, the choice of instruments is fine and the GMM results are accurate. The respective regression are run and the F-statistic is examined, indicating that all instruments used in this study are appropriate.

H1 – Preliminary Results and Discussion

Introduction

This section provides the analysis and discussion of Hypothesis 1(H1) about the effect of CG indices on firm performance before and during the debt-sovereign crisis in Greece.

In order to highlight the role of corporate governance during the Greek debt-sovereign crisis, the governance-performance relationship is tested through the use of a crisis year

dummy variable. The data is broken into two sub-samples, the before crisis-period sample (2006, 2008, 2009) and the during crisis-period sample (2010, 2011, 2012). It is expected that firms with stronger corporate governance are able to resolve crisis problems, thus efficiently improve their firm's financial performance.

Firm performance – Tobin's Q

Penalized CG indices

Examining the penalized CG indices as seen in Table 6 firms with higher levels of CG indices have higher firm performance, as seen by the positive relationship at the 1% level, evident in the pre-crisis year sample, the crisis year sample and the pooled sample. Additionally, in the crisis year sample, even higher levels of performance are evident for firms with better corporate governance in comparison to the pre-crisis year sample, as is evident in the higher coefficient found in the crisis year sample. Similar results are apparent in both ratings of penalized CG indices, using the Dichotomous_item method (*cgpentotal*) and the Dichotomous_category method (*cg2pentotal*).

Positive significant results, at the 1% level, in the pre-crisis year sample, the crisis year sample and the pooled sample are found between leverage (*lev*) and firm performance, indicating that firms with higher leverage also have higher performance. Research has shown that a positive relationship between leverage and firm performance could exist since debt could potentially limit managerial misbehavior due to greater monitoring by creditors, thereby improving both management and firm performance (Campbell and Mínguez-Vera, 2010).

Finally, a significant positive relationship, at the 1% level in the crisis year sample and 10% level in the pooled sample is found between concentrated ownership (*ownconc*) and firm performance. This indicates that firms that have higher ownership concentration levels perform better due to the fact that owners play an active role in the firm, scrutinizing the performance of managers forcing them to make better decisions that increase firm performance.

Insignificant results are observed between firm performance and firm size (*ta*), free cash (*free_cf*) flow and growth opportunities (*growth*).

Non-penalized CG indices

Similar results are observed between firm performance and non-penalized CG indices as with penalized CG indices. More specifically, significant positive relationships, at the 1% and 10% significant level, between firm performance and non-penalized CG indices with both rating schemes (Dichotomous_item (*cgnontotal*) and Dichotomous_category (*cg2nontotal*) in all three samples, the pre-crisis period, the crisis period and the pooled sample as seen in Table 6.

Significant positive relationships at the 1% level between leverage (*lev*) and firm performance is observed in the pre-crisis, crisis and pooled sample. The results of non-penalized CG indices and penalized CG indices are similar.

Dissimilar results are evident between the Dichotomous_item and Dichotomous_category rating scheme for growth opportunities (*growth*), free cash flows (*free_cf*) and ownership concentration (*ownconc*). More specifically, a significant negative relationship at the 10% level, is seen between growth opportunities

and firm performance, only when the Dichotomous_item rating scheme is applied. Thus sample firms in the crisis period sample that have higher growth opportunities have weaker performance. Possible reasons for this negative relationship can be that the market during the crisis period considers firms that spend in capital expenditures to be more risky and thus are less apt to invest in such firms, therefore their market value decreases and consequently Tobin's Q decreases.

Additionally, under the Dichotomous_item rating scheme, a significant positive relationship, at the 1% level, is seen between free cash flows and firm performance for the crisis period sample. This result is expected since firms that have more cash flows have the ability to invest in various projects and/or investments, thus increasing firm's performance.

Finally, in the Dichotomous_category rating scheme, a positive significant relationship at the 1% level is found between firm performance and ownership concentration, a similar result that is found in penalized indices as well.

Insignificant relationships are seen between firm performance and firm size (*ta*).

Firm performance - ROA

Penalized CG indices

Similar results are observed between the penalized CG indices and firm performance examining both rating schemes, the Dichotomous_item (*cgpentotal*) and Dichotomous_category (*cg2pentotal*) methods.

More specifically, significant positive relationships at the 1% and 5% level are observed between firm performance and penalized CG indices as seen in Table 6 in the pre-crisis and crisis year samples. However, contrary to what is expected, looking at the coefficients of the pre-crisis and crisis samples, higher values are observed in the pre-crisis sample, indicating that firms with higher CG index scores have even higher levels of performance in the pre-crisis sample compared to the crisis sample. Insignificant results between the two variables are observed in the pooled sample.

As for the dummy variable, *crisis_year*, a significant negative relationship is seen between it and firm performance, indicating that firms in the crisis year perform worse than firms in the pre-crisis period, a result that is expected and logical. However, examining the interaction crisis year dummy variable and CG indices, insignificant results are observed.

Positive significant relationships, at the 1% level, between firm performance and growth opportunities (*growth*) in the pre-crisis, crisis and pooled sample is seen. As expected firms that experience more growth opportunities perform better, since the extra capital expenditures of those firms positively affect firm performance.

Positive significant relationships, at the 1% level, are also observed between firm performance and free cash flow (*free_cf*) in the pre-crisis, crisis and pooled sample. Firms that have higher levels of free cash flow, as expected, perform better.

Negative significant relationships, at the 1% level, is observed between firm performance and leverage (*lev*). Higher leveraged firms perform weaker since they

have limited cash flows, have additional expenses and their net income is negatively affected.

Insignificant relationships are observed between firm performance and both ownership concentration (*ownconc*) and firm size (*ta*).

Non-penalized CG indices

Positive significant relationships, at the 1%, 5% and 10% between firm performance and non-penalized CG indices is observed for the pre-crisis sample and pooled sample.

Similar to the penalized CG indices a significant negative relationship at the 1% level is observed between firm performance and leverage. Additionally, a significant positive relationship at the 1% level is observed between firm performance and growth opportunities & free cash flows. Thus the results for the non-penalized CG indices are similar to the penalized CG indices. Finally, as in the case of penalized CG indices, a significant negative relationship, at the 5% and 10% significance level, is observed between the crisis year dummy variable and firm performance.

Table 6 – Penalized CG indices and firm performance

variables	ROA			Tobin's Q			variables	ROA			Tobin's Q		
	Pre-crisis year	Crisis years	Pooled sample	Pre-crisis year	Crisis years	Pooled sample		Pre-crisis year	Crisis years	Pooled sample	Pre-crisis year	Crisis years	Pooled sample
	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)		coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	
cgpentotal	0.211 (3.650)***	0.364 (2.117)**	0.128 (0.430)	0.279 (2.336)**	1.140 (7.994)***	1.167 (3.634)***	cg2pentotal	0.337 (5.202)***	0.553 (2.602)***	0.480 (1.628)	0.454 (4.055)***	1.386 (9.716)***	1.612 (5.834)***
ownconc	0.010 (0.620)	0.025 (0.727)	0.010 (0.192)	0.008 (0.200)	0.198 (3.558)***	0.133 (1.386)	ownconc	0.023 (1.245)	0.042 (1.094)	0.016 (0.315)	0.028 (0.704)	0.230 (4.381)***	0.153 (1.734)*
ta	0.002 (0.862)	0.003 (0.436)	0.003 (0.337)	0.004 (0.613)	-0.004 (-0.360)	0.014 (0.840)	ta	0.000 (0.149)	-0.003 (-0.353)	0.001 (0.115)	0.006 (0.879)	-0.008 (-0.687)	0.014 (0.858)
lev	-0.107 (-5.603)***	-0.248 (-10.602)***	-0.219 (-4.693)***	0.930 (24.081)***	0.911 (28.507)***	0.874 (12.729)***	lev	-0.097 (-4.642)***	-0.242 (-10.335)***	-0.214 (-4.729)***	0.963 (25.961)***	0.924 (30.980)***	0.916 (14.229)***
growth	0.102 (5.554)***	0.256 (5.454)***	0.201 (4.603)***	-0.023 (-0.659)	-0.047 (-0.459)	0.009 (0.086)	growth	0.100 (5.613)***	0.267 (5.235)***	0.212 (4.637)***	-0.022 (-0.664)	-0.027 (-0.254)	0.035 (0.382)
free_cf	0.510 (11.266)***	0.636 (8.175)***	0.677 (7.259)***	-0.073 (-0.896)	0.099 (0.848)	-0.012 (-0.062)	free_cf	0.482 (10.701)***	0.583 (7.795)***	0.625 (6.877)***	-0.104 (-1.324)	0.029 (0.241)	-0.094 (-0.520)
crisis_year			-0.293 (-2.391)**			-0.259 (-1.012)	crisis_year			-0.248 (-1.757)*			-0.152 (-0.564)
cgpentotal*crisis_year			0.365 (1.407)			-0.132 (-0.305)	cg2pentotal*crisis_year			0.130 (0.474)			-0.482 (-1.107)
<i>J</i> -statistic	0.1481	0.1433	0.1431	0.1416	0.1475	0.1471	<i>J</i> -statistic	0.1460	0.1430	0.1423	0.1393	0.1467	0.1461
N	582	538	1120	576	538	1114	N	582	538	1120	576	538	1114

Variables: *Tobin's Q* market based measure of firm performance; *ROA* operating performance measure of firm performance; *cgpentotal* penalized total CG index using the *Dichotomous_item* method; *cg2pentotal* penalized total CG index using the *Dichotomous_category* method; *ownconc* ownership concentration; *ta* total assets; *lev* leverage; *growth* growth opportunities; *free cf* free cash flow; *crisis_year* an indicator variable taking the value of zero for 2006, 2008, 2009 and one for 2010, 2011, 2012;
*** significant at level 1%; ** significant at level 5%; *significant at level 10%

Table 7 – Non-penalized CG indices and firm performance

Variables	ROA			Tobin's Q			variables	ROA			Tobin's Q		
	Pre-crisis year coefficient (t-stat)	Crisis years coefficient (t-stat)	Pooled sample coefficient (t-stat)	Pre-crisis year coefficient (t-stat)	Crisis years coefficient (t-stat)	Pooled sample coefficient (t-stat)		Pre-crisis year coefficient (t-stat)	Crisis years coefficient (t-stat)	Pooled sample coefficient (t-stat)	Pre-crisis year coefficient (t-stat)	Crisis years coefficient (t-stat)	Pooled sample coefficient (t-stat)
cg2nontotal	0.121 (1.843)*	0.078 (0.955)	0.818 (2.211)**	0.274 (1.751)*	0.529 (7.197)***	2.048 (5.135)***	0.054 (1.292)	0.114 (0.642)	0.769 (2.172)**	-0.009 (-0.106)	1.559 (7.088)***	1.576 (5.179)***	
ownconc	-0.007 (-0.393)	-0.034 (-1.132)	0.013 (0.240)	0.008 (0.222)	0.055 (1.353)	0.125 (1.325)	-0.005 (-0.379)	-0.028 (-0.883)	0.002 (0.035)	-0.005 (-0.199)	0.112 (2.873)***	0.097 (1.173)	
ta	0.004 (1.276)	0.004 (0.599)	0.001 (0.137)	0.003 (0.436)	0.003 (0.423)	0.013 (0.816)	0.007 (2.822)***	0.008 (1.061)	0.007 (0.719)	0.005 (0.948)	0.003 (0.333)	0.020 (1.450)	
lev	-0.120 (-6.037)***	-0.234 (-9.468)***	-0.267 (-4.723)***	0.944 (25.136)***	0.913 (37.564)***	0.858 (11.182)***	-0.116 (-7.310)***	-0.234 (-7.078)***	-0.276 (-5.111)***	0.917 (31.317)***	0.923 (24.797)***	0.829 (11.939)***	
growth	0.098 (5.161)***	0.295 (4.761)***	0.243 (4.802)***	-0.026 (-0.820)	-0.092 (-1.685)*	0.062 (0.645)	0.113 (5.294)***	0.282 (3.708)***	0.217 (4.486)***	-0.035 (-1.219)	-0.041 (-0.595)	0.021 (0.246)	
free_cf	0.523 (10.937)***	0.691 (8.105)***	0.618 (6.062)***	-0.051 (-0.633)	0.235 (2.908)***	-0.090 (-0.446)	0.544 (12.317)***	0.602 (7.040)***	0.562 (5.177)***	-0.021 (-0.315)	0.010 (0.082)	-0.183 (-0.982)	
crisis_year			-0.686 (-1.992)**			-0.736 (-1.211)			-0.706 (-1.710)*			-1.231 (-1.534)	
cg2nontotal*crisis_year			0.705 (1.520)			0.541 (0.666)			0.667 (1.286)			1.160 (1.105)	
J-statistic	0.1477	0.1440	0.1371	0.1405	0.1507		0.1494	0.1407	0.1439	0.1424	0.1495	0.1489	
N	582	538	1120	576	538		582	538	576	538	1114		

Variables: *Tobin's Q* market based measure of firm performance; *ROA* operating performance measure of firm performance; *cg2nontotal* non-penalized total CG index using the *Dichotomous_item* method; *cg2nontotal* non-penalized total CG index using the *Dichotomous_category* method; *ownconc* ownership concentration; *ta* total assets; *lev* leverage; *growth* growth opportunities; *free cf* free cash flow; *crisis_year* an indicator variable taking the value of zero for 2006, 2008, 2009 and one for 2010, 2011, 2012;
*** significant at level 1%; ** significant at level 5%; *significant at level 10%

7. CONCLUSION

In this study the research question of whether firms' corporate governance characteristics are effective in maintaining or increasing firm performance during the Greek debt sovereign crisis is examined. Corporate governance characteristics are examined through the creation of a CG index, while firm performance is calculated using Tobin's Q and ROA.

The sample consists of non-financial firms listed on the ASE from 2006-2012, where two settings are examined, the pre-crisis (2006/2008/2009) and crisis (2010/2011/2012) setting, with a final sample of 1205 firm-year observations with complete data. Corporate governance data for formulating the CG index is hand-collected from firms' annual reports and financial data is obtained from Datastream.

The issue of endogeneity is vital in corporate governance research. To deal with this issue and examine the relationships between firm performance, corporate governance and leverage a system of simultaneous equations using GMM is applied to test the hypothesis.

The results indicate that a positive and significant relationship is evident between the CG indices and firm performance as measured by Tobin's Q, in all three samples: the pre-crisis, the crisis and the pooled sample. Similar results are also evident when firm performance is measured by ROA. Although a positive relationship is seen between the two variables in all settings, in the crisis period higher levels of CG indices result in even higher firm performance compared to the pre-crisis

period, indicating the corporate governance plays an even more important role in determining firm performance in a crisis setting. Based on this positive relationship firms should enhance corporate governance attributes, such as board composition, board committees and transparency & disclosure items. Policy makers should put forth regulations that enhance governance practices. Although weak shareholder protection and concentrated ownership exists in Greece, as a civil law country, improving governance practices, for example having more independent directors on boards, could potentially improve crisis-period performance.

The results presented in this paper are subject to some limitations. Firstly, research in family businesses in Greece is justified given the fact that approximately 60% of Greek firms are family-owned. Family owned businesses have unique characteristics since they have longer investment horizons, their presence and control of management often constrains management misbehavior, thus increasing firm performance. On the other hand, family businesses often restrict key executive positions to family members who are often unqualified and make inaccurate managerial decisions, negatively influencing firm performance. Therefore examining governance attributes in such a distinctive setting would be a useful extension of this analysis.

Secondly, some key governance items, such as director remuneration, training of board members, were not included in the study. Additionally, the effect of the individual governance attributes, such as board size, CEO duality and audit committee independence, on firm performance is also not examined. For these reasons the generalizability of the findings is somewhat limited.

It is important to note that although the ASE was considered a developed market from 2000 until 2015¹¹, Greece was demoted from a developed market to an advanced emerging market due to recent extended market closure, capital control imposition on domestic markets and continuous economic instability, as a result of Greece's sovereign debt crisis that lead the ASE to extreme low levels (FTSE, 2015).¹² Thus, this study adds to the literature on corporate governance in a distinctive market, such as Greece, operating in a severe debt-sovereign crisis.

¹¹ The ASE is considered a developed market according to FTSE Annual Classification Review in March 2010 by FTSE Russell, the global index provider.

¹² The ASE is considered a developed market according to FTSE Annual Classification Review in March 2010 by FTSE Russell, the global index provider.

BIBLIOGRAPHY

- AGGARWAL, R., EREL, I., STULZ, R. & WILLIAMSON, R. 2009. Differences in Governance Practices between US and Foreign Firms: Measurement, Causes, and Consequences. *The review of financial studies*, 22.
- ALVES, C. & MENDES, V. 2004. Corporate Governance Policy and Company Performance: the Portuguese case. *Corporate Governance: An International Review*, 12, 290-301.
- AMMANN, M., OESCH, D. & SCHMID, M. M. 2011. Corporate governance and firm value: International evidence. *Journal of Empirical Finance*, 18, 36-55.
- ANDRIKOPOULOS, A., MERIKA, A. A., TRIANTAFYLLOU, A. & MERIKAS, A. G. 2013. Internet disclosure and corporate performance: A case study of the international shipping industry. *Transportation Research Part A*, 47, 141-152.
- ASHBAUGH-SKAIFE, H., COLLINS, D. W. & LAFOND, R. 2006. The effects of corporate governance on firms' credit ratings. *Journal of Accounting & Economics*, 42, 203-243.
- BAUMS, T. 1993. Takeover versus institutions in corporate governance in Germany. *Contemporary Issues in Corporate Governance*.
- BEBCHUK, L., COHEN, A. & FERRELL, A. 2009. What Matters in Corporate Governance? *Review of Financial Studies*, 22, 783-827.
- BEINER, S., DROBETZ, W., SCHMID, M. M. & ZIMMERMANN, H. 2006. An Integrated Framework of Corporate Governance and Firm Valuation. *European Financial Management*, 12, 249-283.
- BEKIRIS, F. V. & DOUKAKIS, L. C. 2011. Corporate Governance and Accruals Earnings Management. *Managerial and Decision Economics*, 32, 439-456.
- BHAGAT, S. & BOLTON, B. 2008. Corporate governance and firm performance. *Journal of Corporate Finance*, 14, 257-273.
- BLACK, B. & KIM, W. 2012. The effect of board structure on firm value: A multiple identification strategies approach using Korean data. *Journal of Financial Economics*, 203-226.
- BLACK, B. S., JANG, H. & KIM, W. 2006b. Predicting firms' corporate governance choices: Evidence from Korea. *Journal of Corporate Finance*, 12, 660-691.
- BLACK, B. S., JANG, H. & KIM, W. 2006c. Does Corporate Governance Predict Firms' Market Values? Evidence from Korea. *Journal of Law, Economics & Organization*, 22, 366-413.
- BLACK, B. S., KIM, W., JANG, H. & PARK, K.-S. 2015. How corporate governance affect firm value? Evidence on a self-dealing channel from a natural experiment in Korea. *Journal of Banking & Finance*, 51, 131-150.
- BLACK, B. S., LOVE, I. & RACHINSKY, A. 2006a. Corporate governance indices and firms' market values: Time series evidence from Russia. *Emerging Markets Review*, 7, 361-379.
- BOZEC, R., DIA, M. & BOZEC, Y. 2010. Governance–Performance Relationship: A Re-examination Using Technical Efficiency Measures. *British Journal of Management*, 21, 684-700.

- BROWN, L. D. & CAYLOR, M. L. 2006. Corporate governance and firm valuation. *Journal of Accounting and Public Policy*, 25, 409-434.
- BROWN, P., BEEKES, W. & VERHOEVEN, P. 2011. Corporate governance, accounting and finance: A review. *Accounting & Finance*, 51, 96-172.
- CAMPBELL, K. & MÍNGUEZ-VERA, A. 2008. Gender Diversity in the Boardroom and Firm Financial Performance. *Journal of Business Ethics*, 83, 435-451.
- CAMPBELL, K. & MÍNGUEZ-VERA, A. 2010. Female board appointments and firm valuation: short and long-term effects. *Journal of Management and Governance*, 14, 37-59.
- CARCELLO, J. V., HERMANSON, D. R. & YE, Z. X. 2011. Corporate Governance Research in Accounting and Auditing: Insights, Practice Implications, and Future Research Directions. *Auditing: A Journal of Practice & Theory*, 30, 1-31.
- CHHAOCHHARIA, V. & LAEVEN, L. 2009. Corporate governance norms and practices. *Journal of Financial Intermediation*, 18, 405-431.
- COLES, J. L., DANIEL, N. D. & NAVEEN, L. 2008. Boards: Does one size fit all? *Journal of Financial Economics*, 87, 329-356.
- CREMERS, K. J. M. & NAIR, V. B. 2005. Governance mechanisms and equity prices. *Journal of Finance*, 60, 2859-2894.
- CUERVO, A. 2002. Corporate Governance Mechanisms: a plea for less code of good governance and more market control. *Corporate Governance: An International Review*, 10, 84.
- DAH, M. A. 2016. Governance and firm value: The effect of a recession. *Research in International Business and Finance*, 37, 464-476.
- DEMSETZ, H. & VILLALONGA, B. 2001. Ownership structure and corporate performance. *Journal of Corporate Finance*, 7, 209-233.
- DENIS, D. K. & MCCONNELL, J. J. 2003. International Corporate Governance. *Journal of Financial & Quantitative Analysis*, 38, 1-36.
- DITTMAR, A. & MAHRT-SMITH, J. 2007. Corporate governance and the value of cash holdings. *Journal of Financial Economics*, 83, 599-634.
- DRAKOS, A. A. & BEKIRIS, F. V. 2010. Endogeneity and the relationship between board structure and firm performance: a simultaneous equation analysis for the Athens Stock Exchange. *Managerial & Decision Economics*, 31, 387.
- DROBETZ, W., SCHILLHOFER, A. & ZIMMERMANN, H. 2004. Corporate Governance and Expected Stock Returns: Evidence from Germany. *European Financial Management*, 10, 267-293.
- DUCASSY, I. & GUYOT, A. 2017. Complex ownership structures, corporate governance and firm performance: The French context. *Research in International Business and Finance*, 39, 291.
- DURNEV, A. & KIM, E. H. 2005. To Steal or Not to Steal: Firm Attributes, Legal Environment, and Valuation. *The Journal of Finance*, 60, 1461-1493.

- DURU, A., IYENGAR, R. J. & ZAMPELLI, E. M. 2016. The dynamic relationship between CEO duality and firm performance: The moderating role of board independence. *Journal of Business Research*, 69, 4269-4277.
- ERICKSON, J., PARK, Y. W., REISING, J. & SHIN, H.-H. 2005. Board composition and firm value under concentrated ownership: the Canadian evidence. *Pacific-Basin Finance Journal*, 13, 387-410.
- FLOROU, A. & GALARNIOTIS, A. 2007. Benchmarking Greek Corporate Governance against Different Standards. *Corporate Governance: An International Review*, 15, 979-998.
- FTSE. 2015. *FTSE Annual Country Classification Review-2015* [Online].
- GOMPERS, P., ISHII, J. & METRICK, A. 2003. Corporate Governance and Equity Prices. *The Quarterly Journal of Economics*, 107.
- HARFORD, J., MANSI, S. A. & MAXWELL, W. F. 2008. Corporate Governance and Firm Cash Holdings in the US. *Journal of Financial Economics*, 87, 535-555.
- HERMALIN, B. E. & WEISBACH, M. S. 2003. Boards of directors as an endogenously determined institution: a survey of the economic literature. *Economic Policy Review*, 9, 7-26.
- INDUSTRIES, H. F. O. 2010. Corporate Governance Code for Listed Companies. Athens.
- JACKLING, B. & JOHL, S. 2009. Board Structure and Firm Performance: Evidence from India's Top Companies. *Corporate Governance: An International Review*, 17, 492-509.
- JIANG, W., LEE, P. & ANANDARAJAN, A. 2008. The association between corporate governance and earnings quality: Further evidence using the GOV-Score. *Advances in Accounting, incorporating Advances in International Accounting*, 24, 191-201.
- KACZMAREK, S., KIMINO, S. & PYE, A. 2012. Board Task-related Faultlines and Firm Performance: A Decade of Evidence. *Corporate Governance: An International Review*, 20, 337-351.
- KESTER, C. 1997. Governance, contracting, and investment horizons: a look at Japan and Germany. *Studies in International Corporate Finance and Governance Systems*.
- KLOCK, M. S., MANSI, S. A. & MAXWELL, W. F. 2005. Does corporate governance matter to bondholders? *Journal of financial and quantitative analysis : JFQA*, 40, 693-720.
- KOSMIDOU, K. V., KOUSENIDIS, D. V. & NEGAKIS, C. I. 2015. The impact of the EU/ECB/IMF bailout programs on the financial and real sectors of the ASE during the Greek sovereign crisis. *Journal of Banking & Finance*, 50, 440-454.
- KOWALEWSKI, O. 2016. Corporate governance and corporate performance: financial crisis (2008). *Management Research Review*, 39, 1494-1515.
- LA PORTA, R., LOPEZ-DE-SILANES, F., SHLEIFER, A. & VISHNY, R. 2000. Investor protection and corporate governance. *Journal of Financial Economics*, 58, 3-27.
- LA PORTA, R., LOPEZ-DE-SILANES, F., SHLEIFER, A. & VISHNY, R. 2002. Investor Protection and Corporate Valuation. *Journal of Finance*, 1147.
- LA PORTA, R., LOPEZ-DE-SILANES, F., SHLEIFER, A. & VISHNY, R. W. 1998. Law and Finance. *Journal of Political Economy*, 106, 1113-1155.

- LARCKER, D. F. & RUSTICUS, T. O. 2010. On the use of instrumental variables in accounting research. *Journal of Accounting and Economics*, 186.
- LAZARIDES, T. 2010. Corporate governance law effect in Greece. *Journal of Financial Regulation and Compliance*, 18, 370-385.
- LAZARIDES, T. & DRIMPETAS, E. 2011. Evaluating Corporate Governance and identifying its formulating factors: the case of Greece. *Corporate Governance*, 11, 1-1.
- LEWBEL, A. 1997. Constructing instruments for regressions with measurement error when no additional data are available, with an application to patents and R&D *Econometrica*, 65, 1201-1213.
- LOVE, I. 2011. Corporate Governance and Performance around the World: What We Know and What We Don't. *World Bank Research Observer*, 26, 42-70.
- NERANTZIDIS, M. 2015. Measuring the quality of the “comply or explain” approach. *Managerial Auditing Journal*, 30, 373-412.
- NERANTZIDIS, M. & FILOS, J. 2014. Recent corporate governance developments in Greece. *Corporate Governance: The International Journal of Effective Board Performance*, 14, 281-299.
- NO.3016, G. L. 2002. Corporate Governance, Compensation and Other Issues (Articles 1-11). *In: ATHENS* (ed.).
- NO.3693, G. L. 2008. Audit Committee (Articles 37-38). *In: ATHENS* (ed.).
- PÉREZ-GONZÁLEZ, F. 2006. Inherited Control and Firm Performance. *American Economic Review*, 96, 1559-1588.
- PETERSEN, M. A. 2009. Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. *Review of Financial Studies*, 22, 435-480.
- RENDERS, A. & GAEREMYNCK, A. 2012. Corporate Governance, Principal-Principal Agency Conflicts, and Firm Value in European Listed Companies. *Corporate Governance: An International Review*, 20, 125.
- REPOUSIS, S. 2015. Greek fiscal crisis and measures to safeguard financial stability. *Journal of Financial Regulation & Compliance*, 23, 415-430.
- SCHULTZ, E., TAN, D. & WALSH, K. D. 2010. Endogeneity and the corporate governance-performance relation. *Australian Journal of Management*, 35, 145-163.
- SPANOS, L. 2005. Corporate governance in Greece: developments and policy implications. *Corporate Governance*, 5, 15-30.
- STOCK, J. H. & WATSON, M. W. 2003. *Introduction to Econometrics*, Boston.
- STOCK, J. H., WRIGHT, J. H. & YOGO, M. 2002. A Survey of Weak Instruments and Weak Identification in Generalized Method of Moments. *Journal of Business and Economic Statistics*, 20, 518-529.
- TSALAVOUTAS, I. & EVANS, L. 2010. Transition to IFRS in Greece: Financial statement effects and auditor size. *Managerial Auditing Journal*, 25, 814-842.

- TSIONAS, M. G., MERIKAS, A. G. & MERIKA, A. A. 2012. Concentrated ownership and corporate performance revisited: The case of shipping. *Transportation Research Part E: Logistics and Transportation Review*, 843-852.
- TSIPOURI, L. & XANTHAKIS, M. 2004. Can Corporate Governance be Rated? Ideas based on the Greek experience. *Corporate Governance: An International Review*, 12, 16-28.
- VAN DEN BERGHE, L. A. A. & LEVRAU, A. 2003. Measuring the Quality of Corporate Governance: In Search of a Tailormade Approach? *Journal of General Management*, 28, 71-86.
- VERBEEK, M. 2008. *A Guide to Modern Econometrics*, John Wiley & Sons, Ltd.
- VILLALONGA, B. & AMIT, R. 2006. How Do Family Ownership, Control and Management Affect Firm Value? *Journal of Financial Economics*, 80, 385-417.
- WINTOKI, M. B., LINCK, J. S. & NETTER, J. M. 2012. Endogeneity and the dynamics of internal corporate governance. *Journal of Financial Economics*, 105, 581-606.
- YEH, Y.-H., CHUNG, H. & LIU, C.-L. 2011. Committee Independence and Financial Institution Performance during the 2007-08 Credit Crunch: Evidence from a Multi-country Study. *Corporate Governance: An International Review*, 19, 437-458.