



UNIVERSITY OF
STIRLING

*Corporate governance mechanisms in Greece
and their effect
on earnings management and firm performance*

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**A thesis submitted for examination for the degree of
Doctor of Philosophy (PhD)**

The University of Stirling

July 2018

Abstract

Greece provides an interesting setting for corporate governance research since it is a country characterized by weak governance structures, low audit quality, moderate tax and financial conformity, low importance of capital markets and low financial transparency compared to other developed countries (Bushman et al., 2004; Dimitropoulos and Asteriou, 2010). Additionally, the 2008 global financial crisis triggered the Greek sovereign debt crisis in 2010, which highlighted pre-existing structural weaknesses and macroeconomic imbalances and led the economy into a deep recession (Repousis, 2015). In such a setting, this thesis investigates corporate governance mechanisms in Greece and their effect on earnings management and firm performance, examining non-financial firms listed on the Athens Stock Exchange (ASE) from 2006-2012.

Efforts to increase investor confidence and improve the long-term success and competitiveness of Greek firms by improving corporate governance have come through the enacting and enforcement of laws and specific codes of good governance practice. The first empirical study examines the extent to which the implementation of corporate governance Law 3693/2008, which made audit committees mandatory for all Greek listed firms, constrains earnings management practices by these firms. Using panel data analysis, the negative relationship that is found to exist between corporate governance quality and earnings management before the implementation of the law changes to a positive one after the law's implementation. This suggests that firms are more interested in adhering to the letter of the law rather than its spirit and that this particular corporate governance mechanism is not achieving its purpose.

The second empirical study examines the relationship between corporate governance and firm performance in a financial crisis setting, where the expected relationship between the two variables is not a priori clear. Using panel data analysis, it is found that the positive relationship between corporate governance and firm performance prior to the Greek sovereign debt crisis period changes to a negative relationship during this period. This suggest that what is considered as 'good' governance in steady times can be counterproductive in times of crisis.

Acknowledgements

As I reach the end of this long journey, I would like to express my appreciation to many, although it seems impossible to mention all, who have helped me prepare this thesis.

First of all, words are not enough to thank my principal supervisor, Dr. Ioannis Tsalavoutas, whose dedication, academic support, guidance, persistence and constant feedback on my research helped me achieve this goal. I would also like to thank my supervisor Dr. Kevin Campbell for accepting the role of first supervisor in the last years of this journey, whose valuable comments immensely assisted in drafting this thesis, to who I am truly indebted.

I would also like to express my gratitude to the American College of Greece-Deree College for the financial support provided for the preparation of this thesis.

Many thanks go to my colleagues, friends, and co-travellers in this PhD journey, Effie and George. Endless conversations in our office on the ‘difficulties’ we faced in our PhDs, as well as their support and help made this process doable. I would also like to thank Stelio who helped me put the PhD process in a correct context and always gave me sound advice. Above all, I want to thank my friend Katerina for patiently listening to me ‘complain’ during this long process and always reminding me of my ultimate goal.

Finally, this thesis would not be a reality without the support and help of my family, to whom I dedicate this thesis. Without the constant support and encouragement of my mother, as well as the understanding of my two young children, Theodore and Eugenia, for my limited available free time, this result would not be possible. Above all, I would like to thank my husband, Mihalis, who patiently endured my absences, my enthusiasms and my many despairs, often taking on the weight of our family obligations, and always trying to seem interested in my endless conversations on corporate governance.

Preface

At the time of submission, some material, based on work presented in this thesis, has been accepted for publication.

- Constantatos, A.-F., Dionysiou, D. and Tsalavoutas, I. (2016) A synthesis and analysis of models measuring accrual based and real activities earnings management. In: Yates, K. (ed.) *Earnings Management: Global Perspectives, Performance and Future Research*. Series: Management science: theory and applications. Nova Science Publishers. ISBN 9781634855112

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Chapter 1 – Motivation, objectives and overview of the study

1.1 Corporate governance in Greece

Corporate governance is a set of relationships between the firm and its various stakeholders, such as the board, management, and shareholders. It consists of internal and external mechanisms by which firms are directed and controlled to ensure that all stakeholders' interests are balanced. It is needed to deal with conflicts that could potentially arise among the firm's stakeholders (Dey, 2008). For many, the issue of corporate governance lies in finding a solution to the underlying agency problems and so ensuring that the suppliers of finance get a return on their investment (Shleifer and Vishny, 1997).

Numerous laws and codes of corporate governance have been created in different countries to improve corporate governance practices, an issue that has become of utmost importance, after serious corporate scandals that have occurred in various countries around the world (Hassan et al., 2017). Improvements in corporate governance practices can result in a wide range of benefits for a country's economy by improving international competitiveness, attracting local and foreign investments and building modern financial and capital markets (OECD, 2004).

Although corporate governance is a topic that many developed countries considered as far back as 1776, in Greece, the country of interest for this study, corporate governance has only lately become an issue of concern. A change in corporate culture, which was primarily focused on government affairs since the creation of the modern Greek state, was initiated by legislators and business people in Greece in the late 1990's (Mertzanis, 2001). The unprecedented increase in the value of the Athens Stock Exchange (ASE) during 1995-2000, followed by the tremendous decrease in the early 2000s, created the need for effective corporate governance in an effort to re-establish investors' confidence. It became evident that effective corporate governance structures were needed to protect shareholders' rights, restore investors' confidence and increase firm performance (Dimitropoulos and Asteriou, 2010; Dasilas and Leventis, 2013).

Although the topic of corporate governance in Greece was first formally introduced in 1998 through a paper published by the ASE, the year 2002 was critical. In May 2002, the Greek Ministry of National economy enacted Law 3016/2002, entitled “On Corporate Governance, board remuneration and other issues”. For the first time, Greek listed companies were obliged to abide by a set of governance guidelines, mainly involving the composition of the board of directors, non-executive directors’ remuneration, internal auditing, share capital increases and the participation of shareholders in the decision-making process (Dimitropoulos and Asteriou, 2010; Dasilas and Papasyriopoulos, 2015).

Based on a desire to make continuous improvements, additional corporate governance (CG) laws were enacted in later periods. More specifically, Law 3693/2008, entitled “Mandatory audit of annual and consolidated financial reports”, was enacted in 2008 requiring all Greek listed firms to have an audit committee and complete disclosure of the firm’s relationship with the external auditor was required. In 2010, Law 3873/2010, entitled “Mandatory reports by a certified expert for mergers and dissolutions of corporations”, was enacted. This required all listed firms to disclose a CG statement in their annual report, which gives information on CG practices the firm uses beyond those legally required, while also providing reasons for not conforming to the requirements of CG laws. In addition to this law, in 2010, Law 3884/2010, entitled “Exercise of shareholders’ rights for listed firms”, was introduced concerning the rights of shareholders and the company’s obligations regarding disclosure of information prior to general meetings (Nerantzidis and Filos, 2014).

In addition, the establishment of laws concerning corporate governance mechanisms provided a stimulus for the Hellenic Federation of Industries to prepare a *Corporate Governance Code* for listed companies. A first draft was published in 2010 and after suggestions and feedback, the final draft, with minor amendments, was published in 2011.

1.2 Motivation of the thesis

This thesis investigates the effect of CG mechanisms in Greece on earnings management and firm performance.

The first study examines the relationship between CG and earnings management. Motivated by the implementation of Law 3693/2008, the effect of corporate governance on earnings management practices is studied for the periods before and after its implementation. Inter alia, the law prescribed the following: the existence of an audit committee; the characteristics of the audit committee, such as member independence and expertise must be disclosed; the audit committee is responsible for all financial reporting processes of the firm and supervises the work of the external auditors; all processes and relationships with the external auditors need to be disclosed so as to ensure an objective and independent audit; although the audit committee is required to overlook the work of the external auditor, the full responsibility still lies with the full board. These mandatory disclosures oblige firms to explicitly discuss corporate governance issues and companies are thus forced to examine and improve key CG issues. As such, CG as a whole is influenced and positive changes are expected, such as the mitigation of earnings management practices.

The second study examines the effect of corporate governance mechanisms of Greek listed firms on firm performance before and during the Greek sovereign debt crisis. The existing literature indicates that the relationship between corporate governance and firm performance in a crisis setting is not a priori clear. The positive relationship between the two variables that is evident in a non-crisis setting is not as distinct in a crisis setting. The need for corporate governance to respond effectively in a crisis setting is imperative. Boards are primarily needed to assist the firm by providing guidance and control. The recent financial crisis suggests that boards in other countries did not live up to this role by taking risks and implementing financing policies that were ineffective (Erkens et al., 2012). These failures of internal corporate governance mechanisms are key parts of the explanation for the financial crisis, despite the fact that its triggering has been attributed to external financial and economic factors (Bekiaris et al., 2013). As such, the relationship between governance quality and firm performance is initially

tested and this relationship is also examined in light of the sovereign debt crisis in Greece.

1.3 Research questions

The first study examines the effect of corporate governance mechanisms of Greek listed firms on earnings management, as a result of Law 3693/2008. Thus, the first research question is:

“Do corporate governance mechanisms in Greece restrain earnings management practices and is this relationship more negative after the implementation of Law 3693/2008?”

This study covers all non-financial Greek listed companies for the fiscal years 2006 (two years before the implementation of the law), 2008 (the year the law was created), 2010 (two years after the implementation of the law) and 2012 (four years after the implementation of the law).¹ These specific years are intentionally chosen to examine the change of any potential effect of corporate governance on earnings management before and after the implementation of Law 3693/2008. The data is broken down into two periods, the pre-law period sample (2006/2008) and the post-law period sample (2010/2012). It is expected that the negative effect of corporate governance variables on EM will be stronger after the implementation of the law.

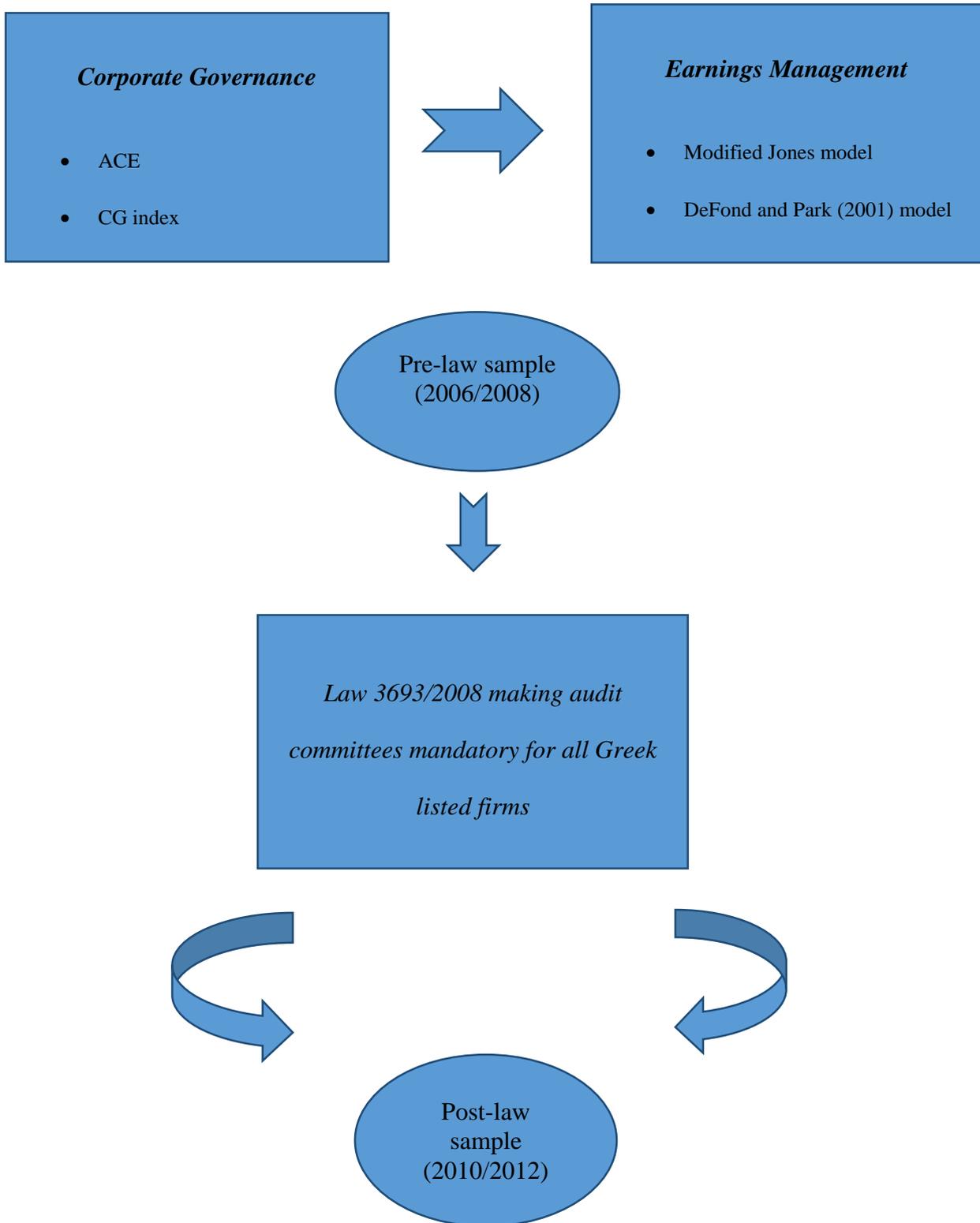
Accruals-based earnings management is measured using the cross-sectional version of the modified Jones model of Dechow et al. (1995) and the DeFond and Park (2001) model.

Corporate governance is measured through the use of a composite measure of governance quality that captures audit committee effectiveness and consists of the following: independence of audit committee members; financial expertise of audit committee members; size of audit committee; and frequency of meetings of the audit committee. Additionally, a multi-dimensional indicator of corporate governance is

¹ Due to the fact that data for corporate governance variables had to be hand-collected from firms' annual reports, limiting the study to four years made the task feasible within the time available.

created for the purpose of this study in the form of a corporate governance index. The CG index is developed based on the requirements of Greek CG laws, as well as particular features of the Greek CG code created by the Hellenic Federation of Industries in 2010. Figure 1-1 illustrates the first study.

Figure 1-1 Illustration of Study #1



The second study examines the effect of corporate governance mechanisms of Greek listed firms on firm performance before and during the Greek sovereign debt crisis. Thus, the second research question is:

“Does the expected positive relationship between corporate governance mechanisms and firm performance also exist during the sovereign debt crisis in Greece?”

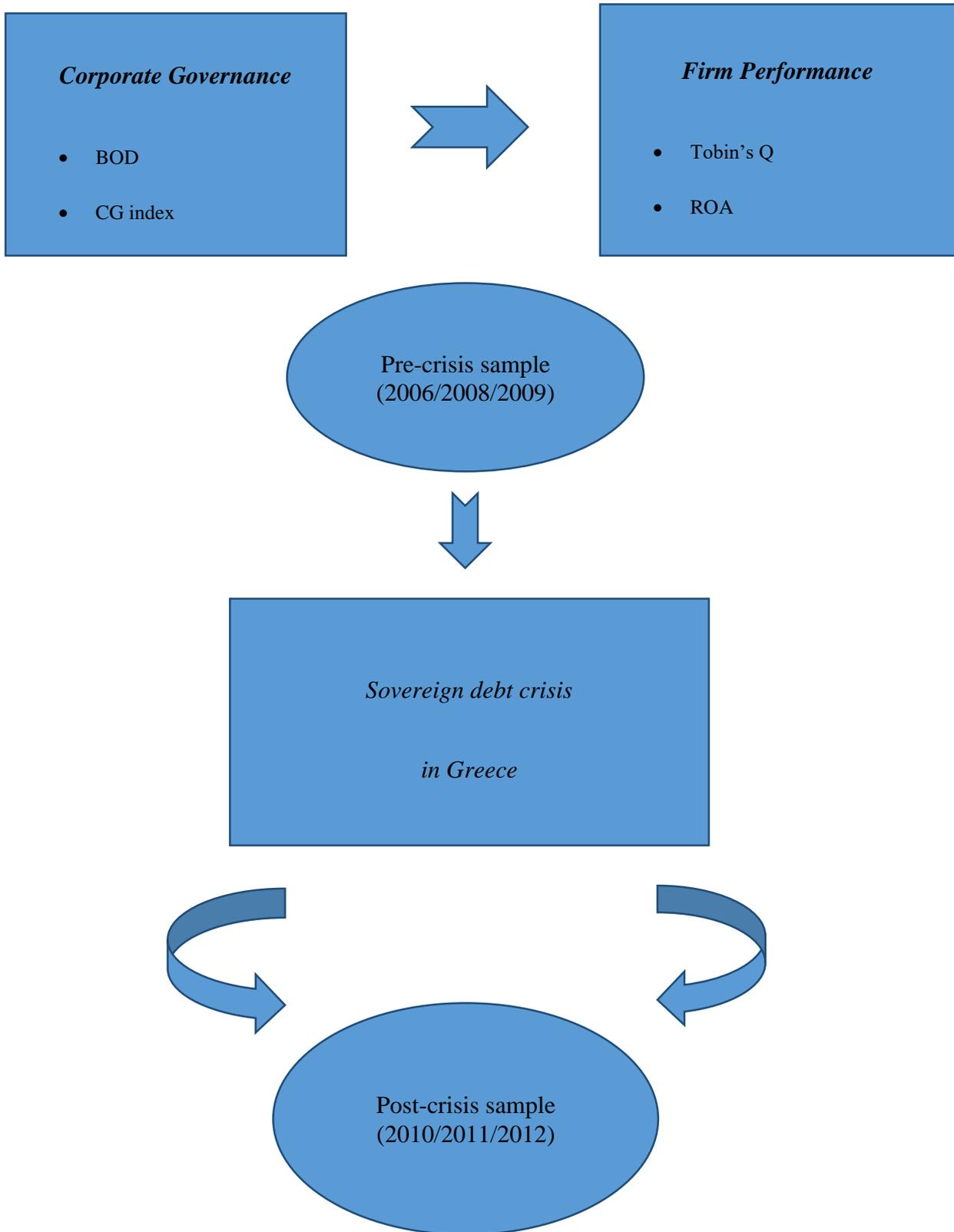
The study examines Greek listed firms for the fiscal years 2006, 2008, 2009, 2010, 2011, and 2012.² The data is disaggregated into two periods: the pre-crisis sample in 2006, 2008 and 2009 and the crisis sample in 2010, 2011 and 2012. It is expected that firms with stronger governance quality will have higher firm performance during the crisis years when firms are under greater pressure.

Firm performance is measured using the market-based performance measure, Tobin’s Q and an operating performance measure, ROA. Both firm performance measures are employed in this study since the former is a market-based measure, while the latter an operating performance measure, and so they complement each other (Elsayed, 2007).

Corporate governance quality is measured through the use of individual corporate governance items, namely board size, board independence and the absence of CEO duality, and also through the use of a corporate governance index, as in the first study. Figure 1-2 illustrates the second study.

²As stated earlier, due to the fact that data for corporate governance variables had to be hand-collected from firms’ annual reports, this study was limited to six years so as to make the task feasible within the time available.

Figure 1-2 Illustration of study #2



1.4 Contribution of the study

Greece provides an interesting setting for research, since it has a distinctive financial reporting regime, culture and socio-economic context (Tsalavoutas et al., 2012). It is a country characterized by weak governance structures, low audit quality, moderate tax and financial conformity, low importance of capital markets and low financial transparency compared to developed countries (Bushman et al., 2004; Dimitropoulos and Asteriou, 2010). Studies have shown that corporate governance practices are more important in countries with weaker legal systems (Klapper and Love, 2004; Durnev and Kim, 2005). Such a case is that of Greece, which has a relatively young and weak accounting profession with inadequate enforcement of accounting regulations and a high incidence of earnings management (La Porta et al., 1998; Baralexis, 2004; Tsalavoutas et al., 2012; Leuz et al., 2003). It is indicative that these differences from other developed markets have led to the Greek accounting regime's classification within the emerging Asian and Near East countries (Myring, 2006).³

Although most European countries only have corporate governance codes with best practices instead of a compulsory legal framework, Greece is a European country with legislation. Law 3016/2002 provides detailed standards for improvement of managerial efficiency and transparency for all Greek listed firms, so as to protect shareholders rights (Drakos and Bekiris, 2010; Dimitropoulos and Asteriou, 2010). Thus, studying the impact of mandatory CG mechanisms in Greece provides a unique setting with useful insights.

Both research questions are examined in the context of the ASE, a small capital market.⁴ The ASE was considered a developed market from 2000 until 2015⁵ and approximately 40% of the market capitalization belongs to foreign investors during that period (FTSE, 2011; Tsalavoutas et al., 2012; FTSE, 2015). All non-financial Greek listed firms for the period 2006-2012 are used in the study, covering all sectors of the ASE.

³ Alongside India, Indonesia, Korea, Malaysia, Philippines, Thailand and Turkey.

⁴ The market capitalisation in ASE in 2008 is at \$90.2 billion, while the UK is at \$1.9 trillion, France is at \$1.5 trillion, Germany is at \$1.1 trillion and Italy at \$522 billion.

⁵ Greece was demoted to an advanced emerging market according to FTSE Russell in its FTSE Annual Country Classification Review-2015 as of March 2016.

The first study examines the relationship between corporate governance mechanisms and earnings management for Greek listed firms. There have been a limited number of studies on Greek corporate governance and its effect on accruals-based earnings management (i.e. Dimitropoulos and Asteriou (2010), and Bekiris and Doukakis (2011)). However, none of these studies examines the effect of CG practices on earnings management after the implementation of Law 3693/2008, concerning the mandatory existence of an audit committee for all Greek listed firms. Studying the extent to which CG mechanisms improve the quality of financial statements prepared by Greek listed firms, as a result of this law, provides important findings for firms' stakeholders.

More specifically, the findings indicate that the negative relationship between corporate governance quality on EM that exists in the pre-law period sample changes to a positive relationship after the implementation of the law. This signifies that firms are more interested in adhering to the letter rather than the spirit of the law after its implementation and thus, CG was not fulfilling its role of mitigating EM. Additionally, it is observed that when examining the best practice CG index with the interaction year dummy variable, a negative relationship between CG and EM exists. Thus, firms that follow voluntary, best practice governance items are more successful in mitigating EM since they appear to follow the substance and not the form of governance attributes. These results are in line with the Hellenic Federation of Industries beliefs that CG items should be voluntary and not legally enforceable.⁶

The 2008 global financial crisis triggered the Greek sovereign debt crisis, one of a number of European sovereign debt crises. The 2008 global financial crisis had a lagged impact on the Greek economy and brought forth pre-existing structural weaknesses and macroeconomic imbalances that led the economy into a deep recession (Repousis, 2015). In such a setting, this study examines the effects of governance practices on firm performance, before and during the sovereign debt crisis in Greece, examining all non-financial listed firms for the period 2006-2012. Moreover, the conflicting results found in the literature in studying the effect of corporate governance

⁶ See Chapter 2, section 2.5 for more details.

mechanisms on firm performance (i.e. Bhagat and Black (2002), Bozec (2005), Dahya et al. (2008), Essen et al. (2013) and Duru et al. (2016)) is an additional motivation for this study, especially in light of the sovereign debt crisis. According to agency theory, firms with boards consisting of non-executive members are better-governed and thus have higher firm performance. On the other hand, resource dependency theory argues that executive directors add value to firms by providing information and expertise to the firm, suggesting that boards with executive members have higher firm performance. This study examines both the monitoring and advisory role of boards and how this affects firm performance in Greece during the sovereign debt crisis. Although a few studies examine the effect of corporate governance on firm performance in Greece (i.e. Toudas (2009), Drakos and Bekiris (2010), Hermes and Katsigianni (2012) and Zhou et al. (2018)), no study examines the relationship between these two variables in the context of the financial crisis, where the relationship between the two is not a priori clear.

This study finds a positive relationship between board size and firm performance in both the pre-crisis and crisis periods sample. Board independence and firm performance has a negative relationship in the pre-crisis period sample, while in the crisis period sample, this relationship becomes positive. As for the absence of CEO duality and firm performance, although the relationship between the two is positive in the pre-crisis period sample, this relationship becomes negative in the crisis period sample. This illustrates that in uncertain times, such as a financial crisis, a unitary leadership structure is more suitable so as to make quick decisions without the need for continuous consensus. Additionally, although the relationship between the CG indices and firm performance is positive in the pre-crisis period sample, as expected, this relationship becomes negative in the crisis period sample indicating that what is considered as 'good' governance in steady times can be counterproductive in times of crisis.

Overall, this study examines the effect of corporate governance laws and codes in a single country setting, Greece. It is more difficult to control for the factors that affect firms' financial reporting and firm performance in an international comparative study than it is in a single country study. The board's monitoring activities can better be

isolated in our single country study of Greece since institutional, socio-economic, political and environmental factors remain constant over the period of investigation (Marra et al., 2011; Tsalavoutas et al., 2012).

Finally, much of the existing literature applies to economies with Anglo-Saxon types of financial systems, i.e. the US and the UK (Bedard and Gendron, 2010). The Greek context provides a more bank-based financial system with a relatively small stock market in which the issue of corporate governance does not have a long history (Kapopoulos et al, 2007). Additionally, the ownership structure in Greece differs greatly from that of the US and the UK in that that shareholders are more concentrated and family shareholders are more significant (Drakos and Bekiris, 2010). Thus, this study builds on the existing strand of literature on corporate governance in a non-Anglo-Saxon context, such as Osma and Noguera (2007), Jackling and Juhl (2009), Marra et al. (2011), Ntim and Soobaroyen (2013) and Zhou et al. (2018).

1.5 Structure of the thesis

This chapter has discussed the background of this thesis and specified the research questions. Additionally, the motives of the thesis and its contributions have been highlighted.

The remainder of this thesis is organized as follows. Chapter two provides a discussion of corporate governance, examining the theories and systems of corporate governance. The chapter then discusses the institutional setting of Greece and proceeds with the review of the evolution of corporate governance in Greece.

Chapters three, four and five pertain to the first research question regarding the relationship between corporate governance and earnings management following the implementation of Law 3693/2008.

Chapter three provides the literature review and hypothesis development focusing on the relationship between corporate governance and earnings management. The literature review discusses studies that examine corporate governance mechanisms in relation to audit committee characteristics such as independence, size, diligence and

expertise, as well as corporate governance indices, and reviews their ability to constrain accrual-based earnings management. As such, this literature review forms the basis for the development of the hypotheses tested and discussed in chapter five.

Chapter four provides the relevant research design. The chapter begins by reviewing the earnings management models used in the literature. It continues by reviewing corporate governance indices created in prior literature. The process of how these CG indices have been created are discussed and common elements in this process are reviewed. The chapter continues by analysing the measures of earnings management used in the first study, as well as the corporate governance mechanisms employed. The process of the creation of the CG index used in this study is explained and discussed. The empirical research model of this study is then reviewed, and the sample selection and data collection procedures are analysed.

Chapter five reports the results of the data analysis and provides a discussion of the findings regarding Q1. The chapter begins with the univariate analysis of the data, examining the descriptive statistics, and continues with a bivariate analysis, reporting the correlation coefficients, and proceeds to a multivariate analysis of the data. Presentation of the results follow, and the inferences drawn from tests of the hypotheses are discussed.

Chapters six, seven and eight relate to the second research question regarding the relationship between corporate governance and firm performance in the pre-crisis and crisis periods.

Chapter six discusses the relevant literature review focusing on the relationship between corporate governance and firm performance. The chapter begins with the literature review that contains studies that examine corporate governance mechanisms in relation to individual corporate governance variables, such as board size, board independence, and CEO duality, as well as corporate governance indices, which incorporate many governance attributes in one measure, and reviews their effects on firm performance. A review of studies examining the relationship between corporate governance and firm performance in a crisis setting is then examined. A discussion of the sovereign debt

crisis in Greece follows. This literature review forms the basis for the development of the hypotheses that are tested and discussed in chapter eight.

Chapter seven provides the relevant research design pertaining to corporate governance and firm performance for Greek listed firms before and during the Greek sovereign debt crisis. The chapter discusses the measures of firm performance used in the study, as well as how corporate governance is examined both through individual governance measures, as well as through a multi-dimensional proxy for governance in the form of a CG index. Empirical research models used to test the hypotheses are presented and an analysis of how the data is collected and prepared to test the relationship between corporate governance and the financial performance of Greek listed firms before and during the Greek sovereign debt crisis is discussed.

Chapter eight provides a report of the data analysis and a discussion of the findings. The chapter begins by examining the descriptive statistics of the data, continues with a discussion of the correlation coefficients and proceeds to a multivariate analysis of the data. Presentation of the results follow, and the inferences drawn from tests of the hypotheses are discussed.

Chapter nine presents a summary of this research study and draws conclusions and implications. The limitations of the study are presented and recommendations for future research are also provided.

Chapter 2 – Corporate Governance

2.1 Introduction

Corporate governance is a system that prescribes how firms are directed and controlled (Tihanyi et al., 2014). Board of directors, shareholders and auditors are key components of how a firm is governed. The various views on corporate governance mainly stem from a financial perspective whereby Shleifer and Vishny (1997:737) define corporate governance as

“The way in which suppliers of finance to a corporation are assured of adequate returns on their investments”.

Corporate governance is a necessary tool to deal with potential conflicts among the stakeholders of a company. These conflicts, which are called agency problems, exist because stakeholders of a company have different goals and preferences, as well as limited access to information concerning each other’s actions, knowledge and preferences. These conflicting interests exist primarily between shareholders and corporate managers and arise from the separation of ownership and control (Gillan and Starks, 2003; Dey, 2008). The mechanisms, both internal and external, that deal with these potential conflicts are known as corporate governance (Garay and González, 2008).

Denis and McConnell (2003) classify corporate governance mechanisms into internal and external mechanisms. Internal governance mechanisms are determined by firms’ internal factors and include the board of directors’ structure and characteristics, board committees and ownership structures. External governance mechanisms refer to outside forces that ensure that firms are governed in support of shareholders’ and other stakeholders’ interests and includes mechanisms, such as country legal systems and takeover rules. Internal governance mechanisms consist of individual governance variables and are applicable to research involving either individual or multi-country settings. External governance mechanisms, such as the impact of a different legal system on the effectiveness of corporate governance, are applicable only in research involving the comparison of various corporate governance systems across countries for

studies in a multi-country setting (Denis and McConnell, 2003). This research concentrates on internal governance mechanisms since the analysis is based on a single country, Greece.⁷

2.2 Theories of corporate governance

Although corporate governance does not have one set of theories based on one discipline or one common theoretical base, the disciplines that have influenced the development of corporate governance are many (Mallin, 2010:14). The basic theories are agency theory, resource dependency theory, stakeholder theory and stewardship theory. Out of all the theories that set the foundation for corporate governance, the fundamental theory on which the development of corporate governance rests is agency theory.

Agency Theory

Modern businesses are characterized by the separation of ownership and control, which creates the context for agency theory. Capitalism is a system where independent companies compete with each other to maximize their wealth and in sequence the wealth of their shareholders. These companies are directed by a chief executive officer (CEO), who works on behalf of shareholders for this purpose. Agency theory refers to the relationship between the principal, who authorizes another party, the agent, to work on his or her behalf. In a corporate setting the principals are the shareholders and the agents are the managers (Mallin, 2010:15). It is thus possible for the managers to take advantage of their power for their own benefit, against the interests of the companies they serve. There are times the real owners of companies are often powerless and incapable of safeguarding their interests and verifying if the agent has behaved properly (Morck and Lloyd, 2005; Eisenhardt, 1989). These conflicting interests give rise to what is termed as the principal-agent conflict (Jensen and Meckling, 1976; Fama and Jensen, 1983).

⁷ External governance mechanisms, such as legal systems and takeover rules, are not included in this study because all firms in the data set are from a single country therefore a single legal system is applied and a limited amount of mergers and acquisitions took place during the sample period.

Conflicts arise between the managers who pursue personal wealth, in the form of enhanced salaries and bonuses, strengthening their reputations and shareholders who pursue firm value maximization (Raelin and Bondy, 2013). This misuse of power can be either in the form of extraction of direct financial benefits for the agent or in the form of the agent not taking the necessary risks to pursue the principals' interests and increase shareholder value (Mallin, 2010:15).

The potential problems associated with this separation of ownership and control were identified as early as the 18th century by Adam Smith (1776). Much later, Berle and Means (1932) illustrated that as countries develop and industrialize, the separation of ownership and control becomes more evident (Mallin, 2010:15). These early advocates of agency theory argued that a logical relationship exists between shareholders, managers and the board of directors (Christopher, 2010). Since the interests of managers and shareholders have the potential to be at odds, a need for realignment of these interests is desirable. The process of realigning these parties' interests creates costs for the firm, which are known as agency costs; most of which are attributed to the control and monitoring of managers by the firms' board of directors. The board's primary role, according to agency theory, is to monitor and control the CEO and they are accountable to shareholders to fulfill this role (Christopher, 2010).

According to advocates of agency theory, the monitoring role of the board can be compromised if CEO duality exists, a term used if the chairman of the board and the CEO is the same person. If this position is held by the same person, potential conflicts of interest can exist, since the flow of information can be subjectively filtered by the CEO (Jensen, 1993). Thus, best practice, institutional investors and recommendations of agency theorists suggest the absence of CEO duality (Nordberg 2011:120). In addition to the costs associated with the supervision and control of agents, incorrect decisions taken by agents, as a result of the pursuit of their personal interests, are also considered agency costs. This agency problem, between the principal and agent is known as Type I agency problem or a P-A conflict and is mainly observed where there is a high level of ownership diffusion (Ding et al., 2011).

Another type of agency problem, known as Type II, exists between a firm's majority controlling shareholders and its minority shareholders (Ali et al., 2007). This type of agency problem usually exists where ownership of listed firms is concentrated in the hands of a few shareholders, and is known as the principal-principal (P-P) conflict (Fan and Wong, 2002; Morck and Yeung, 2003; Miller and Le Breton-Miller, 2006). In a P-P conflict, expropriation of minority shareholders can take place in many forms such as placing less-qualified family members in key positions, purchase of products or services by organizations owned or associated with controlling shareholders in higher market prices, and engagement in strategies for personal advancement at the expense of firm performance (Young et al., 2008).

An additional potential conflict also exists between equity and debt holders. This conflict is a result of diversified shareholders expropriating wealth from bondholders by investing in new projects that are riskier than the current investment portfolio of the firm. In cases where the high-risk projects pay off, shareholders receive the additional gains, while debtholders' returns are fixed. As a result, bondholders in anticipation of such actions, demand higher returns, resulting in higher cost of debt capital for firms (Jensen and Meckling, 1976; Anderson et al., 2003(b)).

To deal with agency problems, corporate governance mechanisms are developed in an effort to align all parties' interests, and thus reduce agency costs (Denis and McConnell, 2003; Gillan, 2006; Christopher, 2010). Corporate governance incorporates all institutional and market mechanisms that assist 'the controllers', i.e. managers to maximize the firm's value on behalf of 'the owners' i.e. shareholders (Denis, 2001). Actions such as the development of auditing systems to restrict unwanted behaviour, contractual agreements that bond managers so as to minimize, if not eliminate, their self-interest, and a change in the organizational system, such as boards consisting of non-executive members, are mechanisms to restrict the ability of managers to engage in such undesirable behaviour (Weston et al., 2004).

Corporate governance mechanisms that align manager's actions with the decisions delegated to them by shareholders through the board of directors, deals with the principal-agent conflict, or Type I agency problem. Good governance mechanisms that

deal with the principal-principal conflict or Type II agency problem, includes ways to reduce the private benefits of control or majority shareholders, by limiting the occurrences of tunnelling⁸, asset stripping, related-party transactions, and other ways of diverting firm assets and cash flows from minority shareholders (Renders and Gaeremynck, 2012). ‘Effective governance’ schemes regulate managerial power so as to improve corporate governance effectiveness (Brennan and Solomon, 2008; Christopher, 2010).

Stewardship Theory

An alternative view to agency theory is formally introduced by Donaldson and Davis (1991). Their work suggests that agents can be good stewards of the firms and if entrusted with the appropriate resources, can act in the interests of owners. In these circumstances, monitoring is unnecessary and their relationship should be based on trust (Davis et al., 1997). They reject the opinion cultivated by agency theory that agents are self-serving and should be monitored. The cost of monitoring is thus eliminated and sanctions and incentives as a means of control should not exist. Stewardship theory is based on a psychological approach in which peoples’ intrinsic need for achievement is reinforced by a positive relationship with the firm. Managers’ motivation comes from their excellent performance on the job (Dedman, 2015). These intrinsic non-financial motives are based on the need for successful performance, authority, and a desire for recognition. Thus, managers’ incentives are aligned with those of shareholders, since the behaviour of the steward is collective, seeking to achieve the firm’s goals. This achievement results in the steward’s personal satisfaction (Davis et al., 1997; Dedman, 2015). Stewards are considered individuals that place the best interests of the group ahead of personal benefits (Hernandez, 2008).

According to stewardship theory, the board of directors acts as an assistant to the CEO rather than as a monitor, as claimed by the agency theory. Managers feel part of the firm and want to succeed so as to maintain their reputation in the workplace. Therefore,

⁸ The expropriation of minority shareholders by majority shareholders is known as ‘tunneling’ and can take the form of expropriation of cash flows, assets, equity or a combination of these (Bhaumik and Gregoriou, 2010).

a firm's successful performance is a reflection of the performance of managers (Daily et al., 2003). Stewards are created not through regulations and rules, but through firm structures that promote the feeling of trust, openness and disclosure (Hernandez, 2008). According to the advocates of stewardship theory, employees are motivated if they feel they have autonomous responsibility in their work. Thus, control devices are not only needless, but are also counterproductive (Hernandez, 2012).

According to stewardship theory, an effective board is one that is mainly made up of executive members, whose expertise, access to critical information and commitment, leads to better decision-making and thus, superior firm performance (Donaldson and Davis, 1994). Similarly, CEO duality, in contrast to the advocates of agency theory, is preferable. A single person acting as chairman of the board and CEO leads to superior firm performance due to a clear and unified leadership structure, facilitating better channels of communication between the CEO and the board of directors (Donaldson and Davis, 1994; Davis et al., 1997; Chen et al., 2007).

In terms of corporate governance, the board of directors' role is that of a consultant and not of a monitor. Boards serve to empower managers to engage in self-directed actions (Davis et al., 1997). Governance mechanisms create a trust system between managers and shareholders and encourage cooperation and involvement to promote the natural alignment of interests between the two parties (Madison et al., 2016).

Stakeholder Theory

Stakeholder theory is based on the broad framework which emphasizes the wider group of stakeholders, such as employees, creditors, suppliers, government and the community at large, rather than only shareholders. Stakeholder theory was first introduced by Freeman (1984) who argues that each firm's primary purpose is to serve its stakeholders. Stakeholder management is based on the assumption that the firm's focus is not only on the fair treatment of primary or direct stakeholders, such as shareholders, management, employees, and customers but also on indirect groups such as creditors, suppliers and competitors (Schilling, 2000). Primary stakeholders are those that have a direct and contractual relationship with the firm, while secondary

stakeholders are those without any contractual association (Collier and Roberts, 2001; Fassin, 2012). Apart from the classical categorization of stakeholders as either primary/direct or secondary/indirect, another classification of stakeholders is given by Phillips (2003b) whereby stakeholders are either normative or derivative. Normative stakeholders are those towards whom the company has a moral obligation of fairness, while derivative stakeholders are those individuals who have the ability to benefit or harm the firm but to whom the firm has no moral obligation, such as competitors and activists (Phillips, 2003a; Fassin, 2012). The stakeholder approach focuses on transparency and dialogue among all parties involved so as to balance their divergent needs (Fassin, 2012). However, there has been disagreement on whether all parties should be treated with the same level of priority (Schilling, 2000). Some state that stakeholders' interests with greater power and legitimacy, should be prioritized, while others, that all groups should benefit without setting one group's interests over the other (Schilling, 2000).

Furthermore, ambiguity exists in the definition of stakeholders, depending on whether a narrow or broad definition is adopted (Orts and Strudler, 2002; Fassin, 2012). Kaler (2002) defines stakeholders using two opposing theories, the 'claimant' definition and the 'influencer' definition. The former defines stakeholders as all individuals or groups that have a claim or right on the firm, while the latter as those that are influenced by the firm. The combinatory use of the various definitions of stakeholders has created an increased ambiguity and uncertainty around the issue of stakeholders (Kaler, 2002; Fassin, 2012).

Businesses that emphasize only shareholders, consider profit as the primary, if not the only reason for a firm's existence, thus considering shareholders the only stakeholder that should be considered. However, stakeholder theory is based on a different perspective. It recognizes that a firm is a system of interdependencies among a large group of parties that are to be served and that shareholders, are just one of those groups. The firm exists to serve all stakeholders and profit is only one small part of a firm's total performance (Schilling, 2000). According to Clarkson (1995) if the firm focuses only on the needs of shareholders and does not meet the needs of all its stakeholders, it will fail (Schilling, 2000). Stakeholder theory is a great defender of corporate

governance. It is essential to integrate the interests of all stakeholders into the firm's decision-making process. The connection of stakeholder theory and corporate governance has focused on representation of stakeholders on the firm's board, on the board members' perception regarding their stakeholders, and the effects of board composition on a firm's stakeholder performance (Ayuso et al., 2014).

However, stakeholder theory has been criticized a lot since it ignores a business's basic function, which is to maximize shareholder value. A business where accountability lies in everyone can lead to unsuccessful businesses since no one is actually accountable. Additionally, although stakeholder theory recognizes that boards are influenced by internal and external groups, it fails to consider the possibility that the absence or ineffectiveness of external institutions can hinder the board's ability to direct and control the firm (Chakrabarty and Bass, 2014).

Resource Dependency Theory

Resource-dependency theory states that the board is the means to access and manage the resources needed for managers and stockholders to achieve their strategic goals. The board's role is not to monitor management, as stated by the agency theory, but to act as a partner to management to assist them in effectively setting policies and strategies for the company (Cohen et al., 2008).

According to Dalton and Daily (1999) resource dependency theory advocates that board members supply strategic resources, networking, information and other resources that develop a firm's long-term success. Since board members are actively involved in the firm's business strategy, they should have industry expertise, know-how in setting corporate strategy, and access to external resources (Cohen et al., 2008). Board members are key elements in setting a firm's strategic direction. Independent board members' contributions are their connections and specific technological knowledge, rather than only their independent perspective. These attributes assist managers in taking effective actions. The ideal situation would be to appoint board members that are independent, possess industry expertise, and have significant access to strategic resources. Such board members have a greater ability to understand, interpret and

access the quality of financial information. However, hiring and retaining such board members can be costly for firms, thus difficult choices have to often be made (Cohen et al., 2008).

Resource-dependency theory focuses on how boards' characteristics contribute to more effective governance. For example, an audit committee, with members who have industry expertise, is expected to significantly improve audit committee effectiveness. From a resource dependence perspective such audit committee members have the knowledge to evaluate business activities and risks, and assess whether the accounting methods applied reflect the financial position of the firm, thus leading to higher quality financial reporting (Cohen et al., 2008).

Managerial Hegemony Theory

Another corporate governance theory found in the strategic management literature is that of managerial hegemony (Cohen et al., 2008). This theory states that managers choose associates that always agree with their actions, are passive participants in the governance process, and are dependent on management for information on the firm and its industry. According to this theory, the board's role is more symbolic than substantial. Its role is limited to ratifying and legitimizing management's actions, satisfying regulatory requirements, and developing senior management's compensation schemes. The board is not perceived as a tool for organizational change or substantial overview of management. This contrasts agency theory in which boards act as independent and effective monitors of management's actions (Cohen et al., 2008). From a hegemony perspective, boards are dominated by management and play a passive role in developing strategies and directing firms (Hendry and Kiel, 2004; Chen et al., 2009).

According to Henry and Kiel (2004), managerial hegemony theory relies on five management control mechanisms. First, separation of ownership and control, as expressed by Berle and Means (1932), in conjunction with share capital growth, leads to ownership diffusion, whereby large shareholders lose their power and control. This decrease in shareholder control gives management greater control, which according to agency theory, could be self-serving, and makes many boards play a passive role. A

second factor that contributes to managers' control is information asymmetry between top management and non-executive board members. Management has deep knowledge of the business, placing the board, especially non-executive members at a disadvantage. This limits the boards contribution in the decision-making process. A third element that increases managerial control is managers of profitable firms depend less on shareholders for capital. They finance their investment decisions through retained earnings and hence, are able to enhance their control. Fourth, boards are chosen by management and consequently management controls these board members, both executive and non-executive. Finally, executive members are dependent on the CEO for their career and compensation advancement, and as a result, are unlikely to challenge decisions made by CEOs. The greater the number of executive members, the greater the control of the CEO. The net effect of these mechanisms is boards dominated by management, that play a passive role in developing strategies and directing firms (Hendry and Kiel, 2004).

According to managerial hegemony theory, boards have negative consequences for shareholders, since they are often powerless and do not fulfil their essential role. Independent board members often recognise that CEOs control the information flow, however this can influence the effective performance of even the most conscientious board member (Nowak and McCabe, 2003; Cohen et al., 2008). There is limited independent monitoring and management's position is reinforced (Westphal and Zajac, 1994; Beatty and Zajac, 1994; Core et al., 1999; Cohen et al., 2008). Thus, according to managerial hegemony theory, simply having regulatory requirements for independent board members, does not solve the problem (Cohen et al., 2008).

This theory considers the inner workings of firms, rather than how external institutions can adjust the board's ability to control the firm (Chakrabarty and Bass, 2014). Critics of this theory state that empirical support is limited, and its theoretical basis depends on the definition of 'control'. For example, according to Mizruchi (1983) boards have the ultimate control over management in their ability to fire the CEO, thus undermining the very basis of this theory (Hendry and Kiel, 2004).

Institutional Theory

Institutional theory states that corporate governance is based on a comprehensive set of organizational dynamics linking the institutional environment and individuals. According to this theory, corporate governance defines organizational goals in accordance with the expectations of the relevant participants of their institutional environment, such as suppliers, consumers, regulatory agencies and competitors (DiMaggio and Powell, 1983). Institutional theory highlights the difference between what a firm can accomplish given its structures and what the external environment suggests it should accomplish (Fogarty and Rogers, 2005).

According to Cohen et al. (2008), institutions tend to organize themselves in a similar manner to other organizations that face similar environmental factors. They tend to adapt structures and practices of other firms that operate in similar environmental conditions. Although a large number of organizational forms and practices initially display a great amount of diversity, as they develop, there is a push toward homogenization (DiMaggio and Powell, 1983). Initially, various agents participate in open and free competition, but as some gain advantage by accumulating power and resources, the so-called 'strong participants', institutional validity is created for those entities. As such, these entities' behaviours become routine and create pressure for others to adopt to their 'successful' behaviour. Once this institutional structure is created, it is continuously supported by these strong participants so as to create institutions that legitimize and promote their own behaviour. Thus, change, as a result of these institutional processes is resisted and cannot be accomplished by participants that have low levels of power and influence (Tuttle and Dillard, 2007). This process of homogenization is best depicted by the theory of isomorphism, which is described as the practice that forces one unit of the population to resemble the other units that experience similar environmental conditions (DiMaggio and Powell, 1983; Cohen et al., 2008; Zattoni and Cuomo, 2008).

Isomorphism is accomplished either through coercive, normative or mimetic means (DiMaggio and Powell, 1983). Coercive/regulative isomorphism is a result of both formal and informal pressures on firms by other firms on which they are dependent on,

as well as cultural expectations by the society in which they function in. These pressures are either felt as forced, as persuasive, or as an invitation to join a group, so as to conform to accepted standards. In some cases, legal regulations are imposed on firms for organizational convergence. For example, according to the Sarbanes-Oxley Act (SOX) regulation, all listed firms in the US have to have independent audit committee members, irrespective of the environment that each firm operates in (Cohen et al., 2008).

Normative isomorphism states that convergence to expected and accepted social behaviours is achieved through information provided, either through academic institutions or through professional bodies such as auditing firms. Universities and professional training institutions often possess similar viewpoints, which often deter change in tradition, which could otherwise shape organizational behaviour differently. Positions are occupied by individuals with similar orientations and viewpoints, often hired from similar industries or from a narrow range of training institutions. Many managers for example, are recruited from the same universities, that tend to view problems in a similar manner, and make decisions in much the same way (DiMaggio and Powell, 1983).

Finally, mimetic/cognitive isomorphism is a result of environmental uncertainty that makes firms want to 'follow the leader', irrespective of whether the leader's practices are effective or a suitable for the specific firm operating in a particular industry (Cohen et al., 2008). The use of models is a response to uncertainty. When a firm faces an ambiguous situation, copying others' behaviour is a viable solution with a small cost (DiMaggio and Powell, 1983). There are instances where the modelled firm may be unaware of this process or might not even have the desire to be modelled. This modelling process occurs unintentionally, either as a result of employee transfer or turnover, or intentionally, through organizations, such as consulting firms or industry trade associations. Mimetic isomorphism also has a ritual aspect. Companies adopt successful prototypes so as to enhance their legitimacy and illustrate their effort to improve their working conditions. Firms with a large customer base and a greater number of personnel employed, experience stronger pressures to engage in mimetic isomorphism (DiMaggio and Powell, 1983). Although all three means of isomorphism

somehow overlap, they stem from different conditions. Mimetic and normative develop from internal drives and explain how roles and structures are created, while coercive is linked to the environment in which the organization operates (Frumkin and Galaskiewicz, 2004).

The basic underlying implication of institutional theory for corporate governance is that in uncertain conditions, the board and its committees' roles may be symbolic or ceremonial. For instance, a ceremonial role of the audit committee may be hiring and firing the auditor, whereby a symbolic role may be redefining the business relationship with the auditor. This can add credibility to the auditor-client relationship in the eyes of investors (Orton and Weick, 1990; Cohen et al., 2008). Audit committees need to accomplish legitimacy in the eyes of the public, thus member expertise is emphasized. Therefore the case might exist whereby individuals hired to serve on the board will have objective credentials, such as prior experience and degrees, but not necessarily have the ability to effectively monitor managers (Cohen et al., 2008). Additionally, according to institutional theory, firms look for homogeneous individuals. Their similar backgrounds act as a signal to outsiders that trust and competency exists in the work of the board and its committees (Cohen et al., 2008). Therefore board members are selected from similar backgrounds and consequently are less likely to challenge each other or management (Tuttle and Dillard, 2007).

Under institutional theory, firms follow social rules and conventions that influence the way they do business. As such boards must identify such institutional deficiencies and pressures and direct the firm accordingly. Institutional theory emphasizes the presence and effectiveness of external institutions, when evaluating the ability of the board to direct and control the company (Chakrabarty and Bass, 2014)

Corporate governance mechanisms created are a result of an organization's goals linked to the expectations of the strong participants in the environment in which they operate. Thus, board members, board leadership and board committees are chosen so as to conform to the strong participants expectations and tend to become similar to others in the same industry (Cohen et al., 2008). Institutional theory is subject to criticism and limitations. Yazdifar (2003) states that it lacks consideration of the relationship

between the environment, political and cultural elements within the firm. It ignores interest-based behaviour and neglects to examine the processes of organizational change. He states that institutional theory cannot stand on its own but must be accompanied with other theories.

Limited studies, such as Ntim and Soobaroyen (2013), Young and Thyil (2014), Chakrabarty and Bass (2014) have been conducted with a focus on institutional theory and corporate governance. Kalbers and Fogarty (1993) find that audit committees operate in an environment where power is gained from interactions with others and they are effective when they have institutional support, such as access to information provided by management and auditors, as well as function in a supportive environment provided by top management (Cohen et al., 2008). Additional corporate governance research based on institutional theory examining changes in governance practices as a result of changes in the environment are seen in Chang (2006) and Kim (2010), where the effects of institutional changes on the transparency and accountability of business groups are a result of the Asian financial crisis as stated in Colli and Colpan (2016).

Summary

Among the various theories discussed in the context of corporate governance, agency theory is by far the most popular and the one that has been used most by academics and practitioners (Eisenhardt, 1989; Aguilera and Jackson, 2003; Aguilera et al., 2008; Christopher, 2010). Although alternative corporate governance theories, such as institutional theory, stakeholder theory and stewardship theory have also been the subject of research by academics, agency theory has been the primary basis for the development of corporate governance standards, principles, and codes (Christopher, 2010). According to Mallin (2010:21), who provides a comprehensive analysis of corporate governance theories, agency theory provides the best explanation for corporate governance roles in relation to legal, cultural, ownership and other structural characteristics.

All corporate governance theoretical perspectives are complements to agency theory and not substitutes for it (Daily et al., 2003). Although various corporate governance

theories influence the relationship between corporate governance mechanisms and earnings management and firm performance, agency theory is the fundamental underlying theory that forms the basis for the examination of the hypothesized relationships between the variables.

This study initially examines the effect of corporate governance on earnings management. From an agency perspective, board of directors effective monitoring mechanisms are crucial in mitigating earnings management practices. The second issue examined in this study is the relationship between corporate governance mechanisms and firm performance. Agency theory sets the context for aligning the interests of all parties involved in governing the firm, with the ultimate objective of increasing shareholder value. Properly designed board of directors is of utmost importance in minimizing agency costs and any sort of closely connected private benefits that affect firm performance.

Agency theory provides the theoretical framework to explain the motives and reasons for earnings management and firm performance. Thus, this study will draw on agency theory to develop hypotheses to test the relationship between corporate governance mechanisms and earnings management and firm performance.

2.3 Corporate governance systems

Corporate governance systems are mainly classified in two categories: a shareholder-interest driven Anglo-American business system and a stakeholder driven Continental European business system (Aguilera and Jackson, 2010). The Anglo-American business system's characteristics are equity finance, dispersed ownership, strong shareholder rights, active markets for capital control and flexible labor markets where the basic conflict lies between managers and shareholders, the Type I agency problem. Such systems are seen in countries such as the US, Canada and the UK. The Continental European business system is characterized by long-term debt financing, the predominant role of the government on economic and social affairs, the group alignment of society, close ties between banks and industry, weaker shareholder rights, less active markets for capital control, rigid labor markets and concentrated block

holder ownership. In such a governance system the basic conflict lies between majority and minority shareholders, the so-called Type II agency problem (Millar et al., 2005; Aguilera and Jackson, 2010; Cuervo, 2002). The risk that potential investors face is insider expropriation where the few strong owners manage the firm. The role of corporate governance in this case is to align the interests of strong shareholders with weak minority shareholders (Ali et al., 2007). This classification is the basis for analyzing corporate governance, although it does not entirely represent governance in Japan, East Asia, a wide range of European countries and the new emerging markets (Aguilera and Jackson, 2010).

Although corporate governance is defined similarly around the world there are differences in the approach, based on the law and history of each country. Dispersed shareholders have led to one approach to corporate governance, different legal systems to another, while history and geography have also played a detrimental role in how firms are organized, and their activities monitored and controlled. Corporate governance is thus perceived in different ways in the US compared to Continental Europe and the UK.

Firms in the US indicate the important role of the separation of ownership and control of modern firms, as stated by Berle and Means (1932). In these firms, the Type I agency problem is evident and corporate governance mechanisms are aimed principally at dealing with these issues. Shareholders have a limited ability to control the board and much power resides with the CEO. In many US boards CEO duality exists, whereby the CEO and chairman of the board are the same individual (Cuervo, 2002; Fama and Jensen, 1983; Grossman and Hart, 1986; Ali et al., 2007). The abuse of power by strong CEOs has led to governance failures, as seen in the examples of WorldCom and Enron (Nordberg, 2011:78).

In the US, corporate governance is based on rules set by the Securities Exchange Commission (SEC) and the Financial Accounting Standards Board (FASB). Although CG guidelines do not mandate a separation of CEO and the chairman of the board, it is highly recommended that an independent vice president of the board exists, in cases of CEO duality (Nordberg, 2011:107). More emphasis is placed on boards consisting of

independent non-executive members and the ‘comply or explain’ principle is enforced, which was originally introduced in the Cadbury Code (1992) in the UK. The greatest change in US corporate governance was the development of a statute, Sarbanes-Oxley Act (SOX), Public Law 107-204 in 2002. The most important feature of this Act was that CEOs and CFOs personally certify the accuracy of financial information supplied, whereby false information leads not only to civil actions taken against them, but also criminal action, which could even lead to imprisonment (Nordberg, 2011: 107-108). SOX also requires US listed firms to establish internal control processes and all external auditors are required to register with Securities Exchange Commission (SEC) so as to ensure and endorse their oversight procedure (Fletcher and Miles, 2004).

The UK’s governance system is somewhat different from that of the US, though both are classified as a shareholder-interest driven Anglo-American business systems. Corporate governance in the UK is based on principles, voluntary compliance of CG codes and application of the ‘comply or explain’ principle. On the other hand, the US, after SOX, bases its corporate governance on rules, mandatory compliance or penalty enforcement (Tricker, 2008; Aguilera and Jackson, 2010). Another difference between the UK and the US, as a result of the Cadbury Code, is that in the UK the role of the CEO and the chairman of the board are separate, with the chairman of the board being an independent non-executive member, while in the US most firms have CEO duality (Nordberg, 2011:81). However, in both the UK and the US, the corporate governance system is based on a unitary board of directors, comprised of both executive and non-executive members whose task is to protect shareholders’ interests.

Corporate governance in Germany follows a stakeholder-oriented approach, illustrating how different continental Europe is from the US and the UK (Cioffi, 2002; Lane, 2003; Fiss and Zajac, 2004). The basic difference in the German corporate governance system is the existence of a dual-board structure, consisting of a ‘management board’ and a ‘supervisory board’. The ‘management board’ consists of managers dealing with daily operations which reports to a ‘supervisory board’ that is responsible for monitoring, control and policy-making. ‘Supervisory boards’ consist of independent non-executive members and employees, whose aim is to protect workers’ interests. Management is not allowed to sit on ‘supervisory boards’ (Nordberg, 2011:74). The main advantage

of a dual board system is that the ambiguity of roles in a board is eliminated, since each board's role is different and clearly specified (Nordberg, 2011: 83).

Other Continental European countries that also follow the stakeholder driven business system have either a unitary board, similar to the US and the UK, or a two-tier board, similar to Germany's structure. Italy, Spain and Greece follow the unitary board structure, while Austria, Switzerland, and the Netherlands mandates dual boards. Other countries, such as France, leave the choice of unitary or dual boards to the shareholders (Nordberg, 2011: 83).

2.4 The institutional setting in Greece

Greece is a European country with distinct economic and socio-political characteristics. Although Greece seems to have been influenced by free market thinking over the last thirty years, it continues to reflect a mixture of Eastern and Western influences in terms of culture, politics and economics (Tsipouridou and Spathis, 2014). Greece "industrialized" in the early post-world war II years and after a few years of rapid growth, it entered an era of stagnation and structural economic problems until the mid-1990's (Tsipouri and Xanthakis, 2004). During that period, investor's interest in the ASE was insignificant. Very few Greek firms raised capital through IPOs and most domestic and international investors were reluctant to invest in such a small capital market (Dasilas and Papasyriopoulos, 2015). The ASE's underdevelopment was a result of the heavy reliance of firms on debt financing and thus, the predominance of the banking sector, the high level of state intervention in the economy, the high ownership concentration of listed firms, as well as a lack of transparent and credible information disclosed to investors by firms (Dasilas and Papasyriopoulos, 2015).

During the period 1995-2000, there was an unprecedented increase in the value of shares quoted on ASE when Greece met the Maastricht criteria and joined Economic and Monetary Union (EMU) in 2001, together with the expansion of many Greek firms in Southern Europe. During this period, Greece maintained a high growth rate, mainly through the entry of international funds listed on the ASE, with the ASE increasing in value much faster than other capital markets in developed countries (Tsipouri and

Xanthakis, 2004; Dasilas and Leventis, 2013). Additionally, the ASE went through market microstructure changes such as the expansion of trading hours, the operation of OASIS, an integrated electronic system of settlements, and the extension of margin accounts (Dasilas and Leventis, 2013). As a result, Greece experienced a remarkable increase in its stock market and the ASE was considered a developed market from 2000 until 2015⁹ (FTSE, 2011; Tsalavoutas et al., 2012; Tsipouri and Xanthakis, 2004; Dasilas and Leventis, 2013). During this positive economic growth period, the number of companies listed on the ASE increased, and the significant use of IPO's changed many private-family owned companies to public listed companies, and the need for modernization and supervision by the market became a necessity (Tsipouri and Xanthakis, 2004). Although many private-family owned businesses became publicly listed firms through this expansion of the ASE, this did not change the relatively high levels of concentrated family ownership (Lazarides, 2010). The massive entrance of institutional and individual investors into the capital market, mainly through placements on small and medium capitalization firms, increased the stock prices and liquidity of these companies.

This unprecedented rise in value of the ASE came to an end when international institutional investors discovered that the ASE was overvalued and wanted to realize their profits (Dasilas and Papasyriopoulos, 2015). The stock market started experiencing losses, which reached an average of almost 90% of its peak value, there was a great reduction in trade turnover and the number of IPOs, and thus firms turned to alternative forms of financing, such as bank lending, where access to credit was easy and the cost of debt low (Tsipouri and Xanthakis, 2004; Dasilas and Leventis, 2013). More specifically, the ASE General Index realized an annual decrease of 38.8% in 2000, a 23.5% decrease in 2001 and a 32.5% decrease in 2002. In 2002, the total value of transactions in the ASE decreased by 85.7% in comparison to 1999. Total market capitalization in 2002 amounted to 65.7 billion euros, a decrease of 66.7% in relation to 1999 (Spanos, 2005). Later on, the global credit crunch crisis of 2008 and Greece's subsequent sovereign debt crisis resulted in the ASE reaching even lower levels

⁹ Greece was demoted to an advanced emerging market according to FTSE Russell in its FTSE Annual Country Classification Review-2015 as of March 2016.

(Dasilas and Papasyriopoulos, 2015).¹⁰ Greece was demoted from a developed market to an advanced emerging market as of March 2016, due to recent extended market closure, capital control imposition on domestic markets and continuous economic instability (FTSE, 2015).

Nowadays, the ASE is small in comparison to other European stock markets in terms of market capitalization, turnover and number of listed firms (Sikalidis and Leventis, 2017). Greek firms are still to a large extent family owned with high ownership concentration. Only 20-50% of Greek firms are freely floated firms, thus the ability to achieve control of a firm through capital markets is limited. Family members or the controlling shareholders are part of the management group and there is often no distinction between management and ownership. Thus, financial statements have lower value as a prime source of information and communication for owners (Tzovas, 2006; Tsalavoutas and Evans, 2010; Dasilas and Leventis, 2013). Even in cases where managers are not part of the family or the controlling shareholder, they have close ties with them and are often subject to their control (Lazarides and Drimpetas, 2011).

Furthermore, the Greek legal system is based on civil law, resembling the French-code system, which typically is related to high ownership concentration, weak legal protection for shareholders and poor law enforcement (Tsalavoutas and Evans, 2010; Caramanis et al., 2015). Banks are still the main source of capital for firms, which has fostered the development of personal relationships between banks and firms, where bank lending relies on personal relationships, collateral, political intervention and social criteria (Tsalavoutas and Evans, 2010). Additionally, the need for external financing is greater given the fact that internal financing of projects by Greek firms is limited, due to Greek corporate law which mandates an annual minimum cash dividend distribution equal to 35% of net profits minus the amount needed to maintain regular reserves (net distributable earnings) or 6% of share capital, whichever is higher (Corporate Law 2190/1920, as amended by Laws 148/1967 and 876/1979). The main reason for this law is to minimize potential agency conflicts and protect minority shareholders (Sikalidis and Leventis, 2017). If a firm wants to bypass this requirement and not

¹⁰ For an analytical discussion of the sovereign debt crisis in Greece consult Chapter 6.

distribute a cash dividend, 70% of the voting rights are required, while a smaller distribution than the one required by law needs a 65% voting right agreement. However, most Greek shareholders vote in favor of the proposed dividend distribution. Therefore Greek firms rely on external debt and equity financing for their financial needs (Dasilas and Papasyriopoulos, 2015; Sikalidis and Leventis, 2017).¹¹

The Greek accounting environment is tax-driven and conservative (Ballas, 1994). Tax rates are perceived to be high and in their attempt to avoid taxes firms use earnings management techniques (Baralexis, 2004). The link between tax avoidance and earnings management of Greek firms has been examined extensively in the literature (see for example, Leuz et al. (2003), Baralexis (2004), Caramanis and Spathis (2006), Burgstahler et al. (2006), Ghicas et al. (2008)) as stated by Tsalavoutas and Evans (2010).¹²

2.5 Evolution of corporate governance in Greece

Although the issue of Corporate Governance can be dated back as far as 1776 (Adam Smith) in developed countries, in Greece the topic was considered much later. Legislators and business people in Greece began trying to change a corporate culture that was highly focused on government affairs since the creation of the modern Greek state (Mertzanis, 2001). It was only after the two major financial crises in South-East Asia in 1997 and in Russia in 1998, that concerns about corporate governance rose in Greece (Mertzanis, 2001).

The great increase in the ASE from 1995-2000, followed by the record decrease, created the need to re-establish investor confidence and effective corporate governance was an essential part of this effort. Although international capital providers required effective corporate governance after the expansion of the ASE, the great decline of the ASE that

¹¹ According to recently enacted Law 4548/2018, named “Amendment of Corporate Law”, the annual minimum cash dividend distribution equals 35% of net profits minus the amount needed to maintain regular reserves. This amount can decrease to 10% of net profits with a majority voting right. However, non-distribution of this cash dividend requires 80% of voting rights.

¹² Although financial reporting and tax accounting are measured by different measurement rules for consolidated financial statements of listed firms after the implementation of IFRS in 2005, there is a link between tax avoidance and EM, since taxable income calculation depends on financial reporting income.

followed indicated that the governance structure of Greek firms was inefficient. Many instances of corporate scandals took place and it became evident that implementation of modern forms of corporate governance structures were necessary so as to protect shareholders' rights, restore investor's confidence and increase firm performance (Dimitropoulos and Asteriou, 2010; Dasilas and Leventis, 2013).

Following along these lines, the Hellenic Capital Market Commission (HCMC) in collaboration with market participants, company experts, auditors, legal practitioners and investors, began discussing extensively the corporate governance issue (Florou and Galarniotis, 2007; Mertzanis, 2001; Tsipouri and Xanthakis, 2004).

More specifically, the corporate governance topic was first formally introduced in 1998 through a paper published by the ASE. A number of discussions and conferences led to the creation of a voluntary code of conduct in October 1999, known as the Blue Book (Tsipouri and Xanthakis, 2004). The Blue Book has five chapters that are basically a replicate of the structure of the OECD principles (Governance, 1999). In collaboration with all relevant agents, the HCMC developed a Committee of Corporate Governance in Greece, which presented a white paper in 1999, titled "*Principles of Corporate Governance in Greece-Recommendations for its Competitive Transformation*" whose voluntary corporate governance code was based on internationally accepted corporate governance principles (Florou and Galarniotis, 2007). This voluntary Greek CG code reflected OECD principles (Mallin, 2010: 38). The changes the Committee opted for were focused mainly on corporate transparency, consistency and accountability (Mertzanis, 2001; Zhou et al., 2018).

The Committee opted for the view that the set of practices set out would be effective if they were characterized by the voluntary behavior of all relevant parties involved and should conform to the best practices of the member-states of the European Union and the OECD recommendations (Mertzanis, 2001). The motive behind the voluntary nature rather than a mandatory one was to minimize the risk of companies complying with the letter rather than the spirit of efficient governance (Mertzanis, 2001).

In 2000, the Center of Financial Studies in the Department of Economics of the University of Athens began a project financed by the ASE, aimed at creating a rating system for compliance with the corporate governance criteria for listed companies on the ASE. This indicated to the financial community that the corporate governance debate was an important issue (Tsipouri and Xanthakis, 2004; Spanos, 2005).

The importance of corporate governance led to the development of two major rules created by the HCMC in 2000. The first rule, Rule 5/204/2000, named “A code of conduct for companies listed in the Athens Stock Exchange and their affiliated parties”, set the duties and obligations of major shareholders, the board of directors, executive management and others. Its aim was to eliminate uncertainty in the market on corporate matters (HCMC Rule 5/204/2000). The second rule, Rule 1/195/2000, named “Tender offers in the capital market for the acquisition of securities”, set the new framework for takeover bids (HCMC Rule 1/195/2000) (Spanos, 2005).

In alliance with the HCMC, the Ministry of National Economy and Development set up a law in 2000, creating a committee on corporate governance, the Rokkas Committee. This led to an intense debate between the Hellenic Federation of Industries, which believed that a corporate governance voluntary code should be applied, and the State, which wanted a law that would make additional corporate governance items mandatory (Spanos, 2005).

In August 2001, the Hellenic Federation of Industries introduced voluntary principles of corporate governance primarily for companies listed in the ASE (Tsipouri and Xanthakis, 2004). In March 2002, a corporate governance rating system was presented by the Center of Financial Studies of the University of Athens, based on these voluntary principles (Spanos, 2005). The main conclusions drawn from this survey were that, overall, Greek companies listed on the ASE demonstrated a fairly satisfactory degree of compliance with corporate governance principles (Tsipouri and Xanthakis, 2004).

The year 2002 was a critical year for corporate governance in Greece. In May 2002, the Greek Ministry of National economy created Law 3016/2002, named “On

Corporate Governance, board remuneration and other issues”.¹³ The law set by the Greek Ministry of National Economy was based on the initial plan of the Rokkas Committee. For the first time, Greek listed companies were obliged to enforce a set of governance guidelines. The main requirements according to the new law involved the composition of the board of directors, non-executive directors’ remuneration, internal auditing, share capital increases and the participation of shareholders in the decision-making process (Dimitropoulos and Asteriou, 2010). Law 3016/2002 mandates that the number of non-executive directors be at least 1/3 of the total number of board members. At least two of the non-executive directors should be independent, whereby independence is defined as board members that do not own any stock of the firm and are not on the company’s payroll (Dasilas and Papasyriopoulos, 2015). Additionally, the law requires all listed firms to adopt an internal audit function so as to ensure the credibility of the disclosed information. Greek firms are free to choose their leadership structure between a unitary leadership structure, that is CEO duality, or a two-tier leadership structure (non-duality) (Dasilas and Papasyriopoulos, 2015). It is worth noting that throughout this legal process of the creation and implementation of the governance law, the Hellenic Federation of Industries firmly believed that governance codes should be voluntary and not legally enforceable (Florou and Galarniotis, 2007).

In an effort to continuously reform and revise the existing corporate governance law, in July 2002, the ASE established qualitative criteria covering corporate governance, transparency and communication. These were optional and in addition to the laws that already existed (Spanos, 2005).

Based on this effort of continuous improvement, Greece transposed a number of discrete legislative acts from several European directives in the area of company law into the Greek legal framework, creating new CG rules. More specifically, Law 3693/2008, named “Mandatory audit of annual and consolidated financial reports” requires the existence of an audit committee for all listed firms and complete disclosure of the firm’s relationship with the external auditor is required. In accordance with this

¹³ Many argued that this law was a response to numerous scandals in the 1990s (Dasilas and Papasyriopoulos, 2015).

law, firms are obliged to provide a comprehensive description of their external audit firm including its corporate governance structure, its professional relationship with the firm and all fees provided to it. The audit committee oversees the external auditor and ensures its independency and objectivity, especially in cases where the external audit firm provides non-audit services, such as consulting or tax-related services, that could potentially compromise its objectivity and independence. Additionally, audit committee characteristics, such as member independence and expertise need to be disclosed. Law 3693/2008 transposes the 8th European Directive 2006/43/EC on Company Law into Greek legislation on statutory audits of annual and consolidated accounts (Nerantzidis and Filos, 2014; Zhou et al., 2018).

In 2010, Law 3873/2010, named “Mandatory reports by a certified expert for mergers and dissolutions of corporations” was created, incorporating into Greek legislation EU Directive 2006/46/EC and 2007/63/EC. This law’s greatest contribution is the requirement for all listed firms to disclose a CG statement in their annual report. This CG statement gives information on mandatory and voluntary CG practices the firm applies, while providing reasons for not conforming to the requirements of CG laws. The law also permits firms to either adopt existing CG codes or create their own CG code based on their firm’s needs. The CG statement should include information on the main features of any principle risk management system the firm has, existing internal controls for the preparation of the firm’s financial statements and the composition of the board and its committees. Penalties should be imposed on the board members of firms that do not prepare such a CG statement in their annual report (Nerantzidis and Filos, 2014).

In addition to this law, in 2010, Law 3884/2010, named “Exercise of shareholders’ rights for listed firms”, was introduced concerning the rights of shareholders and the company’s obligation regarding disclosure of information prior to general meetings. This law incorporated into Greek legislation EU Directive 2007/36/EC. This law enables all shareholders to either personally participate and vote in general meetings or appoint a representative for the general meeting. The principle innovation of this law is the establishment of e-participation, i.e. watching or interacting in real time, as well as mail voting or e-voting, to allow for distant voting (Nerantzidis and Filos, 2014).

A voluntary CG code in Greece appeared in December 2010 by the Hellenic Association of Investors & Internet (SED), a non-profit association that acts as a representative of private investors of Greece in the advisory Committee of Hellenic Capital Market. In the 8th Conference of their Association, a ‘Charter-Map of Corporate Governance’ was introduced for Greek listed firms in the ASE. This ‘Charter-Map’ promotes the use of international CG best practices so as to enhance transparency and shareholder activism. SED also created a CG index based on the ‘Charter-Map’, so as to assess Greek listed firms on CG practices they adopted (Nerantzidis and Filos, 2014).

The establishment of laws concerning corporate governance mechanisms provided a stimulus for the Hellenic Federation of Industries to prepare a formal *Corporate Governance Code* for listed companies. A well-developed first draft was published in 2010 and after suggestions and feedback the final draft, with minor amendments, was published in 2011. The main objective of the Code was to educate and guide board of directors of Greek companies on governance best practice. Another crucial aim of the Code was to improve shareholder information and provide an easily available reference system for listed companies, which, as of 2011, are required by Law 3873/2010, as mentioned earlier, to disclose annually information about their corporate governance, in a statement as a specific and clearly identifiable section of the annual report. Additionally, this Code was the first CG code that explicitly stated that Greek firms should apply the ‘comply or explain’ concept, a concept that other EU members had already practiced.

In 2012, the Hellenic Exchanges in a joint collaboration with the Hellenic Federation of Industries formed the Hellenic Corporate Governance Council (HCG Council). The HCG Council encourages, supports and monitors the implementation of a CG code by Greek firms. The Code implemented could either be the existing CG Code or one that a firm creates based on its needs. HCG Council as a distinct body that certifies the relevance and implementation of a CG code, indicates the recognition of the importance of corporate governance in sustaining the competitiveness of Greek firms and enhancing their credibility in the eyes of Greek and foreign investors (Grose et al., 2014).

A first review of the Greek CG code created at the initiative of the Hellenic Federation of Industries in 2010, was conducted in 2013 by the Hellenic Corporate Governance Council. The revised code, created in 2013, is now called the *Hellenic Corporate Governance Code*, which continues to promote the enhancement of the Greek corporate institutional framework.

2.6 Conclusion

Greece is a country with the characteristics of a Continental European corporate governance system. Nevertheless, the characteristics of Greek corporate governance laws are influenced by SOX (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).

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 (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 shareholder rights has not yet been completely answered (Spanos, 2005; Nerantzidis, 2015).

In this context, this study examines the effectiveness of internal corporate governance mechanisms of a non-Anglo Saxon country, Greece, on earnings management and firm performance. Motivated by the enactment of Law 3693/2008, the effect of corporate governance mechanisms on earnings management practices is tested. Additionally, in light of the current sovereign-debt crisis in Greece, corporate governance mechanisms effect on Greek firm's performance is studied. Table 2-1 shows the main events concerning the evolution of corporate governance in Greece.

Table 2-1 Evolution of CG laws and codes in Greece

1998	Paper published by ASE resulting in the first formal introduction of CG
1999	Development of a voluntary CG Code developed by the Committee of CG in Greece, titled " <i>Principles of Corporate Governance in Greece-Recommendations for its Competitive Transformation</i> ".
2000	Development of two major rules by the HCMC concerning CG practices. The first rule, Rule 5/204/2000, named " <i>A code of conduct for companies listed on the Athens Stock Exchange and their affiliated parties</i> " and the second rule, Rule 1/195/2000, named " <i>Tender offers in the capital market for the acquisition of securities</i> ".
2001	Introduction of voluntary CG principles by the Hellenic Federation of Industries.
2002	Enactment of CG law for listed firms, Law 3016/2002, named " <i>On Corporate Governance, board remuneration and other issues</i> ".
2002	The ASE established qualitative criteria covering corporate governance, transparency and communication.
2008	Enactment of CG law, Law 3693/2008, named " <i>Mandatory audit of annual and consolidated financial reports</i> " requiring all listed firms to have an audit committee.
2010	Enactment of CG law, Law 3873/2010, named " <i>Mandatory reports by a certified expert for mergers and dissolutions of corporations</i> " requiring listed firms to disclose an annual CG statement in their annual report.
2010	Enactment of CG law, Law 3884/2010, named " <i>Exercise of shareholders rights' for listed firms</i> " concerning the rights of shareholders and the firm's obligation to disclose information prior to general meetings.
2010	Additional CG codes were introduced by the Hellenic Association of Investors & Internet (SED)
2010	Hellenic Federation of Industries prepared a formal voluntary CG code for listed firms named <i>Corporate Governance Code</i>
2013	Hellenic Corporate Governance Council updated the voluntary CG code for listed firms now called the <i>Hellenic Corporate Governance Code</i>

Chapter 3 – Literature Review and Hypothesis Development (CG & EM)

3.1 Introduction

Chapter one identifies the research questions tackled in this thesis. Chapter two discusses issues pertaining to corporate governance, focusing on the issue of corporate governance in Greece. This chapter reviews the literature pertaining to the association between facets of corporate governance and earnings management. The chapter begins by examining the theoretical framework concerning the impact of CG on EM in section 3.2. Corporate governance is examined from two perspectives - audit committee effectiveness in section 3.3, and overall CG quality, proxied by a corporate governance index, in section 3.4. Earnings management is examined through accrual-based EM studies, in line with most EM literature.¹⁴ The literature review forms the basis for the hypotheses development in section 3.5. Finally, section 3.6 concludes the chapter. Consequently, the hypotheses are tested and discussed in chapters 4 and 5.

3.2 Theoretical framework for the impact of CG on earnings management

Among the various theories that apply to corporate governance, the key theories that provide the theoretical framework that help to explain the relationship between corporate governance and earnings management are agency theory, stakeholder theory and stewardship theory.

The basis of agency theory is the separation of ownership and control. Managers are often motivated by their own self-interest, rather than those of shareholders. This conflict of interest is costly and difficulties exist in verifying that managers strive for maximization of shareholder value (Jensen and Meckling, 1976; Fama and Jensen, 1983). The pursuit of self-interest by management creates an incentive to manage a firm's earnings so as to achieve specific personal benefits. Managers can exercise

¹⁴ According to Dechow et al. (2010) abnormal accrual-based, which reflect earnings management, are the most extensively used proxy of earnings quality in empirical accounting research. As such in line with most EM literature and data constraints accrual-based EM studies are examined in this study.

discretion on accruals, which can reduce the relevance and reliability of reported earnings, whereby earnings management is a type of agency cost. As a result, managers cannot be trusted and strict monitoring is needed. The role of the board of directors is significant in monitoring top management so as to ensure that managers act in the best interests of shareholders. Corporate governance literature emphasizes this role in resolving agency problems (Peasnell et al., 2005). The use of audit committees is also considered an important part of the decision control system, in an effort to deal with agency problems (Jensen and Meckling, 1976; Fama and Jensen, 1983). Given agency assumptions, enhancing corporate governance mechanisms should result in the reduction of earnings management practices.

Stewardship theory takes an opposing perspective. Under this theory the interests of managers and shareholders are aligned. Managers are trustworthy and are good stewards of the firm and should be entrusted with the firm's resources. Monitoring is unnecessary since managers are not opportunistic and act in the best interest of the shareholders. They should be given autonomy, since they gain satisfaction through effectively performing their work and achieving organization's goals. Non-financial motives, such as the need for achievement, recognition, respect and work ethic influence the decisions made by managers (Donaldson and Davis, 1994; Davis et al., 1997; Chen et al., 2007). Under stewardship theory, managers are less likely to practice earnings management and the board of directors is an instrument that assists managers rather than monitors them.

Stakeholder theory advocates the concept that firms and society are interdependent and firms are not only responsible to their shareholders, but also serve a broader social purpose (Kiel and Nicholson, 2003). Although agency theory expects the board to look after the interests of shareholders, stakeholder theory expects the board to consider the interests of many stakeholder groups, including social, environmental and ethical interest groups (Freeman, 2004). The link between earnings management and stakeholder theory suggests that management might conduct EM in order to obtain personal benefits, at the expense not only of the shareholders but also of additional stakeholders. Under stakeholder theory effective corporate governance mechanisms should protect all stakeholders' interests (Prior et al., 2006). The difficulty of

stakeholder theory is to align the various interests of different stakeholders and consider their needs of equal value. As such, it has less impact on policy making of corporate governance due to the common criticism that aligning various conflicting stakeholder interests can undermine the welfare of the firm (Sternberg, 1997).

Each of these theories are useful in considering the efficiency and effectiveness of the monitoring and control functions of corporate governance. However, these theories are considered complements not substitutes to agency theory, thus this study draws upon agency theory to examine the relationship between earnings management and corporate governance.

Prior literature examining the relationship between earnings management and corporate governance, either through audit committee variables, such as size, independence, diligence and expertise, as well as corporate governance indices, is presented in the following sections. The relationship between corporate governance and earnings management is examined to develop research hypotheses for further analysis.

3.3 The audit committee and earnings management

Among the designated board committees, such as the audit committee, the nomination committee, and the remuneration committee, the audit committee is responsible for ensuring compliance to generally accepted accounting principles, so as to maintain the credibility of a firm's financial statements (Lin and Hwang, 2010). An audit committee is responsible for supervising the accounting process and works as a coordinator between external and internal auditors (Piot and Janin, 2007). It is an important part of the decision control system, with respect to the internal monitoring by the board of directors, and has the delegated responsibility of protecting and progressing shareholders' interests (Fama and Jensen, 1983; Chen and Zhang, 2014). It ensures that accurate financial information is provided to decision-makers by monitoring management's possible opportunistic behaviour (Chen and Zhang, 2014). The committee's composition, size, activity, expertise, ownership and tenure are manifestations of the level of corporate governance of firms (Ghosh et al., 2010).

The board of directors delegates the process of monitoring financial reporting to the members of the audit committee. They are responsible for the accuracy of the financial statements in consultation with the external auditors (Abed et al., 2012). Although they are primarily responsible for the reliability of reported earnings, legal responsibility still lies with the full board (Marra et al., 2011).

An audit committee increases the quality of the audit process in two ways. Firstly, an audit committee supervises the major accounting choices made and therefore mitigates EM. Second, it works as a coordinator between internal and external auditors and protects the independence of external auditors from managerial pressures. This increases the probability that auditors will report irregularities discovered without hesitation (Piot and Janin, 2007).

Most of the literature indicates that the existence of audit committees mitigates EM. More specifically, Dechow et al. (1996) with a sample of 92 US firms under SEC investigation for manipulating earnings between April 1982 and December 1992, Jaggi and Leung (2007) for Hong Kong for a total of 523 firm-year observations for the period 1999-2000, Piot and Janin (2007) with 225 firm-year observations for France for the period 1999-2001, Baxter and Cotter (2009) for 309 Australian firms for the year 2001, Marra et al. (2011) for a sample of 888 Italian firm-year observations from 2003 to 2006 and Chen and Zhang (2014) for a sample of 3,129 firm-year observations of Chinese listed firms on the Shanghai and Shenzhen stock exchanges from 2000 to 2006, find that audit committees constrain EM. The only exception is the study by Peasnell et al. (2005) for 1,271 firm-year observations for UK listed firms for the period 1993-1996 who find no link between the existence of audit committees and EM.

The effectiveness of audit committees depends on its widely recognized monitoring roles. Literature has identified many aspects that contribute to an effective audit committee. *Composition* of an audit committee, primarily in terms of independence, *diligence*, shown as committee size, number and length of meetings, and *competence*, in terms of financial and industry expertise are key factors that make an audit committee effective (Carcello et al., 2002; Abbott et al., 2004; Zaman et al., 2011; Al-Shaer and Zaman, 2016; Lary and Taylor, 2012).

The characteristics of the audit committee such as its size, independence, diligence and expertise have been studied in relation to EM, as a monitoring mechanism of management in the financial reporting process (Lin and Hwang, 2010; Ellwood and Garcia-Lacalle, 2016).

Audit Committee Size and Earnings Management

The complexity of a company's financial information requires audit committee members to exert considerable effort. As such, a large committee is needed so as to ensure the necessary resources and manpower needed to control EM. However, as the size of the audit committee increases, the risk of facing 'the free-rider' problem also increases, whereby individual members of the committee may not apply the effort needed (He and Yang, 2014).

Many codes and recommendations on Corporate Governance, such as the UK Corporate Governance Code recommends a minimum audit committee size of three, while SOX (2002) requires a minimum of three members (Sierra Garcia et al., 2012). Bedard et al. (2004) state the larger audit committees have a greater probability of detecting potential financial reporting problems, due to the wide range of views and expertise that ensures effective monitoring (Katmon and Farooque, 2017). Greater diversity of intellectual, social and professional backgrounds is more likely to exist in larger audit committees, thus increasing the committee's effectiveness in mitigating EM (Baxter and Cotter, 2009; Ellwood and Garcia-Lacalle, 2016).

Research examining the relationship between audit committee size and accrual-based EM is seen in Anglo-American and non-Anglo-American settings. Some studies find a negative relationship between audit committee size and accrual-based EM (Ghosh et al., 2010; Kent et al., 2010; Sierra Garcia et al., 2012), while others find no association (Xie et al., 2003; Bedard et al., 2004; Davidson et al., 2005; Baxter and Cotter, 2009; Jaggi et al., 2009; Katmon and Farooque, 2017; He and Yang, 2014; Ramachandran et al., 2015).

Audit Committee Independence and Earnings Management

The existence of an audit committee is not necessarily sufficient in mitigating EM and the effectiveness of the audit committee's monitoring role arguably depends on how the committee is structured and organized. Independent members of audit committees are considered to be more effective monitors, and so are more capable of constraining EM, as they do not have personal incentives and can better restrain managerial reporting discretion (Ghosh et al., 2010). Additionally, independent members have the incentive to maintain their reputation in the market as independent, competent professionals and do not want to risk potential litigation and loss of directorships (Sharma and Kuang, 2014). For this reason, international regulations such as SOX (2002), the UK Corporate Governance Code and the code of Australian Stock Exchange CG Council (ASX) (2003), all emphasize the importance of independent audit committee members in effectively monitoring financial reporting (Sharma and Kuang, 2014). As an example, the New York Stock Exchange Standards and the UK Corporate Governance Code require listed firms on NYSE and the LSE respectively, to have audit committees with a minimum of three independent members (Chen and Zhang, 2014).

The relationship between audit committee independence and accrual-based EM has been studied by many researchers both in Anglo-Saxon settings such as the US and Australia, as well as non-Anglo-Saxon settings, such as in Spain, France, and Malaysia.

Klein (2002a), Xie et al. (2003), Bedard et al. (2004), Davidson et al. (2005), Bradbury et al. (2006), Hutchinson et al. (2008), Kent et al. (2010), Chen and Zhang (2014) and Sharma and Kuang (2014) all find that the presence of a majority of independent members on the audit committees limits accrual-based EM. However, there is no definite conclusion in the literature on the issue of whether a majority of independent audit committee members or an audit committee comprised of only independent members is more effective in mitigating EM (Sharma and Kuang, 2014). More specifically, Klein (2002a) and Davidson et al. (2005) suggest that the critical threshold for the number of independent audit committee members is over fifty percent. Instead, Bedard et al. (2004) and Sharma and Kuang (2014) find that an audit committee consisting of 50-99% independent members has no significant effect on mitigating EM,

while a significant reduction in EM is found only when 100% of the members of the audit committee are independent. On the other hand, Rashidah and Fairuzana, (2006), Yang and Krishnan (2005), Ghosh (2010), Katmon and Farooque (2017), Osma and Noguera (2007) and Sierra Garcia et al. (2012), Piot and Janin (2007) and Baxter and Cotter (2009) find that the degree of independence of audit committees has no incremental effect on the mitigation of accrual-based EM.

Audit Committee Expertise and Earnings Management

Members of the audit committee that have financial expertise are in a superior position to monitor the integrity of the financial statements. They possess similar heuristic techniques to external auditors in the decision making process, positively impacting their oversight judgement, demanding higher quality audits and facilitating the effective communication with internal and external auditors on the issue of controls (Lary and Taylor, 2012; Alzeban and Sawan, 2015). This expertise helps the audit committee better understand the firm's risk management strategies. They can make more appropriate financial decisions and conduct an accurate cost-benefit analysis of the operational decisions (Alzeban and Sawan, 2015). Accounting and auditing expertise allows members of the audit committee to assess independently financial issues that are presented to them (Baxter and Cotter, 2009).

The competence of an audit committee depends on its ability to detect financial irregularities, such as EM. Financial knowledge is often needed by audit committee members to maintain attention over the firm's financial reporting. Xie et al. (2003) state that an independent member that has financial background is more likely to be acquainted with various forms of earnings manipulation, such as EM.

The importance of financial expertise in audit committees, is shown by the fact that regulations and codes require at least one member of the audit committee to possess financial expertise (e.g. the UK Corporate Governance Code and SOX (2002)).

Literature examining audit committee expertise, such as Xie et al. (2003), Bedard et al. (2004), Sharma and Kuang (2014), He and Yang (2014) and Chen and Zhang (2014) reveal that audit committees with financial experts mitigates EM. However, the work

by Yang and Krishnan (2005), Rashidah and Fairuzana (2006), Baxter and Cotter (2009), Ghosh et al. (2010), Kent et al. (2010), and Katmon and Farooque (2017) find no association between audit committee expertise and EM.

Audit Committee Meetings and Earnings Management

The frequency of meetings between audit committee members enhances the communication process. Bedard et al. (2004) state that frequency is an indicator of effectiveness. Audit committees should allocate sufficient time to discuss key financial issues of the firm. An active audit committee is in a position to rectify any problem immediately and is in a better position to accomplish its monitoring role. This results in higher quality financial reporting and thus less EM (Sierra Garcia et al., 2012; Katmon and Farooque, 2017).

Various codes and recommendations, such as the UK Corporate Governance Code and SOX (2002) state that audit committee meetings should not be less than three or four times per year and should correspond to important financial reporting dates and the audit cycle.

Prior studies have shown inconsistent results between audit committee meetings and accrual-based EM. Some have shown an inverse relationship between the number of meetings and EM (Xie et al., 2003; Baxter and Cotter, 2009; Kent et al., 2010; Sierra Garcia et al., 2012). Some have shown a positive relationship between the two (Ghosh et al., 2010; Katmon and Farooque, 2017), while others find no association (Bedard et al., 2004; Davidson et al., 2005; Yang and Krishnan, 2005; Rashidah and Fairuzana, 2006; Hutchinson et al., 2008).

Audit Committee Effectiveness and Earnings Management

Research has also indicated that the effectiveness of an audit committee may depend on multiple characteristics and not a single one (e.g. independence), so researchers have developed composite measures. Each audit committee variable used in a composite measure individually influences audit committee quality, but the joint effect of all audit

committee variables is considered to have the greatest impact on the effectiveness of audit committees (Zaman et al., 2011).

In line with this premise, Kent et al. (2010) and Zaman et al. (2011) extend prior research by using audit committee variables not in isolation but as a group, creating a composite measure of 'audit committee effectiveness' (ACE). Their composite measure (ACE) consists of four audit committees variables: independence, financial expertise, size, and frequency of meetings.

Kent et al. (2010) examine the association between corporate governance mechanisms, such as board independence, a Big 4 audit firm, individual audit committee characteristics such as audit committee size, diligence, independence and expertise, as well as a composite measure of audit committee effectiveness and accruals quality. Their sample consists of 392 listed Australian firms for governance data for the year 2004 and accruals quality measures for the period 2001-2005. They find a significant positive relationship between a Big 4 audit firm and a large, independent and diligent audit committee and accruals quality. Zaman et al. (2011) examine the effect of ACE in audit fees and non-audit service fees for a sample of 540 UK listed non-financial firm-year observations for the period 2001-2004. They find a significant positive relationship between ACE and audit fees and non-audit fees for larger clients.

3.4 Corporate governance index and earnings management

Larcker and Richardson (2004) state that looking at each individual CG variable by itself limits the ability to measure the entire magnitude of CG and provides an incomplete analysis of the determinants of EM. A corporate governance index provides a complete picture of the quality of corporate governance, capturing the multidimensional character of corporate governance.

In line with this, Larcker et al. (2007) use 39 individual measures of CG grouped into seven categories: characteristics of the board of directors; stock ownership by executives and board members; stock ownership by institutions; stock ownership by activist shareholders; debt and preferred stock holdings; compensation mix variables; and anti-takeover devices. These 39 individual governance items result in the creation

of 14 multi-indicator CG indices based on exploratory principal component analysis (Larcker et al., 2007). The authors examine 2,106 firms in the year 2003 and find that the 14 CG indices¹⁵ are associated with EM. Their research reveals an association between some governance indices and EM, such as stock ownership by activist holders, board size, antitakeover devices and old directors. However, the association between the majority of governance factors and EM produces mixed results.

Shen and Chih (2007) also examine the relationship between CG and EM by using a CG index. Their CG index is created using CG data found in the Credit Lyonnais Security Asia (CLSA) report for nine Asian countries.¹⁶ The CLSA report includes CG information about 495 firms in 25 Asian countries for the period between April 2001 and February 2002, covering seven categories: management discipline; transparency; independence; accountability; responsibility; fairness; and social awareness. Shen and Chih (2007) find that firms with poor CG quality, based on these measures, engage in more EM.

Similarly, Bowen et al. (2008) test a CG score, based on the Gompers et al. (2003) G-index,¹⁷ and test the association of this CG score with EM. Their CG index is based on 3,154 US firm-year observations for the period 1992-1995. They find no significant relationship between CG and EM.

Jiang et al. (2008) used the Gov-Score based on the research by Brown and Taylor (2006),¹⁸ to examine the relationship between CG and earnings quality. They use US data for 4,311 firm-year observations for the period 2002- 2004 and examine the effect of the CG index on earnings quality. Their study concludes that higher levels of CG are associated with lower levels of EM, thus higher earnings quality.

¹⁵ CG data for the sample was generated from two comprehensive datasets: Equilar Inc. and TrueCourse Inc and covered 70% of the Russell 3000 market capitalization in the US. Equilar Inc. provides complete data on board, board committees (audit and compensation) and equity ownership by executives and board members. TrueCourse Inc. is a dataset that consists of anti-takeover provisions for US firms that are incorporated in major indices such as the Fortune 500, Standard & Poor's Super 1500 and others.

¹⁶ The nine Asian countries used in the study are Hong Kong, India, Indonesia, Korea, Malaysia, the Philippines, Singapore, Taiwan and Thailand.

¹⁷ For more details on the Gompers et al. (2003) G-index consult Chapter 4.

¹⁸ For more information on the research of Brown and Taylor (2006) consult Chapter 4.

Bekiris and Doukakis (2011) examine the association between CG and EM for firms listed in the Athens, Milan and Madrid Stock Exchanges for the year 2008. Their CG index consists of 55 individual CG items, categorized into five areas: board of directors; audit; remuneration; shareholder rights; and transparency. Variables included in their CG index were taken from the existing literature,¹⁹ two basic CG rating firms,²⁰ as well as the Standard and Poor's Disclosure and Transparency Index. Their sample consists of 185 firms listed on the Athens Stock Exchange, 155 firms listed on the Milan stock exchange and 87 firms on the Madrid Stock Exchange, resulting in a total sample of 427 firms. Their research concludes that an inverse relationship between CG and EM exists, both overall as well as in each market separately.

Shan (2015) examines whether good governance practices are more likely to constrain EM for firms listed on the Shanghai SSE 180 and Shenzhen SSE 100. His final sample consists of 1,012 firm-year observations for the period 2001-2005. Corporate governance quality is proxied through the creation of a CG index, consisting of eight corporate governance mechanisms: state & foreign ownership concentration, board size, board independence, supervisory board, professional supervisor, audit committee independence and Big 4 auditor. His research suggests that firms with good governance practices mitigate EM.

Table 3-1 illustrates the findings of prior studies conducted on internal corporate governance mechanisms and accrual-based earnings management found in the literature.

¹⁹ See Florou and Galarniotis (2007).

²⁰ Risk Metrics, former ISS and GMI Ratings.

Table 3-1 Findings of prior studies on Corporate Governance and Accrual-based Earnings Management

AUTHORS	PERIOD	SAMPLE SIZE	CG VARIABLES	COUNTRY
Dechow et al. (1996)	1982-1992	92 firms	Board independence (-), Board size (+), Audit Committee (-)	USA
Klein (2002a)	1992-1993	692 firm-year observations	Board independence (-), CEO duality (+), Audit Committee independence (-)	USA
Xie et al. (2003)	1992/1994/1996	282 firm-year observations	Board size (-), Board independence (-), CEO duality (0), Audit Committee independence (-) Audit Committee expertise (-) Audit Committee size (0) Audit Committee meetings (-)	USA
Bedard et al. (2004)	1996	300 firms	Audit Committee independence (-) Audit Committee expertise (-) Audit Committee size (0) Audit Committee meetings (0)	USA
Peasnell et al. (2005)	1993-1996	1271 firm-year observations	Board independence (-) , Audit Committee(0)	UK
Davidson et al. (2005)	2000	434 firms	Board independence (-), CEO duality (0), Audit committee (0) Audit Committee independence (-) Audit Committee size (0) Audit Committee meetings (0)	Australia
Yang and Krishnan (2005)	1996-2000	896 firm-year observations	Audit Committee independence (0) Audit Committee expertise (0) Audit Committee meetings (0)	USA
Bradbury et al. (2006)	2000	139 firms/113 firms	CEO duality (0), Board size (-), Board independence(0), Audit Committee independence(-)	Singapore and Malaysia
Rashidah and Fairuzana (2006)	2002-2003	97 firm-year observations	Board independence (0), CEO duality (0), Board Size (+), Audit Committee independence (0) Audit Committee expertise (0) Audit Committee meetings (0)	Malaysia
Jaggi and Leung (2007)	1999-2000	523 firm-year observations	Board Size (+), Audit Committee (-)	Hong Kong
Larcker et al. (2007)	2003	2109 firms	CG index (mixed results)	USA
Osma and Noguera (2007)	1999-2001	155 firm-year observations	Board independence (+), Audit Committee independence (0)	Spain
Piot and Janin (2007)	1999-2001	225 firm-year observations	Audit committee (-) Audit Committee independence (0)	France
Shen and Chih (2007)	2001-2002	495 firms	CG index taken from CLSA (-)	Asian countries
Hutchinson et al. (2008)	2000 & 2005	200 firms	Board independence (-) Audit Committee independence (-) Audit Committee meetings (0)	Australia
Jiang et al. (2008)	2002-2004	4311 firm-year observations	CG index based on the Gov-score (-)	USA
Bowen et al. (2008)	1992-1995	3154 firm-year observations	CG index using G-score (0)	USA

Chapter 3- Literature Review and Hypothesis Development (CG & EM)

AUTHORS	PERIOD	SAMPLE SIZE	CG VARIABLES	COUNTRY
Baxter and Cotter (2009)	2001	309 firms	Audit Committee (-) Audit Committee independence (0) Audit Committee expertise (0) Audit Committee size (0) Audit Committee meetings (-)	Australia
Ghosh et al. (2010)	1999-2006	9290 firm-year observations	Board independence (0), Board size (-), CEO duality (0), Audit Committee independence (0) Audit Committee size (-) Audit Committee meetings (+) Audit Committee expertise (0)	USA
Kent et al. (2010)	2001-2005	392 firms	Board independence (0), Audit Committee Independence (-), Audit Committee expertise (0), Audit Committee size (-), Audit Committee meetings (-), Audit Committee Effectiveness (0)	Australia
Marra et al. (2011)	2003-2006	888 firm-year observations	Board independence (-), Audit Committee (-)	Italy
Bekiris and Doukakis (2011)	2008	185 firms/155 firms/ 87 firms	CG index (-)	Greece, Italy, Spain
Sierra Garcia et al. (2012)	2003-2006	432 firm-year observations	Audit Committee independence (0) Audit Committee size (-) Audit Committee meetings (-)	Spain
Chen and Zhang (2014)	2000-2006	3129 firm-year observations	Board independence (-), Audit Committee (-), Audit Committee independence (-) Audit Committee expertise (-)	China
Gonzalez and Garcia-Meca (2014)	2006-2009	1740 firm-year observations	Board size (+), Board independence (-), CEO duality (0), Government Index (-)	Latin America
Sharma and Kuang (2014)	2004-2005	194 firm-year observations	Audit Committee independence (-) Audit Committee expertise (-)	New Zealand
He and Yang (2014)	2003-2007	1500 S&P firms	Audit Committee Size (0) Audit Committee expertise (-)	USA
Ramachandran et al. (2015)	2010-2011	326 firms	Board size (+) Board independence (0) CEO duality (0) Audit Committee Size (0)	Singapore
Shan (2015)	2001-2005	1012 firm-year observations	CG index (-)	China
Katmon and Farooque (2017)	2005-2008	145 matched-pair sample (290 observations)	Board size (0), Board independence (0), Audit Committee Independence (0), Audit Committee expertise (0), Audit Committee size (0), Audit Committee meetings (+)	UK

Studies in this table only include accrual-based earnings management research and proxy corporate governance using internal corporate governance mechanisms such as board size & independence, CEO duality, audit committee composition, as well as CG indices. Studies are listed in chronological order according to publication date.

(0): no relationship between CG variable and EM.

(+): positive relationship between CG variable and EM.

(-): negative relationship between CG variable and EM.

3.5 Hypothesis development

The following section discusses the development of the hypotheses on the effect of composite measures of governance, such as audit committees' effectiveness and CG indices, on EM in a Greek context.

Kent et al. (2010) and Zaman et al. (2011) use audit committee variables not in isolation but as a group, creating a composite measure of 'audit committee effectiveness' (ACE). Their composite measure (ACE) consists of four audit committees variables: independence, financial expertise, size, and frequency of meetings.

The use of these four audit committee variables is considered suitable to measure audit committee effectiveness since they have been included in governance codes at both an international level, for example in the UK Corporate Governance Code as well as at a local level, as proposed by the Greek CG code.

In the Greek setting, Greek CG law does not require a minimum audit committee size, while the 2010 Greek CG Code Section B1-Internal Controls (2013) recommends three members as a minimum size, to ensure that they function effectively. In the Greek context, it is recommended that the majority of members of the audit committee to be independent non-executive members. Greek Law No.3693/2008, article 37, states that an audit committee should have at least one independent non-executive member, while the 2010 Greek CG Code, Section B1-Internal Controls (2013) strongly advises Greek listed firms to have an audit committee with non-executive members where the majority consists of independent non-executive members. It is evident that importance is placed on the independence of audit committee members to ensure their effectiveness in the process of monitoring financial reporting. In Greece, at least one member of the audit committee should have relevant financial and/or accounting expertise to ensure the reliability of financial reports. Greek Law 3693/2008, Article 37 states that the independent audit committee member should have financial expertise, defined as holding a degree in accounting or finance, or professional qualifications such as CPA, CMA, or ACCA. The 2010 Greek CG Code, Section B1-Internal Controls (2013) confirms that at least one member of the audit committee should have proven adequate

accounting experience. Thus, importance is placed in audit committee expertise for effective monitoring of financial statements. Although Law 3693/2008 or earlier Greek laws does not mandate a minimum number of meetings per year, the 2010 Greek CG Code, Section B1-Internal Controls (2013) recommends the minimum number of meetings per year to be four, as it coincides with the required quarterly audit review.

In the spirit of Kent et al. (2010) and Zaman et al. (2011), this study uses a composite measure of audit effectiveness (ACE), incorporating the four audit committee variables, to examine its effect on EM. The use of ACE, as an indication of audit committee effectiveness, assists in the creation of the following hypothesis:

H1. A negative relationship between the composite measure of audit committee effectiveness (ACE) and EM is expected.

Although the Greek CG code recommended the existence of an audit committee for Greek firms since 1999, it only became mandatory in 2008 with Law 3693/2008, article 37. The implementation of Greek law 3693/2008 is expected to create a greater association between ACE and EM, and accordingly, the following hypothesis is also tested:

H1a. For the periods after 2008, a more negative relationship between the composite measure of audit committee effectiveness (ACE) and EM is expected.

In line with the rationale behind the composite measure of an audit committee, there is also a rationale for creating a composite measure of corporate governance, in the form of a corporate governance index. The use of an overall corporate governance index captures the multidimensional character of corporate governance and provides a more holistic indication of corporate governance quality.

In the Greek context, the effect of a CG index on EM has been examined only by Bekiris and Doukakis (2011), where they report a significant negative relationship between the two variables. Their study focuses on the year 2008 whereby the basic governance law that existed was Law 3016/2002. Additionally, their sample includes 427 firms of which 185 are Greek listed firms, 155 Italian and 87 Spanish. This study also examines

the relationship between a CG index created for Greek listed firms and EM. However it focuses on the period 2006-2012, where apart from Law 3016/2002, additional governance-related laws are enacted, such as Law 3016/2008, Law 3873/2010 and Law 3884/2010, as well as the 2010 Greek CG Code that affect the governance mechanisms of Greek listed firms.²¹ Finally, this study includes 788 firm-year observations examining a single country setting, Greece.

Based on the overall view in the literature the following hypothesis is tested:

H2. A negative relationship between the CG index created for Greek firms and EM is expected.

The implementation of Greek law 3693/2008 is expected to create a stronger negative association between the CG index created for Greek firms and EM, and accordingly the following hypothesis is also tested:

H2a. For the periods after 2008, a more negative relationship between the CG index created for Greek firms and EM is expected.

3.6 Conclusion

This chapter examines the literature concerning the internal governance mechanisms that mitigate accruals earnings management. Corporate governance quality is examined through a composite measure of audit committee characteristics and a multi-dimensional proxy of governance quality, a CG index.

Literature examining audit committee effectiveness, proxied by audit committee independence, size, frequency of meetings and member expertise, as well as a composite measure and its effect on accruals EM is demonstrated. Finally, literature discussing the relationship between CG indices and accruals EM is considered.

This literature review forms the basis for the development of the hypotheses that are tested in Chapter 5.

²¹ For a discussion of the Greek CG laws and Greek CG codes consult Chapter 2.

Chapter 4 – Research Design (CG & EM)

4.1 Introduction

The previous chapter reviews prior empirical studies examining the effect of corporate governance on earnings management and discusses the development of the relevant hypotheses. This chapter provides a description and analysis of the methods applied in collecting and preparing the data necessary to test these hypotheses. Section 4.2 describes the earnings management models employed in the literature, while section 4.3 describes how international CG indices and Greek CG indices have been created. Weighting methods used to create CG indices are discussed in section 4.4. The methodology used to measure the dependent variable, earnings management in this study, is described in section 4.5. The independent variable, corporate governance, measured by a corporate governance (CG) index, as well as audit committee characteristics as captured in this study, are all discussed in section 4.6 and section 4.7 analyzes the control variables used. Finally, the empirical research models used are presented in sections 4.8 and 4.9 and the sample selection and data collection procedures in section 4.10. Section 4.11 concludes the chapter.

4.2 Methods of earnings management

Earnings quality, also called earnings informativeness, is defined as the ability of earnings to provide information about a firm's financial performance to assist decision-makers (Dechow et al., 2010). The most commonly used representation of earnings quality is through properties of earnings, applying techniques such as earnings persistence, earnings smoothing and abnormal accruals.

Earnings persistence mainly examines earnings quality not as a decision tool for all types of decision-making, but as a tool for equity investors on how useful earnings is for company valuation. The basis for earnings persistence, as a proxy of earnings quality, is that more persistent earnings are of higher quality than less persistent earnings because they lead to better decision inputs for equity valuation (Dechow et al., 2010).

Earnings smoothing is another technique that affects earnings and can be used as a proxy for earnings quality. Accruals can be used to smooth the random fluctuations of cash payments and receipts, so that earnings focus on performance instead of cash flows, for superior decision making. However, further development of models to distinguish normal smoothness as a result of fundamental performance and artificial smoothing, is needed. Consequently, mixed results are found in various studies about the effect of earnings smoothness on earnings quality (Dechow et al., 2010).

The most commonly used measure of earnings quality is earnings management (EM). Earnings management can be classified into two types (1) EM arising from purely financial reporting decisions and (2) real earnings management (Peasnell et al., 2000a). The first type of earnings management is accomplished through accounting method changes and accrual choices. It is possible to distinguish between abnormal or discretionary accruals and normal or non-discretionary accruals. Normal accruals are the result of the firm's actual performance, while abnormal accruals indicate the firm's attempt to create distortions that result in earnings management due to an imperfect measurement system (Dechow et al., 2010). The second type of earnings management, namely real earnings management, arises from actions that are concerned with the real operating decisions of the company, such as the timing of the sale of assets or manipulating R&D expenditures (Peasnell et al., 2000a).

Managers who engage in either form of EM face costs. The cost of applying accrual accounting EM is that their effects will reverse sometime in the future. For example, earnings that are boosted in year one, due to accrual choices, result in a reduction of earnings in the following year (Peasnell et al., 2000a). Furthermore, accrual EM generally does not have a direct cash flow consequence (Peasnell et al., 2005).²² However, if managers choose to conduct real EM, they are in essence changing the way their firm does business. For example, if increased profits is the goal, firms could decrease advertising or R&D expenses. This action is costly since it negatively affects

²² Although financial reporting and tax accounting are measured by different measurement rules for consolidated financial statements of listed firms after the implementation of IFRS in 2005, accruals can have tax effects, thus affecting cash flows, in a Greek context since taxable income calculation depends on financial reporting income.

future cash flows and might negatively affect shareholder value (Peasnell et al., 2000a; Peasnell et al., 2005). Since the cost of reversals (i.e. choosing accrual accounting EM) is less than choosing an inappropriate operating decision (i.e. choosing real EM), it is likely that accrual EM will be managers' first alternative before they choose more costly real changes in investment and operating activities (Peasnell et al., 2005).²³ Accrual accounting EM is also preferred by managers whose goal is to temporarily alter reported profits for the respective year (Peasnell et al., 2000a). Moreover, accrual accounting EM is considered less visible than real EM and is therefore more frequently preferred by firms (Osma, 2008). Zang (2012) illustrates that firms prefer accrual accounting EM in situations when they are less competitive in the industry, have a poor financial health, are monitored heavily by institutional investors and/or are associated with higher tax expenses. However, firms prefer real EM in cases when they have exercised excessive accrual manipulation in previous years and/or have a short operating cycle. In both cases managers weigh each EM technique based on their relative costs (Ho et al., 2015). Finally, according to Dechow et al. (2010) abnormal accruals, which lead to earnings management, are the most extensively used proxy of earnings quality in empirical accounting research. Thus, this research will apply accrual EM models.

4.2.1 Accrual Earnings Management Models

Accruals summarize in a single measure the net effect of numerous recognition and measurement decisions, thereby capturing the portfolio nature of income determination (Watts and Zimmerman, 1990). Accrual-based measures are commonly used to test for the existence of EM (Peasnell et al., 2000b). The EM literature distinguishes between "abnormal" and "normal" accruals. Normal accruals tend to show adjustments that reflect fundamental performance, while abnormal accruals reflect distortions due to the particular application of accounting rules (Dechow et al., 2010). The use of abnormal/discretionary accruals by managers is based on three basic managerial hypotheses: the performance measure hypothesis, the opportunistic management hypothesis and the noise hypothesis (Guay et al., 1996). The performance measure

²³ There are however cases where managers prefer real EM to accrual EM, as stated in Lo (2008) based on survey evidence found in Graham et al. (2005).

hypothesis states that managers exercise discretion so as to produce reliable and timely performance related information (that is earnings) which would not be conveyed through the use of nondiscretionary accruals only. The opportunistic management hypothesis states that discretionary accruals are used to conceal mediocre performance or maintain a portion of unusual good performance for the future. Finally, the noise hypothesis is the case where discretionary accruals represent noise in earnings (Guay et al., 1996).

A problem with the accruals EM method is the difficulty in accurately separating reported accruals into their managed (discretionary/abnormal) and unmanaged (non-discretionary/normal) parts (Peasnell et al., 2000b). Additionally, another challenge accruals models face is that measures of abnormal accruals tend to be positively correlated with the level of accruals. That is, firms that extensively use accruals, will also consequently have more abnormal accruals. This can affect the interpretation of the results and can indicate uncertainty about whether abnormal accruals are due to accounting distortions or are a result of poor accruals models that also incorporate an element of true performance (Dechow et al., 2010).

Various accrual-based EM models have been implemented, such as those developed by Healy (1985) and DeAngelo (1986; 1988). These early works are a benchmark against which to evaluate the Jones (1991) model, which is considered a landmark in the evolution of accruals-based earnings management research (Ronen and Yarri, 2010: 389).²⁴

The Healy (1985) accruals-based EM model is based on total accruals, consisting of both discretionary (abnormal) and non-discretionary (normal) accruals, the latter defined as deflated long-run accruals. Discretionary accruals are those that differ from the long-run average. Healy (1985) tests for EM by comparing mean total accruals, scaled by lagged total assets.

²⁴ According to the work of McNichols (2000) aggregate accrual models, from Healy (1985) to Kang and Sivaramakrishnan (1995), which attempt to find discretionary accruals based on the relation between total accruals and some explanatory variables are extensively used in the literature. McNichols (2000) finds however that the greatest number of studies that use the aggregate accruals approach are based on the Jones model.

The equation for the Healy (1985) EM model is as follows:

$$DA_{it} = \frac{TAC_{it}}{TA_{it} - 1} \quad \text{eq 4 - 1}$$

where:

DA_{it} is discretionary accruals of firm i at the end of year t

TAC_{it} is total accruals of firm i at the end of year t

TA_{it-1} is the book value of total assets of firm i at the end of year $t-1$.

This method is the simplest accrual EM method and assumes that expected normal accruals for the period are zero, and so total accruals are a result of managerial discretion (Young, 1999). This assumption is restrictive because working capital accruals change according to economic conditions (Young, 1999).²⁵

Another accrual-based EM model is proposed by DeAngelo (1988; 1986). She criticizes the Healy (1985) model by pointing out that it lacks a benchmark for what normal accruals should be. Therefore, her model calculates normal accruals as the previous period's accruals deflated by lagged assets. Since the expected accruals in a given year are equal to those of the previous year, all changes in accruals are considered discretionary.

Therefore the equation for the DeAngelo (1988; 1986) EM model is as follows:

$$DA_{it} = \frac{TAC_{it} - TAC_{it-1}}{TA_{it} - 1} \quad \text{eq 4 - 2}$$

where:

TAC_{it} is total accruals of firm i at the end of year t

TAC_{it-1} is total accruals of firm i at the end of year $t-1$

TA_{it-1} is the book value of total assets of firm i at the end of year $t-1$.

The major weakness of this model is that it assumes that normal accruals follow a random walk (Young, 1999).²⁶ Since normal accruals change over time due to changes in business activities, the model might misclassify normal accruals as discretionary

²⁵ Dechow et al. (1995) created the mean-reverting model which is slightly different to the Healy (1985) model because it is based on a time-series firm specific mean rather than a cross-sectional mean (Thomas et al. (2000)). Some papers in the literature, such as Guay et al. (1996), refer to the Dechow et al. (1995) mean-reverting model as the Healy model (Thomas et al. (2000)).

²⁶ Although there are limitations to the random walk model, DeAngelo (1986) considers it a suitable way of finding normal accruals, since there is no estimation period (Thomas et al. (2000)).

accruals, thus creating the possibility of a Type I error. Furthermore, the total accruals of the previous period, which are considered as a benchmark for non-discretionary accruals, might also contain a discretionary accruals component that could bias the results. Studies today do not use the DeAngelo approach unless they want to compare the efficiency of various models of discretionary accruals (Ronen and Yarrow, 2010: 402).

A landmark for accrual-based EM models is the model proposed by Jones (1991). Her model controls for changes in the economic circumstances of a firm.²⁷ While Healy (1985) and DeAngelo (1986) consider non-discretionary accruals as constant, Jones models consider non-discretionary accruals as a linear function of changes in revenues and fixed assets.

The Jones (1991) model estimates normal accruals as a function of revenue growth and depreciation as a function of property, plant and equipment (PPE). All variables are scaled by lagged total assets. Residuals from the Jones (1991) model constitute the measure of abnormal accruals (Dechow et al., 2010).

The Jones (1991) model uses a two-stage approach to separate total accruals into discretionary and non-discretionary components. First, to identify the non-discretionary component for each sample firm, total accruals (TAC) are regressed on the change in sales (Δ REV) and investment in PPE for all non-sample firms in the same industry (Xie et al., 2003). Then, the estimated parameters of this regression are combined with total assets (TA), change in sales (Δ REV) and PPE data so as to find the discretionary component of total accruals for each sample firm (Peasnell et al., 2000b). As noted earlier, the Jones model relaxes the assumption that nondiscretionary accruals are constant. In contrast to previous EM models, this regression-based model incorporates changes in the economic activities of the firm and the depreciation charge

²⁷ The Healy (1985) and the DeAngelo (1986) models are considered 'non-peek ahead' models while the Jones-type models are considered 'peek ahead' models. 'Peek ahead' models use information from the year being forecasted, while 'non-peek ahead' models only use information from the prior year (Thomas et al. (2000)).

(through the use of revenues and PPE respectively as independent variables in the first regression), which affects the changes in non-discretionary accruals.²⁸

The equation for the Jones (1991) EM model is as follows:

$$\frac{TAC_{it}}{TA_{it-1}} = \alpha \left(\frac{1}{TA_{it-1}} \right) + \beta_1 \left(\frac{\Delta REV_{it}}{TA_{it-1}} \right) + \beta_2 \left(\frac{PPE_{it}}{TA_{it-1}} \right) + \varepsilon_{it} \quad \text{eq 4 - 3}$$

where:

TAC_{it} is total accruals of firm i at the end of year t

TA_{it-1} is the book value of total assets of firm i at the end of year $t-1$.

$\Delta REV_{it} / TA_{it-1}$ is sales revenue of firm i in year t less revenues in year $t-1$ scaled by TA_{it-1}

PPE_{it} / TA_{it-1} is gross property, plant and equipment of firm i at the end of year t scaled by TA_{it-1}

All variables in the accruals expectations model are scaled by lagged total assets to reduce heteroscedasticity, as it is assumed that lagged assets are positively associated with the variance of the disturbance term in the regression equation (Jones, 1991; Davidson et al., 2005)

Although growth in sales and investment in PPE are reasonable drivers of firm value, and the Jones model confirms a correlation between these attributes of the firm and accruals, the explanatory power of the model is usually low, with only about 10% of the variation in accruals explained (Dechow et al., 2010). One reason for this low explanatory power is that managers have significant discretion over the accrual process, which they can use to cover true performance (Dechow et al., 2010). According to Dechow et al (2011), discretionary accruals are less robust in identifying EM than total accruals, which suggests that the use of the Jones model residuals, as a proxy for poor quality accruals because of EM, can create the possibility of a Type II error, where accruals are classified as normal when they are not (Dechow et al., 2010). A major

²⁸ Boynton et al. (1992) estimate the Jones model with pooled data from each industry rather than using data for each firm separately (Thomas et al., 2000). Additionally, Beneish (1997) suggest that the Jones model include two additional variables, lagged total accruals and the market performance of the year. Thomas et al. (2000) examined both proposed changes but did not find much improvement to the original Jones model.

limitation of this model is the underlying assumption that managers do not exercise discretion over revenues. Therefore sales-based manipulation cannot be detected since changes in sales are assumed to increase non-discretionary accruals (Peasnell et al., 2000b). Additionally, the model may also provide biased accruals because it does not include a regressor for expenses (Dechow et al., 2010).

In an effort to improve the standard-Jones model, Teoh et al. (1998c) and DeFond and Jiambalvo (1994) used a working capital component instead of total accruals. According to Beneish (1998) and Young (1999) this is preferable due to the fact that the use of depreciation as a continuous form of earnings management is unlikely because of its visibility and predictability (Peasnell et al., 2000b). Furthermore, Young (1999) shows that the use of total accruals in the standard-Jones model creates a significant measurement error in the estimation of discretionary accruals (Peasnell et al., 2000b).

Research has also been conducted around the question of how the Jones model can be improved to reduce the potential errors it creates and whether there are other tests of EM that can support the results of the Jones Model (Ronen and Yarri, 2010: 433). Improvements to the Jones model have been developed, for example, through the development of the 'modified Jones' model of Dechow et al. (1995), the cash flow model of Dechow and Dichev (2002) and the linear performance model of Kothari et al. (2005) (Ronen and Yarri, 2010: 433).

Dechow et al. (1995) developed the so-called modified Jones model to eliminate the inclination of the Jones (1991) model to measure discretionary accruals with errors in cases where there is managerial discretion over revenues (Bartov et al., 2001). The basis of their model revolves around the treatment of accounts receivable. The initial stage of this model is the same as the Jones model, but in the second stage the change in receivables (ΔREC) is subtracted from change in sales (ΔREV). This model assumes that all changes in credit sales in the 'event' year are as a result of EM (Peasnell et al., 2000b). This is an attempt to reduce Type II errors. As credit sales can potentially be manipulated by managers, this modification can increase the power of the Jones model to produce a residual that is uncorrelated with normal revenue accruals

and therefore better indicate possible revenue manipulation (Dechow et al., 2010). Despite the improvements of the modified Jones Model, it still suffers from the possibility of Type I errors, which means identifying accruals as abnormal when they are a representation of true performance (Dechow et al., 2010).

The equation for the modified Jones model, as developed by Dechow et al. (1995), is as follows:

$$\frac{TAC_{it}}{TA_{it-1}} = \alpha \left(\frac{1}{TA_{it-1}} \right) + \beta_1 \left(\frac{(\Delta REV_{it} - \Delta REC_{it})}{TA_{it-1}} \right) + \beta_2 \left(\frac{PPE_{it}}{TA_{it-1}} \right) + \epsilon_{it} \quad \text{eq 4 - 4}$$

where:

TAC_{it} is total accruals of firm i at the end of year t

TA_{it-1} is the book value of total assets of firm i at the end of year $t-1$.

$\Delta REV_{it} - \Delta REC_{it} / TA_{it-1}$ is sales revenue of firm i in year t less revenues in year $t-1$ – the change of accounts receivables scaled by TA_{it-1}

PPE_{it} / TA_{it-1} is gross property, plant and equipment of firm i at the end of year t scaled by TA_{it-1}

The adjustment for changes in receivables (that is the use of the modified Jones model) is only applied in the second stage where discretionary accruals are calculated. To estimate the specific regression coefficients in the equation, that is the first stage of the model whereby non-discretionary accruals are estimated, the original Jones model is used (Dechow et al., 1995; Bartov et al., 2001; Davidson et al., 2005).

Dechow et al. (1995) find in tests comparing the power of the modified Jones model and the Jones (1991) model, that the modified Jones model is substantially better at detecting sales-based EM. Nonetheless, research has shown that both models are poorly specified in situations of extreme financial performance, each generating a significant proportion of Type I errors when companies have extreme cash flows. This creates an issue in evaluating the effectiveness of both models in isolating accruals management in time-series analysis (Peasnell et al., 2000b).

The cash flow model of Dechow and Dichev (2002) examines accruals as a function of past, present and future cash flows, since the purpose of accruals is to change the timing of the cash flow recognition of earnings. Abnormal accruals are measured by the residuals from the model (Dechow et al., 2010). In this model matching accruals to cash flows is considered of utmost importance and therefore past, current and future

cash flows are modeled as accruals, since accruals anticipate future cash payments and/or collections, and reverse when cash previously recorded in accruals is paid and/or received (Dechow et al., 2010). Their focus is on working capital and short-term accruals and they do not examine long-term accruals and their relation to cash flows (Dechow et al., 2010).

The equation for the Dechow and Dichev (2002) model is as follows:

$$\Delta WC = \alpha + \beta_1 CFO_{t-1} + \beta_2 CFO_t + \beta_3 CFO_{t+1} + \varepsilon_{it} \quad \text{eq 4 – 5}$$

where:

ΔWC is the change of working capital

CFO_{t-1} is the operating cash flows at the end of year t-1.

CFO_t is the operating cash flows at the end of year t.

CFO_{t+1} is the operating cash flows at the end of year t+1.

The Dechow and Dichev (2002) model does not predict the direction of earnings management, which can decrease the power of tests when it is important for the researcher to predict the direction (Dechow et al., 2010). Another limitation of this model is that it cannot identify distortions created by long-term accruals. This is a major disadvantage of this model since impairments of PPE and goodwill, which are related to long-term aspects of the firm, can indicate EM (Dechow et al., 2010).

Larcker and Richardson (2004) use the modified Jones model and add book to market (BM) and operating cash flows (CFO) to it. They find that, with this addition, the measurement error associated with discretionary accruals is reduced. BM is used to control for expected growth in operations which, if not controlled for, can be picked up as discretionary accruals. CFO is used to control for current operating performance as companies with extreme levels of performance may result in misspecified discretionary accruals (Bekiris and Doukakis, 2011). Larcker and Richardson (2004) state that their model is superior to the modified Jones model because it has greater explanatory power and recognizes unexpected accruals that are not as persistent as other elements of earnings (Bekiris and Doukakis, 2011).

The equation for the Larcker and Richardson (2004) model is as follows:

$$\frac{TAC_{it}}{TA_{it-1}} = \alpha \left(\frac{1}{TA_{it-1}} \right) + \beta_1 \left(\frac{(\Delta REV_{it} - \Delta REC_{it})}{TA_{it-1}} \right) + \beta_2 \left(\frac{PPE_{it}}{TA_{it-1}} \right) + \beta_3 (BM_{it}) + \beta_4 \left(\frac{CFO_{it}}{TA_{it-1}} \right) + \varepsilon_{it}$$

eq 4 – 6

where:

TAC_{it} is total accruals of firm I at the end of year t

TA_{it-1} is the book value of total assets of firm i at the end of year t-1

$\Delta REV_{it} - \Delta REC_{it} / TA_{it-1}$ is sales revenue of firm i in year t less revenues in year t-1 – the change of accounts receivables scaled by TA_{it-1}

PPE_{it} / TA_{it-1} is gross property, plant and equipment of firm i at the end of year t scaled by TA_{it-1}

BM_{it} is the book value of common equity for firm i in year t over market value of common equity for firm i in year t

CFO_{it} is the operating cash flows for firm i in year t.

Kothari et al. (2005) develop a performance-matching EM model (a type of control sample approach) concerned with normal accruals and performance (Ronen and Yarri, 2010: 445). This is a response to the conclusion of Dechow et al. (1995) that discretionary accruals are positively related to return on assets. To overcome the issue of misspecification due to performance, Kothari et al. (2005) remove the effect of the correlation between discretionary accruals and performance by using a performance-matching model. They believe that errors in measurement occur when the models employed do not control for the prior period performance of a company.

This model matches a firm-year observation with another sample company from the same industry and year with the closest return on assets and deducts the firm's discretionary accruals (that is their residuals) from those of the sample firm to generate "performance-matched" residuals. The discretionary accruals are estimated using the Jones model or the modified Jones model (Dechow et al., 2010).

Kothari et al. (2005) study the results of the Jones model or the modified Jones model discretionary accruals and retest them after they have been adjusted for performance. They find that performance-matched discretionary accruals improve the conclusions of EM research, when the hypothesis does not suggest that EM will vary with performance or when the sample company is not expected to engage in EM.

The equation for the Kothari et al. (2005) model is as follows:

$$TAC_{it} = \alpha \left(\frac{1}{TA_{it-1}} \right) + \beta_1 \left(\frac{(\Delta REV_{it} - \Delta REC_{it})}{TA_{it-1}} \right) + \beta_2 \left(\frac{PPE_{it}}{TA_{it-1}} \right) + \beta_3 ROA_{it-1} + \epsilon_{it}$$

eq 4 – 7

where:

TAC_{it} is total accruals of firm i at the end of year t

TA_{it-1} is the book value of total assets of firm i at the end of year $t-1$.

$\Delta REV_{it} - \Delta REC_{it} / TA_{it-1}$ is sales revenue of firm i in year t less revenues in year $t-1$ – the change of accounts receivables scaled by TA_{it-1}

PPE_{it} / TA_{it-1} is gross property, plant and equipment of firm i at the end of year t scaled by TA_{it-1}

ROA_{it-1} is return on assets of firm i at the end of year $t-1$

Dechow et al. (2012) propose a new method to identify accruals based EM. Their concept is based on the fact that any accrual-based EM in one period must be reversed in the next (Gerakos, 2012). Their method is based on the fact that the underlying purpose of all discretionary accruals is to shift earnings. Thus, misstatements in one period will reverse in the next (Dechow et al., 2012). This concept of reversal could result in potentially increasing the statistical power of the method and thus better control for omitted variables so as to improve specification and model the dynamics of earnings and accruals (Gerakos, 2012). Dechow et al. (2012) state that their technique can establish the existence of EM in historical data, and thus their model can be considered a much needed innovation in EM research. Furthermore, according to Keung and Shih (2014), incorporating the reversal of discretionary accruals in future periods in test of the Dechow et al. (2012) model, will greatly decrease the existence of Type I errors for skewed samples, without implementing the Kothari et al. (2005) performance matching model, while additionally often resulting in lower Type II errors than can be attained with performance matching.

In this model, EM is tested not only in the period for which the presence of EM is examined, but also for the reversals of these discretionary accruals in an adjacent period. It involves regressing discretionary accruals on two partitioning variables. The first one ($PART_{it}$) is a dummy variable that is denoted as one in the period the hypothesized accrual-based EM should occur and zero otherwise. The second ($PARTP1_{it}$) partitioning variable is identified as one in the period in which accrual-based EM should reverse and zero otherwise. The following regression is estimated as a pooled cross section:

$$DA_{it} = \alpha + \beta_1 PART_{it} + \beta_2 PARTP1_{it} + \epsilon_{it}$$

eq 4 – 8

where:

DA_{it} is discretionary accruals of firm i at the end of year t

$PART_{it}$ is a dummy variable that is denoted as one in the period the hypothesized accrual-based EM should occur and zero otherwise

$PARTP1_{it}$ is a dummy variable that is denoted as one in the period in which the accrual-based EM should reverse and zero otherwise

EM is then identified by rejecting the null hypothesis that $\beta_1 - \beta_2 = 0$. To estimate discretionary accruals, Dechow et al. (2012) suggest that the traditional accrual-based EM methods, such as the Jones model, the modified Jones model and the Dechow and Dichev (2002) model can be used. The limitations of the traditional methods are addressed by the new method proposed by Dechow et al. (2012) by specifying a null hypothesis of the equality of the estimated coefficients, $\beta_1 - \beta_2 = 0$. This way, correlated omitted variables that are constant in both the manipulation and reversal periods are controlled for and this should lead to the coefficients being equal (Gerakos, 2012). Dechow et al. (2012)'s method allows researchers to classify accruals as income-increasing or income-decreasing through the test statistic specified. The sign of statistically significant differences between the two coefficients (β_1 and β_2) indicate whether EM is for income-increasing purposes ($\beta_1 - \beta_2 > 0$) or income-decreasing purposes ($\beta_1 - \beta_2 < 0$) (Gerakos, 2012).

All of the aforementioned EM proxies primarily calculate discretionary accruals through the use of regressions and are classified as Jones type EM measures. However, other EM measures are also used in the literature to find discretionary accruals.

DeFond and Park (2001) estimate abnormal accruals based upon the firm specific, seasonally adjusted ratio of working capital to sales. Abnormal Working Capital Accruals (AWCA) is defined as the difference between the firm's realized working capital and the working capital required to sustain its following year's sales (Prencipe and Bar-Yosef, 2011). Anticipated working capital is projected from the historical relationship between working capital and sales (Becker et al., 1998; Ashbaugh et al., 2003; Prencipe and Bar-Yosef, 2011). This model aims to distinguish normal working capital accruals and abnormal working capital accruals. Normal working capital

accruals represent the change in noncash working capital accounts, such as inventory, accounts receivable and accrued expenses. This model is based upon the notion that normal working capital accruals are based on a fixed portion of sales and the income-increasing or income-decreasing accruals in the period of a change in sales does not reverse in future periods. On the other hand, if abnormal working capital accruals reverse in future periods, they will have a smaller net impact on lifetime earnings. The proxy for abnormal accruals measures the difference between realized working capital and a proxy for the market's expectations of the level of working capital needed to support future sales levels. The logic behind this measure is that this difference is the amount of working capital accruals that are unlikely to be continued and that are expected to reverse in future periods. The use of the historical relationship between working capital to sales to find expected working capital is consistent with Dechow et al. (1998) who also consider working capital as a fixed proportion of contemporary sales (DeFond and Park, 2001). AWCA is estimated separately for each company.

The equation for the DeFond and Park (2001) model is as follows:

$$AWCA_t = WC_t - \left(\left(\frac{WC_{t-1}}{S_{t-1}} \right) * S_t \right) \quad \text{eq 4 - 9}$$

where:

$AWCA_t$ is abnormal working capital accrual in year t;

WC_t is non-cash working capital accruals in year t, computed as:

(current assets-cash and short-term investments) - (current liabilities-short-term debt);

WC_{t-1} is non-cash working capital at the end of year t-;

S_t is sales in year t; and

S_{t-1} is sales in year t-1.

AWCA is scaled by the end-of-year total assets.

The DeFond and Park (2001) model differs from the Jones-type abnormal accrual models since abnormal accruals are estimated using a seasonal firm-specific ratio of working capital to sales, while the Jones-type models do not account for seasonality between accruals and sales changes (DeFond and Park, 2001). DeFond and Park consider their method superior to the Jones-type methods because the Jones models calculate non-discretionary accruals based on a coefficient from a pooled cross-sectional regression and uses the intercept term from this regression, while DeFond and Park (2001) measurement of non-discretionary accruals is specifically tailored for each

observation in the sample. Thus, the DeFond and Park (2001) model removes the average variation across all observations, as is the case in the Jones-type models, and considers that the firm-specific measures it employs are likely to give superior results compared to industry-wide estimates (Defond and Park, 2001).

Leuz et al. (2003) propose an aggregate measurement of earnings management so as to minimize possible measurement errors. Their EM measure is based on existing EM literature, such as Healy and Wahlen (1999) and Dechow and Skinner (2000), while also incorporating various extended dimensions. Their aggregate EM score is constructed by averaging four individual EM measures, consisting of two earnings smoothing measures, the magnitude of accruals and a small loss avoidance measure.

The equations for the EM measures are as follows:

$$EM1 = \frac{\text{standard deviation of operating earnings}/TA_{it-1}}{\text{standard deviation of CF from operations}/TA_{it-1}}$$

$$EM2 = \text{Spearman correlation between } \frac{\Delta \text{accruals}}{TA_{it-1}} \text{ and } \frac{\Delta \text{CF from operations}}{TA_{it-1}}$$

$$EM3 = \frac{\text{absolute value of accruals}/TA_{it-1}}{\text{absolute value of CF from operations}/TA_{it-1}}$$

$$EM4 = \frac{\text{small profits}}{\text{small losses}}$$

$$\text{aggregate EM} = \text{average rank across all four EM measures} \quad \text{eq 4 – 10}$$

where:

CF from operations is operating earnings – accruals;

Accruals is $(\Delta CA_{it} - \Delta \text{cash}_{it}) - (\Delta CL_{it} - \Delta STD_{it} - \Delta TP_{it}) - \text{Dep}_{it}$;

TA_{it-1} is the book value of total assets of firm i at the end of year t-1;

$\Delta CA_{it} - \Delta \text{cash}_{it}$ is change in total current assets – change in cash / cash equivalents;

$\Delta CL_{it} - \Delta STD_{it} - \Delta TP_{it} - \text{Dep}_{it}$ is change in total current liabilities – change in short term debt - change in taxes payable - depreciation expense of firm i in year t;

Small profits = net earnings / TA_{it-1} if in the range of 0 to 0.01;

Small losses = net earnings / TA_{it-1} if in the range of -0.01 to 0.

It is worth noting that research examining the relationship between corporate governance and earnings management primarily utilizes accrual-based EM measures,

in which the Jones-type models are primarily used to calculate EM.
summarizes the main EM accrual-based models used in the literature.

Table 4-1

Table 4-1 Summary of EM accrual models employed in prior literature

		Google Citations as of March 2018
Jones (1991) model	$\frac{TAC_{it}}{TA_{it-1}} = \alpha \left(\frac{1}{TA_{it-1}} \right) + \beta 1 \left(\frac{\Delta REV_{it}}{TA_{it-1}} \right) + \beta 2 \left(\frac{PPE_{it}}{TA_{it-1}} \right) + \epsilon_{it}$	7134
where: TAC_{it} is total accruals of firm i at the end of year t; TA_{it-1} is the book value of total assets of firm i at the end of year t-1; $\Delta REV_{it} / TA_{it-1}$ is sales revenue of firm i in year t less revenues in year t-1 scaled by TA_{it-1} ; PPE_{it} / TA_{it-1} is gross property, plant and equipment of firm i at the end of year t scaled by TA_{it-1}		
Dechow et al. (1995) Modified Jones model	$\frac{TAC_{it}}{TA_{it-1}} = \alpha \left(\frac{1}{TA_{it-1}} \right) + \beta 1 \left(\frac{(\Delta REV_{it} - \Delta REC_{it})}{TA_{it-1}} \right) + \beta 2 \left(\frac{PPE_{it}}{TA_{it-1}} \right) + \epsilon_{it}$	7315
where: TAC_{it} is total accruals of firm i at the end of year t; TA_{it-1} is the book value of total assets of firm i at the end of year t-1; $\Delta REV_{it} - \Delta REC_{it} / TA_{it-1}$ is sales revenue of firm i in year t less revenues in year t-1 – the change of accounts receivables scaled by TA_{it-1} ; PPE_{it} / TA_{it-1} is gross property, plant and equipment of firm i at the end of year t scaled by TA_{it-1}		
DeFond and Park (2001) model	$AWCA_t = WC_t - \left(\frac{WC_t - 1}{S_t - 1} \right) * S_t$	549
where: $AWCA_t$ =abnormal working capital accrual in year t; WC_t =non-cash working capital accruals in year t, computed as: (current assets-cash and short-term investments)-(current liabilities-short-term debt); WC_{t-1} =working capital at the end of year t-1; S_t =sales in year t; and S_{t-1} =sales in year t-1		
Dechow and Dichev (2002) model	$\Delta WC = \alpha + \beta 1 CFO_{t-1} - 1 + \beta 2 CFO_t + \beta 3 CFO_{t+1} + 1 + \epsilon_{it}$	3898
where: ΔWC is the change of working capital; CFO_{t-1} is the operating cash flows at the end of year t-1; CFO_t is the operating cash flows at the end of year t; CFO_{t+1} is the operating cash flows at the end of year t+1		
Leuz et al. (2003) model	$EM1 = \frac{\text{standard deviations of operating earnings}/TA_{it-1}}{\text{standard deviations of CF from operations}/TA_{it-1}}$ $EM2 = \text{Spearman correlation between } \frac{\Delta \text{accruals}}{TA_{it-1}} \text{ and } \frac{\Delta \text{CF from operations}}{TA_{it-1}}$ $EM3 = \frac{\text{absolute value of accruals}/TA_{it-1}}{\text{absolute value of CF from operations}/TA_{it-1}}$ $EM4 = \frac{\text{small profits}}{\text{small losses}}$ <p>aggregate EM = average rank across all four EM measures</p>	4016

<p>where: <i>CF from operations</i> is operating earnings – accruals; <i>accruals</i> is $(\Delta CA_{it} - \Delta cash_{it}) - (\Delta CL_{it} - \Delta STD_{it} - \Delta TP_{it}) - Dep_{it}$; TA_{it-1} is the book value of total assets of firm i at the end of year t-1; $\Delta CA_{it} - \Delta cash_{it}$ is change in total current assets –change in cash / cash equivalents; $\Delta CL_{it} - \Delta STD_{it} - \Delta TP_{it} - Dep_{it}$ is change in total current liabilities –change in short term debt- change in taxes payable-depreciation expense of firm i in year t; <i>small profits</i> = net earnings / TA_{it-1} if in the range of 0 to 0.01; <i>small losses</i> = net earnings / TA_{it-1} if in the range of -0.01 to 0.</p>		
<p>Larcker and Richardson (2004)</p>	$\frac{TAC_{it}}{TA_{it-1}} = \alpha \left(\frac{1}{TA_{it-1}} \right) + \beta 1 \left(\frac{(\Delta REV_{it} - \Delta REC_{it})}{TA_{it-1}} \right) + \beta 2 \left(\frac{PPE_{it}}{TA_{it-1}} \right) + \beta 3 (BM_{it}) + \beta 4 \left(\frac{CFO_{it}}{TA_{it-1}} \right) + \epsilon_{it}$	817
<p>where: TAC_{it} is total accruals of firm I at the end of year t; TA_{it-1} is the book value of total assets of firm i at the end of year t-1; $\Delta REV_{it} - \Delta REC_{it} / TA_{it-1}$ is sales revenue of firm i in year t less revenues in year t-1 – the change of accounts receivables scaled by TA_{it-1}; PPE_{it} / TA_{it-1} is gross property, plant and equipment of firm i at the end of year t; scaled by TA_{it-1}; BM_{it} is the book value of common equity for firm i in year t over market value of common equity for firm i in year t; CFO_{it} is the operating cash flows for firm i in year t.</p>		
<p>Kothari et al.(2005) model</p>	$TAC_{it} = \alpha \left(\frac{1}{TA_{it-1}} \right) + \beta 1 \left(\frac{(\Delta REV_{it} - \Delta REC_{it})}{TA_{it-1}} \right) + \beta 2 \left(\frac{PPE_{it}}{TA_{it-1}} \right) + \beta 3 ROA_{it-1} + \epsilon_{it}$	4378
<p>where: TAC_{it} is total accruals of firm i at the end of year t; TA_{it-1} is the book value of total assets of firm i at the end of year t-1; $\Delta REV_{it} - \Delta REC_{it} / TA_{it-1}$ is sales revenue of firm i in year t less revenues in year t-1 – the change of accounts receivables scaled by TA_{it-1}; PPE_{it} / TA_{it-1} is gross property, plant and equipment of firm i at the end of year t scaled by TA_{it-1}; ROA_{it-1} is return on assets of firm i at the end of year t-1</p>		
<p>Dechow et al. (2012) model</p>	$DA_{it} = \alpha + \beta 1 PART_{it} + \beta 2 PARTP1_{it} + \epsilon_{it}$	351
<p>where: DA_{it} is discretionary accruals of firm i at the end of year t; $PART_{it}$ is a dummy variable that is denoted as one in the period the hypothesized accrual-based EM should occur and zero otherwise; $PARTP1_{it}$ is a dummy variable that is denoted as one in the period in which the accrual-based EM should reverse and zero otherwise</p>		

4.3 CG indices in the literature

CG indices used in different countries²⁹

Many indices are used in academic studies as a proxy for corporate governance performance so as to encapsulate firms' overall CG quality. These measures of CG quality are used as independent/explanatory variables in a vast number of studies on market performance, earnings management, cost of capital, and other dependent variables. In all studies that construct CG indices, various categories of governance are used, incorporating specific CG items that firms are assessed upon, and their CG scores calculated. The term *category*, criterion, theme and dimension is interchangeably used to indicate the broad categories that a firm's CG quality is tested on (e.g. staggered boards, shareholder rights and ownership parity), while the terms *items*, variables, attributes and provisions are interchangeably used to indicate the specific CG item that the firm is evaluated on (e.g. audit committee has an independent non-executive chair, CEO and chairman are different people, the firm has a remuneration committee).

Gompers et al. (2003) construct an index assessing governance quality for a large number of publicly traded US firms. They use data from the Investor Responsibility Research Center (IRRC)³⁰ and create a "Governance Index" named G-index³¹, which measures corporate governance characteristics based on 24 distinct corporate governance provisions classified into five groups: tactics for delaying hostile takeovers; voting rights; director/officer protection; other takeover defenses; and state laws. Relying on the judgment of IRRC as to what corporate governance mechanisms are considered important to investors, the index is created by summing 24 binary governance factors.

²⁹ This section summarizes the most commonly used CG indices used in the literature. For an in depth coverage of this strand of the literature, readers can consult Ammann et al. (2011), Nerantzidis (2016), and Nerantzidis (2017).

³⁰ 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.

³¹ 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.

Drobetz et al. (2004) create a broad corporate governance rating (CGR) for German public firms. Their 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. The survey was sent out to all firms in the four principal market segments of the German stock exchange. The survey consisted of a Likert five-point scale for each question. For each governance item present, 25 base points were added, resulting in scores ranging from zero to 30 for each governance item. Each firm's final CGR consists of the unweighted sum of all base points across all governance items. Higher values of CGR represent better company specific corporate governance.

Alves and Mendes (2004) develop a CG index incorporating items included in the code of best practice issued by the Portuguese Securities Market Commission (CMVM). CMVM issued 17 non-mandatory recommendations on corporate governance, classified into the following groups: disclosure of information, voting and shareholder representation, the adoption of certain corporate internal rules of best practice, the structure and functioning of the board of directors. CMVM sent out three questionnaires to firms listed on the Lisbon Stock Exchange (BVL) 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. In calculating their index, a dummy variable was created taking the value of one if the company complied with a recommendation and zero otherwise. A score is then calculated by adding each item and assigning equal weights for each recommendation that was implemented in the study and then dividing this score by the total recommendations, thus resulting in an index in percentage form.

DeFond et al. (2005) create a CG index based on six attributes of a firm's governance: board size, board independence, audit committee size, audit committee independence, shareholders' rights and institutional ownership. They combine the six attributes into a dichotomous variable. For each governance characteristic a value of one is assigned to indicate strong governance and a value of zero indicates weak governance. For board size, firms are assigned a value of one if the board size is less than the sample median and zero otherwise. For board independence, firms are assigned a value of one if 60%

or more of board members are independent and zero otherwise. For audit committee size, firms are assigned a value of one if the proportion of audit committee size to board size is greater than the sample median and zero otherwise. For audit committee independence, firms are assigned a value of one if the audit committee is solely comprised of independent members and zero otherwise. For shareholders' rights, firms are assigned a value of one if the G-index³² is less than the sample median and zero otherwise. For institutional ownership, firms are assigned a value of one if the percentage of institutional ownership is greater than the sample median and zero otherwise. All six dichotomous variables are then added, and a new dichotomous variable is created based on the median of the summed values. Firms are assigned one (indicating strong governance) if their summed values are greater than the median of the summed values and zero (indicating weak governance) otherwise.

Brown and Caylor (2006) create the Gov-score. This is an index based on 51 firm-specific provisions obtained from Institutional Shareholder Services (ISS), representing both internal and external governance. The 51 provisions are classified into eight categories: audit, board of directors, charter/bylaws, director education, executive and director compensation, ownership, progressive practices and state of incorporation. Each of the 51 factors is coded as either one or zero depending on whether or not ISS considers the firm's governance to be minimally acceptable, based on information in *ISS Corporate Governance: Best Practices User Guide and Glossary* (2003). Similar to Gompers et al. (2003), this index is measured as the sum of each firm's binary variables to create a firm-specific summary measure.

Black et al. (2006c) construct a Korean CG index (KCGI) based on a survey of CG practices by the Korea Stock Exchange (KSE) sent to all Korean listed firms, as well as corporate governance data that was hand collected by the researchers. This index 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. The index is constructed using a 0-1 dummy variable that shows whether a governance element exists. Due to the lack of a theoretical basis to use for

³² Shareholders' rights as captured by the Gompers et al. (2003) G-index.

assigning different weights, equal weighting is given to the variables of the categories in the computation of KCGI.

Bebchuk et al. (2009) develop an entrenchment index (i.e. the E-Index) based on six of the 24 IRRC provisions included in the G-index that Gompers et al. (2003) developed. The six provisions they chose are 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. In creating their index, each company is given a score from zero to six, based on the number of provisions the firm has in a given year and applied a “standard” equal weight for each provision.

Aggarwal et al. (2009) use the ISS governance attributes to form their own CG index, also named the GOV index.³³ Their index includes 44 attributes that cover four broad subcategories: the board; audit; anti-takeover provisions; and compensation and ownership. The GOV index is created by assigning a value of one if the firm meets the attribute or zero otherwise.³⁴ If a value is missing, the attribute is disregarded, and the index includes the percentage of non-missing attributes the company has. As in the work of Gompers et al. (2003) and Bebchuk et al. (2009), the GOV index is created by adding all the attributes and it is expressed as a percentage, by dividing by the total non-missing attributes.

Ammann et al. (2011) create two alternative additive CG indices using data from Governance Metrics International (GMI).³⁵ Their indices include 64 governance attributes which are sub-categorized by GMI into six categories: board accountability; financial disclosure and internal control; shareholder rights; remuneration; the market for corporate control; and corporate behaviour. Similar to the research of Gompers et al. (2003), Bebchuk et al. (2009), and Aggarwal et al. (2009), the indices developed by

³³ ISS included governance items that increase the power of minority shareholders. ISS was acquired by RiskMetrics Group in 2007.

³⁴ 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.

³⁵ Ammann et al. (2011) constructed an additional CG index derived from principal component analysis.

Ammann et al. (2011) are additive, with equal weights given to the governance attributes. For the first index, as in the research of Aggarwal et al. (2009), a value of one is assigned if the company adopts a governance attribute, while the item is deleted from the computation of the index if the company does not provide information on an attribute. The second index is prepared the same way as the first. However, missing values are assigned a value of zero and are not deleted from the computation of the index. Both indices are presented in percentage forms.

Black et al. (2012) develop a Brazilian Corporate Governance Index (BCGI). The BCGI consists of 41 firm-specific governance attributes, categorized into six categories: board structure; ownership structure; board procedure; disclosure; related party transactions; and minority shareholder rights. The BCGI is computed by assigning the value of one if an attribute exists and zero otherwise. If a firm has a missing value for a specific element, the average score of the non-missing values are used to compute each index.³⁶

Black and Kim (2012) create 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.

Gupta et al. (2013) create a firm level governance index using 41 governance attributes available from RiskMetrics, based on the work of Aggarwal et al. (2011). Their index is broken into four sub-categories: board, audit, anti-takeover provisions and compensation ownership. Their CG index is computed by assigning the value of one, if the firm minimally meets the governance attribute, and zero otherwise. The scores of all 41 governance attributes are added and divided by 41 to construct the governance index.

Black et al. (2015) construct 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).

³⁶ More specifically, the missing values of elements of the index are calculated by the sum of the non-missing elements, which is then multiplied by the total number of items in the index divided by the number of non-missing items.

KCGI consists of five equally weighted categories: board structure, disclosure, shareholders' rights; board procedures; and ownership parity.

Shan (2015) develop a CG index based on eight corporate governance mechanisms: state and foreign ownership concentration, board size, board independence, supervisory board, professional supervisor, audit committee independence and Big 4 auditor. His index is computed by assigning a value of one if an attribute exists and zero otherwise, and a score from zero to eight is given to each firm.

CG indices in the Greek context

The first study examining governance quality of Greek firms, using a CG index, is that of Tsipouri and Xanthakis (2004). Their effort aims at creating a rating scheme for Greek listed firms in an effort to quantify the compliance of Greek firms with international best practice standards, the so called Blue Book³⁷ based on the OECD principles of corporate governance (Governance, 1999). Their methodological approach is heavily influenced by the Deminor Corporate Governance Rating Service, the Davis Global Advisors, the OECD and the Greek Codes. In this effort, a questionnaire including 54 questions reflecting the five chapters of the Blue Book is sent to Greek listed firms. The data is sorted into five categories including: rights and obligations of shareholders; transparency, disclosure of information and auditing; the board of directors; executive management; and corporate governance commitment, the role of stakeholders and social responsibility. Of the 54 questions in the questionnaire, some are appropriate for CG rating, while others are used for control and clarification and are not for CG rating. Thus 37 questions³⁸ are used for CG rating, of which six relate to the rights and obligations of shareholders, nine to transparency, disclosure of information and auditing, 12 to the board of directors, five to executive management and five to corporate governance commitment, the role of stakeholders and social responsibility. The weighting of the various governance items is a difficult task, since it involved subjectivity. The weighting of the index is first constructed by having each

³⁷ For more information consult Chapter 2, section 2.5.

³⁸ Five questions referring to mandatory governance issues in the regulatory framework of the time, received 'perfect scores' by all Greek firms, and are included in the questionnaire to show potential international investors that Greek listed firms comply with minimum standards.

of the senior members of the research team individually assign weights among and within each category. The weights of the members of the research team coincided in most cases, and otherwise mutual agreement was reached, after discussion, in cases where differences existed. These weights are presented to the Advisory Committee and are adjusted to reflect the priorities of the participants in the market. The results for each individual firm is discussed and analyzed by the researchers so as to compare their results with the average scores and use it as a benchmark for future improvements.

A multi-level and comprehensive governance index in the Greek context is also constructed by Florou and Galarniotis (2007). Their index contains variables at three levels: the minimum requirements under Greek law (No.3016/2002), which obliges Greek firms to apply a set of governance guidelines; the incremental recommendations of the voluntary Greek Corporate Governance Code, entitled *Principles of Corporate Governance* (1999) developed by the Committee on Corporate Governance in collaboration with market experts which includes some of the recommendations of the OECD (1999); and additional international best practices, as prescribed by the UK Corporate Governance Code. This approach is consistent with prior work that also used national governance regulations, such as Alves and Mendes (2004) and Drobetz et al. (2004). As there is limited theory on which items to include in a CG index, Florou and Galarniotis (2007), include items that could be verified through annual reports and/or company web sites. Therefore, non-observable items, such as “board of directors should cooperate with internal auditors”, are not included in their research. As such, only clearly identifiable governance items are included in the index. Additionally, since no theory exists in helping one construct a CG index, a diverse set of governance items in terms of both their number and nature are included by Florou and Galarniotis (2007) in their index. They construct their index by manually collecting data on 47 items, comprising of 14 from the Greek law, 21 from the Greek CG code and 12 from international best practices, and these are categorized into seven main categories. Consistent with the work of Tsipouri and Xanthakis (2004), these categories are: board of directors; board composition; internal audit and financial reporting; external audit; corporate services; investor rights; and disclosures and transparencies. As acknowledged by Florou and Galarniotis (2007) there were cases whereby ambiguity

existed in assigning items to specific categories. For example, items could potentially be placed in two categories and so a choice of placement had to be made by the researchers. This issue did not distort the main empirical findings, because the essential focus of the study was evaluating the governance quality of Greek listed firms against the three quality standards and not against the various governance categories. If items could be included in more than one source, the researchers included only the extra items as they moved from lower to middle and finally to a higher governance benchmark. The index is constructed by applying a binary classification of one where the presence of the item was met and zero otherwise. Missing observations led to the creation of two versions of the index whereby in the first version missing items were considered non-existing items (that is, coded as zero), and in the second version missing items are excluded from the study. Consistent with other studies, such as Alves and Mendes (2004), Drobetz et al. (2004), and Black et al. (2006c) equal weights are applied to all items. Although applying equal weights does not reflect the relative significance of each governance item, it is used in this study as well as in others because it is transparent and objective. Additionally, there is a limited theoretical background on which governance items or categories are important for the evaluation of governance quality, and so applying uneven weights can lead to subjective results (Van den Berghe and Levrau, 2003).

Additional research in the Greek context has also been conducted by Bekiris and Doukakis (2011). They examine the association between CG and EM, using a CG index, in a Greek, Italian, and Spanish setting. Their study examines all firms (small, medium, and large capitalization firms) listed on the three stock exchanges of Greece, Italy and Spain; therefore, the CG items chosen are applicable to all sizes of capitalization. Their CG index is broad in scope due to the fact that Bekiris and Doukakis (2011) examine countries with different CG codes and different legal regulations. For this reason their CG index is based on international best practices, mainly focusing on the then UK Combined Code.³⁹ Additionally, the items included in their CG index are also taken from the two basic corporate governance rating firms,

³⁹ The UK Corporate Governance Code is formerly the Combined Code.

which offer data to most researchers, namely Risk Metrics (formerly ISS) and GMI Ratings, as in the research of Brown and Caylor (2006), Aggarwal et al. (2009), and Ammann et al. (2011). Bekiris and Doukakis (2011) also incorporate in their index items taken from Standard & Poor's Disclosure and Transparency Index.⁴⁰ Finally, the items chosen for their index also came from the existing literature, which examines corporate governance ratings in a specific market, such as in the research of Florou and Galarniotis (2007). Bekiris and Doukakis (2011) include 55 individual items in their CG index, categorized into five categories of corporate governance: board of directors; audit; remuneration; shareholder rights; and transparency. They create their index by collecting data from publicly available information, such as annual reports and companies' websites. Their decision not to use questionnaires is taken to avoid the possibility that the data collected is biased and subjective, a common criticism of questionnaires, as per Drobetz et al. (2004). Their corporate governance index is calculated by assigning a value of one if the CG item exists or zero otherwise, a common practice for calculating CG indices. Ratings are calculated in two ways, following the work of Florou and Galarniotis (2007) and Ammann et al. (2011), whereby in the first, missing values are considered as absent and are assigned a value of zero, and in the second, missing elements are excluded from the analysis. Following previous studies, equal weights are assigned to each CG item, therefore the CG index is calculated by adding all existing items and a percentage value is calculated for each firm.

Another Greek corporate governance index is created by Nerantzidis (2015). This index is created to evaluate the quality of Greek listed firms' compliance or non-compliance with corporate governance items included in the *Greek Corporate Governance Code* created by the Hellenic Federation of Industries in 2010. His CG index consists of 52 variables classified into five categories: board and its members; internal control; shareholders relation and communication; information disclosure; and board remuneration. The items of the CG index are found on either the firms' annual reports or their websites. The coding scheme of this index is achieved through a two-

⁴⁰ The Transparency Index was mainly utilized in selecting CG variables for the Transparency category, incorporating items such as "Is there a discussion of corporate strategy?" and "Does the company disclose its plans in the coming years?"

level analysis by two coders. At the first level, compliance to the Greek code results in the value of one if the company complied with a recommendation and zero otherwise. This process is the most objective, since the coders identify the section the corporate governance item is found in the annual report or website and a decision of whether a firm complies or not is reached. At the second level, the two coders evaluate the reasoning for non-compliance. This is a subjective process, whereby a decision has to be made for the narrative part of the CG statement between a missing explanation, a non-adequate explanation and an adequate explanation for non-compliance. The following coding scheme is used to record non-compliance: a value of one is given for no explanation, a value of two for an inadequate explanation and a value of three for an adequate explanation. Thus, the non-compliance explanations are evaluated and the effectiveness of the ‘comply or explain’ principle is illustrated. In order to ensure reliability and validity in the scoring process used by both coders in deciding between a non-adequate and an adequate explanation, a ten-point Likert scale is implemented to evaluate the adequacy of the explanations given for non-compliance. If the average score is above five, it is considered as an adequate response (coded as three) of non-compliance or else it is considered as a non-adequate response (coded as two). This process results in a consensus between the two coders for each attributed code (either coded as two or three) for each provision of each firm, establishing validity and reliability in the content analysis (Nerantzidis, 2015).

Nerantzidis and Tsamis (2017) construct a CG index in a Greek setting based on the index created by Nerantzidis (2015). They evaluate key elements, such as structure-related, performance-related, market-related, and governance-related variables, that lead firms to higher levels of CG disclosure, proxied by their CG index. Their index includes the same items and categories as Nerantzidis (2015), however they include only the objective part of the Nerantzidis (2015) index. They create two indices, according to the scoring method applied. In their first CG index, the *Scoring by item*

method is applied, while in their second CG index the *Scoring by category* method is applied.⁴¹

4.4 Weighting methods used to estimate CG indices

CG indices can be estimated using a *Scoring by item* method, a *Scoring by category* method or a *Scoring by expert* method (Nerantzidis, 2017).

The most commonly used approach in studies employing CG indices is the *Scoring by item* method (e.g. Gompers et al. (2003), Alves and Mendes (2004) and Ammann et al. (2011)) (Nerantzidis, 2017). The researcher initially needs to score each firm against the items included in the CG index. This is performed as follows: if an item is disclosed it is given a score of one, if it is not disclosed it is given a score of zero.⁴² If an item is not applicable to a specific firm, it is scored as non-applicable (n/a) and not included in the calculation of the CG indices (Cooke, 1992). In the *Scoring by item* method the index is calculated for each firm by adding all scores for each individual item and dividing this score by the maximum possible score applicable for that firm. Each item in the index is scored equally, irrespective of the number of items in each category or the number of categories in the index. The central focus of the CG indices using this method is on the items included in the indices and not on the categories that the items are part of.

Another scoring procedure for CG indices used in the relevant literature is the *Scoring by category* method. This method focuses on each category, not on each item, irrespective of the number of items each category includes. This method treats each category equally, indirectly giving unequal weights to the items of each category. The *Scoring by category* method first applies the *Scoring by item* method for each category

⁴¹ Nerantzidis and Tsamis (2017) name the *Scoring by item* method the ‘dichotomous method’ and the *Scoring by category* method the ‘PC unweighted method’. For further analysis of the *Scoring by item* and *Scoring by category* methods, see section 4.4.

⁴² There are also studies where a point of zero is given only if an item is specifically stated as non-existent. If an item is missing or non-disclosed then it is not included in the calculation of the CG index (e.g. Florou and Galarniotis (2007), Ammann et al. (2011) and Bekiris and Doukakis (2011)).

separately. Then, the CG score for each firm is measured by adding the scores of each category and dividing the sum by the number of categories that comprise the CG index.

The following simplified example illustrates how the CG index is calculated using the *Scoring by item* method and the *Scoring by category* method. Assume the CG index includes two categories, ‘board of directors’ which has 14 items and ‘transparency and disclosure’ which has 4 items and the firm complies with 12 items of the first category and 1 item of the second category. The CG index of the firm applying the *Scoring by item* method is 72% (13/18), while under the *Scoring by category* method is 55% $[(12/14)*0.5+(1/4)*0.5]$. This hypothetical example reveals that very different CG scores are calculated if one follows the *Scoring by item* method and/or the *Scoring by category* method. Weighting all items equally is the basic difference for CG indices based on the *Scoring by item* method, as opposed to the *Scoring by category* method. As depicted in the example, the CG index created using the *Scoring by item* method does not show the low performance in one key aspect of CG, i.e. disclosure and transparency. Thus, categories with more items, indirectly, and unintentionally, are not treated equally with categories that include fewer variables in the *Scoring by item* method. Therefore, the governance quality of firms can be either substantially biased, positively or negatively, based on the weighting method employed. Additionally, the different CG scores based on the rating method implemented can result in different statistical relationships when these scores are included in econometric analysis due to different overall and relative (ranking order) CG results (Nerantzidis, 2017).

A scoring procedure for CG indices also used in the relevant literature is the *Scoring by expert* method. In this scoring procedure, knowledgeable and experienced views of academics or professionals on corporate governance issues are utilized to assign weights for CG items and/or categories in the scoring process of the CG index. The weights reflect current market trends, ranking the importance of each individual item and/or category, aimed at measuring the perceived substance of each CG item and/or category, rather than only its form (Florou and Galarniotis, 2007; Bhagat and Bolton, 2008; Bozec and Bozec, 2012). This scoring procedure needs particular attention. Concerns arise as to how academics and professionals, the so-called ‘experts’, prioritize the items and/or categories of the CG index. In many instances, the way the weights

are assigned to the various CG items and/or variables is not explicit and may seem somewhat arbitrary. Additionally, the experience and knowledge of the so-called 'experts' is not so transparent. Although in the literature there are general references to the so-called 'experts' as practitioners (i.e. auditors), institutional investors, analysts and academics, there is no clear evidence of their experience (Tsipouri and Xanthakis, 2004; Cheung et al., 2007). Thus, a trade-off exists between validity and reliability. Although validity can be assessed based on the CG categories, there is an issue with reliability. No consistency in terms of criteria for weighting exists in prior literature, and thus a great deal of subjectivity is applied (Nerantzidis, 2017). Additionally, limited theoretical background exists on which items and/or categories are more important in evaluating corporate governance quality and thus an issue can arise when assigning the appropriate weights (Van den Berghe and Levrau, 2003). Although some variables could deserve more weight than others could, assigning appropriate weights might depend on the presence or absence of other variables, and thus this approach lacks objectivity and consistency (Florou and Galarniotis, 2007; Bebchuk et al., 2009). Van den Berghe and Levrau (2003) who review and analyze corporate governance ratings systems, state that the application of research methodologies such as questionnaires and interviews of key company representatives, as opposed to simply relying on annual reports, is necessary for the weighting of corporate governance criteria. However, studies based on questionnaires may suffer from self-selection and self-reporting biases. A potential self-selection bias exists when firms that have poor governance mechanisms may choose not to answer the questionnaire, while the data collected from respondents of the questionnaire may also suffer from self-reporting bias where respondents answer the questionnaire based on how they would like their governance mechanisms to be and not on how they actually are. Table 4-2 describes the features of the CG indices found in the literature.

Table 4-2 Summary of CG indices employed in prior literature

Corporate Governance Index	Components	Source of information	Sample	Results	Weighting Method
<i>CG Indices in different countries</i>					
Gompers et al. (2003) – G-Index	24 CG provisions classified into five groups : tactics for delaying hostile takeovers; voting rights; Director/officer protection; other takeover defenses; state laws	IRRC data	1500 US firms during 1990, 1993, 1995 and 1998	Higher quality governance resulted in improved future stock performance.	<i>Scoring by item</i>
Drobetz et al. (2004) - CGR	Objective survey questions including 30 governance items divided into five categories: corporate governance commitment; shareholder rights; transparency; management & supervisory matters; auditing	Survey questions	91 German firms in 2002	Positive relationship between governance practices and firm value.	<i>Scoring by item</i>
Alves and Mendes (2004)	13 non-mandatory recommendations on corporate governance included in the code of best practice issued by CMVM classified into four 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.	Multiple-choice questionnaires	82 firms on the Lisbon Stock Exchange in 1999-2001	The CG quality of Portuguese firms was found to be correlated with company performance.	<i>Scoring by item</i>
DeFond et al. (2005)	Six governance characteristics: board size, board independence, audit committee size, audit committee independence, shareholders' rights and institutional ownership are combined into a single dichotomous variable.	Annual reports & websites & G-index	Announcement of 702 newly appointed outside directors on audit committees of US firms	A positive market reaction to the appointment of financial experts on audit committees	<i>Scoring by item</i>
Brown and Caylor (2006) – Gov score	51 firm specific provisions classified into eight categories: audit; board of directors; charter/bylaws; director education; executive and director compensation; ownership; progressive practices; state of incorporation	ISS	1868 US listed firms for 2003	Measures corporate governance quality	<i>Scoring by item</i>
Black et al. (2006c) -KCGI	38 variables classified into five categories: shareholder rights; board structure; board procedure; disclosure; ownership parity	survey	515 Korean listed firms in 2001	A relationship exists between the CG index and the market value of Korean public firms.	<i>Scoring by category</i>
Bebchuk et al. (2009) – E-index	6 out of the 24 IRRC provisions included in the G-index consisting of staggered boards; limits to shareholder amendments of bylaws; supermajority requirements for mergers; supermajority requirements for charter amendments; poison pills; golden parachute arrangements	IRRC	Between 1,400-1,800 US firms from 1990-2003	Their index is negatively correlated with firm valuation.	<i>Scoring by item</i>

Corporate Governance Index	Components	Source of information	Sample	Results	Weighting Method
Aggarwal et al. (2009) – GOV index	44 attributes compiled by ISS covering four categories: board; audit; antitakeover provision; compensation and ownership	ISS	2,234 foreign firms and 5,296 US firms for 2005	The governance of foreign firms is compared to the governance of US firms and both are related to firm value.	<i>Scoring by item</i>
Amman et al. (2011)	64 governance attributes cover six categories: board accountability; financial disclosure and internal control; shareholder rights; remuneration; the market for corporate control ; corporate behaviour	GMI	6.663 firm-year observations from 22 developed countries, such as Japan, the UK and Canada from 2003-2007	The relationship between firm-level corporate governance and firm value is examined.	<i>Scoring by item</i>
Black et al. (2012) - BCGI	41 firm-specific governance attributes in six categories: board structure; ownership structure; board procedure; disclosure; related party transactions; minority shareholder rights.	survey	66 Brazilian firms for 2004	Assess similarities and differences across four emerging markets: Brazil, India, Korea and Russia.	<i>Scoring by item</i>
Black and Kim (2012)	Rely on the work of Black et al. (2006) – KCGI; consists of five equally weighted indices: board structure; board procedure; shareholder rights; disclosure; ownership parity	survey	428 Korean firms from 1998-2004	They examine how a 1999 Korean CG law for large public firms affects market value; a positive relationship between board structure reforms and firm market value is found.	<i>Scoring by category</i>
Gupta et al. (2013)	Rely on the work of Aggarwal et al. (2011); 41 firm-level governance attributes in four categories: board; audit; anti-takeover provisions; compensation & ownership	RiskMetrics	4,046 publicly traded non-financial firms from 23 countries.	They examine the effect of CG on firm performance during the financial crisis.	<i>Scoring by item</i>
Black et al. (2015)	Rely on the work of Black and Kim (2012) – KCGI; consists of five equally weighted indices: board structure; disclosure; shareholder rights; board procedures; ownership parity	survey	509 Korean firms from 1998-2004	A positive relationship with firm value is observed; additionally, better governed firms are more able to moderate the negative effects of related party transactions on market value.	<i>Scoring by category</i>
Shan (2015)	8 corporate governance mechanisms: state & foreign ownership concentration; board size; board independence; supervisory board; professional supervisor; audit committee independence; Big 4 auditor.	Annual reports & websites	1012 firm-year observations for Chinese listed firms for 2001-2005	Firms with good governance practices constrain EM	<i>Scoring by item</i>
<i>CG Indices in the Greek context</i>					
Tsipouri and Xanthakis (2004)	The questionnaire consisted of 54 questions sorted into five categories: rights and obligations of shareholders; transparency, disclosure of information and auditing; the board of directors; executive	questionnaire	120 Greek listed firms in 2001	Created a rating scheme to quantify the compliance of Greek firms with the so-called Blue Book	<i>Scoring by expert</i>

Corporate Governance Index	Components	Source of information	Sample	Results	Weighting Method
	management; corporate governance commitment, the role of stakeholders and social responsibility				
Florou and Galarniotis (2007)	47 variables in seven dimensions: board of directors; board composition; internal audit and financial reporting; external audit; corporate services; investor rights and disclosures and transparencies	Annual reports & websites	274 Greek listed firms in 2003	Evaluation of governance quality	<i>Scoring by item</i>
Bekiris and Doukakis (2011)	55 items categorized into five dimensions: board of directors; audit; remuneration; shareholder rights; and transparency	Annual reports & websites	185 Greek listed firms, 155 Italian listed firms and 87 Spanish listed firms resulting in a total sample of 427 firms for 2008	The association between CG and EM is examined in a Greek, Italian and Spanish setting.	<i>Scoring by item</i>
Nerantzidis (2015)	52 variables in five categories: board and its members; internal control; shareholders relation & communication; information disclosure; and board remuneration	Annual reports & websites	144 Greek listed firms for 2011	This study examines the level of compliance of Greek firms to the Greek code, as well as rating the explanations for non-compliance.	<i>Scoring by item / Scoring by expert</i>
Nerantzidis and Tsamis (2017)	52 variables in five categories: board and its members; internal control; shareholders relation & communication; information disclosure; and board remuneration	Annual reports & websites	156 Greek listed firms for 2011	This study examines key elements, such as structure-related, performance-related, market-related, and governance-related variables, that lead a firm to higher levels of CG disclosure, proxied by a CG index, in a Greek setting	<i>Scoring by item / Scoring by category</i>

Empirical models used in this study

The aim of this research is to examine the influence of corporate governance mechanisms on EM before and after the implementation of Law 3693/2008 requiring Greek listed firms to have an audit committee and complete disclosure of the firm's relationship with the external auditor. The following regression model will be used:

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

This regression is tested for periods before and after the implementation of Law 3693/2008.⁴³

4.5 Earnings management models applied in this study

Measurement of the discretionary accruals models used in the study are the cross-sectional version of the modified Jones model by Dechow et al. (1995) and the DeFond and Park (2001) model. Absolute values are used to measure EM, regardless of whether EM is used to increase or decrease income, thus capturing the combined effect of both types of EM (Ianniello, 2015; Maijoor and Vanstraelen, 2006; Katmon and Farooque, 2017). This approach is also used in previous studies and is deemed appropriate in countries where managers are motivated to manage their earnings in both directions (Prencipe and Bar-Yosef, 2011; Klein, 2002a). Baralexis (2004) states that Greek firms engage in both income-increasing and income-decreasing EM due to different motives directly related to their size. Large Greek firms tend to engage in income-increasing EM since their primary motive is external financing, while small firms understate profit since their primary incentive is the reduction of income taxes (Baralexis, 2004).⁴⁴ Therefore, this study examines the magnitude of EM and not its direction.

⁴³ For more details consult section 4.8.

⁴⁴ Although financial reporting and tax accounting are measured by different measurement rules for consolidated financial statements of listed firms after the implementation of IFRS in 2005, accruals can have tax effects since taxable income calculation depends on financial reporting income.

4.5.1 Modified Jones model

This study uses the cross-sectional version of the modified Jones model as the first EM accruals-based method by Dechow et al. (1995). Research conducted by Dechow et al. (1995) concludes that the modified Jones model performs the best in detecting sales-based abnormal accruals. Guay et al. (1996) also state that this model is the most powerful in detecting EM in cases where managers use their discretion in revenue recognition, thus increasing the precision of the model compared to the original Jones model (Tsipouridou and Spathis, 2014). Additionally, the cross-sectional modified Jones model is also chosen so that changes in economic conditions in specific years affecting specific accruals will be filtered out since the model is re-estimated every year (Tsipouridou and Spathis, 2012). Finally, in similar research such as Cornett et al. (2008), Jiang et al (2008), and Jaggi and Leung (2007), all of which examine the effect of CG on EM, the use of the modified Jones model is also implemented for determining discretionary accruals.

In contrast to previous studies that have used total operating accruals to measure EM, this study focuses on the working capital component, since current accruals are easier for managers to manipulate (Xie et al., 2003). Total operating accruals in previous studies has been defined as working capital accruals plus an important long-term accrual, depreciation (Peasnell et al., 2005). As per Beneish (1998), this long-term component provides a limited way to detect EM, since changes in depreciation methods are not easily accomplished and attract attention from auditors and investors (Peasnell et al., 2005). Other long-term accruals, such as defined benefit pension obligations and certain environmental liabilities are suitable for detecting EM, but due to their complexity are not used as a proxy for EM by previous studies (Peasnell et al., 2005). Due to the absence of a model describing what drives these other long-term accruals, it is difficult to distinguish between discretionary and non-discretionary accruals when total accruals are used, and the power of the tests will be negatively affected if these components are not used (Peasnell et al., 2005). Therefore, the focus in this study is on discretionary current accruals to measure EM.

Current accruals are defined as the change in non-cash current assets (non-cash current assets = current assets - cash & short-term investments) less the change in non-debt current liabilities (non-debt current liabilities = current liabilities - short-term debt & current portion of long-term debt). Total current accruals are assumed to be the sum of both discretionary and non-discretionary accruals. To find the non-discretionary component of accruals for a given firm-year observation, current accruals are first regressed on the change in sales from the previous year for all non-sample companies in the same industry. The industry classification is based on the Industry Classification Benchmark (ICB), which is used globally to divide the market into specific categories, allowing investors to compare industry trends between well-defined subsectors.⁴⁵ In order to avoid heteroskedasticity, consistent with Teoh et al. (1998a), each variable is deflated by lagged total assets:

$$\frac{CA_{it}}{TA_{it-1}} = \alpha \left(\frac{1}{TA_{it-1}} \right) + \beta_1 \left(\frac{\Delta REV_{it}}{TA_{it-1}} \right) \quad \text{eq 4 - 11}$$

where

CA_{it} =total current accruals of firm i in year t ($WC02201$; $WC02001$; $WC03101$; $WC03051$)

TA_{it-1} =book value of total assets of firm i at the end of year $t-1$ ($WC02999$)

$\Delta REV_{it} / TA_{it-1}$ =the change of sales of firm i in year t scaled by TA_{it-1} ($WC01001$; $WC02999$)

The estimation of regression coefficients is carried out for each industry year and for each Greek firm in the sample. A separate regression is run for each firm, including all firms in the same industry, but excluding the sample firm each time from the regression. As per Klein (2002a), industries with less than eight observations should be excluded from the analysis, so as to control for industry-wide changes in economic conditions that influence the accrual process. Having followed this approach in this study, the industries that should have been excluded would include firms with large capitalization, whose data are important for this study. For this reason, all firms were incorporated in the study and similar industries were combined.⁴⁶ The regression coefficients of the

⁴⁵ The Industry Classification Benchmark (ICB) is a definitive system categorizing over 70,000 companies and 75,000 securities worldwide, enabling the comparison of companies across four levels of classification and national boundaries. The ICB system is supported by the ICB Database, a data source for global sector analysis, which is maintained by FTSE Group. For further information, see <http://www.icbenchmark.com/>.

⁴⁶ See the sample selection procedure section for more details in section 4.10.

previous equation are the parameters of interest in estimating changes in non-discretionary accruals. Using these coefficients, each sample firm's non-discretionary current accruals are calculated. It should also be noted that the change in accounts receivable is not included in estimating the coefficients, although it is used in the estimation of non-discretionary accruals (Ashbaugh et al., 2003; Jaggi and Leung, 2007). The non-discretionary current accruals are the portion of current accruals that are considered independent of managerial control and are created due to the company's sales growth (Xie et al., 2003).

Non-discretionary current accruals ($NDCA_{it}$) are estimated as follows:

$$NDCA_{it} = \hat{\alpha} \left(\frac{1}{TA_{it-1}} \right) + \hat{\beta}_1 \left(\frac{(\Delta REV_{it} - \Delta REC_{it})}{TA_{it-1}} \right) \quad \text{eq 4 - 12}$$

where

$NDCA_{it}$ =non-discretionary current accruals of firm i in year t

TA_{it-1} =book value of total assets of firm i at the end of year t-1 (WC02999)

$\Delta REV_{it} - \Delta REC_{it} / TA_{it-1}$ =the change of sales of firm i in year t less the change of receivables scaled by TA_{t-1} (WC01001; WC02051)

Discretionary current accruals, DCA_{it} are then defined as the remaining portion of the current accruals:

$$DCA_{it} = \left(\frac{CA_{it}}{TA_{it-1}} \right) - NDCA_{it} \quad \text{eq 4 - 13}$$

where

DCA_{it} =discretionary current accruals of firm i in year t

CA_{it} =total current accruals of firm i in year t (WC02201; WC02001; WC03101; WC03051)

TA_{it-1} =book value of total assets of firm i at the end of year t-1 (WC02999)

$NDCA_{it}$ =non-discretionary current accruals of firm i in year t

4.5.2 DeFond and Park (2001) model

This research also uses the DeFond and Park (2001) model to measure EM. As observed in the research of Peek et al. (2013), for studies that include a limited number of observations per year/industry, the estimation of discretionary accruals based on Jones type models can result in estimations that may be unrealistic (Wysocki, 2004; Marra and Mazzola, 2014). Therefore, given the sample size and the number of firms listed on ASE and included in this study, the DeFond and Park (2001) model is also

implemented. This model is also used in the research of Marra et al. (2011) and Prencipe and Bar-Yosef (2011), whose samples are also similar in size and who also examine the effect of CG on EM.⁴⁷

For similar reasons to those proposed for the modified Jones model, working capital accruals are used as the second proxy for EM, instead of total accruals. In the DeFond and Park (2001) model AWCA is estimated separately for each company, as follows:

$$AWCA_t = WC_t - \left(\left(\frac{WC_t - 1}{S_t - 1} \right) * S_t \right) \quad \text{eq 4 - 14}$$

where

AWCA_t=abnormal working capital accrual in year t;

WC_t=non-cash working capital accruals in year t;(WC02201; WC02001; WC03101; WC03051)

WC_{t-1}=non-cash working capital at year t-1;(WC02201; WC02001; WC03101; WC03051)

S_t=sales in year t; (WC01001) and

S_{t-1}=sales in year t-1 (WC01001).

Non-cash working capital accruals are computed as non-cash current assets (current assets-cash and short-term investments) - non-cash current liabilities (current liabilities-short-term debt).

Working capital accruals are calculated by scaling by sales instead of total assets, as is the case in the modified Jones model, since sales is considered a more appropriate scalar because it is directly related to earnings (Ianniello, 2015).

The positive element of the DeFond and Park (2001) model compared to the modified Jones model is that normal accruals are measured for each firm separately, and so are tailored to each observation of the sample. The modified Jones model measures normal accruals based on a coefficient from a pooled cross-sectional regression, including firms that are in the same industry. Therefore, the modified Jones model uses industry-wide estimates, while the DeFond and Park (2001) model uses firm-specific measures. For example, although within an industry each firm's specific characteristics affect normal

⁴⁷ Marra et al. (2011) have a sample of 222 firms per year from 2003-2006, while Prencipe and Bar-Yosef (2011) have a sample of 122 firms in 2003 and 127 firms in 2004. This study's sample is 204 in 2006, 205 in 2008, 192 in 2010 and 187 in 2012.

capital accruals, this is only truly captured through the DeFond and Park (2001) model, since the modified Jones model uses the average effects of firms in the same industry to measure normal accruals (Defond and Park, 2001). Thus, it is important to use this model, since it complements the Modified Jones model.

4.6 Governance quality measures applied in this study

Two models of governance quality are employed in this study: one with audit committee variables and one with a CG index. Both models also include control variables that could potentially affect EM.

4.6.1 Audit Committee Effectiveness (Weighted ACE)

Governance quality is proxied through a composite measure of audit committee effectiveness (*ace*) consisting of the independence of audit committee members; the financial expertise of audit committee members; the size of audit committees; and the frequency of meetings of audit committees, in line with Kent et al. (2010) and Zaman et al. (2011).

More specifically, audit committee independence is a dichotomous variable, which takes the value of one if the majority of the members of the audit committee are independent, non-executive members (>50%) and zero otherwise. Similarly, audit committee expertise is also a dichotomous variable that takes the value of one when at least one member of the audit committee has financial expertise and zero otherwise. Although audit committee meetings and audit committee size are continuous variables, for the purpose of inclusion in the composite measure, a cut-off point of four meetings or more per year for audit committee meetings and three or more members for audit committee size is used.⁴⁸ Therefore, audit committee meetings is denoted as one when there are four or more meetings per annum and zero otherwise and audit committee size

⁴⁸ Although Greek law does not mandate a minimum of audit committee meetings, a diligent committee should meet at least four times a year, as recommended by the Greek CG Code, as it coincides with the required quarterly audit review. Thus, a cut-off point of four or more meetings is set. Accordingly, Greek law does not require a minimum committee size, however, the Greek CG Code recommends a minimum of three board members to ensure that the board functions effectively. Thus, a cut-off point of three members is set.

is denoted as one when the number of members are three or more and zero otherwise. In order to construct the composite *ace* measure, the combination of all four characteristics is required. *Ace* is also a dichotomous variable, whereby if all four variables are denoted as one individually, then *ace* is also one, and otherwise it is zero.

However, due to the fact that *ace* is a very strict measure, an alternative measure, a *weighted ace* measure (*weighace*) is used in this study. Instead of using a dichotomous variable, whereby if only one element of audit committee effectiveness is missing, *ace* is zero, *weighted ace* is constructed taking values ranging from zero to four depending on the number of audit committee effectiveness criteria that are present. This weighted measure allows for an evaluation of audit committee effectiveness based on how many audit committee attributes are present. It avoids the pitfalls of the *ace* measure where a firm could be considered to have an effective audit committee if it has all of the attributes or it can be considered to have an ineffective audit committee if even one attribute is missing.

4.6.2 Corporate Governance Index

This study also develops a corporate governance index based on Greek CG laws, as well as particular features of the Greek CG code created by the Hellenic Federation of Industries in 2010, and examines its relationship to EM.

Construction of CG index: validity and reliability

The CG index draws upon three sets of regulations/best practice guidance and thus is separated into: (a) requirements drawn from Greek law (No.3016/2002), which obliges Greek firms to apply a set of governance standards, 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, Article 37), which requires the creation of audit committees; and (c) voluntary best practice items that are included in the *Greek CG Code* created by the Hellenic Federation of Industries in 2010, 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 (e.g. Alves and Mendes (2004), Drobetz et al. (2004), and Florou and Galarniotis (2007)).⁴⁹

Content Validity

Content validity shows whether an instrument, in this case the CG index, measures effectively what the researcher wants it to measure. A necessary procedure is for a group of experts to evaluate the process of construction of a CG index so as to verify its validity (Tsalavoutas et al., 2010). This issue was considered here in the following way.

The process began by the researcher deciding on which items to include in the CG index. Initially, the items considered as part of the researcher's CG index included CG items from the research of Tsipouri and Xanthakis (2004) and Florou and Galarniotis (2007) in combination with the recommendations of the Hellenic Federation of Industries in 2010, the Greek CG Code. The initial CG index created consisted of 44 items, of which 15 were based on the first Greek Law of Corporate Governance (No.3016/2002), three were based on the Greek Law concerning audit committees (No.3693/2008, Article 37) and 26 were based on the Hellenic Federation of Industries' suggestions (the Greek CG code). The items 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 variables (that is, board of directors, internal auditing). Additionally, although there is no theory that provides guidance on what exact items to include in an index, it is essential that all 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.

Following this initial screening process, the items comprising the CG index were examined independently by two experts, a financial analyst and an accounting professor

⁴⁹ Florou and Galarniotis (2007) incorporate in their index 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 are optional and considered best practice, whereby in the CG index constructed for this study they are compulsory.

whose expertise lies in the area of CG. Based on their suggestions, two items⁵⁰ were excluded from the original CG index due to vagueness and ambiguity, and thus an updated version with 42 items was created whereby 13 items were based on the Greek CG Law (Law 3016/2002), three based on the Greek Law concerning audit committees (Law 3693/2008, Article 37) and 26 voluntary items based on recommendations of the Greek CG Code.

This instrument, consisting of 42 items, was used to record the CG index for 2006, 2008 and 2010. After constructing the CG index, it became evident that it was not possible to consistently record two voluntary items. Thus, they were deleted from the final CG index. Therefore, the final CG index consists of 40 items⁵¹ of which 13 items are based on the first Greek CG Law (Law 3016/2002), three are based on the CG law requiring the existence of an audit committee (Law 3693/2008, Article 37) and 24 are based on the voluntary items based on the Greek CG Code. Consequently, the CG index consists of 16 “compliance” items that are mandatory because of the CG laws and 24 “voluntary” items that are optional and are based on best practices.⁵² The 40 items of the CG index are placed in the following four broad CG categories: (i) Board of directors, (ii) Internal Auditing and Corporate Services, (iii) Board Committees, and (iv) Disclosure and Transparency. Each category includes items based on Greek CG Laws and voluntary items based on the recommendations of the Greek CG Code. More specifically, ‘Board of directors’ includes three items from the first Greek CG Law (Law 3016/2002) and seven items from the recommendations of the Greek CG Code; ‘Internal Auditing & Corporate Services’ includes eight items from the first Greek CG Law (Law 3016/2002); ‘Board Committees’ includes three items from the Greek CG

⁵⁰ The two items that were excluded are from the board of directors’ dimension of the Greek law and are the following: *Independent non-executive directors own $\leq 0.5\%$ of the company shares* and *Independent non-executive directors do not have any “dependency” relationship with the company or with affiliated members.*

⁵¹ The two items that were excluded are from the disclosure and transparency dimension of the Greek Code and are the following: *Disclosure of quantitative and qualitative matters concerning employees* and *A corporate governance statement included in the annual report provides information on the board’s composition and includes the names of the chairman, the vice-chairman, the chief executive, as well as the heads and members of all board committees. It also names the non-executive members considered as independent.*

⁵² The three items concerning the audit committee law are also considered as voluntary items for the data collected for 2006, therefore there are 13 “mandatory” items and 27 “voluntary” items for 2006.

Law concerning audit committees (Law 3693/2008, Article 37) and 11 items from the recommendations of the Greek CG Code; 'Disclosures and Transparency' includes two items from the first Greek CG Law (Law 3016/2002) and six items from the recommendations of the Greek CG Code. Table 4-3 lists the items in each category of the CG index.

Table 4-3 Items in each category of the CG index

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

<u>Board Committees</u>	
19.	Existence of an audit committee <i>(mandatory item after 2006)</i>
20.	Audit committee consists of 3 non-executives, of which 1 is an independent non-executive <i>(mandatory item after 2006)</i>
21.	The independent non-executive member of the audit committee has financial/accounting expertise <i>(mandatory item after 2006)</i>
22.	The company has a nomination committee <i>(best practice / optional)</i>
23.	The nomination committee has at least 3 members <i>(best practice / optional)</i>
24.	The majority of the nomination committee should be non-executive <i>(best practice / optional)</i>
25.	The nomination committee should be chaired by an independent non-executive member <i>(best practice / optional)</i>
26.	The audit committee should be composed exclusively of non-executive board members <i>(best practice / optional)</i>
27.	The audit committee is chaired by an independent non-executive member <i>(best practice / optional)</i>
28.	The company has a remuneration committee <i>(best practice / optional)</i>
29.	The remuneration committee should be composed of entirely non-executive members. <i>(best practice / optional)</i>
30.	The majority of the remuneration committee should be independent. <i>(best practice / optional)</i>
31.	The members of the remuneration committee should be at least 3. <i>(best practice / optional)</i>
32.	The chair of the remuneration committee should be an independent- non-executive member <i>(best practice / optional)</i>
<u>Disclosures and Transparency</u>	
33.	Separate disclosure of the remuneration of non-executive directors in the account notes <i>(mandatory item)</i>
34.	Disclosure of the ownership structure (from Law2190/1920) <i>(mandatory item)</i>
35.	Disclosure of corporate targets and prospects <i>(best practice / optional)</i>
36.	The corporate governance statement discloses the term of appointment of each board member and contains their brief biographies. <i>(best practice / optional)</i>
37.	The work of the nomination committee and the number of meeting is described in the corporate governance statement. <i>(best practice / optional)</i>
38.	The annual corporate governance statement illustrates how the performance evaluation of the board and its committees has been conducted. <i>(best practice / optional)</i>
39.	The annual corporate governance statement describes the work of the audit committee and the number of meetings held during the year. <i>(best practice / optional)</i>
40.	The annual corporate governance statement summarizes the work of the remuneration committee and the number of meetings held during the year. <i>(best practice / optional)</i>

Scoring Approach

This study estimates the CG indices using the *Scoring by item* method.⁵³ The *Scoring by expert* method was not chosen so as to avoid inconsistency and subjectivity when weights are applied, as discussed earlier. Although the disadvantage of not reflecting the relative importance of each governance item or category exists, the advantage of being transparent and relatively objective outweighs the disadvantage of not reflecting accurately the relative importance of each governance item or category (Florou and Galarniotis, 2007; Van den Berghe and Levrau, 2003; Jiang et al., 2008; Bekiris and Doukakis, 2011; Alves and Mendes, 2004).

The CG index for this study is constructed by manually recording each CG item 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 items, whereby a point of one is awarded when the governance item is present and zero otherwise. Non-disclosed or missing items are documented as n/d and non-applicable variables are disclosed as n/a. This led to the creation of two ratings for the CG index. In the first rating approach (*cg_pen index*), non-disclosed or missing values are considered to be absent from the annual reports of the companies analyzed. Therefore, firms are penalized during the rating procedure. In the second rating approach, (*cg_nonpen index*), the missing values are excluded from the analysis. In both ratings, non-applicable items are excluded from the analysis. This dual rating procedure is consistent with previous work of Florou and Galarniotis (2007) and Ammann et al. (2011).

Some items that comprise the CG index are recorded differently. Items concerning the nomination⁵⁴ and remuneration committees in the CG index due to their dependency on previous items in the category were recorded as zero only in the first item in the category and not applicable (n/a) in all the remaining dependent items. This was applied because of the “comply or explain” principle underlying the CG Code. If the

⁵³ The *Scoring by category* method is used in the next study, as discussed in chapter 7.

⁵⁴ The nomination committee items are 22, 23, 24, 25, 37, the remuneration items are 28, 29, 30, 31, 32, 40, and the audit committee items are 19, 20, 21, 26, 27, and 39.

first item was recorded as not disclosed (n/d), all others were also classified as not disclosed (n/d),⁵⁵ while in cases where the first item was classified as one (i.e. the governance variable was met), all other items were either classified as non-disclosed (n/d) or non-existing (zero). The same reasoning is applied to the items concerning the audit committee for the year 2006, since there was no law at that time for the mandatory existence of an audit committee. However, after 2006 all items were recorded as zero, where applicable, since the existence of an audit committee was mandatory.

When applying the *Scoring by item* scoring procedure, under both rating schemes (penalized and non-penalized), apart from calculating the total index which incorporates all CG items, there was an index created for each rating that included mandatory and voluntary variables separately. Therefore, six indices are constructed, where either non-disclosed and or missing items are recorded as zero and the sum divided by the total governance items, or non-disclosed items are excluded from the analysis, and the sum divided by the maximum expected. More specifically, the following indices are constructed when applying the *Scoring by item* method: (1) *cg_pen_total*, all items are included in the calculation of the index (2) *cg_pen_mand*, only mandatory items are included in the calculation of the index (3) *cg_pen_bp*, optional/best practice items are included in the calculation of the index (4) *cg_non_total*, all items are included in the calculation of the index (5) *cg_non_mand*, only mandatory items are included in the calculation of the index and (6) *cg_non_bp*, optional/best practice items are included in the calculation of the index.

Reliability of the research instrument

In addition to validity, ensuring reliability is also necessary. Reliability looks at how accurately and consistently the instrument, in this case the CG index, is measured. A problem concerning reliability can occur due to the fact that there is subjective judgment exercised in scoring the items of the CG index (Tsalavoutas et al., 2010).

⁵⁵ If an item is n/d in “disclosures and transparency” (36, 37, 38, 39, 40) and no dependency exists it is recorded as zero not n/d.

To ensure the reliability of the CG index, the CG index is scored independently for a pilot sample of 10 firms⁵⁶ for 2010 by the researcher, a financial analyst and an accounting professor - the three that took part in the content validity discussed earlier. It was decided that both methods in calculating the CG index (the *Scoring by item* and the *Scoring by category* method) should be employed so as to establish whether the two methods produce significantly different scores among the three researchers.

To test the reliability of the research instrument, the “Kruskal- Wallis test’ is used so as to examine if a statistically significant difference exists in the scores between the three researchers. Given that the three researchers were involved in the content validity process, the potential differences in scoring the CG indices are reduced, thus no significant differences are expected for both the penalized and non-penalized indices.

Table 4-4 shows the CG index scores calculated under both weighting procedures by all three researchers individually. Based on the Kruskal-Wallis Test in both weighting procedures, the CG index scores for both the penalized and non-penalized indices for all three researchers is not significantly different, indicating that the research instrument is reliable.

⁵⁶ The 10 sample firms chosen come from all nine industries of the Greek market according to the ICB classification scheme.

Table 4-4 Testing the reliability of the research instrument

Company	Researcher				Financial Analyst				Accounting Professor			
	<i>Scoring by item method¹</i>		<i>Scoring by category method²</i>		<i>Scoring by item method¹</i>		<i>Scoring by category method²</i>		<i>Scoring by item method¹</i>		<i>Scoring by category method²</i>	
	Penalized index	Non-penalized index	Penalized index	Non-penalized index	Penalized index	Non-penalized index	Penalized index	Non-penalized index	Penalized index	Non-penalized index	Penalized index	Non-penalized index
1	0.83	0.86	0.71	0.88	0.80	0.83	0.78	0.81	0.77	0.79	0.75	0.78
2	0.83	0.92	0.60	0.76	0.93	0.95	0.91	0.94	0.80	0.91	0.80	0.91
3	0.67	0.87	0.82	0.85	0.77	0.82	0.74	0.79	0.74	0.90	0.76	0.88
4	0.84	0.87	0.55	0.76	0.68	0.72	0.66	0.72	0.77	0.80	0.78	0.82
5	0.58	0.74	0.83	0.85	0.77	0.80	0.75	0.78	0.63	0.73	0.62	0.71
6	0.74	0.91	0.66	0.84	0.74	0.94	0.77	0.94	0.72	0.88	0.75	0.88
7	0.60	0.80	0.84	0.91	0.74	0.77	0.75	0.78	0.64	0.77	0.67	0.78
8	0.76	0.78	0.77	0.91	0.83	0.83	0.85	0.85	0.81	0.83	0.82	0.85
9	0.58	0.66	0.59	0.66	0.64	0.66	0.63	0.64	0.55	0.65	0.56	0.64
10	0.50	0.71	0.77	0.79	0.61	0.70	0.59	0.68	0.50	0.74	0.55	0.77
Mean	0.69	0.81	0.71	0.82	0.75	0.80	0.74	0.79	0.69	0.80	0.71	0.80
Median	0.71	0.83	0.74	0.84	0.76	0.81	0.75	0.79	0.73	0.80	0.75	0.80
	Penalized CG index						Non-penalized CG index					
Scoring by item¹	Anova F-test : 0.99 / Kruskal-Wallis test 1.32						Anova F-test : 0.05 / Kruskal-Wallis test 0.14					
Scoring by category²	Anova F-test : 0.40 / Kruskal-Wallis test 0.44						Anova F-test : 0.25 / Kruskal-Wallis test 0.51					

¹CG indices calculated with the *Scoring by item* method. ²CG indices calculated with the *Scoring by category* method.

4.7 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 EM are also controlled for so as to avoid the effect of possible puzzling factors (Bartov et al., 2001). This study examines the effect of corporate governance on EM, therefore it is necessary to control for other factors that influence EM, so as to achieve this goal.

The study uses five control variables consistent with previous studies, namely: concentrated ownership, leverage, firm performance, firm size and growth opportunities (Marra et al., 2011; Davidson et al., 2005; Peasnell et al., 2005; Park and Shin, 2004; Klein, 2002a).

Concentrated ownership

The first control variable used is ownership concentration (*ownconc*) which is measured as the percentage of shares owned by the largest shareholder of the firm. Studies show that in firms with concentrated ownership, major shareholders may have the interest and the ability to persuade managers to influence EM so as to achieve gains at the expense of minority shareholders (Marra et al., 2011). On the other hand, studies indicate that concentrated shareholders might improve the monitoring process and therefore minimize EM (Davidson et al., 2005; Peasnell et al., 2005; Agrawal and Knoeber, 1996). Therefore, although ownership concentration appears frequently to have an effect on EM, the sign of this effect is not consistent.⁵⁷

Leverage

Another control variable used is leverage (*lev*), measured as total debt over total assets (Davidson et al., 2005; Beasley and Salterio, 2001; Klein, 2002a).

Leveraged firms are likely to increase EM when they are close to the violation of binding debt agreements (Marra et al., 2011; Park and Shin, 2004; Davidson et al.,

⁵⁷ Concentrated ownership is also a proxy for family ownership, since on average the pooled sample (2006-2012) has 52% family firms, of which 86% has a family member being the largest shareholder of the firm (the variable concentrated ownership). See Appendix VI for more information.

2005). Therefore, highly leveraged firms may be highly motivated to manage their earnings. However on the other hand, the opposite might also exist, whereby highly leveraged companies might be less able to perform EM because of close scrutiny by creditors (Park and Shin, 2004). Therefore, the overall effect of leverage on EM is not consistent.

Firm performance

Previous research shows that it is necessary to control for firm performance. Similar to the research of Klein (2002a) and Davidson et al. (2005), two measures are used. The first control variable is the absolute change in net income (*absearn*), calculated as the absolute change in net income between the current and prior periods scaled by total assets. Additionally, absolute earnings (*absni*), calculated as the absolute value of net income before extraordinary items scaled by total assets, is also another control variable included in the study.⁵⁸ Absolute values are used since the use of these variables is to control for the firm's inherent accruals or earnings process, not its direction. This is consistent with the approach of Kothari et al. (2005) that the period's abnormal accruals are associated with the company's earnings process (Klein, 2002a). For both indicators of firm performance, a positive relationship with EM is expected.

Firm size

Firms have the ability to choose among various corporate governance practices so as to implement structures that are more suitable for their business. The effect of firm size is controlled for through the use of the log of total assets (*ta*) (Bartov et al., 2001; Davidson et al., 2005).

Different sized firms need different corporate governance structures to meet their different needs (Peasnell et al., 2005). As firms change in size, diversity, and

⁵⁸ Klein (2002a) also tests her model using signed earnings because EM is related to firm performance, a measure used extensively as a control variable in many studies. This is similar to Bekiris and Doukakis (2011), who also examine Greek data, whereby the relationship between EM and the level of profitability is controlled for through return on assets (ROA), which is the same control variable. The regressions are also repeated using signed current earnings and change of current earnings to ascertain the results for robustness, as seen in Appendix III, IV and V.

complexity, research shows that these changes influence corporate governance variables and EM. It is expected that larger firms have more difficulty in conducting EM, due to the fact that they are monitored more carefully by the market and other stakeholders (Bedard et al., 2004; Klein, 2002a; Park and Shin, 2004; Marra et al., 2011). On the other hand, Lobo and Zhou (2006) argue that larger firms find it easier to conduct EM due to the fact that the complexity of their operations makes it difficult to detect EM (Bekiris and Doukakis, 2011). Therefore, the relationship between firm size and EM is not consistent.

Firm growth

Prior studies indicate that it is necessary to control for a firm's growth by using sales growth (*salesgrowth*) measured as the change in sales compared to sales of the previous year, as in the research of Saenz Gonzalez and Garcia-Meca (2014).

Companies might be pressured to increase, maintain or exceed anticipated growth rates. This need creates an incentive to conduct EM (McNichols, 2000; Klein, 2002a). Firms with high growth opportunities may increase their current assets temporarily due to the anticipation of future sales growth. This practice might lead to a positive relationship between growth opportunities and EM (Park and Shin, 2004). In addition to this, fast-growing firms can conduct EM easier than slow-growing or stagnant firms, due to the fact that it is more difficult to trace EM in fast-growing firms and see through their business activities (Park and Shin, 2004). It is expected that there is a positive relationship between the extent of EM and a company's growth opportunities.

4.8 Empirical research models

This study examines the effect of governance on earnings management before and after the implementation of the 2008 governance law concerning the mandatory existence of audit committees for all Greek listed firms. The audit committee is responsible for all financial reporting processes of the firm and supervises the work of the external auditors. All processes and relationships with the external auditors need to be disclosed so as to ensure an objective and independent audit. These mandatory disclosures oblige firms to explicitly discuss corporate governance issues and thus are forced to examine

and improve key CG issues. As such, corporate governance as a whole is influenced and positive changes are expected. Changes in CG mechanisms as a result of this law are examined through holistic governance scores, weighted ACE and CG indices.

The data is broken down into two periods: the pre-law sample period (2006 and 2008)⁵⁹ and the post-law sample period (2010 and 2012). In a multivariate analysis setting, a dummy year variable equaling one is assigned to the post-law sample period and zero to the pre-law sample period. Interaction variables between corporate governance variables and the dummy year variable are used in the regressions. The coefficient of such interaction variables shows the marginal effect of corporate governance variables on EM, before and after the implementation of the 2008 governance law. It is expected that the effect of corporate governance variables on EM will be stronger after the implementation of the governance laws.

Audit committee variables and a CG index are used to capture governance quality, therefore the research applies two models, each utilizing different variables to proxy for corporate governance so as to test the research hypotheses. The first model examines audit committee effectiveness, similar to the work of Baxter and Cotter (2009), while the second model studies many governance attributes incorporated in a CG index, similar to Ammann et al. (2011) and Bekiris and Doukakis (2011).

It should be noted that all regressions are run twice: once with EM captured with the modified Jones model and once with the DeFond and Park (2001) model.

4.9 Statistical properties and econometric issues

4.9.1 Univariate analysis

Statistical methods for analyzing data can be classified as either parametric or non-parametric. Parametric tests are employed when the data conform to normal

⁵⁹ Although 2008 is the first year of implementation of Law 3693/2008, it is considered as a pre-law period for this study since the law became effective as of August 2008. Since the firms' year end is December 2008, many firms CG mechanisms, such as the existence of an audit committee might have been implemented after August 2008, whereby four quarterly meetings of the audit committee might not be possible in 2008. Thus, the first full year of implementation of the Law is considered the financial period starting after January 1, 2009.

distributions, while no such assumption is needed for non-parametric tests. Normality is tested using the Kolmogorov-Smirnov statistic for all variables. For some variables the null hypothesis of normality is rejected, but other variables are considered normal, and therefore both parametric tests, focusing on mean values, and non-parametric tests, focusing on median values, are applied.

To examine the differences between years, *t*-tests, focusing on mean values, and Mann Whitney tests, focusing on median values, are applied, while for other subsamples, such as CG indices, mean and median differences are examined using the ANOVA F-test / Welch F-test⁶⁰ and the Kruskal-Wallis test.

4.9.2 Multivariate analysis

Panel data estimation is used in this study to analyze the data so as to allow 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).

To reduce the impact of extreme values on the results, all continuous variables are winsorized at the top and bottom 1% of the distribution (Chung et al., 2002; Tsipouridou and Spathis, 2012; Cheng et al., 2016)

The relationship between earnings management and governance is tested applying the following model:

⁶⁰ 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.

$$\begin{aligned} EM = & c(1) + c(2) * \textit{governance quality} + c(3) * \textit{ownconc} + c(4) * \textit{ta} + c(5) * \textit{lev} + c(6) \\ & * \textit{absni} + c(7) * \textit{absearn} + c(8) * \textit{salesgrowth} + c(9) * \textit{dummy year} + c(10) \\ & * \textit{governance quality} * \textit{dummy year} \\ & + \varepsilon \end{aligned} \qquad \textbf{eq 4 – 15}$$

Governance quality is tested through different proxies, i.e. audit committee effectiveness and a CG index. The use of the different proxies for corporate governance helps resolve the issue of multicollinearity. The high correlation among corporate governance variables is evident in many corporate governance studies such as Klein (2002b) and Xie et al. (2003). One way to deal with this issue is to exclude collinear variables from the regression. For this reason, two models are created in this study, one with a CG index and one with audit committee variables.

Multicollinearity diagnostics are conducted in two ways. Firstly, bivariate correlations using Pearson and Spearman's rank correlation coefficients are examined. All values of any pairs of independent variables should be well below the critical range of 0.8, above which multicollinearity could cause a threat to the regression results (Gujarati, 2003: 359). Second, Variance Inflation Factor (VIF) tests are also used to test for multicollinearity, since it may still exist even if the correlation value is low. In order to ascertain that the regression model has no evidence of multicollinearity, VIF's of all independent variables should be below the critical value of 10 (Asteriou and Hall, 2007: 91).

Another 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 earnings management. 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*, *simultaneous endogeneity* and *unobserved heterogeneity*.

Dynamic endogeneity exists if current governance characteristics, control variables and performance are determined by previous performance of the variables. 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 *simultaneous endogeneity*. For example, while it is possible that well governed firms have higher performance, it is also possible that firm performance affects governance structures. In such a case governance and firm performance are simultaneously determined, whereby causality runs in both directions (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, the effect of performance and control variables 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). Thus, for this study it is necessary to use an instrument that does not directly affect earnings management but affects earnings management indirectly through its impact on governance.

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 plausibly 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 model where they omit industry variables, two parameters of the Capital Asset Pricing Model (alpha and beta) and firm size from Tobin's Q, when testing governance on firm performance. They assume that governance does not vary according to the industry it belongs to. However, these exclusions are considered arbitrary. According to the work of Black et al. (2006b) and Black et al. (2006c), industry participation does affect governance, thus industry dummies 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, but previous year's governance has already been predetermined, and 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 longer lags (Wintoki et al., 2012).⁶¹

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

⁶¹ The effectiveness of the instrumental variable 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).

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), Black et al. (2006a), Black and Kim (2012) and Black et al. (2015).

To deal with potential endogeneity, a system of simultaneous equations is used in this study to examine the hypotheses. Two equations are chosen so as to account for the effect of governance on earnings management, as well as the reverse effect.

The Generalized Methods of Moments (GMM) specification is utilized in this study which accounts for *dynamic endogeneity*, *simultaneous endogeneity* and *unobserved heterogeneity* in panel data models (Duru et al., 2016; Wintoki et al., 2012). GMM includes fixed effects so as to account for unobservable firm heterogeneity and thus is considered a better choice than traditional OLS estimation. Additionally, GMM is robust to firm-specific patterns of heteroscedasticity, serial correlation and gaps in the sample of unbalanced panels (Duru et al., 2016).

Some researchers have chosen the instrumental variable approach, instead of GMM, which removes the fixed effects through the first difference transformation. This method used lagged values as the only instrument. However, a major limitation of this method is failure to consider additional valid instruments, resulting in lack of efficiency. To deal with this issue, researchers have considered using longer lagged dependent variables as additional instruments. However, this process can lead to an over-identification problem as a result of the use of additional instruments (Dang et al., 2015). Additionally, using lagged values as instruments can cause inconsistency if the relationship between the lagged and current values is weak (Akbar et al., 2016). Utilization of GMM is needed to deal with this issue (Dang et al., 2015). GMM is chosen over simple 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).

Research, such as Durnev and Kim (2005) and Aggarwal et al. (2009), has also shown that the selection of instruments based on unrealistic assumptions about data can lead

to instruments that are not totally exogenous, thus providing unrealistic results (Akbar et al., 2016). 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). The exogenous variables chosen are prior year performance, powerful CEO and audit firm.

A major advancement in GMM is provided by Lewbel (1997), who illustrated that valid instruments are not only predetermined instruments, but also the cross-products of each instrument with the dependent variables. The cross-products of such variables can be considered valid instruments so as to at least satisfy the order condition for identification (Tsionas et al., 2012). Lewbel (1997) development 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 instruments consists of the predetermined variables and the cross-products of all with the dependent variables. Additionally, all instruments implemented in this study will be deviations from their means.

It is also essential to examine if the instruments are ‘weak’, leading to biased 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 (Tsionas et al., 2012). More specifically, Stock and Watson (2003: 350) state that running a first-stage regression and examining the F-statistic, is a perfect guide to determining if instruments are weak. If F is greater than 10, the choice of instrument is fine and GMM results are accurate (as also stated in Verbeek, 2008: 157).

The analysis is carried out using GMM⁶² as follows:

⁶²The analysis originally is carried using OLS, however due to endogeneity issues GMM is utilized.

$$\begin{aligned} EM = & c(1) + c(2) * \textit{governance quality} + c(3) * \textit{ownconc} + c(4) * \textit{ta} + c(5) * \textit{lev} + c(6) * \\ & \textit{absni} + c(7) * \textit{absearn} + c(8) * \textit{salesgrowth} + c(9) * \textit{auditfirm} + c(10) * \textit{nip} + c(11) * \\ & \textit{dummy year} + c(12) * \textit{dummy year} * \textit{governance quality} + \\ & \varepsilon \end{aligned} \qquad \text{eq 4 – 16}$$

$$\begin{aligned} \textit{governancy quality} = & c(1) + c(2) * \textit{em} + c(3) * \textit{ownconc} + c(4) * \textit{ta} + c(5) * \textit{lev} + c(6) * \\ & \textit{absni} + c(7) * \textit{absearn} + c(8) * \textit{salesgrowth} + c(9) * \textit{pshare} + c(10) * \textit{dummy year} + \\ & \varepsilon \end{aligned} \qquad \text{eq 4 – 17}$$

Table 4-5 presents the measurement of the variables used in the analysis of this project.

Table 4-5 Measurement of the variables used in the analysis

<u>Earnings Management</u>			WorldScope identifiers
Modified Jones model (<i>EM</i>)	discretionary accruals using the modified Jones model (Dechow et al. 2005)	Datastream	WC02201; WC02001; WC03101; WC03051
			WC01001; WC02999
			WC02051
DeFond and Park (2001) model (<i>AWCA</i>)	Absolute value of abnormal working capital accruals using the DeFond and Park (2001) model	Datastream	WC02201; WC02001; WC03101; WC03051; WC01001
<u>Governance Quality</u>			
<i>weighace</i>	A variable taking the value of 0 to 4, depending on the number of <i>ace</i> criteria met.	Data hand-collected from annual reports	
<i>cg_pen_total</i>	CG index (all items included in calculation of index), whereby the non-disclosed values were considered as non-existent, therefore firms were penalized in the rating procedure. The <i>Scoring by item</i> rating approach is utilized.	Data hand-collected from annual reports	
<i>cg_pen_mand</i>	CG index (mandatory CG items included in calculation of index), whereby the non-disclosed values were considered as non-existent, therefore firms were penalized in the rating procedure. The <i>Scoring by item</i> rating approach is utilized.	Data hand-collected from annual reports	
<i>cg_pen_bp</i>	CG index (best practice CG items included in calculation of index), whereby the non-disclosed values were considered as non-existent, therefore firms were penalized in the rating procedure. The <i>Scoring by item</i> rating approach is utilized.	Data hand-collected from annual reports	
<i>cg_non_total</i>	CG index (all items included in calculation of index), whereby the non-disclosed values were excluded in the rating procedure. The <i>Scoring by item</i> rating approach is utilized.	Data hand-collected from annual reports	
<i>cg_non_mand</i>	CG index (mandatory CG items included in calculation of index), whereby the non-disclosed values were excluded in the rating procedure. The <i>Scoring by item</i> rating approach is utilized.	Data hand-collected from annual reports	
<i>cg_non_bp</i>	CG index (best practice CG items included in calculation of index), whereby the non-disclosed values were excluded in the rating procedure. The <i>Scoring by item</i> rating approach is utilized.	Data hand-collected from annual reports	
<u>Control Variables</u>			
<i>ownconc</i>	the percentage owned by the largest shareholder of the firm	Data hand-collected from annual reports	
<i>ta</i>	natural log of total assets	Datastream	WC02999
<i>lev</i>	total debt over total assets	Datastream	WC03255; WC02999
<i>absni</i>	absolute current earnings, calculated as the absolute value of net income before extraordinary items scaled by total assets	Datastream	WC01551; WC02999
<i>absearn</i>	absolute change in earnings, calculated as the absolute change in net income before extraordinary items between current and prior periods, scaled by total assets	Datastream	WC01551; WC02999
<i>salesgrowth</i>	change in sales from the prior year	Datastream	WC01001
<u>Exogenous Variables</u>			
<i>nip</i>	prior year performance calculated as the prior year's return on assets	Datastream	WC01551; WC02999
<i>pshare</i>	powerful CEO, measured as the percentage of ownership held by the CEO	Data hand-collected from annual reports	
<i>auditfirm</i>	external auditor is one of the Big Four audit firms	Data hand-collected from annual reports	
<u>Dummy Variable</u>			
<i>year</i>	an indicator variable taking the value of 0 for 2006 and 2008 and 1 for 2010 and 2012		

The primary variables examined in this analysis are CG and EM before and after the 2008 governance law relating to the mandatory existence of audit committees for all Greek listed firms. Governance quality is examined in model #1 through audit committee effectiveness and in model #2 through CG indices. Initially the relationship between CG and EM is tested, where a negative relationship between the two variables is expected. In order to highlight the role of corporate governance after the implementation of the 2008 CG law, the governance-earnings management relationship is tested through the use of a dummy year variable. The data is broken into two sub-samples, the pre-law sample before the implementation of the 2008 CG law (2006 and 2008) and the post-sample after the implementation of the 2008 CG law (2010 and 2012) through the use of a dummy year variable equaling one if the sample is in 2010 and 2012, or zero otherwise. It is expected that firms with stronger CG are able to better restrain EM. Each regression is run separately for the pre-law period, the post-law period and the pooled sample. The potential change in the coefficients between the pre-law and post-law period tests whether there is a difference (structural change) in the model between the two periods. This is tested by using pre-law and post-law data for each sample firm and utilizing a dummy year variable in the regression of the pooled sample.

4.10 Sample selection and data collection procedures

This study covers all non-financial Greek listed companies for the fiscal years 2006, 2008, 2010 and 2012. Financial, real estate and insurance firms are excluded from the sample since their accrual processes are fundamentally different from firms in other industries and the incentives and opportunities for EM are therefore altered. Additionally, according to Davidson et al. (2005), the exclusion of financial firms is required because they have unique working capital structures, as well as an additional layer of governance regulations compared to non-financial firms. This is consistent with the work of Peasnell et al. (2000b), Klein (2002a) and Bekiris and Doukakis (2011).

These specific years are intentionally chosen so that all firms used in the study apply International Financial Reporting Standards (IFRS), since IFRS became mandatory for

all Greek listed firms in 2005 and research indicates that significant changes in companies' statements were introduced as a result (Tsalavoutas and Evans, 2010). Furthermore, the choice of these four years allows all firms included in the study to comply with the first law concerning corporate governance, Law 3016/2002 "On Corporate Governance, board remuneration and other issues", which was implemented in 2002. Additionally, as of 2008, following the introduction of Law 3693/2008, "Mandatory audit of annual and consolidated financial reports", all Greek listed firms are required to have an audit committee responsible for the monitoring process of financial reporting. This law concerning the mandatory existence of audit committees is of utmost importance in effecting the quality of financial reporting, whereby one would assume that firms' financial reporting has improved after its implementation. Finally, 2010 is the year the Hellenic Federation of Industries prepared an updated CG code for Greek listed firms. The main objective of this Code is to inform and guide firms on governance best practice, as well as to improve shareholder information. For this reason, the years 2006 (two years before the implementation of the audit committee law), 2008 (the year the law was created), 2010 (two years after the implementation of the law) and 2012 (four years after the implementation of the law) are chosen. The study examines the change of any potential effect of CG on EM before and after the implementation of Law 3693/2008. Finally, due to the fact that a large amount of data had to be hand-collected for the corporate governance variables, limiting the study to four years makes the task feasible within the time available.

Data for corporate governance characteristics is hand-collected from annual reports found on the ASE website, while EM is calculated based on data sourced from DataStream. Firms' websites are not used to collect corporate governance data because the sample includes data from 2006, 2008, 2010 and 2012, while the firms' websites includes contemporary corporate governance information of the current year. Companies for which no financial data and no annual reports are available for the collection of corporate governance data are also excluded. Moreover, firms for which data is not available in all four years are included in the analysis, resulting in a different number of observations for each of the four years (i.e. unbalanced panel). This procedure resulted in a final sample of 788 firm year observations with complete data,

ranging from 65% (204/316) of ASE firms in 2006 to 73% (187/256) of ASE firms in 2012. Table 4-6 illustrates the sample selection procedure.

Table 4-6 Sample Selection Procedure

	2006	2008	2010	2012	Total
No. of firms listed on the ASE	316	290	273	256	1,135
Firms in financial, real estate and insurance industries	(47)	(42)	(41)	(34)	(164)
Firms with missing values (financial or corporate governance)	(65)	(43)	(40)	(35)	(183)
Total	204	205	192	187	788

The final sample is disaggregated across industries based on the ICB classification scheme. More specifically, firms in the sample are classified as belonging to: Basic Materials (12% of the sample); Consumer Goods (32% of the sample); Consumer Services (18% of the sample); Healthcare (5% of the sample); Industrials (26% of the sample); Oil & Gas (1% of the sample); Technology (4% of the sample); Telecommunications (1% of the sample); and Utilities (2% of the sample) as shown in Table 4-6. However, when estimating EM using the Jones-type models, according to Klein (2002a), industries with less than eight observations should be excluded from analysis. Therefore, firms in the Healthcare, Utilities, Oil and Gas, and Telecommunications industries should be excluded from the study. However, the industries that should have been excluded contain firms with large market capitalization that are important in the Greek economy and, if excluded, would likely alter the results. In order to incorporate all firms in the sample and avoid having industries with less than eight firms, some industries are combined. More specifically, Oil and Gas is combined with Industrials. Utilities and Telecommunications is combined with Consumer Services. Finally, Healthcare is combined with Consumer Services and Consumer

Goods.⁶³ This created the Combined Industries classification, as shown in Table 4-7, whereby Basic Materials now comprise 11%, Consumer Goods 31%, Consumer Services 22%, and Industrials 26% and Technology 10%.

Table 4-7 Distribution of sample firms across industries

Industry Classification	Based on ICB					Combined Industries				
	2006	2008	2010	2012	Total	2006	2008	2010	2012	Total
Basic materials (6)	22	22	23	22	89	22	22	23	22	89
Consumer goods (4)	61	63	58	52	234	63	65	60	53	241
Consumer services (2)	34	37	32	29	132	46	49	42	40	177
Healthcare (3)	9	9	7	7	32	-	-	-	-	
Industrials (1)	52	48	46	50	196	54	50	48	52	204
Oil & Gas (7)	2	2	2	2	8	-	-	-	-	
Technology (8)	19	19	19	20	77	19	19	19	20	77
Telecommunications (9)	2	1	1	1	5	-	-	-	-	
Utilities (5)	3	4	4	4	15	-	-	-	-	
Total	204	205	192	187	788	204	205	192	187	788

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 did not include at least eight firms was examined separately and was placed in the another appropriate industry.

4.11 Conclusion

This chapter examines the earnings management models applied in the relevant research so as to determine which EM models to apply in this study. Additionally, a review of the CG indices created in an international and Greek setting is discussed so as to establish the creation of the current CG index for the purpose of this study.

The study examines the relationship between governance quality and EM for all Greek listed firms for 2006, 2008, 2010 and 2012. This relationship is examined before and after the implementation of the 2008 governance law for all Greek listed firms concerning the mandatory existence of an audit committee. The data is broken down into two periods, the pre-law period sample (2006/2008) and the post-law period sample

⁶³ In order to incorporate all firms in the sample, each firm was examined separately and according to its specific product or service characteristic it was decided where it should be placed. More specifically, in 2006 out of the nine healthcare firms, seven were combined with consumer services and two with consumer goods, in 2008 out of the nine healthcare firms, seven were combined with consumer services and two with consumer goods, in 2010 out of the seven healthcare firms, five were combined with consumer services and two with consumer goods and in 2012 out of the seven healthcare firms, six were combined with consumer services and one with consumer goods. See Appendix II with the names of firms that are classified in different industries, where they are classified and why.

(2010/2012). It is expected that the effect of corporate governance variables on EM will be stronger after the implementation of the governance law.

Governance quality is measured through audit committee attributes, as well as a holistic governance measure in the form of a CG index. EM is measured through the Modified Jones model and the DeFond and Park (2001) model. Both EM measures are employed in this study since the former uses industry-wide estimates, while the latter uses firm-specific measures. The use of both is deemed necessary so as to include both industry and firm specific measures.

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 earnings management. For this reason, a system of simultaneous equations is used in this study to examine the hypotheses. The analysis is carried out using GMM.

Data for corporate governance characteristics is hand-collected from annual reports found on the ASE website, while earnings management is calculated based on data obtained from DataStream. The sample consists of all firms listed on the ASE for the years 2006, 2008, 2010, and 2012, excluding only firms in financial, real estate and insurance industries since they require additional governance regulations.

Chapter 5 – Data Analysis and Discussion (CG & EM)

5.1 Introduction

This chapter presents the analysis and discussion of the data pertaining to the effect of corporate governance mechanisms in Greece on EM before and after the 2008 CG law concerning the mandatory existence of an audit committee for all Greek listed firms.

In this chapter, the hypotheses formulated in chapter 3 are tested whereby corporate governance mechanisms are measured using audit committee characteristics and a multi-dimensional governance mechanism in the form of a corporate governance index. EM is measured using the Modified Jones Model and the DeFond and Park model. The statistical analysis begins with descriptive statistics in section 5.2 and continues with bivariate tests in section 5.3 and multivariate tests in section 5.4. Discussion of the findings is presented in section 5.5 and section 5.6 concludes the chapter.

5.2 Descriptive statistics

The univariate analysis begins with descriptive statistics for each variable for the pre- and post-law periods, as well as for the pooled sample. The pooled sample consists of 763 firm-year observations, with 392 firm-year observations for the pre-law period (2006/2008) and 371 firm-year observations for the post-law period (2010/2012). The descriptive statistics for each variable are presented in Table 5-1.

Table 5-1 Descriptive Statistics

	Pooled sample					Pre-law period (2006 / 2008)					Post-law period (2010 / 2012)					Comparisons across the periods	
	mean	median	min	max	sd	mean	median	min	max	sd	mean	median	min	max	sd	t-test	Mann-Whitney
EM	0.07	0.04	0.00	0.50	0.09	0.08	0.05	0.00	0.47	0.09	0.07	0.04	0.00	0.61	0.09	1.44	1.95*
AWCA	0.07	0.04	0.00	0.45	0.08	0.07	0.04	0.00	0.46	0.08	0.07	0.04	0.00	0.45	0.08	0.32	0.67
ace	0.07	0.00	0.00	1.00	0.26	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	1.00	0.36	-8.50***	3.65***
weighace	1.22	0.00	0.00	4.00	1.40	0.12	0.00	0.00	3.00	0.44	2.37	2.00	0.00	4.00	1.11	-37.31***	21.59***
cgpentotal	0.49	0.48	0.00	0.91	0.23	0.31	0.25	0.00	0.62	0.13	0.67	0.69	0.00	0.95	0.15	-35.37***	22.01***
cgpenmand	0.65	0.81	0.00	0.94	0.29	0.51	0.44	0.00	0.92	0.26	0.80	0.88	0.00	0.94	0.20	-17.52***	14.35***
cgpenbp	0.35	0.27	0.04	0.86	0.23	0.18	0.17	0.00	0.50	0.08	0.53	0.53	0.00	0.95	0.19	-32.32***	21.62***
cgnontotal	0.66	0.69	0.29	0.94	0.15	0.56	0.57	0.29	0.81	0.12	0.77	0.78	0.00	0.95	0.11	-26.26***	20.05***
cgnonmand	0.76	0.88	0.00	0.94	0.28	0.69	0.78	0.00	0.93	0.31	0.84	0.93	0.00	0.94	0.23	-7.63***	14.72***
cgnonbp	0.50	0.50	0.11	0.90	0.19	0.38	0.38	0.11	0.72	0.13	0.62	0.64	0.00	0.95	0.16	-25.03***	19.13***
ownconc	0.40	0.36	0.00	0.89	0.19	0.40	0.36	0.08	0.89	0.18	0.41	0.36	0.00	0.90	0.19	-0.53	0.26
ta	11.75	11.66	8.48	15.88	1.47	11.80	11.71	8.98	16.00	1.42	11.71	11.60	8.35	15.88	1.51	0.28	0.39
lev	0.36	0.35	0.00	1.00	0.21	0.31	0.32	0.00	0.68	0.16	0.40	0.40	0.00	1.54	0.25	-5.43***	4.58***
ni	-0.02	0.00	-0.56	0.17	0.10	0.01	0.02	-0.39	0.38	0.08	-0.05	-0.03	-0.62	0.13	0.11	8.70***	10.57***
absni	0.07	0.04	0.00	0.61	0.10	0.06	0.03	0.00	0.61	0.09	0.08	0.04	0.00	0.62	0.10	-3.45***	3.18***
earn	-0.01	-0.00	-0.38	0.25	0.07	-0.01	-0.00	-0.26	0.22	0.05	-0.02	-0.01	-0.43	0.30	0.08	1.69*	2.57**
absearn	0.04	0.02	0.00	0.60	0.08	0.04	0.02	0.00	0.59	0.07	0.05	0.02	0.00	0.60	0.08	-2.26**	3.00***
salesgrowth	0.01	0.01	-0.73	1.06	0.28	0.12	0.08	-0.63	1.34	0.28	-0.08	-0.08	-0.81	0.66	0.24	10.12***	11.46***
nip	-0.01	0.01	-0.26	0.17	0.07	0.02	0.02	-0.16	0.18	0.05	-0.03	-0.01	-0.32	0.14	0.08	10.24***	9.94***
pshare	0.17	0.07	0.00	0.77	0.21	0.17	0.08	0.00	0.72	0.20	0.17	0.07	0.00	0.78	0.21	-0.40	0.26
auditfirm	0.21	0.00	0.00	1.00	0.41	0.20	0.00	0.00	1.00	0.40	0.22	0.00	0.00	1.00	0.42	-1.32	0.92

Variables: *EM* discretionary accruals using the Modified Jones model; *AWCA* abnormal working capital accruals using the DeFond and Park (2001) model; *ace* audit committee effectiveness; *weighace* weighted audit committee effectiveness; *cgpentotal* penalized total CG index; *cgpenmand* penalized mandatory CG index; *cgpenbp* penalized best practice CG index; *cgnontotal* non-penalized total CG index; *cgnonmand* non-penalized mandatory CG index; *cgnonbp* non-penalized best practice CG index; *ownconc* ownership concentration; *ta* total assets; *lev* leverage; *absni* absolute value of current earnings; *absearn* absolute value of changes in earnings; *salesgrowth* changes in sales from prior year; *nip* prior year's net income; *pshare* powerful CEO; *auditfirm* external auditor is one of the Big Four audit firms

All continuous variables are winsorized at the top and bottom 1% of the distribution.

*** significant at level 1%; ** significant at level 5%; *significant at level 10%

5.2.1 Descriptive statistics for *Audit Committee Effectiveness*

The first proxy for governance quality is audit committee effectiveness. Audit committee effectiveness is observed through two composite measures, *ace* and *weighace*. Both measures capture audit committee independence, financial expertise, size and the frequency of meetings of audit committees.

The data collected on audit committee variables is somewhat limited, because not all firms were disclosing audit committee information, in both the pre-law and post-law periods. For the pre-law period (2006/2008), one reason for this is that, in 2006, the existence of audit committees was not mandatory. Additionally, according to Law 3556/2007, Greek listed firms had to submit to the ASE only annual and semiannual financial statements and were obliged to report figures and information instead of a comprehensive annual report, and thus were disclosing less information. For the sample years 2010 and 2012 (post-law period), Greek firms were following Law 3873/2010 which obliged listed firms to disclose a corporate governance statement in a clear and distinguishable section of their annual report. Additionally, although firms were disclosing the existence of audit committees, they still were not disclosing detailed information about their audit committees, such as meeting frequency and the financial expertise of members.

Audit Committee Existence

In the pre-law period, only a few firms were disclosing the existence of an audit committee compared to the post-law period. Only one firm in the pre-law period and two in the post law period actually stated that they did not have an audit committee. More specifically, out of the 392 firms in the pre-law period, only 55 firms (14%) stated they had an audit committee in the pre-law period, while in the post-law period, as a result of implementation of Law 3693/2008, out of the 371 firms, 360 firms (97%) disclosed that they had an audit committee.

Audit Committee Independence

Out of the 392 firms in the pre-law period sample, only 33 firms (8.4%) disclosed their audit committee's composition, i.e., if their audit committee is comprised of independent members. Those 33 firms have an average of 66% of audit committee members who are independent. However, out of the 371 firms in the post-law sample, the firms that disclosed their audit committee's composition rose drastically to 342 firms (92.18%). For those 342 firms, audit committee independence is on average 45% of members.⁶⁴ As seen in the post-law period sample, firms on average adhered to Law 3693/2008, whereby at least one member of the audit committee is an independent member, while they did adhere to the 2010 Greek CG Code which recommends that the majority of members to be independent.

Audit Committee Expertise

Out of the 392 firms in the pre-law period sample, only 15 firms (3.8%) disclosed that their audit committee had a member with financial expertise, while in the post-law sample 245 firms (66.04%) disclosed that their audit committee had a member with financial expertise. As seen in the post-law period sample, firms on average adhered to Law 3693/2008 and the recommendations of the 2010 Greek CG Code, whereby at least one member of the audit committee has financial expertise.

Audit Committee Size

For the pre-law period sample, out of the 392 firms, 31 firms (7.9%) disclosed their audit committee size, while in the post-law period sample, out of the 371 firms, 344 firms (92.7%) disclosed their audit committee size. For the pre-law period the average audit committee size is 2.71, where out of those 31 firms, 20 firms had an audit committee size of three or more members, while for the post-law period sample the average audit committee size is 3.09, where out of the 344 firms, 338 firms had an audit committee size of three or more members. As seen in the post-law period sample, firms

⁶⁴ These findings are in line with Zhou et al. (2018).

on average adhered to the 2010 Greek CG Code, which recommends a minimum audit committee size of three members.

Audit Committee Meetings

In the pre-law period sample, no firms (0%) disclosed the number of audit committee meetings, while in the post-law period sample, out of the 371 firms, 247 firms (66.6%) disclosed the number of audit committee meetings. Out of the 247 firms, 161 firms had 4 or more meetings per year. As seen in the post-law period sample, firms on average adhered to the 2010 Greek CG Code, which recommends a minimum of four meetings per year.

Audit Committee Effectiveness (ACE) – (Weighted ACE)

Ace is an indicator variable taking the value of one if all members of the audit committee are independent and the size of the audit committee is three or above and the audit committee conducted four or more meetings per year and at least one audit committee member has financial expertise, or zero otherwise. *Weighace* is a variable taking the value of zero to four, depending on the number of *ace* criteria met.

In the pre-law period, no firms had *ace*, mainly due to non-disclosure of information concerning audit committees, while in the post-law period, the mean (median) score is 0.15 (0.00). Thus, few firms scored positively in terms of *ace* even in the post-law period. As expected, significant differences at the 1% level exist in the mean and median scores between the two periods.

As for weighted audit committee effectiveness (*weighace*), the rates are higher than *ace*. The pooled sample shows a mean (median) for *weighace* of 1.22 (0.00), with a minimum value of 0.00 and a maximum value of 4.00. More specifically, the pre-law period illustrates a mean (median) value of 0.12 (0.00), while in the post-law period, a large increase in the mean (median) values to 2.37 (2.00) is seen.

It is clear that more firms in the post-law period (2010/2012) compared to the pre-law period (2006/2008) disclosed more audit committee information and implemented elements of the 2008 audit committee law and 2010 Greek CG Code, so as to have

higher audit committee effectiveness. This is also evident in the significant difference in the mean and median values at the 1% level between the two periods.

5.2.2 Descriptive statistics for *CG Indices*

The corporate governance quality of Greek listed firms is also measured through a corporate governance index. The corporate governance index is created to incorporate various governance attributes together so as to capture the level of governance quality. It is examined in its “penalized” and “non-penalized” forms. More specifically, the penalized CG index considers non-disclosed or missing values as non-existing values, while in the non-penalized CG index the non-disclosed or missing values are excluded from the analysis. Additionally, in both rating schemes, separate indices are created that incorporate mandatory and best practice variables, resulting in a total of six indices.⁶⁵

Examining the descriptive statistics for the CG indices in Table 5-1, the mean (median) of the penalized CG index for the pooled sample is 49% (48%), with a minimum value of 0% and a maximum value of 91%. More specifically the pre-law period has a mean (median) of 31% (25%), while the post-law sample has a mean (median) of 67% (69%).⁶⁶

The non-penalized CG index of the pooled sample ranges from 29% to 94%, with a mean (median) of 66% (69%). The mean (median) of the pre and post-law periods are 56% (57%) and 77% (78%) respectively. The trend is for more firms to comply with disclosure of corporate governance items, reflected in the value of the CG index in 2010, for both rating schemes, being much higher than in 2006. This increase is caused by the implementation of CG laws and codes, such as Law 3693/2008, which requires all listed firms to have an audit committee, Law 3873/2010 which obliges listed firms to disclose annual information about their corporate governance in a statement that is in a specific and clearly identifiable section of the annual report, as well as the 2010

⁶⁵ A description of the exact process of creating the CG indices can be found in chapter 4, section 4.6.

⁶⁶ These findings are in line with Bekiris and Doukakis (2011), Nerantzidis (2015) and Nerantzidis and Tsamis (2017), who create a similar CG index, in terms of items and rating schemes, for Greek listed firms for the same sample periods.

Greek CG Code; this resulted in more firms disclosing more CG information, and thus higher values for CG indices. This is also evident from the mandatory CG indices. More specifically, the mean (median) of the mandatory penalized CG index rose from 51% (44%) in the pre-law period to 80% (88%) in the post-law period, while the mean (median) of the mandatory non-penalized CG index rose from 69% (78%) in the pre-law period to 84% (93%) in the post-law period.

As for the best practice indices, the mean (median) of the best practice penalized CG index is 18% (17%) in the pre-law period and 53% (53%) in the post-law period. The best practice non-penalized CG index has a mean (median) of 38% (38%) and 62% (64%) in the pre and post-law periods respectively. More sample firms disclose that they comply with best practice corporate governance items in 2010/2012 compared to 2006/2008 as a result of implementing the voluntary, best practice corporate governance items suggested by the Greek CG Code created by the Hellenic Federation of Industries in 2010.

The differences in the scores of the all the CG indices between the pre-law and post-law periods are reported in Table 5-1. For all CG index categories, the differences in the mean and median scores between the two periods are significantly different at the 1% level.

5.2.3 Descriptive statistics for *Earnings Management*

Discretionary accruals – Modified Jones Model

Discretionary accruals estimated using the Modified Jones Model, as seen in Table 5-1 has a mean (median) of 0.07 (0.04) in the pooled sample, with a minimum value of 0.00 and a maximum value of 0.50. More specifically, in the pre-law period the mean (median) is 0.08 (0.05) and in the post-law period it is 0.07 (0.04).⁶⁷

⁶⁷ These findings are in line with Bekiris and Doukakis (2011), Tsipouridou and Spathis (2012), Dimitropoulos et al. (2013) and Tsipouridou and Spathis (2014) for the pre-law period sample.

Examining the differences among the pre and post-law periods, there are insignificant differences in the mean values between the two periods and a significant difference at the 10% level between the median values of the two periods.

Abnormal working capital accruals – DeFond and Park Model

The mean (median) values of abnormal working capital accruals, using the DeFond and Park model, are 0.07 (0.04) for the pooled sample, ranging from 0.00 to a maximum value of 0.45. The mean (median) values in the pre and post-law periods are 0.07 (0.04) and 0.07 (0.04) respectively, indicating almost no changes in abnormal working capital accruals between the two periods. Indeed, there are no significant differences in the mean and median values between the years, as seen in Table 5-1.

5.2.4 Descriptive statistics for *Control Variables*

This study employs six control variables consisting of ownership concentration, total assets, leverage, the absolute net income, the absolute change in earnings and sales growth.

Ownership concentration

The mean (median) of ownership concentration is 40% (36%) in the pre-law period and 41% (36%) in the post-law period. This indicates that the dispersion of ownership has not changed significantly between the two periods, which is also evident from the insignificant differences observed in the mean and median values of ownership concentration between the pre and post law periods.⁶⁸ The high levels of ownership concentration illustrates the fact that a few large shareholders control management and competition for control is relatively low (La Porta et al., 1999; Spanos et al., 2008; Nerantzidis and Tsamis, 2017).

⁶⁸ Results are in line with Nerantzidis and Tsamis (2017).

Total assets

Total assets, as an indicator of size, and measured as the natural logarithm of total assets, has a mean (median) score of 11.75 (11.66) in the pooled sample. In the pre-law period the mean (median) is 11.80 (11.71) and in the post-law period 11.71 (11.60). No significant differences are observed between the mean and median scores of the pre and post-law period samples.⁶⁹

Leverage

As for leverage, it greatly increased from a mean (median) of 31% (32%) in the pre-law period to 40% (40%) in the post-law period, while the pooled sample shows a mean (median) of 36% (35%).⁷⁰ Significant differences are observed in both the mean and median, at the 1% level, between the pre and post-law periods. This is expected due to the sovereign debt crisis in Greece during the post-law period.⁷¹

Absolute net income

The mean (median) absolute net income of the pooled sample is 0.07 (0.04) with a minimum value of 0.00 and a maximum value of 0.61. The pre-law period has a mean (median) of 0.06 (0.03) and the post-law period has a mean (median) of 0.08 (0.04), with significant differences, at the 1% level, in the mean and median scores between the two periods, as expected due to the sovereign debt crisis in Greece.⁷²

Absolute change in earnings

The mean (median) score of changes in net income, in absolute terms, for the pooled sample is 0.04 (0.02), with a minimum value of 0.00 and a maximum value of 0.60. In the pre-law period the mean (median) is 0.04 (0.02) and in the post-law period it is 0.05 (0.02). This is also observed in the significant differences in the mean (at the 5% level)

⁶⁹ Results are in line with Bekiris and Doukakis (2011), Tsipouridou and Spathis (2012) and Dimitropoulos et al. (2013).

⁷⁰ These findings are in line with Bekiris and Doukakis (2011), Tsipouridou and Spathis (2012) and Nerantzidis and Tsamis (2017).

⁷¹ For more information on the sovereign debt crisis in Greece consult Chapter 6, section 6.2.

⁷² These findings are in line with Bekiris and Doukakis (2011) and Bekiris (2013), and Tsipouridou and Spathis (2014).

and the median (at the 1% level) between the pre and post-law periods. This indicates greater fluctuations of net income between 2009 and 2012 than between 2005 and 2008, as expected due to the sovereign debt crisis in Greece.

Sales growth

The mean (median) score of sales growth for the pooled sample is 1% (1%), with a minimum value of -73% and a maximum value of 106%. Sales growth decreased significantly from a mean (median) of 12% (8%) in the pre-law period to -8% (-8%) in the post-law period. Significant differences, at the 1% level, in the mean and median scores are evident between both periods. This large decrease in sales is the result of the sovereign debt crisis in Greece at the time.⁷³

5.2.5 Descriptive statistics for *Instruments*

Prior year net income

The mean (median) score of prior year's net income for the pooled sample is -0.01 (0.01), ranging from a minimum score of -0.26 to a maximum score of 0.17. More specifically the mean (median) scores for the pre-law period is 0.02 (0.02) and for the post-law period is -0.03 (-0.01). This can also be observed from the significant differences in both the mean and median scores, at the 1% level, between the two periods. The decrease in net income between the two periods is the result of the sovereign debt crisis in the country during the period under study.

Powerful CEO

Powerful CEO is estimated as the percentage share ownership held by the CEO. The percentage of CEO ownership did not change significantly from 2006 to 2012, as is evident from the insignificant differences in the mean and median scores across the two periods. More specifically, the mean (median) of CEO share ownership is 17% (8%)

⁷³ Results are in line with Dimitropoulos et al. (2013).

and 17% (7%) for the pre and post-law periods respectively, while the mean (median) scores for the pooled sample is 17% (7%), as observed in Table 5-1.

Audit firm

The proportion of Greek listed firm in the pooled sample employing an auditor from a Big Four auditing firm is 21% on average. More specifically in the pre-law period, the mean (median) score is 0.20 (0.00), while in the post-law period it is 0.22 (0.00), with the differences being insignificant.

5.3 Correlation coefficients

In this section, the bivariate correlations among the variables is examined using the Pearson and Spearman rank correlation coefficients.⁷⁴

Model # 1 (H1)

Table 5-2 shows the bivariate correlations between audit committee variables and discretionary accruals pertaining to H1. No significant correlations exist between the discretionary accruals and audit committee variables and the signs of the correlation coefficient between these two variables are both positive and negative, therefore no initial conclusion can be reached relating to the effect of audit committee variables on discretionary accruals. No correlation coefficients values are high enough in this model to suggest future multicollinearity issues in the regressions that could potentially affect the interpretation of the results.

⁷⁴ Both the Pearson and Spearman rank correlation coefficients are examined since for some variables the null hypothesis of normality is rejected, but other variables are considered normal, and therefore both parametric tests, focusing on mean values, and non-parametric tests, focusing on median values, are applied.

Table 5-2 Pearson product moment correlation coefficient (right) Spearman rank-order correlation (left) – Model 1

	EM	AWCA	acexist	ace	weighace	acindep	ownconc	ta	lev	absni	absearn	salesgrowth	nip	pshare	auditfirm
EM		0.652***	n/a	0.015	0.014	0.038	-0.019	-0.237***	0.028	0.248***	0.240***	-0.003	-0.147***	0.036	-0.107**
AWCA	0.623***		n/a	0.027	0.046	0.025	-0.012	-0.236***	0.135***	0.234***	0.249***	-0.011	-0.189***	0.060	-0.077
acexist	n/a	n/a		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ace	-0.041	-0.016	n/a		0.665***	-0.053	0.053	0.113**	0.060	-0.045	-0.075	-0.055	0.002	0.018	0.104**
weighace	-0.024	0.004	n/a	0.645***		0.002	0.047	0.128**	0.133***	-0.002	-0.005	-0.010*	-0.129**	-0.014	0.200***
acindep	0.023	0.049	n/a	-0.011	0.020		-0.007	-0.135***	-0.012	0.060	0.031	-0.027	-0.063	0.042	-0.078
ownconc	0.005	0.006	n/a	0.047	0.033	-0.025		0.067	-0.072	-0.031	-0.101*	0.078	0.068	0.117**	0.159***
ta	-0.300***	-0.234***	n/a	0.128**	0.117**	-0.103**	0.111**		0.010	-0.084	-0.115**	0.211***	0.328***	-0.331***	0.411***
lev	0.012	0.083	n/a	0.066	0.127**	-0.048	-0.076	0.069		0.316***	0.272***	-0.153***	-0.517***	0.001	0.039
absni	0.240***	0.146***	n/a	-0.032	-0.032	-0.002	-0.054	-0.069	0.214***		0.595***	-0.218***	-0.339***	-0.048	-0.074
absearn	0.220***	0.223***	n/a	-0.061	-0.057	-0.020	-0.054	-0.110**	0.173***	0.475***		-0.198***	-0.384***	-0.054	-0.047
salesgrowth	-0.079	-0.034	n/a	-0.045	-0.085*	-0.061	0.104**	0.231***	-0.122**	-0.230***	-0.257***		0.300***	-0.090	0.125**
nip	-0.122**	-0.148***	n/a	0.010	-0.106**	0.025	0.120**	0.276***	-0.480***	-0.372***	-0.314***	0.324***		-0.023	0.067
pshare	0.083	0.065	n/a	-0.023	-0.037	0.084	-0.041	-0.388***	-0.016	-0.025	-0.038	-0.107**	-0.051		-0.275***
auditfirm	-0.154***	-0.113**	n/a	0.104**	0.199***	-0.086*	0.133***	0.379***	0.046	-0.060	-0.037	0.136***	0.061	-0.319***	

Variables: EM discretionary accruals using the Modified Jones model; AWCA abnormal working capital accruals using the DeFond and Park (2001) model; acexist audit committee existence; acindep audit committee independence; ace audit committee effectiveness; weighace weighted audit committee effectiveness; ownconc ownership concentration; ta total assets; lev leverage; absni absolute value of current earnings; absearn absolute value of changes in earnings; salesgrowth changes in sales from prior year; nip prior year's net income; pshare powerful CEO; auditfirm external auditor is one of the Big Four audit firms

*** significant at level 1%; ** significant at level 5%; *significant at level 10%

Model # 2 (H2)

Table 5-3 examines the correlation coefficients between discretionary accruals and corporate governance indices. Significant negative correlations exist between discretionary accruals and the corporate governance indices using the Modified Jones model (EM). More specifically, as per the Pearson product moment correlation, a negative correlation of -6.3%, at the 10% level, is seen with the mandatory non-penalized CG index. Additionally, as per the Spearman rank-order correlation a negative correlation of approximately -7% is seen with the total penalized CG index, the best practice penalized CG index, the total non-penalized CG index and the best practice non-penalized CG index, at the 5% and 10% levels respectively.

These correlations suggest that good CG proxied by governance index levels may constrain earnings management, in line with H2.

Very high correlations, at the 1% significance level, as expected, are evident between all of the CG indices (ranging from 33% to 96%), so these independent variables will not be used simultaneously in the same regression but will be implemented in separate regressions, so as to avoid multicollinearity issues that may affect the interpretation of the results.

Chapter 5- Data Analysis and Discussion (CG & EM)

Table 5-3 Pearson product moment correlation coefficient (right) Spearman rank-order correlation (left) – Model 2

	EM	AWCA	cgpentotal	cgpenmand	cgpenbp	cgnottotal	cgnonmand	cgnonbp	ownconc	ta	lev	absni	absearn	salesgrowth	nip	pshare	auditfirm
EM		0.653***	-0.058	-0.003	-0.051	-0.052	-0.063*	-0.043	-0.014	-0.226***	0.042	0.291***	0.336***	-0.014	-0.104***	0.043	-0.098***
AWCA	0.620***		-0.046	0.002	-0.048	-0.039	0.055	-0.046	0.012	-0.228***	0.081**	0.305***	0.377***	-0.034	-0.168***	0.045	-0.068**
cgpentotal	-0.067*	-0.041		0.707***	0.947***	0.930***	0.346***	0.885***	-0.028	0.066*	0.111***	0.045	-0.011	-0.218***	-0.218***	-0.069*	0.066*
cgpenmand	0.011	0.008	0.745***		0.545***	0.700***	0.673***	0.555***	-0.035	-0.039	0.056	0.045	-0.008	-0.166***	-0.158***	-0.008	-0.027
cgpenbp	-0.062*	-0.041	0.960***	0.641***		0.855***	0.257***	0.909***	-0.021	0.103***	0.126***	0.040	-0.011	-0.190***	-0.200***	-0.096***	0.108***
cgnottotal	-0.076**	-0.053	0.942***	0.702***	0.921***		0.330***	0.934***	-0.025	0.096***	0.089**	0.023	-0.036	-0.163***	-0.189***	-0.119***	0.102***
cgnonmand	0.010	0.031	0.668***	0.835***	0.591***	0.633***		0.262***	-0.028	-0.061*	0.029	0.072**	0.021	-0.087**	-0.089**	-0.024	-0.016
cgnonbp	-0.068*	-0.055	0.890***	0.602***	0.943***	0.951***	0.534***		-0.035	0.150***	0.101***	0.027	-0.020	-0.145***	-0.150***	-0.167***	0.147***
ownconc	-0.006	0.035	-0.021	-0.035	-0.003	-0.036	-0.026	-0.033		0.080**	-0.042	-0.012	-0.011	0.068*	0.046	0.131***	0.174***
ta	-0.277***	-0.188***	0.061*	-0.004	0.105***	0.089**	-0.020	0.144***	0.104***		0.091**	-0.088**	-0.103***	0.189***	0.275***	-0.326***	0.436***
lev	-0.001	0.043	0.105***	0.033	0.124***	0.096***	0.064*	0.104***	-0.041	0.155***		0.225***	0.161***	-0.111***	-0.421***	-0.037	0.040
absni	0.148***	0.124***	0.047	0.020	0.046	0.043	0.060*	0.033	-0.14	-0.048	0.075**		0.705***	-0.295***	-0.296***	-0.025	-0.043
absearn	0.207***	0.221***	0.054	0.042	0.053	0.041	0.056	0.040	-0.007	-0.033	0.115***	0.427***		-0.270***	-0.309***	-0.051	-0.022
salesgrowth	-0.032	-0.025	-0.256***	-0.185***	-0.237***	-0.219***	-0.217***	-0.193***	0.077**	0.185***	-0.102***	-0.230***	-0.254***		0.298***	-0.040	0.073**
nip	-0.042	-0.078**	-0.251***	-0.161***	-0.229***	-0.241***	-0.207***	-0.196***	0.094**	0.227***	-0.349***	-0.168***	-0.226***	0.346***		0.017	0.087**
pshare	0.086**	0.059	-0.078**	-0.008	-0.114***	-0.116***	-0.023	-0.159***	0.007	-0.370***	-0.064*	-0.028	-0.082**	-0.032	-0.000		-0.257***
auditfirm	-0.129***	-0.083**	0.070*	-0.002	0.111***	0.100***	0.025	0.146***	0.155***	0.399***	0.056	0.006	0.041	0.067*	0.079**	-0.287***	

Variables: EM discretionary accruals using the Modified Jones model; AWCA abnormal working capital accruals using the DeFond and Park (2001) model; cgpentotal penalized total CG index; cgpenmand penalized mandatory CG index; cgpenbp penalized best practice CG index; cgnottotal non-penalized total CG index; cgnonmand non-penalized mandatory CG index; cgnonbp non-penalized best practice CG index; ownconc ownership concentration; ta total assets; lev leverage; absni absolute value of current earnings; absearn absolute value of changes in earnings; salesgrowth changes in sales from prior year; nip prior year's net income; pshare powerful CEO; auditfirm external auditor is one of the Big Four audit firms
 *** significant at level 1%; ** significant at level 5%; *significant at level 10%;

5.4 Multivariate analysis

5.4.1 Introduction

As discussed in the research design section of Chapter 4, GMM is utilized in this study. Various instruments are included in the regressions to deal with endogeneity issues. Discussion of results are specified for each model separately.

5.4.2 Results – H1

This section provides analysis and discussion of H1 examining the effect of audit committee effectiveness on EM, before and after the implementation of the governance law pertaining to the mandatory existence of an audit committee for all Greek listed firms. Audit committee effectiveness (*ace*) incorporates the synergies of audit committees created from the simultaneous use of various audit committee characteristics, such as audit committee size, audit committee independence, audit committee meetings and audit committee expertise. This study, as discussed in chapter 4, utilizes weighted *ace* (*weighace*) since no firms had an *ace* of 1 in 2006 and 2008. Additionally, in order to investigate how the audit committee law of 2008 influenced audit committee effectiveness and earnings management, a year dummy variable is used in the analysis. It is expected that firms that have greater levels of *weighace* engage in less EM, a relationship that is expected to intensify after the implementation of the 2008 governance law.

Discretionary accruals – Modified Jones model

Table 5-4 reports the results of the regression model, which examines the impact of the composite measure of audit committee effectiveness, *weighace*, on EM, and therefore tests H1. The p-value of the J statistic ranges from 0.0682 in the pre-law period sample to 0.1385 in the pooled sample, indicating that the residuals are uncorrelated with the chosen instruments.⁷⁵

⁷⁵ The assumption that the instruments are not correlated with the error term in the equation of interest is testable through the J-Statistic. It is based on the observation that the residuals should be uncorrelated with the set of exogenous variables if the instruments are truly exogenous. This statistic

Although a significant positive relationship, at the 1% level, between *weighthace* and EM exists in the post-law period sample (+0.071), a significant negative relationship, at the 1% level, is observed in the pooled sample (-0.349), in line with H1. However, when examining *weighthace* with the interaction year dummy variable and its effect on EM (+0.292), a significant positive relationship at the 5% level is observed. This result is contrary to H1.

Control Variables

A significant negative relationship, at the 1% level, is seen between EM and firm size for the pre-law (-0.011) and post-law periods (-0.019), indicating that larger firms conduct less EM.

Turning to the effect of leverage on EM, different results are observed between the pre-law and post-law periods. For the pre-law period, a significant positive relationship (+0.036), at the 10% level, exists between the two variables, while in the post-law period sample a significant negative relationship (-0.068), at the 1% level, exists between EM and leverage. Thus, in the period before the implementation of the 2008 governance law, highly leveraged firms conduct more EM, while after the 2008 governance law, highly leveraged firms conduct less EM.

A significant positive relationship at the 1% level is evident between both the absolute level of earnings and the absolute value of changes in earnings and EM, for the pre-law period (+0.454), for the post-law period (+0.241/+0.239) and for the pooled sample (0.341). Hence, firms that have higher absolute values of earnings or higher absolute values of changes in earnings perform more EM.⁷⁶

Finally, a significant positive relationship at the 1% and 10% levels is evident between sales growth and EM, for the pre-law period (+0.040), for the post-law period (+0.034)

will be asymptotically chi-squared with $m - k$ degrees of freedom under the null that the error term is uncorrelated with the instruments (Hayashi, 2000: p217-221). If the p-value of the J statistic is greater than 0.05 we cannot reject the null hypothesis that residuals are uncorrelated with the chosen instruments.

⁷⁶ When running the regressions with signed values for earnings (*ni*) and changes in earnings (*earn*), there is a significant negative effect of earnings and changes in earnings on EM (see Appendix III).

and for the pooled sample (+0.028), indicating that firms that have higher sales growth engage in higher levels of EM.

Insignificant results are observed between ownership concentration and EM.

In summary, using the Modified Jones model to measure EM, a statistically significant positive relationship is seen between EM and the absolute level of earnings, the absolute value of changes in earnings and sales growth, while a statistically significant negative relationship is seen between EM and weighhace and firm size.⁷⁷

Abnormal working capital accruals – DeFond and Park (2001) model

Table 5-4 reports the results of the regression model, which examines the impact of the composite measure of audit committee effectiveness, weighhace, on AWCA, which tests H1. The p-value of the J statistic ranges from 0.0828 in the post-law period sample to 0.1386 in the pooled sample, indicating that the residuals are uncorrelated with the chosen instruments.

A significant positive relationship, at the 1% level, between weighhace and AWCA exists in the post-law period sample (+0.032). This result is contrary to H1. However, a significant negative relationship, at the 5% level, is observed in the pooled sample (-0.323), in line with H1. When looking at weighhace with the interaction year dummy variable and its effect on AWCA, a significant positive relationship at the 5% level is observed (+0.296), a result that again is contrary to H1.

Control Variables

A significantly negative relationship, at the 1% level, is seen between AWCA and firm size for the pre-law (-0.012) and the post-law periods (-0.012), indicating that larger firms have less AWCA.

⁷⁷ Similar results for all variables are observed when performing regressions using signed earnings (*ni*) and change in earnings (*earn*), instead of absolute values (see Appendix III).

Looking at the effect of leverage on AWCA, a significantly positive relationship, at the 1% level, exists between the two variables for the pre-law period (+0.059), indicating that highly leveraged firms have more AWCA in that period.

A significant positive relationship at the 1%, 5% and 10% levels is evident between both the absolute level of earnings and the absolute value of changes in earnings and AWCA, for the pre-law period (+0.082/+0.040), for the post-law period (+0.066/+0.239) and for the pooled sample (+0.246/+0.150). Therefore, firms that have higher absolute values of earnings or higher absolute values of changes in earnings have more AWCA.⁷⁸

Finally, a significant positive relationship at the 1% and 5% levels is evident between sales growth and AWCA, for the pre-law period (+0.042), the post-law period (+0.024) and the pooled sample (+0.028). This indicates that firms that have higher sales growth have higher levels of AWCA.

Insignificant results are observed between ownership concentration and AWCA.

In summary, using the DeFond and Park (2001) model to measure AWCA, a statistically significant positive relationship is seen between AWCA and leverage, the absolute level of earnings, the absolute value of changes in earnings and sales growth, while a statistically significant negative relationship is seen between AWCA and weighage and firm size.⁷⁹

⁷⁸ Similar to the Modified Jones model, in this model when signed values for earnings (*ni*) and changes in earnings (*earn*) is used, there is a significant negative effect of earnings and changes in earnings on AWCA (see Appendix III).

⁷⁹ Similar results for all variables are observed when performing regressions using signed earnings (*ni*) and change in earnings (*earn*), instead of absolute values (see Appendix III).

Table 5-4 Audit Committee Effectiveness and Earnings Management – Model 1

	Modified Jones model			DeFond and Park (2001) model		
	Pre-Law Period (2006/2008)	Post-Law Period (2010/2012)	Pooled Sample	Pre-Law Period (2006/2008)	Post-Law Period (2010/2012)	Pooled Sample
Variables	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)
weighase	-0.001 (-0.185)	0.071 (9.754)***	-0.349 (-2.600)***	0.005 (1.048)	0.032 (6.195)***	-0.323 (-2.402)**
ownconc	-0.007 (-0.507)	-0.009 (-0.479)	-0.022 (-0.811)	0.006 (0.559)	0.006 (0.443)	-0.004 (-0.199)
ta	-0.011 (-5.855)***	-0.019 (-6.394)***	0.000 (0.047)	-0.012 (-7.265)***	-0.012 (-5.359)***	-0.002 (-0.577)
lev	0.036 (1.9112)*	-0.068 (-4.516)***	-0.008 (-0.226)	0.059 (3.833)***	-0.009 (-0.752)	-0.015 (-0.728)
absni	0.017 (0.640)	0.241 (5.968)***	0.341 (4.354)***	0.082 (2.032)**	0.066 (1.828)*	0.246 (3.456)***
absearn	0.454 (7.914)***	0.239 (4.118)***	0.049 (0.614)	0.040 (5.111)***	0.239 (3.534)***	0.150 (1.665)*
salesgrowth	0.040 (3.854)***	0.034 (1.876)*	0.028 (1.660)*	0.042 (4.116)***	0.024 (2.210)**	0.028 (2.174)**
dummy			0.061 (1.906)*			0.011 (0.311)
dummy*weighase			0.292 (2.356)**			0.296 (2.491)**
<i>J-statistic</i>	0.0682	0.0734	0.1385	0.1058	0.0828	0.1386
<i>N</i>	392	371	763	392	371	763

Variables: *EM* discretionary accruals using the Modified Jones model; *AWCA* abnormal working capital accruals using the DeFond and Park (2001) model; *weighase* weighted audit committee effectiveness; *ownconc* ownership concentration; *ta* total assets; *lev* leverage; *absni* absolute value of current earnings; *absearn* absolute value of changes in earnings; *salesgrowth* changes in sales from prior year; *dummy* an indicator variable where 1 is for 2010/2012 and 0 for 2006/2008.

*** significant at level 1%; ** significant at level 5%; *significant at level 10%

5.4.3 Results – H2

This section presents the findings relating to H2, about the effect of the corporate governance index on EM before and after the implementation of the 2008 governance law concerning the mandatory existence of audit committees for Greek listed firms. It is expected that firms with higher levels of CG indices will have less EM. The CG index is examined with all items included in the index and it is also examined including only mandatory items included in Greek law, as well as the best practice items suggested by the Hellenic Federation of Industries in 2010. Hence eight regressions are run, four for the penalized CG index and four for the non-penalized index. All results are reported in Table 5-5 and Table 5-6.

Discretionary accruals – Modified Jones model

Penalized CG indices

The p-value of the J statistic ranges from 0.0719 in the post-law period sample of total CG index to 0.1426 in the post-law period sample of mandatory/best practice CG indices, indicating that the residuals are uncorrelated with the chosen instruments.

Examining the effect of the total CG index on EM, a significant negative relationship, at the 1% level is seen in the pre-law period (-0.194)⁸⁰ and pooled sample (-0.523), in line with H2, whereby higher CG index scores result in less EM. However, in the post-law sample, a significant positive relationship (+0.285), at the 1% level, exists between the total CG index and EM. This is contrary to H2. This contradictory result is also seen when examining the total CG index with the interaction year dummy variable and its effect on EM. These two variables have a significant positive relationship (+0.325), at the 10% level.

When examining the CG indices that include mandatory and best practice items, the following results are observed. When examining the effect of the mandatory CG index,

⁸⁰ As seen in Appendix IV, when running the regressions using signed values for earnings (*ni*) and change in earnings (*earn*), in the pre-law sample a significant positive relationship between the total penalized CG index and EM is observed. All other tests examining CG and EM have similar results with tests run that use absolute values for earnings (*absni*) and change of earnings (*absearn*).

similar results are seen as those with the CG total index. More specifically, a significant negative relationship, at the 1% level, is seen in the pre-law period (-0.146) and pooled sample (-0.127), in line with H2, whereby higher mandatory CG index scores result in less EM. However, in the post-law sample, a significant positive relationship (+0.085), at the 1% level, exists between the mandatory CG index and EM. This is contrary to H2. This positive relationship also exists when examining the effect of the mandatory CG index with the interaction year dummy variable on EM (+0.187).

As for the best practice CG index and its effect on EM, a positive relationship at the 1% and 5% levels is seen in the pre-law period (+0.102), the post-law period (+0.049) and pooled sample (+0.663). Conversely, when examining the best practice CG index with the interaction year dummy variable and its effect on EM, a significant negative relationship (-0.682), at the 1% level, is observed. This result is in line with H2, whereby firms, in the years after the implementation of the 2008 governance law, that have higher CG scores concerning best practice governance items have less EM.

Control Variables

A significant positive relationship, at the 5% level, in the post-law period sample (+0.036) is observed between ownership concentration and EM, in the regression with the total CG index. This result suggests that firms that have higher ownership concentration conduct higher levels of EM.

A significant negative relationship, at the 1% level, is seen between EM and firm size for the pre-law (-0.010 / -0.015), post-law (-0.014 / -0.012) and pooled samples (-0.008 / -0.016), in both regressions involving penalized indices (the total CG index and the mandatory/best practice CG indices), thus suggesting that larger firms have less EM.

A significant positive relationship, at the 10% level, exists between the leverage and EM in the pre-law period sample (+0.025) in the regression with the mandatory/best practice CG indices.

A significant positive relationship at the 1% and 10% levels, is evident between both the absolute level of earnings and the absolute value of changes in earnings and EM,

for the pre-law (+0.072/+0.101), post-law (+0.244/+0.067) and pooled samples (+0.167/+0.102), in both regressions involving penalized CG indices.⁸¹

Finally, a significant positive relationship at the 1% and 5% levels is evident between sales growth and EM, for the pre-law period (+0.048 / +0.047), the post-law period (+0.027) and pooled samples (+0.032 / +0.026), in both regressions involving penalized CG indices.

In summary, using the Modified Jones model to measure EM, a statistically significant positive relationship is seen between EM and the total CG index, the mandatory CG index, ownership concentration, leverage, the absolute level of earnings, the absolute value of changes in earnings and sales growth, while a statistically significant negative relationship is seen between EM and the best practice CG index and firm size.

Non-penalized CG indices

Table 5-6 reports the results of the regression model which examines the impact of non-penalized CG indices on EM, and therefore tests H2. The p-value of the J statistic ranges from 0.0850 in the pre-law period sample for the total CG index to 0.1374 in the post-law period sample for the mandatory/best practice CG indices, indicating that the residuals are uncorrelated with the chosen instruments.

Examining the effect of the total CG index on EM, a significantly positive relationship, at the 1% level, is seen in the post-law sample (+0.220). This result is contrary to H2, since higher CG scores are expected to result in lower EM.

Similar positive results also exist between the CG scores of the mandatory CG index and the best practice CG index and EM, in the post-law period (+0.036 /+0.129) and for the pooled samples (+0.230). However, when examining the best practice CG index

⁸¹ When using CG indices to proxy governance quality, as seen in the previous proxies of governance quality, when signed values for earnings (*ni*) and changes in earnings (*earn*) are used, there is a significant negative effect of earnings and changes in earnings on EM (see Appendix IV).

with the interaction year dummy variable and its effect on EM, a significant negative relationship, at the 10% level, is observed (-0.161). This result is in line with H2 whereby firms, in the years after the implementation of the 2008 governance law, that have higher CG scores concerning best practice governance items perform less EM.

Control Variables

A significant negative relationship, at the 1% level, is seen between EM and firm size for the pre-law (-0.013/-0.014), post-law (-0.011/-0.014) and pooled samples (-0.013/-0.015), in both regressions involving non-penalized indices (the total CG index and the mandatory/best practice CG indices), thus suggesting that larger firms have less EM.

A significant positive relationship, at the 1% and 5% levels, exists between leverage and EM in the pre-law period sample (+0.037/+0.041) in all regressions involving non-penalized CG indices.

A significant positive relationship, at the 1% level, is observed between both the absolute level of earnings and the absolute value of changes in earnings and EM, for the pre-law (+0.402 / +0.035 / +0.091 / +0.324), post-law (+0.242 / +0.137 / +0.058 / +0.223) and pooled samples (+0.122 / +0.287 / +0.110 / +0.306), in all non-penalized CG index regressions.⁸²

Finally, a significant positive relationship at the 1% level is evident between sales growth and EM, for the pre-law period (+0.035/+0.036), the post-law period (+0.028) and the pooled samples (+0.029/+0.036), in both regressions.

Insignificant results are observed between ownership concentration and EM.

In summary, using the Modified Jones model to measure EM and non-penalized CG indices, as a proxy for governance quality, a statistically significant positive relationship is seen between EM and the total CG index, the mandatory CG index,

⁸² Similar to the case of penalized CG indices, when signed values for earnings (*ni*) and changes in earnings (*earn*) are used, there is a significant negative effect of earnings and changes in earnings on EM (see Appendix V).

leverage, the absolute level of earnings, the absolute value of changes in earnings and sales growth. However, a statistically significant negative relationship is seen between EM and the best practice CG index and firm size.

Abnormal working capital accruals – DeFond and Park (2001) model

Penalized CG index

Table 5-5 reports the results of the regression model which examines the impact of penalized CG indices on AWCA, and therefore tests H2. The p-value of the J statistic ranges from 0.0674 in the post-law period sample of the total CG index to 0.1447 in the pooled sample of mandatory/best practice CG indices, indicating that the residuals are uncorrelated with the chosen instruments.

In the pre-law period (-0.124) and for the pooled sample (-0.436) a significant negative relationship, at the 1% level, exists between the total CG index and AWCA, in line with H2, whereby higher CG index scores result in less AWCA. However, when examining the total CG index with the interaction year dummy variable and its effect on AWCA, a significant positive relationship (+0.339), at the 5% level, is observed between the two variables.

CG indices that include mandatory and best practice items have a similar effect on AWCA as the CG total index. More specifically, a significant negative relationship, at the 1% level, is seen in the pre-law period (-0.017), post-law period (-0.053) and pooled samples (-0.111), between the mandatory CG index and AWCA, in line with H2, whereby higher mandatory CG index scores are expected to result in less AWCA. Similarly, in the post-law period sample (-0.120), the best practice CG index and AWCA display a negative relationship, significant at the 1% level. However, as in the total CG index, when examining the effect of the mandatory CG index with the interaction dummy year variable on AWCA, a significant positive relationship (+0.137), at the 1% level, is seen.⁸³

⁸³ Similar to the Modified Jones model, when running the regressions using signed values for earnings (*ni*) and changes in earnings (*earn*), in the pre-law sample a significant positive relationship between the

Control Variables

A significant negative relationship, at the 1% level, is seen between AWCA and firm size for the pre-law (-0.009/-0.011) and post-law periods (-0.008/-0.008) and for the pooled sample (-0.008/-0.011), in both regressions involving penalized indices (the total CG index and the mandatory/best practice CG indices), thus suggesting that larger firms have less AWCA.

A significant positive relationship, at the 1% level, exists between leverage and AWCA in the pre-law (+0.036) and post-law periods (+0.021) in the regression with the mandatory/best practice CG indices. In the total CG index regression, leverage and AWCA have a significant positive relationship, at the 5% level, in the pre-law period (+0.038).

A significant positive relationship, at the 1%, 5% and 10% levels, is evident between both the absolute level of earnings and the absolute value of changes in earnings and AWCA, for the pre-law period (+0.093 / +0.311 / +0.181 / +0.237), the post-law period (+0.058 / +0.149 / +0.302) and the pooled samples (+0.105 / +0.253 / 0.070 / +0.308), in both regressions involving penalized CG indices.⁸⁴

Finally, a significant positive relationship at the 1% and 5% levels is evident between sales growth and AWCA, for the pre-law period (+0.048/+0.049), the post-law period (+0.015) and the pooled samples (+0.028/+0.030), in both regressions involving penalized CG indices.

Insignificant results are observed between ownership concentration and AWCA.

In summary, using the DeFond and Park (2001) model to calculate AWCA, a statistically significant negative relationship is seen between AWCA and the total CG index, the mandatory CG index, the best practice CG index and firm size. On the other

total penalized CG index and the penalized mandatory CG index and AWCA is observed. All other tests examining CG and AWCA have similar results with tests run that use absolute values for earnings (*absni*) and change of earnings (*absearn*) (see Appendix IV).

⁸⁴ Similar to the Modified Jones model, when signed values for earnings (*ni*) and changes in earnings (*earn*) are used, there is a significant negative effect of earnings and changes in earnings on AWCA.

hand, a statistically significant positive relationship is seen between AWCA and leverage, the absolute level of earnings, the absolute value of changes in earnings and sales growth.

Non-penalized CG index

Table 5-6 reports the results of the regression model which examines the impact of non-penalized CG indices on AWCA, and therefore tests H2. The p-value of the J statistic ranges from 0.0792 in the pre-law period sample for the total CG index to 0.1395 in the post-law period sample for the mandatory/best practice CG indices, indicating that the residuals are uncorrelated with the chosen instruments.

Examining the effect of the total CG index on AWCA, a significant positive relationship, at the 5% level, is seen in the post-law sample (+0.053). This result is contrary to H2, since higher CG scores are expected to result in lower AWCA. Similarly, when examining the effect of the total CG index with the interaction year dummy variable on AWCA, a statistically significant positive relationship (+0.370) at the 1% level is seen.

Similar positive results also exist between the CG scores of the mandatory CG index and the best practice CG index and AWCA, in the pre-law period (+0.016) and pooled samples (+0.216) respectively. However, when examining the best practice CG index with AWCA in the post-law period, a significant negative relationship (-0.030), at the 5% level, is observed. This result is in line with H2, whereby firms in the years after the implementation of the 2008 governance law, that have higher CG scores concerning best practice governance items are expected to have less AWCA. This statistically significant negative relationship is also seen when examining the effect of the best practice CG index with the interaction year dummy variable on AWCA (-0.161), in line with H2.

Control Variables

For both regressions involving non-penalized CG indices (the total and the mandatory/best practice indices), there is a significant positive relationship, at the 1%

and 5% levels, between ownership concentration and AWCA, in the pre-law period (+0.024) and pooled samples (+0.032/+0.020).

A significant negative relationship, at the 1% level, is seen between AWCA and firm size for the pre-law (-0.011/-0.010), the post-law (-0.009 /-0.010) and the pooled samples (-0.014/-0.013), in both regressions involving non-penalized indices (the total CG index and the mandatory/best practice CG indices), thus suggesting that larger firms have less AWCA.

A significant positive relationship, at the 1% level, exists between leverage and AWCA in the pre-law period sample (+0.055/+0.051) in both regressions involving the non-penalized CG indices, and in the post-law period sample (+0.024) in the regressions involving the mandatory/best practice CG indices.

A significant positive relationship, at the 1%, 5% and 10% levels, is observed between both the absolute level of earnings and the absolute value of changes in earnings and AWCA, for the pre-law period (+0.076 / +0.314 / +0.164 / +0.247), the post-law period (+0.069 / +0.132 / +0.369) and the pooled samples (+0.060 / +0.377 / +0.063 / +0.343), in both non-penalized CG index regressions.⁸⁵

Finally, a significant positive relationship, at the 1%, 5% and 10% level, is evident between sales growth and AWCA, for the pre-law period (+0.033 / +0.035), the post-law period (+0.015) and the pooled samples (+0.027 / +0.029), in both regressions.

In summary, using the DeFond and Park model (2001) to measure AWCA and non-penalized CG indices, a statistically significant positive relationship is seen between AWCA and the total CG index, the mandatory CG index, ownership concentration, leverage, the absolute level of earnings, the absolute value of changes in earnings and sales growth. However, a statistically significant negative relationship is seen between AWCA and the best practice CG index and firm size.

⁸⁵ Similar to the penalized-CG indices, when signed values for earnings (*ni*) and changes in earnings (*earn*) are used, there is a significant negative effect of earnings and changes in earnings on AWCA (see Appendix V).

Table 5-5 Penalized CG Indices and Earnings Management – Model 2

	Modified Jones model			DeFond and Park (2001) model				Modified Jones model			DeFond and Park (2001) model		
	Pre-Law period (2006/2008)	Post-Law period (2010/2012)	Pooled Sample	Pre-Law period (2006/2008)	Post-Law period (2010/2012)	Pooled Sample		Pre-Law period (2006/2008)	Post-Law period (2010/2012)	Pooled Sample	Pre-Law period (2006/2008)	Post-Law period (2010/2012)	Pooled Sample
variables	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	variables	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)
cgpentotal	-0.194 (-4.117)***	0.285 (4.944)***	-0.523 (-2.757)***	-0.124 (-2.491)**	-0.039 (-0.813)	-0.436 (-2.239)**	cgpenmand	-0.146 (-7.139)***	0.085 (10.414)***	-0.127 (-3.875)***	-0.071 (-2.962)***	-0.053 (-5.417)***	-0.111 (-4.577)***
							cgpenbp	0.102 (2.065)**	0.049 (3.492)***	0.663 (2.482)**	-0.025 (-0.407)	-0.120 (-8.872)***	0.146 (0.830)
ownconc	-0.015 (-1.123)	0.036 (2.231)**	-0.021 (-1.209)	0.003 (0.238)	0.010 (0.823)	-0.005 (-0.322)	ownconc	-0.013 (-1.162)	0.004 (0.428)	0.001 (0.076)	0.004 (0.451)	0.003 (0.322)	0.006 (0.709)
ta	-0.010 (-5.139)***	-0.014 (-6.575)***	-0.008 (-3.699)***	-0.009 (-5.197)***	-0.008 (-4.981)***	-0.008 (-3.905)***	ta	-0.015 (-9.082)***	-0.012 (-9.970)***	-0.016 (-7.313)***	-0.011 (-7.300)***	-0.008 (-5.739)***	-0.011 (-6.873)***
lev	0.016 (0.881)	-0.011 (-0.842)	-0.003 (-0.148)	0.038 (2.054)**	0.012 (1.213)	0.003 (0.209)	lev	0.025 (1.789)*	-0.011 (-1.333)	-0.002 (-0.140)	0.036 (2.746)***	0.021 (2.608)***	0.007 (0.706)
absni	0.072 (1.675)*	0.244 (6.888)***	0.167 (3.775)***	0.093 (2.419)**	0.058 (1.804)*	0.105 (2.221)**	absni	0.101 (3.331)***	0.067 (9.123)***	0.102 (2.924)***	0.181 (7.128)***	-0.042 (-9.159)***	0.070 (2.468)**
absearn	0.412 (6.576)***	0.138 (2.971)***	0.202 (3.335)***	0.311 (4.660)***	0.149 (2.402)**	0.253 (3.842)***	absearn	0.340 (6.371)***	0.241 (8.556)***	0.306 (6.098)***	0.237 (4.711)***	0.302 (8.147)***	0.308 (6.681)***
salesgrowth	0.048 (4.813)***	0.010 (0.684)	0.032 (2.224)**	0.048 (4.901)***	0.014 (1.274)	0.028 (2.229)**	salesgrowth	0.047 (5.970)***	0.027 (3.347)***	0.026 (2.850)***	0.049 (6.919)***	0.015 (1.989)**	0.030 (3.808)***
dummy			-0.056 (-0.860)			-0.082 (-1.376)	dummy			0.006 (0.135)			-0.037 (-1.155)
cgpentotal* dummy			0.325 (1.842)*			0.339 (2.139)**	cgpenmand* dummy			0.187 (3.659)***			0.137 (3.628)***
							cgpenbp* dummy			-0.682 (-2.654)***			-0.182 (-1.073)
<i>J</i> -statistic	0.0800	0.0719	0.1346	0.0776	0.0674	0.1364	<i>J</i> -statistic	0.1299	0.1426	0.1423	0.1346	0.1221	0.1447
<i>N</i>	392	371	763	392	371	763	<i>N</i>	392	371	763	392	371	763

Variables: *EM* discretionary accruals using the Modified Jones model; *AWCA* abnormal working capital accruals using the DeFond and Park (2001) model; *cgpentotal* penalized total CG index; *cgpenmand* penalized mandatory CG index; *cgpenbp* penalized best practice CG index; *ownconc* ownership concentration; *ta* total assets; *lev* leverage; *absni* absolute value of current earnings; *absearn* absolute value of changes in earnings; *salesgrowth* changes in sales from prior year; *dummy* an indicator variable where 1 is for 2010/2012 and 0 for 2006/2008.

*** significant at level 1%; ** significant at level 5%; *significant at level 10%

Table 5-6 Non-penalized CG Indices and Earnings Management – Model 2

	Modified Jones model			DeFond and Park (2001) model				Modified Jones model			DeFond and Park (2001) model		
	Pre-Law period (2006/2008)	Post-Law period (2010/2012)	Pooled Sample	Pre-Law period (2006/2008)	Post-Law period (2010/2012)	Pooled Sample		Pre-Law period (2006/2008)	Post-Law period (2010/2012)	Pooled Sample	Pre-Law period (2006/2008)	Post-Law period (2010/2012)	Pooled Sample
variables	coefficient (t-stat)	variables	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)					
cgntotal	0.018 (0.296)	0.220 (10.162)***	0.001 (0.007)	0.054 (0.869)	0.053 (2.379)**	0.184 (1.403)	cgnonmand	-0.003 (-0.252)	0.036 (4.513)***	-0.012 (-0.731)	0.016 (1.964)**	0.010 (1.299)	-0.017 (1.230)
							cgnonbp	-0.003 (-0.092)	0.129 (10.614)***	0.230 (2.548)**	-0.043 (-1.494)	-0.030 (-2.097)**	0.216 (2.882)***
ownconc	0.001 (0.045)	0.007 (0.596)	0.006 (0.612)	0.024 (1.997)**	0.011 (0.920)	0.032 (2.701)***	ownconc	0.009 (0.979)	0.007 (0.740)	0.007 (0.688)	0.019 (2.124)**	0.013 (1.435)	0.020 (2.012)**
ta	-0.013 (-6.347)***	-0.011 (-6.954)***	-0.013 (-7.996)***	-0.011 (-5.666)***	-0.009 (-6.578)***	-0.014 (-7.098)***	ta	-0.014 (-8.748)***	-0.014 (-10.921)***	-0.015 (-8.366)***	-0.010 (-6.893)***	-0.010 (-8.041)***	-0.013 (-7.817)***
lev	0.037 (2.127)**	-0.017 (-1.545)	0.010 (0.949)	0.055 (3.192)***	0.010 (0.969)	0.011 (0.898)	lev	0.041 (3.001)***	-0.005 (-0.604)	0.010 (1.120)	0.051 (4.486)***	0.024 (3.090)***	0.012 (1.506)
absni	0.046 (1.148)	0.242 (6.608)***	0.122 (4.026)***	0.076 (1.888)*	0.069 (2.032)**	0.060 (1.824)*	absni	0.091 (2.969)***	0.058 (8.038)***	0.110 (3.564)***	0.164 (6.761)***	-0.055 (-8.682)***	0.063 (2.304)**
absearn	0.402 (6.722)***	0.137 (3.072)***	0.287 (5.693)***	0.314 (4.883)***	0.132 (2.163)**	0.377 (7.311)***	absearn	0.324 (6.157)***	0.223 (8.155)***	0.306 (7.513)***	0.247 (5.578)***	0.369 (9.434)***	0.343 (8.067)***
salesgrowth	0.035 (3.301)***	0.015 (1.130)	0.029 (2.878)***	0.033 (2.937)***	0.006 (0.522)	0.027 (2.447)**	salesgrowth	0.036 (4.095)***	0.028 (3.154)***	0.036 (3.354)***	0.035 (4.082)***	0.015 (1.852)*	0.029 (3.220)***
dummy			-0.160 (-1.543)			-0.319 (-3.243)***	dummy			0.024 (0.376)			0.054 (1.009)
cgntotal* dummy			0.193 (1.323)			0.370 (2.690)***	cgnonmand* dummy			0.018 (0.404)			-0.007 (-0.195)
							cgnonbp* dummy			-0.162 (-1.837)*			-0.161 (-2.229)**
<i>J</i> -statistic	0.0850	0.0852	0.1257	0.0792	0.0874	0.1290	<i>J</i> -statistic	0.1311	0.1374	0.1343	0.1323	0.1395	0.1375
<i>N</i>	392	371	763	392	371	763	<i>N</i>	392	371	763	392	371	763

Variables: *EM* discretionary accruals using the Modified Jones model; *AWCA* abnormal working capital accruals using the DeFond and Park (2001) model; *cgntotal* non-penalized total CG index; *cgnonmand* non-penalized mandatory CG index; *cgnonbp* non-penalized best practice CG index; *ownconc* ownership concentration; *ta* total assets; *lev* leverage; *absni* absolute value of current earnings; *absearn* absolute value of changes in earnings; *salesgrowth* changes in sales from prior year; *dummy* an indicator variable where 1 is for 2010/2012 and 0 for 2006/2008.

*** significant at level 1%; ** significant at level 5%; *significant at level 10%

5.5 Discussion of results

5.5.1 H1 –Audit Committee Effectiveness and earnings management

The relationship between audit committee effectiveness and EM is analyzed in this section. The variable audit committee effectiveness incorporates the various attributes of audit committees, such as their size and independence, the number of meetings and their member's financial expertise. Weighted ace is used to indicate the quality of audit committees and their ability to constrain EM.

5.5.1.1– Audit Committee Effectiveness and the Modified Jones model

A significant negative relationship between weighted ace and EM exists in the pooled sample, in line with H1. Firms that have a higher value of weighted ace, indicating higher quality in their audit committees, have lower EM. This is consistent with Baxter and Cotter (2009), Sierra Garcia et al. (2012), Chen and Zhang (2014), Sharma and Kuang (2014) and He and Yang (2014). They examine individual audit committee attributes and find a negative effect on EM. Nonetheless, Kent et al. (2010) in addition to observing individual audit committee characteristics and their effect on EM, also uses a composite measure of audit committee effectiveness and find a negative relationship between this variable and EM.

However, when observing the post-law period sample and weighace with the interaction year dummy variable, a positive effect of weighace on EM is seen. Thus, firms that have higher values of weighace conduct more EM. These results are contrary to H1. This result indicates that firms adhere more to the form of laws, rather than to their substance. Audit committees have the appropriate size, independence, number of meetings and expertise but are not actually performing their role in constraining EM.

5.5.1.2– Audit Committee Effectiveness and the DeFond and Park (2001) model

When measuring AWCA, using the DeFond and Park (2001) model, similar results are observed with the Modified Jones model. More specifically, a negative relationship between weighace and AWCA is observed in the pooled sample, in line with H1, whereby firms with more attributes in their audit committees, indicating higher levels

of audit committee effectiveness, are better equipped to constrain EM. Yet, in the post-law period sample and in weighace with the interaction year dummy variable, a positive relationship exists between weighace and AWCA. This reveals that firms with higher levels of weighace perform more AWCA, contrary to H1. Thus, after the implementation of the audit committee law regarding the mandatory existence of an audit committee for all Greek listed firms, many firms appear to conform to the form of the law and not to its actual substance. Although they have audit committees that follow the law and best practice requirements, per the Greek CG Code, in terms of size, independence, frequency of meetings and member expertise, they do not appear to be effective in constraining AWCA.

5.5.2 H2 –CG Indices and earnings management

The relationship between corporate governance indices and EM is analyzed in this section. The CG indices represent a multi-dimensional proxy for governance quality incorporating a set of governance attributes in an index. The CG indices are either examined in total, where all governance attributes are included in the index, or are broken down into their mandatory and best practice components. In the mandatory CG index, only mandatory items as per Greek CG laws are included in the CG index, while in the best practice CG index, only best practice items as per the CG Greek Code are included in the CG index. All CG indices are scored using the penalized versions, whereby non-disclosed items are considered non-existent and scored as zero, and the non-penalized versions, where non-existent items are excluded from the index.

5.5.2.1– CG indices and the Modified Jones model

Penalized CG indices

CG pen_total (H2)

A significant negative relationship between the total penalized CG index and EM is observed in the pre-law and the pooled sample, a result that is in line with H2. Similar results are observed by Shen and Chih (2007), Jiang et al. (2008), Bowen et al. (2008) and Shan (2015). In a Greek setting for 2008, Bekiris and Doukakis (2011), who also

use a penalized CG index, also find a negative relationship between their CG index and EM. However, in the post-law period sample, a positive relationship is seen between the two variables. This is also seen when examining the CG index with the interaction year dummy variable and its effect on EM. These results are contrary to H2. In the period when the existence of audit committees is mandatory (2010/2012), firms with higher CG scores conducted more EM. This could imply that firms are more concerned with following the letter of the law rather than its spirit. This is a case where form appears to supersede the substance of the law.

CG pen_mand & CG pen_bp (H2)

Similar results to the total penalized CG index are also seen for the mandatory penalized CG index. As such, in the pre-law and in the pooled sample, a significant negative relationship is observed between the mandatory penalized CG index and EM, a result in line with H2. However, a positive relationship between the two is seen in the post-law period and when examining the mandatory penalized CG index with the interaction year dummy variable and its effect on EM. This result is contrary to H2, and indicates that Greek firms appear to follow the form of the law and not its substance.

When looking at the best practice penalized CG index and EM, a significant positive relationship is seen in the pre-law, post-law and in the pooled sample, results that are contrary to H2. Conversely, when examining the best practice penalized CG index with the interaction year dummy variable and its effect on EM, a significant negative relationship is seen. Firms that follow best practice governance attributes, as suggested by the Greek CG Code, in the years after the mandatory existence of an audit committee, constrain EM. This indicates that firms that follow optional, best practice governance items, in contrast to following mandatory CG items, are more successful in mitigating EM. These attributes play a critical role in mitigating EM, since firms appear to voluntarily follow the substance and not the form of the governance attributes.

Non-penalized CG indices

CG non_total (H2)

Similar to the penalized total CG index, a significant positive relationship between the non-penalized total CG index and EM is seen in the post-law sample period. This result is contrary to H2, suggesting that firms are not following the substance of governance recommendations. Insignificant relationships are observed between the non-penalized CG index and EM in the pre-law period and in pooled sample and when examining the total non-penalized CG index with the interaction year dummy variable and its effect on EM. Similar insignificant results are reported by Bowen et al. (2008).

CG non_mand & CG non_bp (H2)

Similar to the penalized CG index, the mandatory non-penalized CG index and EM have a significant positive relationship in the post-law period sample. Firms that are forced to follow CG recommendations, appear to be following the form of the law and not its substance, and thus firms that have higher CG scores are conducting higher levels of EM. Insignificant relationships between the two variables are seen in the pre-law sample and the pooled sample and when examining the mandatory non-penalized CG index with the interaction year dummy variable.

When looking at the best practice non-penalized CG index and EM, a significant positive relationship is seen in the post-law period and in the pooled sample, a result is contrary to against H2. However, when examining the best practice non-penalized CG index with the interaction year dummy variable and its effect on EM, a significant negative relationship is observed, similar to the best practice penalized CG index. This suggests that firms that follow optional, best practice governance recommendations, appear to follow the substance and not the form of these governance attributes.

5.5.2.2– CG indices and the DeFond and Park (2001) model

Penalized CG indices

CG pen_total (H2)

When looking at the penalized CG index and its effect on AWCA, a significant negative relationship is seen in the pre-law and pooled samples, in line with H2. However, when examining the total penalized CG index with the interaction year dummy variable and its effect on AWCA, a significant positive relationship is observed. As such, this result is contrary to H2, indicating that firms that have higher CG scores appear to have higher levels of AWCA.

CG pen_mand & CG pen_bp (H2)

There is a significant negative relationship between the mandatory CG index and AWCA in the pre-law, post-law and pooled samples, in line with H2. However, this relationship becomes positive when examining the mandatory penalized CG index with the interaction year dummy variable and its effect on AWCA. Thus, when firms are forced to follow mandatory attributes of governance, after the implementation of the CG law concerning the mandatory existence of an audit committee, they appear to be following the letter and not the spirit of the law.

A significant negative relationship between the best practice CG index and AWCA is seen in the post-law period sample, in line with H2. Insignificant results are observed in the pre-law period and in pooled sample, and when examining the best practice penalized CG index with the interaction year dummy variable and its effect on AWCA.

Non-penalized CG indices

CG non_total (H2)

A significant positive relationship is observed between the total non-penalized CG index and AWCA in the pooled sample and when examining the total non-penalized CG index with the interaction year dummy variable and its effect on AWCA. Thus,

firms with higher CG scores have higher levels of AWCA. As such, one can conclude that the governance items included in the index do not appear to assist firms in mitigating AWCA. They are either not appropriate or they are not applied in substance.

CG non_mand & CG non_bp (H2)

A significant positive relationship is also observed between the mandatory non-penalized CG index and AWCA in the pre-law period sample. Insignificant relationships are seen between the two variables in the post-law and the pooled sample, as well as when examining the mandatory non-penalized CG index with the interaction year dummy variable and its effect on AWCA.

A significant positive relationship between the best practice non-penalized CG index and AWCA is also observed in the pooled sample. However, in the post-law period and when examining the best practice non-penalized CG index with the interaction year dummy variable and its effect on AWCA, a significant negative relationship is noticed. This suggests that when firms voluntarily implement best practice governance recommendations, they believe in their value and follow their substance and, as a result, these governance items mitigate EM.

5.6 Conclusion

This chapter presents, analyzes and discusses data examining the effect of corporate governance mechanisms in Greece on EM before and after the implementation of the 2008 law concerning the mandatory existence of an audit committee for all Greek listed firms.

Corporate governance mechanisms are measured using audit committee characteristics and a multi-dimensional governance mechanism in the form of a corporate governance index, thus breaking down the analysis into two corporate governance models. EM is measured using the Modified Jones Model and the DeFond and Park model.

The first model examines the effect of audit committee effectiveness, looking at audit committee characteristics such as size, independence, frequency of meetings and the financial expertise of members. The second model examines governance quality

through a multi-dimensional, holistic index that incorporates various governance items. The results found are mixed, whereby good governance practices do not always mitigate EM. The overall conclusion from the analysis is that firms often follow the form of governance items and not their substance. When forced to implement a governance standard, they often do not appear to actually enforce it and thus it's not able to fulfill its true purpose and constrain EM.

Chapter 6 – Literature Review and Hypothesis Development (CG & FP)

6.1 Introduction

The academic interest in the relationship between corporate governance and firm performance has grown since major corporate failures such as Enron and WorldCom in the US. Improvements to corporate governance have been incorporated in major reforms and standards developed both at country level, as well as international level, such as the Sarbanes-Oxley Act in the US, the Combined Code in the UK and the OECD Code.

Examining this relationship becomes even more important in light of the financial crisis that began in the US in 2008. Although this financial crisis is considered by many to be comparable to the Great Depression of the 1930s, limited research has been conducted examining corporate governance and firm performance in this context. Furthermore, most research examining the two variables in a crisis setting has focused mainly on banks and financial institutions in the US and the UK. Limited research exists for other developed economies. The financial crisis greatly affected Greece by bringing forth pre-existing structural problems and macroeconomic imbalances of the Greek economy and it is therefore of interest to examine this relationship in such a context.

This chapter initially focuses on the theoretical framework that forms the link between corporate governance and firm performance in section 6.2. The empirical literature concerning the issue of corporate governance and its effect on firm performance, in a non-crisis and crisis setting, is discussed in sections 6.3, 6.4 and 6.5. Section 6.6 discusses the sovereign debt crisis in Greece. Consequently, this contextual information and literature review form the basis for the development of the hypotheses stated in 6.7. Finally, section 6.8 concludes the chapter.

6.2 Theoretical framework for the impact of CG on firm performance

Corporate governance is a system that sets the foundations of how a firm is directed and controlled (Tihanyi et al., 2014). Many theories influence the development of

corporate governance, as analyzed in Chapter 2. This section provides a discussion of the theories affect the relationship between CG and firm performance and how they form the link between the two variables. The relationship between CG and firm performance is quite complex and cannot be based on one single CG theory. Prior research employs three CG theories - agency, stewardship and resource-dependency theory – that constitute the theoretical framework about the influence of corporate governance on firm performance (Nicholson and Kiel, 2007; Jackling and Johl, 2009).

Agency theory examines the role directors’ play in contributing to firm performance. The primary activity of boards is monitoring managers on behalf of shareholders whereby agency costs are reduced and firm performance is improved. Research based on agency theory examines the effect of proxies for board incentives, such as board dependence and equity compensation, on firm performance (Hillman and Dalziel, 2003). Directors’ leadership structure, such as CEO duality and board composition, are significant factors in how a firm performs (Rhoades et al., 2001).

In contrast to agency theory, stewardship theory proclaims that managers are stewards of the company and can be entrusted with the firm’s resources. Executive directors have a better understanding of the firm, have direct access to crucial information and thus can make better decisions. According to stewardship theory, managers are trustworthy and when empowered with the firm’s resources, agency costs are minimized, since managers are unlikely to disadvantage shareholders for fear of harming their own reputation. Although the link between board of directors and firm performance, based on the stewardship theory, is not very explicit, superior decision making that positively affects firm performance is the key element (Nicholson and Kiel, 2007).

Resource-dependency theory provides the framework indicating that the board provides the resources needed to maximize performance. This involves board size, board committees and board activity. The board provides resources, either through the experience, expertise and reputation or through their network of ties to other firms. This is referred to in the literature as board capital. Resource-dependency theory studies

how board capital provides resources to firms so as to increase firm performance (Hillman and Dalziel, 2003).

Prior literature examining the relationship between firm performance and corporate governance, either through board of directors' characteristics, such as board size, board independence and CEO duality, as well as corporate governance indices is presented in the following sections. The relationship between corporate governance and firm performance is examined to develop a research hypothesis for further analysis.

6.3 Board of directors' composition and firm performance

Corporate governance mechanisms' effect on firm performance is studied using individual board of director characteristics. Various aspects related to boards, such as board size (e.g. Raheja (2005), Huang and Wang (2015)), board independence (e.g. Guest (2009), Duru et al. (2016)) and board leadership structure (e.g. Jackling and Johl, (2009)) have been observed in the literature.

The literature examining board of directors' characteristics and firm performance is vast, therefore this literature review, for the purpose of this study, focuses on specific research papers examining board characteristics such as board size, board independence, and CEO duality and their effect on firm performance measured by Tobin's Q and/or Return on Assets (ROA).

Board size and firm performance

The role of the size of the board on corporate governance has created a debate in the literature, as there are arguments suggesting that board size can have both a positive and a negative influence on firm performance (Jensen, 1993; Yermack, 1996).

Agency theory implies that larger boards are likely to perform better in their monitoring and controlling role, compared to smaller boards, since more board members are engaged in reviewing management's actions. Larger boards have an increased pool of expertise and so are likely to have more knowledge and skills (Van den Berghe and Levrau, 2004). It is expected that larger boards include members that have connections with the external environment, thus providing resources, such as links to suppliers and

customers and other significant stakeholders that improve CG and increase firm performance (Jackling and Johl, 2009). Additionally, larger boards have a greater chance of reducing CEO dominance and creating the basis for many perspectives on corporate strategy (Forbes and Milliken, 1999; Van den Berghe and Levrau, 2004). Large boards possess a greater pool of collective information, needed for both the advisory and monitoring roles of boards (Lehn et al., 2009).

Empirical evidence in the literature shows that board size has a positive relationship with firm performance. Pearce and Zahra (1992) for 119 US Fortune 500 firms for the period 1983-1989, Kiel and Nicholson (2003) for 348 Australian listed firms for the year 1996 and Beiner et al. (2006) for 109 Swiss firms for the year 2002 all find a positive relationship between board size and firm performance. Additionally, Khanchel (2007) for 24 listed firms in Tunisia, North Africa for the period 2000-2005, Jackling and Johl (2009) for 180 Indian listed firms for the year 2006, and Veprauskaitė and Adams (2013) for 468 UK publicly listed firms for the period 2003-2008 also find a positive relationship between the two variables. Similar results are seen in Coles et al. (2008) for 8,165 US firm-year observations for the period 1992-2001, who find that large, high-debt firms have greater advising requirements that are fulfilled by larger boards and thus firm performance for complex firms increases as board size increases. These results are consistent with Van den Berghe and Levrau (2004) and Nicholson and Kiel (2007) who state that larger boards are more effective due to an increased pool of expertise, knowledge, and skills. Additionally, Huang and Wang (2015) examine the relationship between board size and a firm's variability on future firm performance using a sample of 1,990 Chinese firms over the period 2003-2011. They find that smaller boards face larger variability in future firm performance.

However, a negative association between these two variables is also seen in the literature. Large boards exhibit potential problems due to difficulty in coordination, organization and communication among the board members. Additionally, board members of large boards might experience decreased levels of motivation and participation, as well as difficulty in reaching a consensus on decisions, thus hindering their ability to control management. Furthermore, board members of large groups may suffer from diffusion of responsibility and the occurrence of the 'free-rider' problem

(Eisenberg et al., 1998; Van den Berghe and Levrau, 2004; Uchida, 2011). Jensen (1993) states that boards that have more than eight members are less effective in controlling CEOs due to potential coordination and processing problems. Yermack (1996) with a sample of 452 large US firms between 1984-1991 finds that smaller boards are more effective and thus increase firm performance due to their better communication and decision-making capabilities compared to larger boards. A similar inverse relationship is observed by Eisenberg et al. (1998) for a sample of 879 small Finnish firms for the period 1992-1994, de Andres et al. (2005) for 450 non-financial companies from 10 countries in Western Europe and North America for the year 1996 and Ghosh (2006) for 127 listed manufacturing firms in India for the year 2003. Similarly, Mak and Kusnadi (2005) for 230 firms from Singapore and 230 firms from Malaysia for the year 2000, Bennedsen et al. (2008) for 7,496 closely held corporations with limited liability in Denmark for the year 1999 and Dahya et al. (2008) for 799 firms with a dominant shareholder across 22 countries for the year 2002, also report a negative relationship. Additionally, Cheng (2008) for 6,869 US firm-year observations for the period 1996-2004, Guest (2009) for 2,746 UK firms over 1981-2002, and Ujunwa (2012) for 122 quoted Nigerian firms for the period 1991-2008, also find a negative relationship between the two variables.

Some research has also found no association between board size and performance. Bozec (2005) for a sample of 25 Canadian state-owned enterprises (SOE's) for the period 1976-2000 and Elsayed (2007) for 92 Egyptian listed firms from 2000-2004 find an insignificant relationship between the two variables.

As seen in the literature, there are differing results for the effect of board size on firm performance. In a Greek setting, Toudas (2009) examines 283 randomly selected firms on the ASE for the year 2005 and finds a positive relationship between board size and firm performance. Similarly, Zhou et al. (2018) for a sample of 774 firm-year observations for the period 2008-2012 also find a positive relationship between the two variables. However, Drakos and Bekiris (2010) for a sample of 1,490 firm-year observations for the period 2000-2006, find a negative relationship between board size and firm performance.

Board independence and firm performance

Independent members on the board add value to firms, since their independence helps them succeed in their monitoring role as board members, and thus enables them to better fulfill their role in mitigating agency costs associated with the separation of ownership and control that could potentially lead to conflicts and management expropriation. For example, there is a greater chance that a board with a majority of independent board members fire a non-performing CEO, thus enhancing their independence from the CEO (Franks et al., 2001). Their experience and expertise can facilitate the decision making process. Additionally, in crisis times, independent members of the board can also add value to firms since they limit excessive risk-taking behaviour. Independent directors see themselves as the balancing figure between the interests of the firm's shareholders and other stakeholders. Their risk preferences are different from other members of the board, often influencing hedging decisions, that can positively affect firm value, especially in times of crisis (Yeh et al., 2011).

Daily and Dalton (1993) examine the relationship between board independence and firm performance for 186 small listed firms in the US for the year 1990 and find a positive relationship between the two variables. Similarly, Weir et al. (2002) for a sample of 311 non-financial listed UK firms for the period 1994-1996, Cho and Kim (2007) for 347 listed firms in Korea for the year 1999, and Lefort and Urzúa (2008) for 169 Chilean non-financial listed firms for the period 2000-2003 all find a positive relationship between board independence and firm performance. Similar positive relationships are also seen in the work of Pearce and Zahra (1992), Mak and Kusnadi (2005), Khanchel (2007), Dahya et al. (2008) and Jackling and Johl (2009).

However, a negative relationship between board independence and firm performance is also seen in the literature. There are cases, as Williamson (2008) reports, where independent board members are at a disadvantage, in comparison to insiders, since they do not have direct access to crucial information and thus react slower than executive board members (Essen et al., 2013). Moreover, executive directors are in a better position to influence managers to invest in profitable projects, since they have access to important, specific and relevant information (Jermias, 2007). A number of studies

have also found that pressure on firms to fill board positions with independent directors can force them to choose inappropriate candidates, since there are often insufficient directors with the necessary qualifications to do the job effectively. Furthermore, according to stewardship theory, managers are good stewards of the firm's assets and have intrinsic non-financial motives, such as the need for achievement, intrinsic satisfaction from successful performance and recognition. Thus, a firm that reallocates control to managers from shareholders is a firm that maximizes firm performance (Van den Berghe and Levrau, 2004). Studies such as Agrawal and Knoeber (1996) for 383 large US firms for the year 1987, Klein (1998) for 485 and 486 US listed firms on the S&P 500 for the years 1992 and 1993, Bhagat and Black (2002) for 934 large US firms for the year 1991 and Kiel and Nicholson (2003) for 348 Australian listed firms for the year 1996 all find a negative relationship between board independence and firm performance. A similar inverse relationship is seen in Bozec (2005) for 25 stated owned enterprises selected from the 500 largest firms in Canada for the period 1976-2000, Jermias (2007) for 274 Canadian firms for the period 1997-2000, Bhagat and Bolton (2008) for a sample ranging from 6,130 to 24,255 US firms for the period 1990-2004 and Guest (2009) for 2746 UK listed firms over the period 1981-2002.

Bhagat and Bolton (2013) examine the effect of SOX (2002) for an unbalanced panel of 1,000-1,400 US firms per year for the period 1998-2007 and report mixed results between board independence and firm performance. They divide the sample into two periods, before and after the SOX regulation, and find a negative relationship between the two variables during 1998-2001 (before the regulation), but a positive relationship between the two during 2003-2007 (after the regulation). Additionally, Ramdani and Van Witteloostuijn (2010) examine the effect of board independence on firm performance for Indonesia (66 firms), Malaysia (75 firms), South Korea (111 firms), and Thailand (61 firms) for the years 2001 and 2002. They link the level of firm performance with different types of board characteristics and report mixed results. They find a positive relationship between the two only in "average-performing firms", while board independence is ineffective in "low and high performing firms".

Some studies find no relationship between board independence and firm performance. Examples of such studies are Jackling and Johl (2009), who find a positive relationship

between the two variables when Tobin's Q is used to measure firm performance, but no relationship is found when ROA is used. Similarly, no relationship between the two is found in the work of de Andres et al. (2005), Ghosh (2006) and Veprauskaitė and Adams (2013). Daily and Dalton (1992) for 100 listed firms in *Inc.* magazine (for growing companies) for the year 1989 and Duru et al. (2016) for a sample of 950 US firms for the period 1997-2011, also suggest an insignificant relationship between board independence and firm performance.

The existing literature provides differing results when examining the relationship between board independence and firm performance. Although studies report a positive relationship between the two, there are also cases where a negative relationship exists between board independence and firm performance, indicating a dynamic relationship between the two variables. In a Greek setting, board independence and firm performance have been examined by Toudas (2009) and Drakos and Bekiris (2010) where both find no association between the two variables. However, Zhou et al. (2018) find a negative relationship between board independence and firm performance, suggesting that independent boards are not always in the best interest of stockholders, resulting in inferior performance.

CEO duality and firm performance

The research on CEO duality is basically dominated by two contrasting theoretical perspectives. On the one hand, according to agency theory, CEO duality increases CEO power, thus impeding the independence between the board and management that is vital to deter managerial entrenchment. This results in poorer firm performance. On the other hand, according to stewardship and resource-dependence theory, CEO duality produces a more flexible leadership structure that results in organizational effectiveness in a dynamic business environment, thus increasing firm performance (Dahya and Travlos, 2000). This is the basic reason for the mixed and inconclusive results found in empirical literature (Duru et al., 2016).

Although boards add value to firms by providing advisory services, there is a consensus that the board's primary function is that of monitoring. Vigilant governance practices

include constraining CEO power, by separating the roles of CEO and board chairman. An individual carrying both roles, a phenomenon known as 'CEO duality', has the opportunity to manipulate the board's agenda and control the flow of information, resulting in a negative effect on firm performance (Essen et al., 2013). Most studies exhibit a negative relationship between CEO duality and firm performance, such as Bozec (2005), Mak and Kusnadi (2005), Jermias (2007), Bhagat and Bolton (2008), Ujunwa (2012), Veprauskaité and Adams (2013), Bhagat and Bolton (2013) and Duru et al. (2016). Additionally, Bai et al. (2004) for 2,905 publicly listed Chinese firm-year observations for the period 1999-2001 also find a negative relationship between CEO duality and firm performance.

Conversely, the literature also contains studies that indicate a positive relationship between CEO duality and firm performance. CEOs that have both roles can enhance firm performance, since a single unified strategy, expressed by one individual, can eliminate ambiguity about who is in charge. This creates a clear-cut leadership role that can simplify and accelerate the decision making process, something that is especially important in uncertain economic environments, where firms experience hardship, and are often forced to restructure their operations (Baliga et al., 1996; Essen et al., 2013). Baliga et al. (1996) for a sample of 375 US Fortune 500 firms examine the change in managerial structure for the period 1980-1991 and its effect on firm performance. They found that a subsequent increase in ROA is evident following managerial leadership change to a unitary leadership structure, suggesting that under certain conditions, firms increase their performance from CEO duality. Elsayed (2007) originally finds no association between CEO duality and firm performance. However, when examining the impact of the industry context he finds both a positive and a negative effect of CEO duality on firm performance. He states that the relationship between these two variables is not monotonic, thus it should be viewed as a dynamic relationship that varies with corporate characteristics and industry context. Additionally, according to Finkelstein and D'Aveni (1994), CEO duality can have both a positive and a negative effect. In a positive context where performance is high, the absence of CEO duality is preferred since the financial context can enable possible entrenchment. High performance enhances the CEOs power, whereby he/she has the

ability to institutionalize his/her power. Organizational slack can be created in high performing firms, where the CEO has the ability to indulge in financial excesses. In poor performing firms CEO duality might be preferred so as to convey to stakeholders a sense of unity and strength through a unitary board leadership (Rhoades et al., 2001).

Ramdani and Van Witteloostuijn (2010) suggest a positive relationship between CEO duality and firm performance for “average-performing” firms, but an insignificant affect in “low and high performing” firms. They find that the optimal level of CEO duality is conditional on initial firm performance.

Some studies also report no relationship between the two variables, as in Daily and Dalton (1992), Daily and Dalton (1993), Weir et al. (2002), Kiel and Nicholson (2003) and Jackling and Johl (2009).

As seen in the literature review examining CEO duality and firm performance, inconclusive and mixed results are found in the literature. In a Greek setting, CEO duality and firm performance have been examined by Toudas (2009) and Drakos and Bekiris (2010) where the former finds a negative relationship between CEO duality and firm performance, while the latter find no association between the two variables.

6.4 Corporate governance indices and firm performance

Recent studies have acknowledged that corporate governance quality cannot be captured solely using individual governance mechanisms and that a more holistic approach is needed in which several governance mechanisms are simultaneously examined. Thus, several studies have either created indices that incorporate several elements of corporate governance or use governance measures provided by private commercial ratings agencies, such as Institutional Shareholder Services (ISS), Governance Metrics International (GMI), The Corporate Library, Investor Responsibility Research Center (IRRC) and The Deminor Corporate Governance Ratings, to examine the relationship between a corporate governance score and firm performance.

More specifically, Gompers et al. (2003) was one of the first to construct an index assessing corporate governance quality for a large number of publicly traded US firms. They use data from the Investor Responsibility Research Center (IRRC) and create a “Governance Index” named G-index for 1,500 large US firms for the period 1990-1998. They find that higher quality governance, proxied by their index, results 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 corporate governance quality, even though it is considered more a measure of anti-takeover protection index rather than a broad index of corporate governance (Cremers and Nair, 2005; Brown and Caylor, 2006).

Callahan et al. (2003) construct an index of management involvement in director nominations for a sample of 106 large publicly-traded US firms for the period 1989-1992 and examine its effect on corporate performance. They find a positive relationship between their index and firm performance. Drobetz et al. (2004) create a broad corporate governance rating (CGR) for 91 German public firms and examine its relationship to firm valuation for the year 2002. A positive relationship between governance practices and firm value is found. Beiner et al. (2006) create a CG index for 109 Swiss firms for the year 2002 to evaluate the effect of governance on firm value and find a positive relationship between the two variables. Brown and Caylor (2006) create the Gov-score, based on 51 firm-specific provisions obtained from Institutional Shareholder Services (ISS), and examine its effect on firm performance based on 1,868 US listed firms for the year 2003. They illustrate that only seven of the 51 provisions are the essential drivers of the positive relationship between corporate governance and firm performance.

Black et al. (2006c) construct a Korean CG index (KCGI) based on a survey of CG practices by the Korean Stock Exchange (KSE) sent to 515 Korean listed firms in Spring 2001, as well as corporate governance data that was hand collected by the researchers. They examine the relationship between their KCGI and the market value of Korean public firms and find a positive relationship between the two variables.

Larcker et al. (2007) create 14 multi-indicator CG indices and examine 2,106 firms for the year 2003 and find a statistically significant association with operating performance. Garay and González (2008) create a CG index consisting of 17 questions and examine its relation to firm performance. Their sample consists of 46 Venezuelan listed firms for the year 2004 and they find a significant positive relationship between their CG index and firm performance. Chhaochharia and Laeven (2009) create a CG index consisting of 17 governance provisions that are included in company bylaws to examine the relationship between governance and performance for a sample of over 2,701 firms in 23 countries over the period 2003-2005. They use ISS data to construct their index, similar to the work of Gompers et al. (2003) and Bebchuk et al. (2009). They find a positive relationship between the two variables.

Following the work of Gompers et al. (2003), Bebchuk et al. (2009) investigate the importance of the 24 IRRC provisions included in the G-index that Gompers et al. (2003) developed. Bebchuk et al. (2009) develop an entrenchment index (i.e. the E-Index) based on six of the 24 IRRC provisions and examine its relationship to firm value. Their study includes information for 1,400 to 1,800 US firms for the period 1990-2003 and they find significant reductions in firm valuation when the index level increases.

Aggarwal et al. (2009) use the ISS⁸⁶ governance attributes to form their own CG index, also named the GOV index. They calculate the GOV index for 2,234 foreign firms and 5,296 US firms for the year 2005 and find that both are positively related to firm value.

Balasubramanian et al. (2010) construct an Indian CG index for 49 private non-financial firms for the year 2005. They examine the relationship between their index and firm value and find a positive relationship between the two variables. Sami et al. (2011) investigate the relationship between firm performance and corporate governance in China for 1,236 firm-year observations for the period 2001-2003. They construct and

⁸⁶ ISS includes governance items that increase the power of minority shareholders. ISS was acquired by RiskMetrics Group in 2007.

utilize a composite measure of corporate governance and find that the overall quality of corporate governance is positively related to firm performance.

Ammann et al. (2011) create two alternative, additive CG indices using data from Governance Metrics International (GMI). They examine the relationship between their governance indices and firm value, including 6,663 firm-year observations for 22 developed countries, such as Japan, UK and Canada for the period 2003-2007 and they find a strong and positive relationship between their indices and firm value.

Price et al. (2011) evaluate the compliance to the *Code of Best Corporate Practices* in Mexico by constructing a governance score based on firms' level of compliance. They examine the relationship between the governance score and firm performance for 107 non-financial Mexican listed firms for the period 2000-2004. They find an insignificant relationship between the two variables.

Black and Kim (2012) create a Korean CG index (KCGI) based on the work of Black et al. (2006c). Constructing a CG index for 428 non-financial Korean firms, they examine how a 1999 Korean CG law for large public firms affects firm market value for the period 1998-2004. They find a positive relationship between their Korean CG index and firm market value.

Black et al. (2012) develop a Brazilian Corporate Governance Index (BCGI) based on a survey distributed in January 2005 to a sample of 66 private Brazilian firms for the year 2004 and find an overall positive relationship between their index and firm value. They further continue their study by assessing similarities and differences across four emerging markets: Brazil, Russia, India and Korea (BRIK⁸⁷ countries), in terms of countries and types of firms, so as to examine the relationship between corporate governance indices and market value. For Brazil they use the BCGI they developed, for Russia the CG indices described in Black et al. (2006a), for India the CG indices described in Balasubramanian et al. (2010) and for Korea they use the CG indices described in Black et al. (2006c). Their analysis indicates both commonalities and

⁸⁷ BRIK is a play on World Bank's use of BRIC (Brazil, Russia, India and China) countries as key emerging markets. Black et al. (2012) study Korea instead of China (Black et al., 2014).

differences among BRIK countries and mixed results between governance indices and market value. Tariq and Abbas (2013) evaluate firms' compliance to the Pakistani CG Code by constructing a CG compliance index and examine its impact on firm performance. Using a sample of 119 firms for the period 2003-2010, they find a positive relationship between the CG compliance index and firm performance.

Black et al. (2015) construct a Korean corporate governance index (KCGI) for up to 509 public firms listed on the Korea Stock Exchange, based on the work of Black and Kim (2012) from 1998-2004. A positive relationship with firm value is observed for better governed firms.

Bozec and Dia (2015) create a CG index based on the Report on Business (ROB) index for 130 Canadian firm for the period 2002-2005 and find a positive relationship between their index and firm value. Rose (2016) investigates adherence to the Danish Code of Corporate Governance for 2010. He constructs an index comprising of 71 (out of 77) recommendations of the Code and creates an index. He examines the relationship between the degree of 'comply or explain' disclosure, measured through the index and firm performance, for a sample of 155 Danish firms for the year 2010 and finds a positive relationship between the two variables.

Akbar et al. (2016) study the relationship between corporate governance compliance and firm performance in the UK. They develop a CG index for a sample of 435 non-financial public firms for the period 1999-2009. Their findings are in contrast to most findings on the CG index-performance literature, as compliance with corporate governance regulations does not affect firm performance in the UK.

Ararat et al. (2017) examine Turkish public firms and create a CG index (TCGI). They examine the relationship between their CG index and firm value and profitability for 1,258 firm-year observations for the period 2006-2012. They find that higher levels of TCGI predict higher levels of market value and profitability.⁸⁸

⁸⁸ Research also examines CG indices provided by private commercial rating agencies and firm performance such as Bauer et al. (2004), Klapper and Love (2004), Durnev and Kim (2005), Klein et al. (2005), Black et al. (2006a), Bhagat and Bolton (2008), Epps and Cereola (2008), Morey et al. (2009),

Based on the existing studies that examine CG indices, as a proxy for corporate governance quality, most studies support the widespread hypothesis that a positive relationship exists between corporate governance and firm performance. In a Greek context, Hermes and Katsigianni (2012) construct a CG index for the year 2007 for 124 Greek listed firms on the ASE so as to examine the effect of corporate governance on firm performance. They find that better governed firms have higher operating and market based performance.

Table 6-1 illustrates the findings of prior studies found in the literature conducted on the relationship between internal corporate governance mechanisms, measured either through individual governance attributes such as board size, board independence and CEO duality, or through multiple governance items expressed in a CG index, and firm performance.

Anderson and Gupta (2009), Daines et al. (2010), Renders et al. (2010), Cremers and Ferrell (2014), and Conheady et al. (2015).

Table 6-1 Findings of prior studies on corporate governance and firm performance in non-financial firms

AUTHORS	PERIOD	SAMPLE SIZE	CG VARIABLES	FIRM PERFORMANCE	COUNTRY
Pearce and Zahra (1992)	1983-1989	119 Fortune 500 firms	board independence (+) board size (+)	ROA	US
Daily and Dalton (1992)	1989	100 firm listed in <i>Inc.</i> magazine	board independence (0) CEO duality (0)	ROA	US
Daily and Dalton (1993)	1990	186 small listed firms	board independence (+) CEO duality (0)	ROA	US
Agrawal and Knoeber (1996)	1987	383 large US firms	board independence (-)	Tobin's Q	US
Yermack (1996)	1984-1991	452 large firms	board size (-)	Tobin's Q	US
Baliga et al. (1996)	1980-1991	375 firms from the Fortune 500 firms	CEO duality (+)	ROA	US
Klein (1998)	1992-1993	485 & 486 listed firms on S&P 500	board independence (-)	ROA	US
Eisenberg et al. (1998)	1992-1994	879 small firms	board size (-)	ROA	Finland
Bhagat and Black (2002)	1991	934 large firms	board independence (-)	Tobin's Q	US
Weir et al. (2002)	1994-1996	311 listed non-financial firms	board independence (+)	Tobin's Q	UK
Gompers et al. (2003)	1990-1998	1500 large firms	CG index (+)	Tobin's Q	US
Kiel and Nicholson (2003)	1996	348 listed firms	board independence (-) board size (+) CEO duality (0)	Tobin's Q / ROA	Australia
Callahan et al. (2003)	1989-1992	106 large publicly traded	CG index (+)	Tobin's Q	US
Bauer et al. (2004)	1996-2000	approximately 250 firms per year	CG index (+)	Tobin's Q	European countries
Bai et al.(2004)	1999-2001	2905 firm year observations for publicly listed firms	CEO duality (-)	Tobin's Q	China
Drobetz et al. (2004)	2002	91 German firms	CG index (+)	Tobin's Q	Germany
Klapper and Love (2004)	1999	374 firms	CLSA CG rating (+)	Tobin's Q / ROA	14 emerging markets
Durnev and Kim (2005)	199-2001	344 firms	CLSA CG rating (+)	Tobin's Q	Emerging markets
Klein et al. (2005)	2002	263 Canadian firms	CG index (0)	Tobin's Q	Canada
de Andres et al. (2005)	1996	450 non-financial firms	board independence (0) board size (-)	Tobin's Q / ROA	10 countries in Western Europe and North America
Bozec (2005)	1976-2000	25 state-owned enterprises	board independence (-) board size (0) CEO duality (-)	ROA	Canada
Mak et al. (2005)	2000	460 listed firms (230 firms + 230 firms)	board independence (+) board size (-) CEO duality (0)	Tobin's Q	Singapore and Malaysia
Ghosh (2006)	2003	127 listed manufacturing firms	board independence (0) board size (-)	Tobin's Q / ROA	India
Black et al. (2006a)	199-2005	964 firm-year observations	combined CG index (+)	Tobin's Q	Russia
Black et al. (2006c)	2001	515 listed firms	CG index (+)	Tobin's Q	Korea

Chapter 6- Literature Review and Hypothesis Development (CG & FP)

AUTHORS	PERIOD	SAMPLE SIZE	CG VARIABLES	FIRM PERFORMANCE	COUNTRY
Beiner et al. (2006)	2002	109 firms	board size (+) CG index (+)	Tobin's Q / ROA	Switzerland
Brown and Caylor (2006)	2003	1868 listed firms	CG index (+)	Tobin's Q	US
Jermias (2007)	1997-2001	274 firms	board independence (-) CEO duality (-)	Tobin's Q / ROA	Canada
Elsayed (2007)	2000-2004	92 public limited firms	board size (0) CEO duality (0)(-)(+)	Tobin's Q / ROA	Egypt
Cho and Kim (2007)	1999	347 listed firms	board independence (+)	ROA	Korea
Khanchel (2007)	2000-2005	24 listed firms	board independence (+) board size (+)	Tobin's Q	Tunisia, North Africa
Larcker et al. (2007)	2002	2,106 listed firms	CG indices (+/-)	ROA	US
Bhagat and Bolton (2008)	1990-2004	a range of 6130 to 24255 firms	board independence (-) CEO duality (-) CG indices (+)	Tobin's Q / ROA	US
Lefort et al. (2008)	2000-2003	160 non-financial listed firms	board independence (+)	Tobin's Q / ROA	Chile
Bennedsen et al. (2008)	1999	7496 closely held firms with limited liability	board size (-)	ROA	Denmark
Cheng (2008)	1996-2004	6869 firm year observations	board size (-)	Tobin's Q / ROA	US
Coles et al. (2008)	1993-2000	8750 firm year observations	board size (-)(+)	Tobin's Q	US
Dahya et al. (2008)	2002	799 firms with a dominant shareholder	board independence (+) board size (-)	Tobin's Q	22 countries
Epps et al. (2008)	2002-2004	256 firms for 2002 ; 269 firms for 2003; 273 firms for 2004	ISS CGQ rating (0)	ROA	US
Garay and Gonzalez (2008)	2004	46 listed firms	CG index (+)	Tobin's Q	Venezuela
Aggarwal et al. (2009)	2005	2234 foreign firms and 5296 US firms	CG index (+)	Tobin's Q	US and foreign firms
Guest (2009)	1981-2002	2746 listed firms	board independence (-) board size (-)	Tobin's Q / ROA	UK
Toudas (2009)	2005	283 random selected listed firms	board independence (0) board size (+) CEO duality (-)	Tobin's Q / ROA	Greece
Jackling and Johl (2009)	2006	180 non-financial listed firms	board independence (0) (+) board size (+) CEO duality (0)	Tobin's Q / ROA	India
Anderson and Gupta (2009)	2003-2006	1736 firms from 22 countries	CG index (+)	Tobin's Q	22 countries
Chhaochharia and Laeven (2009)	2003-2005	over 2701 firms in 23 countries	CG indices (+)	Tobin's Q	US and foreign firms
Bebchuk et al. (2009)	1990-2003	1400-1800 firms	CG index (-)	Tobin's Q / ROA	US
Morey et al. (2009)	2001-2006	several hundred cases (14,600 ratings)	change in CG ratings (+)	Tobin's Q	21 emerging countries
Drakos and Bekiris (2010)	2003-2006	1490 firm year observations	board independence (0) board size (-) CEO duality (0)	Tobin's Q / ROA	Greece
Renders et al. (2010)	1999-2003	33,667 firm year observations	CG index (+)	Tobin's Q / ROA	14 EU countries

Chapter 6- Literature Review and Hypothesis Development (CG & FP)

AUTHORS	PERIOD	SAMPLE SIZE	CG VARIABLES	FIRM PERFORMANCE	COUNTRY
Ramdani et al.(2010)	2001-2002	66 firms / 75 firms/ 111 firms / 61 firms	board independence (+) CEO duality (+)	ROA	Indonesia, Malaysia, South Korea, and Thailand
Balasubramanian et al. (2010)	2005	49 non-financial private firms	Indian CG index (+)	Tobin's Q	India
Daines et al. (2010)	2005-2007	US firms	CG ratings (0)	Tobin's Q	US
Ammann et al. (2011)	2003-2007	6663 firm year observations	CG indices (+)	Tobin's Q	22 developed countries such as Japan, UK and Canada
Price et al. (2011)	2000-2004	107 non-financial listed firms	CG index (0)	ROA / Tobin's Q	Mexico
Sami et al. (2011)	2001-2003	1236 firm year observations	CG index (+)	Tobin's Q / ROA	China
Hermes and Katsigianni (2012)SSRN	2007	124 listed firms	CG index (+)	Tobin's Q / ROA	Greece
Black and Kim (2012)	1998-2004	428 non-financial public firms	CG index (+)	Tobin's Q	Korea
Black et al. (2012)	2004	66 private firms	CG index (+)	Tobin's Q	Brazil
Ujunwa (2012)	1991-2008	122 quoted firms	bsize (-) CEO duality (-)	ROA	Nigeria
Veprauskaite and Adams (2013)	2003-2008	468 publicly listed firms	board independence (0) board size (+) CEO duality (-)	Tobin's Q / ROA	UK
Bhagat and Bolton (2013)	1998-2007	1000-1400 firms per year	board independence (-) (+) CEO duality (-)	Tobin's Q / ROA	US
Tariq and Abbas (2013)	2003-2010	119 firms	CG compliance index (+)	ROA	Pakistan
Cremers and Ferrell (2014)	1978-2006	1000 firms	G index (restrictions on shareholders' rights) (-)	Tobin's Q	US
Black et al. (2015)	1998-2004	Up to 509 firms	CG index (+)	Tobin's Q	Korea
Bozec and Dia (2015)	2002-2005	130 firms	ROB index (+)	Tobin's Q	Canada
Conheady et al. (2015)	2003-2009	699 firm year observations	BSCI index (+)	Tobin's Q	Canada
Rose (2016)	2010	155 firms	CG index (+)	ROA	Denmark
Akbar et al. (2016)	1999-2009	435 non-financial public firms	CG index (0)	Tobin's Q / ROA	UK
Duru et al. (2016)	1997-2011	950 firms	board independence (0) CEO duality (-)	ROA	US
Ararat et al. (2017)	2006-2012	1258 firm-year observations	CG index (+)	Tobin's Q	Turkey
Zhou et al. (2018)	2008-2012	774 firm year observations	bsize (+) board independence (-)	ROA	Greece

Studies in this table only include research that proxy firm performance using Tobin's Q & ROA and corporate governance using internal corporate governance mechanisms such as board size & independence, CEO duality and CG indices. Studies are listed in chronological order according to publication date.

- (0): no relationship between CG variable and firm performance
 (+): positive relationship between CG variable and firm performance
 (-): negative relationship between CG variable and firm performance

6.5 Literature review: CG and firm performance in a crisis setting

The global financial crisis that began in September 2007 has been compared by many to the Great Depression of the 1930s. Economists such as Paul Krugman consider it milder than the Great Depression, while others, such as Eichengreen and O'Rourke consider it similar, if not worse than, the Great Depression (Gupta et al., 2013). Although it originated in the financial sector of the US, it affected major stock markets around the world, leading many stock markets to lose as much as half of their value. This stock market decrease was a great test for market-oriented corporate governance models advocated by many advanced economies of the world (Gupta et al., 2013). Many suggest that corporate governance failed the test. Some also state that poor corporate governance was a basic reason for the financial crisis (Yeh et al., 2011). For example, Kirkpatrick (2009) in a report commissioned by the OECD steering group on corporate governance, states that the financial crisis can be attributed to weaknesses of corporate governance in financial service companies. Understanding the relationship between governance mechanisms and firm performance in such difficult times is of utmost importance. It is important to examine whether shareholder equity value is protected when there is a great decrease in the value of capital markets. Do corporate governance structures provide the shield necessary to maintain firm performance in such turbulent times (Leung and Horwitz, 2010)?

Markets characterized by weak institutions and poor firm-level governance are key reasons for investors to lose confidence. Johnson et al. (2000) state that this was the main reason for the Asian crisis of 1997-1998. However, the financial crisis of 2007-2008 originated in the US, a market characterized by institutional strength and good governance. This fact explains why this crisis was predicted by so few. This raises the question of whether and to what extent sound corporate governance practices can be considered to be a cause of the financial crisis (Adams, 2012).

Transparency and accountability are two basic corporate governance principles that were violated by investment and commercial banks that led to the financial crisis (Bekiaris et al., 2013). Company boards, through their compensation committees, were responsible for the great increase in executive pay during the 2000s, which many

believe led to excessive, short-term, risk-taking that set off the financial crisis. Additionally, institutional failings in risk management and financial reporting standards proved ineffective in signaling pre-existing structural problems that led to the financial crisis (Conyon et al., 2011). Researchers believe that the board of directors was incapable of monitoring executives and properly assessing risk (Essen et al., 2013).

Good corporate governance mechanisms that are beneficial in normal business conditions can prove to be harmful in a crisis setting. Decisive leadership in uncertain times is critical, whereby corporate governance mechanisms that stem from agency theory, can prove to be overly restrictive and restraining in response to issues arising in crisis conditions. Thus, governance mechanisms may have a different effect on firm performance during normal and crisis settings (Essen et al., 2013).

Independent directors, board committees, CEO duality, transparency and disclosure can improve firms' governance and essentially aid firms in dealing with financial crisis problems. Better governed firms contribute to more effective decision making, thus contributing to better firm performance.

The relationship between firm performance and the board of directors is of utmost importance, especially in crisis times, for the following reasons. Firstly, corporate boards are an important, if not the most important, governance mechanism, as they are responsible for monitoring and advising management so as to protect shareholders' interests (Fama and Jensen, 1983; Hermalin and Weisbach, 2003; Adams et al., 2005; Francis et al., 2012). This is especially important in times of crisis. According to Hermalin and Weisbach (2003) boards are usually reactive in sound financial times, since good firm performance increases the CEOs bargaining power and reduces board independence. However, in difficult economic times, boards become more proactive, whereby bad firm performance reduces CEOs bargaining power and increases board independence. Secondly, a key function of boards is reviewing and guiding risk management strategies. Research indicates that a major cause of the current financial crisis is excessive managerial risk-taking behaviour, where boards failed to properly assess risk strategies and monitor managers' risk-taking behaviour (Kirkpatrick, 2009). Therefore, although an ineffective board of directors is not the direct reason for the

current financial crisis, boards can be a crucial element that determine the extent to which firms are exposed to the financial crisis. Third, although extensive research has examined board of directors' composition and firm performance, the results are mixed and inconclusive. Researchers have often pointed to endogeneity as a crucial reason for these mixed results. Examining the impact of the board of directors in light of the current financial crisis creates an exogenous shock to firms. Thus, assessing the board of directors before the external shock and examining the changes in firm performance, mitigates to a large extent the endogeneity issue (Francis et al., 2012)

Boards' monitoring and advising role leads to the argument that during the financial crisis, firms with high quality boards are likely to have smaller decreases in their firm performance in comparison to lower quality boards. Boards' effectiveness and firm performance has been examined using multiple variables such as board independence, board financial expertise, board size, board duality, board diversity and board shareholdings (Yermack, 1996; Adams and Ferreira, 2009; Fich and Shivdasani, 2006).

As stated previously, although the relationship between corporate governance and firm performance has been studied extensively in the literature, the critical element is to examine this relationship during a financial crisis setting.

Prior studies, such as Mitton (2002), Lemmon and Lins (2003), and Leung and Horwitz (2010) examine the relationship between corporate governance and firm performance during the Asian financial crisis of the late 1990's. More specifically, Mitton (2002) in a sample of 398 non-financial firms from Indonesia, Korea, Malaysia, the Philippines and Thailand⁸⁹ find that differences in corporate governance attributes have a significant impact on firm performance during the East-Asian financial crisis. Firm performance is measured using stock returns over the crisis period from July 1997 to August 1998. Corporate governance attributes used in this study are higher disclosure quality (ADRs and auditors from Big Six accounting firms), ownership concentration and corporate diversification. They find that better performance is associated with

⁸⁹ These five countries were most involved in the East Asian financial crisis, since compared to other countries affected by the crisis, their stock market decline and currency depreciation was disproportionately higher.

higher disclosure quality, higher outside ownership concentration and less firm diversification.

Lemmon and Lins (2003) use a sample of 800 non-financial firms in eight⁹⁰ East Asian countries to assess the effect of ownership structure on firm value during the East Asian financial crisis. The primary valuation measure is a firm's cumulative stock return over the crisis period, from July 1, 1997 to August 1, 1998. Ownership structure is based on Lins (2003) ownership data sources which utilize various analyst and country handbooks to measure the ownership structures of emerging market firms. They find that the crisis had a negative impact on firms' investment opportunities where controlling shareholders had more incentives to expropriate minority investors, indicating that ownership structure plays an essential role in determining whether insiders expropriate minority shareholders. Their research reports that firms have lower performance when their controlling managers had more control rights than ownership rights. Their findings indicate that corporate governance affects firm performance during the financial crisis.

Leung and Horwitz (2010) evaluate the effects of management ownership, equity ownership by non-executives, the proportion of non-executive directors on the board, and CEO duality on the stock performance of 463 non-financial Hong Kong firms during the start of the Asian Financial Crisis, from August 1, 1997 to August 31, 1998. Firm performance is measured as the market-adjusted stock returns calculated as the compounded monthly, market-adjusted stock returns. They find that firms with more concentrated management ownership, more equity ownership by non-executive members of the board and CEO duality, have better market performance during the crisis period. No effect was observed between the proportion of non-executives on the board and stock market performance.

Various studies have examined corporate governance mechanisms and firm performance during the 2007-2008 credit crisis, such as Aldamen et al. (2012), Francis

⁹⁰ The eight East Asian countries included in the study are Hong Kong, Indonesia, Malaysia, the Philippines, Singapore, South Korea, Taiwan, and Thailand.

et al. (2012), Essen et al. (2013), Gupta et al. (2013), Hawas (2014) and Kowaleski (2016).⁹¹

Aldamen et al. (2012) study the impact of audit committee characteristics on firm performance during the global financial crisis. Their sample includes 120 US listed firms for the year 2008. Firm performance is measured as the change in stock price over one year from the beginning of the impact of the global financial crisis to the first recovery of the market. The dependent variable, performance, is an indicator variable taking the value of one for high performers and zero for low performers. Market performance is also examined by using ROA and the percentage price change between the years 2008 and 2009. The independent variable, audit committee characteristics, is measured by creating a composite governance index, which includes 15 audit committee characteristics employed in previous governance studies, such as size, meetings, independence and expertise. To calculate the index, each of the non-binary variables is transformed to a binary form by assigning one if the variable is greater or equal than the median for all firms or zero otherwise.⁹² Additionally the independent variable is also measured through 13 out of the 15 individual audit committee characteristics obtained from principal component analysis. They find that smaller audit committees, with experience and financial expertise, with block holder representation, with board chairs that have external directorships and years of managerial experience, have a positive impact on firm performance. However, a longer tenured chair has a negative effect. The composite audit committee index produced similar results, and a positive relationship with firm performance is found.

Francis et al. (2012) examine the effect of corporate governance on firm performance during the financial crisis for 876 observations of non-financial US firms from October 2007 until March 2009. This period is chosen so as to examine the impact of the

⁹¹ These studies examine corporate governance mechanisms effect on firm performance during the 2007-2008 credit crisis for non-financial firms, similar to the sample of this study. There are also studies, such as Yeh et al. 2011, Grove et al. 2011, Beltratti and Stulz 2012, Peni and Vahamaa 2012, Aebi et al. 2012, Erkens et al. 2012 and Vallaskas et al. 2017 and Switzer et al. 2018 that also examine the relationship between these two variables during the 2007-2008 financial crisis but are not included in this literature review because they examine financial firms.

⁹² The only exception is for the AC variable, GREY directors, which is expected to have a negative impact on firm performance. Thus, for the purpose of creating the AC index, it is coded as one if it is less or equal than the median or zero otherwise.

external shock (the financial crisis) on firm value. Firm performance is calculated as the cumulative stock returns (buy and hold returns)⁹³ during the crisis period (from October 2007 to March 2009) taken from the Center for Research in Security Prices (CRSP). Various measures of corporate governance are used, such as ‘traditional’ board independence (percentage of independent, non-executive board members), ‘true’ board independence⁹⁴, the financial expertise of directors, the number of board meetings, board attendance and director age. Information for these variables was obtained from the Investor Responsibility Research Center (IRRC), Compustat database and ExecuComp. They find that ‘traditional’ board independence does not significantly affect firm performance, while ‘true’ board independence⁹⁵, independent financial experts on the boards, board meeting frequency, director attendance behaviour and director age positively affect firm performance.

Liu et al. (2012) examine the performance of Chinese state-owned enterprises before and after the global financial crisis. Their sample consists of 970 Chinese listed firms for the period 2007-2008 and proxies the change in firm value during the financial crisis with the use of the change in Tobin’s Q. They report that state-owned firms that have higher levels of bank debt have lower levels of stock price decreases during the crisis period, while having poorer performance during the pre-crisis period. State ownership mitigates financial constraints during the crisis period, while creating overinvestment problems in non-crisis settings. They also find that managerial ownership is positively associated with firm value changes for state-owned enterprises. In addition, firms that employ Big Four auditing firms experience small reductions in firm value during the financial crisis, consistent with the belief that better disclosure is associated with higher firm performance.

Essen et al. (2013) examine the effects of firm and country level governance mechanisms on firm performance during the financial crisis from July 2007 to March

⁹³ Cumulative stock returns are also used in the work of Johnson et al. (2000), Mitton (2002) and Lemmon and Lins (2003) as the primary measure of firm performance.

⁹⁴ ‘True’ board independence is defined as independent, non-executive board members who preceded the current CEO.

⁹⁵ The positive relationship between ‘true’ board independence and firm performance supports the findings that CEO’s try to be actively involved in the selection of independent non-executive board members, so as to maintain their power and control.

2009, using a sample of 1,197 firms from 26 European countries. Lagged ownership concentration, board composition and executive incentive compensation are used to measure governance quality, while firm performance is calculated using cumulative adjusted stock returns. They find that good governance practices prescribed by previous research do not apply in periods of crisis. More specifically, board independence, executive incentive compensation and the absence of CEO duality negatively affect firm performance in crisis periods, where the emphasis is not on maximizing shareholder wealth but on restoring corporate stability.

Gupta et al. (2013) also examine the impact of internal governance mechanisms on firm performance during the 2007-2008 financial crisis, using a comprehensive cross-country sample of 4,046 non-financial publicly traded firms in 23 countries. They construct a CG index as a proxy of governance quality and examine its relationship with firm performance, measured as buy and hold returns, from October 2007 to March 2009. They find that well governed firms do not outperform poorly governed firms during the financial crisis.

Hawas (2014) for 139 UK non-financial listed firms for the period 2005-2009 examines the relationship between corporate governance and firm performance before and during the 2007-2008 financial crisis. He develops a CG index to measure governance quality and measures firm performance using Tobin's Q and ROA. He finds a positive relationship between CG and firm performance in the pre-crisis period, while an insignificant relationship exists between the two variables during the crisis period.

Kowalewski (2016) examines how corporate governance effects firm performance and dividend payout during the financial crisis of 2008. He constructs a CG index, similar to the work of Brown and Caylor (2006), Klapper and Love (2004), Black et al. (2006a) and Black et al. (2006c) for 298 non-financial firms listed on the Warsaw Stock Exchange for the period 2006-2010. Firm performance is measured using ROA and Tobin's Q, as well as a dividend measure indicating the dividends paid to investors. He reports that a positive relationship exists between corporate governance and Tobin's Q, as well as dividend payouts before the financial crisis. However, during the financial crisis, corporate governance is positively related to ROA and negatively related to

dividend payouts. These findings indicate that although good corporate governance does not create shareholder value, as indicated by Tobin's Q, during the financial crisis, firms with strong governance exhibit higher profitability, as shown by ROA, during the crisis. Thus, good governance weakens the harmful influence of the crisis on the financial performance of firms. As for the negative relationship between governance and dividend payouts, this could potentially indicate that better-governed firms are more risk-averse and tend to retain profit and increase their capital during uncertain periods, as is the case of a financial crisis. Table 6-2 illustrates the findings of prior studies conducted on corporate governance mechanisms and the performance of non-financial firms in a crisis setting.

Table 6-2 Findings of prior studies on corporate governance and firm performance of non-financial firms in a crisis setting

AUTHORS	CRISIS	PERIOD	SAMPLE SIZE	CG VARIABLES	FIRM PERFORMANCE	COUNTRY
Mitton (2002)	Asian financial crisis	July 1997-August 1998	398 non-financial firms	ADR's and Big Four auditors (disclosure quality) (+), ownership concentration (+) and corporate diversification (-)	stock returns	Indonesia, Korea, Malaysia, the Philippines and Thailand
Lemmon and Lins (2003)	Asian financial crisis	July 1, 1997-August 1, 1998	800 non-financial firms	ownership structure (-)	cumulative stock returns	Hong Kong, Indonesia, Malaysia, the Philippines, Singapore, South Korea, Taiwan and Thailand
Leung and Horwitz (2010)	Asian financial crisis	August 1, 1997-August 31, 1998	463 non-financial firms	Management ownership (+), equity ownership by non-executives (+), board independence (0), CEO duality (+)	market-adjusted stock returns	Hong Kong
Aldaman et al. (2012)	2007-2008 credit crisis	2008	120 listed firms	Audit committee index (+), ac size (-), ac expertise (+), ac block holder (+), ac chair with external directorships and expertise (+)	change in stock price / ROA	US
Francis et al. (2012)	2007-2008 credit crisis	October 2007-March 2009	876 firm year observations for non-financial firms	Board independence (0), financial expertise (+), number of meetings (+), board attendance (+), director age (+)	cumulative stock returns	US
Liu et al. (2012)	2007-2008 credit crisis	August 2007-December 2008	970 Chinese listed firms	state ownership (+), managerial ownership (+), Big Four auditors (+)	change in Tobin's Q	China
Essen et al. (2013)	2007-2008 credit crisis	July 2007-March 2009	1,197 firms	board independence (-), CEO duality (+) executive incentive compensation (-)	cumulative adjusted stock returns	26 European countries
Gupta et al. (2013)	2007-2008 credit crisis	October 2007-March 2009	4,046 non-financial publicly traded firms	CG index (0)	Buy-and-hold returns / market-adjusted stock returns / ROA	23 countries (US and 22 developed countries)
Hawas (2014)	2007-2008 credit crisis	2005-2009	139 non-financial firms	CG index (+/0)	Tobin's Q / ROA	UK
Kowaleski (2016)	2007-2008 credit crisis	2006-2010	298 non-financial firms	CG index (+)	Tobin's Q / ROA	Poland

(0): no relationship between CG variable and firm performance
 (+): positive relationship between CG variable and firm performance
 (-): negative relationship between CG variable and firm performance
 Studies are listed in chronological order according to publication date.

6.6 The financial crisis in Greece

Eighty years after the financial crisis of 1929 and forty years after the end of the dictatorship in Greece, the country encountered, a severe financial crisis that began in 2008 (Nerantzidis and Filos, 2014). The 2007-2008 financial crisis, also known as the 2008 global financial crisis began in the US as a result of a housing bubble bursting. This led to the downturn of the US economy, resulting in the 2008-2012 global recession. Simultaneously, the 2008 global financial crisis contributed to the crisis in the Eurozone, commonly known as the 'European Sovereign-Debt Crisis' (Mantalos, 2017). Many Eurozone members, such as Greece, Portugal, Ireland, Italy, and Spain were unable to refinance their debt without the assistance of third parties, such as the European Central Bank (ECB) or the International Monetary Fund (IMF). The lagged impact of the global crisis brought forth pre-existing structural problems and macroeconomic imbalances of the Greek economy, leading the country into recession (Repousis, 2015; Mantalos, 2017).

Greece became part of the European Economic Community (EEC) in January 1981 and in January 2001 became part of the Eurozone, a group of European countries with a common currency, the Euro. Both events were significant for the country's history. Membership of the EEC, renamed the European Union (EU) in 1992, was seen as a safeguard for democratic institutions which were restored after the dictatorship of 1967-1974. At the start of the European Monetary Union (EMU) in 1999, Greece was the only country in the EU that wanted to join the Eurozone but was not allowed to do so, as it did not comply with the Maastricht convergence criteria. However, in June 2000 the European Council decided that Greece met the criteria (Herz and Kotios, 2000). Greek citizens welcomed the common currency as an opportunity to obtain economic benefits. Participating in a such large economic community was also considered a political, social and economic opportunity (Oltheten et al., 2013).

EU development programmes funded by the EU during the 1981-2001 period benefited the country, but government policies led the country to run up a substantial deficit. The 2004 Olympic Games, the high employment rate in the public sector, a high level of corruption and tax evasion were fundamental reasons that resulted in an economic

impasse for Greece. As a result, the country's debt level substantially increased since funding for the aforementioned activities came from bonds issued by the Greek government (Samitas and Tsakalos, 2013).

In 2009, a reported increase in the government debt level 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 existing debt. Financial problems, as a result of high public debt and primary deficits, a lack of competitiveness and structural problems due to a bureaucratic, inflexible and over-expanded public sector, are factors that led to Greece's crisis (Nerantzidis and Filos, 2014). As a result, Greece was forced to sign a memorandum in May 2010 to obtain the support of the International Monetary Fund (IMF), the European Commission and the European Central Bank (ECB), known as the Troika partners. The memorandum aimed at restructuring the Greek economy in terms of public expenditure and public property (Nerantzidis and Filos, 2014; Repousis, 2015; Kosmidou et al., 2015).

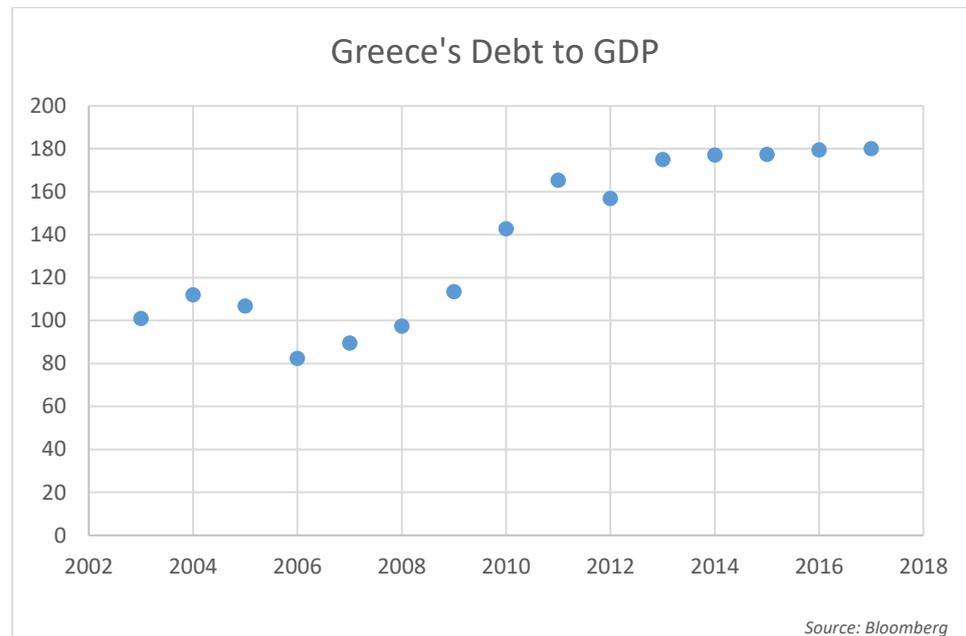
The Greek debt crisis that began in 2009 and is still ongoing has caused significant changes in Greece. The income of Greeks has been reduced, unemployment has increased and continuous austerity bills have been approved by consecutive Greek parliaments (Chionis et al., 2016). However, since 2010, the date of the first bill, the outcome is not what was expected and many sectors of the Greek economy are in a worse condition (Chionis et al., 2016).

In 1974, the debt-to-GDP ratio was 18%. In 1986, public debt reached 58% of GDP, due to volatile growth performance, high inflation, successive currency devaluations and structural weaknesses. Public debt continued to increase reaching 113% of GDP in 1996. Disproportionate social benefits, high pensions, public enterprises with high deficits and unnecessary public appointments are key reasons for this great increase in government debt. Greek governments were arguably buying votes through public spending and state borrowing. As part of the Eurozone, Greece could borrow at lower rates than if it were on its own. Government borrowing accelerated after Greece entered

the Euro in 2001, allowing it to borrow at practically zero interest rates. A decade before the crisis, Greece's average annual real GDP growth was close to 4%, making Greece an excellent performer within the EMU countries. This growth led to high real wages, low interest rates, a boom in the housing market, credit expansion and loose fiscal policy. In 2008, the per capita GDP in Greece was such that it corresponded to 95% of the average EU per capita GDP. However, the country did not take advantage of this favourable setting to decrease its debt to GDP levels to sustainable amounts (Baltas, 2013).

The Greek economy has sustained a period of economic ruin from 2008-2014, according to data published by the Hellenic Statistical Authority (ElStat). Six years of falling GDP was experienced, from approximately 230 billion euros in 2008 to 180 billion euros in 2014. The consecutive years of negative GDP growth, resulting in a 26% decrease by the end of 2014 from its peak in 2007, wiped out all of the gains of the 2000's. An even larger decrease in employment, around 30%, is recorded during this period. From a peak of 4.6 million jobs in 2008, more than one million workers (22%) lost their jobs from 2008-2014, making the total unemployed above 1.2 million. The active working population is shrinking, not only because of unemployment, but also due to workers leaving the country in search of better opportunities abroad (increased migration), as well as reduced immigration to Greece. Additionally, residents' disposable income has decreased, due to higher taxes, more part-time work, and high unemployment rates (Papadimitriou et al., 2014; Papadimitriou et al., 2015; Papadimitriou et al., 2016). Greece's public debt reached a level of 177.1% of GDP in 2014, as seen in Graph 6-1 (Eißel, 2015).

Graph 6-1 Greece's debt to GDP



As a result, domestic demand dropped dramatically, resulting in about 100,000 firms going bankrupt and Greeks losing on average 30% of their income. The country has approximately 500,000 families without any labour income. The numbers are even worse for young people, with the official unemployment rate increasing from 18.1% in 2007 to 53.2% in 2014 (Eiβel, 2015). This deep and prolonged depression has pushed many people into poverty and income inequality has increased, almost tripling between 2007 and 2013 (OECD, 2016).

Although Greece has implemented significant reforms, the crisis continues to exist, as a result of the country failing to address problems affecting the public sector and the policies that resulted in its continuing difficulties. The depressed economy, lack of bank financing and remaining structural weaknesses have been holding the Greek economy back (OECD, 2016). As seen in Graph 6-2 a significant decrease in the ASE index occurred during the crisis years. The crisis has shown that the development model followed by the country all these years has led, ultimately, to economic deterioration and a loss of creditworthiness, and thus an increase in bond yield spreads,

leading to the need for continuous support from the IMF, ECB and the EU (Nerantzidis and Filios, 2014).

Graph 6-2 The ASE Index



Greece today is at a crossroad. As of 2018, the country's privatizations are essential as rescue programmes are due to end in the summer of 2018. Economic growth has returned and is set to continue. However, hurdles lie ahead for Greece. Eurozone finance ministers warned Greece that the prospect of a new austerity package is likely if Greece fails to hit the primary surplus target of 3.5%, a prospect that is possible given the fact that there is a huge shortfall in tax revenues. Additionally, people do not feel their prospects will improve in the near future, and with a general election emerging soon, turmoil could further be generated (Amaro, 2017; Smith, 2017).

6.7 Hypothesis development

In a crisis setting it is important that corporate governance responds in an effective way. Management should be clear on strategies to be followed. The crisis has shown that weaknesses in governance exist, and these influence a firm's effectiveness. The composition of the board of directors and other crucial governance items are critical factors to enable firms to perform well in the sovereign debt crisis. The fundamental

role of boards is to provide guidance and control. The recent global financial crisis indicates that boards did not effectively perform this role. Corporate governance significantly impacted firm performance during the crisis by allowing risks and financing policies that were ineffective (Erkens et al., 2012; Bekiaris et al., 2013). Although the financial crisis has been attributed to external financial and economic factors, the failures of internal corporate governance mechanisms also played a role (Bekiaris et al., 2013).

Based on the existing literature that examines the effect of governance attributes on firm performance in a crisis setting, the relationship is not clear, a priori. The distinct hypothesis of a positive relationship between board of directors' composition variables and firm performance in a non-crisis setting, is not as distinct in a crisis setting. The universality of good governance recommendations is challenged and the effectiveness of governance mechanisms depends on organizational and environmental conditions (Essen et al., 2013).

This study examines the effect of firm and country level "good" governance prescriptions on firm performance before and during the sovereign debt crisis in Greece.

Differing results for the effect of board size on firm performance exist in the literature for both non-crisis and crisis settings. Greek Law No.2190/1920 (Article 18) requires a minimum of three board members and does not set an upper limit. The Greek CG code states that the board size should be large enough to reflect a balance between executive, non-executive and independent non-executive members, so that no individual board member can dictate their views on the decision-making process of the firm. Board size should reflect the firm's size, its activities and its ownership structure and should include a diversity of skills, views, knowledge and experience. The Greek CG Code, Section A, Part II, (2013) suggests that the size of Greek boards contain no fewer than seven members and no more than 15. The Greek CG code's recommendations on board size have not changed in the revised CG Code of 2013, in light of the sovereign debt crisis.

In a Greek setting, Toudas (2009) examines 283 randomly selected firms on the ASE for the year 2005 and finds a positive relationship between board size and firm

performance and Drakos and Bekiris (2010) for a sample of 1,490 firm-year observations for the period 2000-2006 find a negative relationship between board size and firm performance. Both studies differ from this study, since the data sample period for this study is 2006-2012, where Greek firms implemented different governance structures, compared to the period of study of the other two, due to additional governance-related laws, apart from Law 3016/2002, Law 3693/2008, Law 3873/2010 and Law 3884/2010.⁹⁶ Additionally, Zhou et al. (2018) study the relationship between board size and firm performance, for a sample of 774 Greek firm-year observations for the period 2008-2012, and find a positive relationship between the two variables.

Thus, in such a setting the following hypothesis is tested:

H1a: A positive relationship between board size and firm performance before and during the sovereign debt crisis is expected.

The literature also reflects contradictory results concerning the relationship between board independence and firm performance. In a Greek context, the adoption of Law 3016/2002 establishes the corporate governance framework regarding board independence. It requires the participation of at least two independent non-executive board members on the boards of Greek listed firms. Additionally, the Greek CG code, Section A, Part II (2013) recommends Greek listed firms to have more than two independent non-executive members, with adequate experience and knowledge, to ensure board balance and to avoid potential conflicts of interest.⁹⁷ Thus, it is expected that non-executive members on Greek boards will be in a position to improve firm performance. No revisions in the recommendations of the revised CG Code of 2013 have come forth in light of the sovereign debt crisis.

In a Greek setting, board independence and firm performance has been examined by Toudas (2009), Drakos and Bekiris (2010) and Zhou et al. (2018). Toudas (2009) and Drakos and Bekiris (2010) find no association between the two variables. As stated

⁹⁶ For analysis of these laws, consult Chapter 2.

⁹⁷ The 2010 Greek CG Code recognizes the fact that there is a limited pool of potential independent board members in the Greek market, thus making it difficult for Greek firms to follow European best practice, and so a need for some flexibility in this context is needed.

earlier, in these two studies, Greek firms could potentially have different governance structures, compared to the Greek firms used in this research, since additional governance-related laws, apart from Law 3016/2002, Law 3693/2008, Law 3873/2010 and Law 3884/2010 have been enacted.⁹⁸ Furthermore, Zhou et al. (2018) find a negative relationship between board independence and firm performance, suggesting that independent boards do not always increase firm performance.

Thus, in a setting such as the Greek one, the following hypothesis is tested:

H1b: A positive relationship between board independence and firm performance before and during the sovereign debt crisis is expected.

Most results found in the literature find a negative relationship between CEO duality and firm performance. A unitary board leadership structure increases agency costs and the potential entrenchment of shareholders by a controlling CEO. However, in uncertain times, a unitary board leadership structure, mirrored in CEO duality, facilitates firms in making rapid decisions and reflects a sense of unity and strength to shareholders. Although many European codes and corporate governance systems mandate the absence of CEO duality, this is not the case in Greece. The Greek law on corporate governance does not require the absence of CEO duality nor does the Greek CG code recommend that Greek listed firms separate the roles of the CEO and the chairman. Each Greek listed firm is free to choose the leadership structure that best suits its company, considering its cultural identity, industry and commercial practice. Nonetheless, to ensure the independence of the board and the adequate flow of information needed for board oversight and decision-making, the Greek CG code, Section A, Part III, (2013) recommends the appointment of an independent vice chairman, in cases of CEO duality. Although the absence of CEO duality is not part of any corporate governance law, and is not an explicit recommendation of the Greek CG Code, it is the preferred leadership structure for Greek listed firms included in this research for the sample period 2006-2012. This is reflected in the fact that 59% of

⁹⁸ For analysis of these laws, consult Chapter 2.

Greek listed firms for the aforementioned sample period have separate positions for CEO and chairman of the board.

In a Greek setting, CEO duality and firm performance have been examined by Toudas (2009) and Drakos and Bekiris (2010) where the former finds a negative relationship between CEO duality and firm performance, while the latter find no association between the two variables. As stated earlier in these studies Greek firms could potentially have different governance structures, compared to Greek firms of this study, since additional governance-related laws, apart from Law 3016/2002, Law 3693/2008, Law 3873/2010 and Law 3884/2010 have been enacted.⁹⁹

Although the absence of CEO duality is not part of any Greek CG law or Greek CG Code, it is considered to have a positive effect on firm performance. Thus, based on the weight of evidence in the literature the following hypothesis is tested:

H1c: A positive relationship between the absence of CEO duality and firm performance before and during the sovereign debt crisis is expected.

Examining a comprehensive measure of governance quality, incorporated in a CG index, the vast majority of studies have found a positive relationship between CG indices and firm performance, both in non-crisis and crisis settings.

In a Greek context, Hermes and Katsigianni (2012) construct a CG index for the year 2007 for 124 Greek listed firms on the ASE so as to examine the effect of corporate governance on firm performance. They find that better governed firms have higher operating and market based performance. The difference between this study and Hermes and Katsigianni (2012) work is that their sample consists of 124 firms for the year 2007, while this sample includes 1,205 firm-year observations for the period 2006-2012. Finally, Hermes and Katsigianni (2012) study the year 2007, whereby the only governance law that existed was Law 3016/2002, while this study examines the period 2006-2012, where apart from Law 3016/2002, additional governance-related laws are

⁹⁹ For analysis of these laws, consult Chapter 2.

enacted, such as Law 3016/2008, Law 3873/2010 and Law 3884/2010 that affect the governance mechanisms of Greek listed firms.¹⁰⁰

Thus, the following hypothesis is tested:

H2. A positive relationship between the CG index created for Greek firms and firm performance before and during the sovereign debt crisis is expected.

6.8 Conclusion

This chapter explores the literature regarding the effect of internal corporate governance mechanisms on firm performance in non-crisis and crisis settings. Corporate governance is examined through individual governance attributes related to the board of directors' composition, as well as CG indices, which incorporate many governance attributes in one measure.

This literature review on the effect of board of directors' composition - in terms of board size, board independence and CEO duality - on firm performance and the relationship between CG index scores and firm performance, forms the basis for the development of the hypotheses that are tested and discussed in Chapter 8.

¹⁰⁰ For analysis of these laws, consult Chapter 2.

Chapter 7 – Research Design (CG & FP)

7.1 Introduction

The previous chapter examines the relevant literature pertaining to the relationship between corporate governance and financial performance. This relationship is also discussed in the context of crisis situations. This chapter describes and analyzes how the data was collected and prepared to test the relationship between corporate governance and the financial performance of Greek listed firms before and during the Greek sovereign debt crisis. This study focuses on the differences in the CG-performance relationship during a pre-crisis period compared to a crisis-period. Section 7.2. discusses the methods used to test the key dependent variable of firm performance and how the key independent variable, corporate governance, is examined through both individual governance items, such as board size, board independence and the absence of CEO duality, as well as a multi-dimensional proxy of governance, a CG index. Empirical research models used to test the hypotheses are presented in sections 7.3 and 7.4. The sample selection and data collection procedures are discussed in section 7.5 and section 7.6 concludes the chapter.

7.2 Variables used in the study

The aim of this research is to examine the influence of corporate governance mechanisms on firm performance before and during the Greek sovereign debt crisis.

The following regression model is used:

$$FP = \beta_0 + \beta_1(\text{governance quality})_{it} + \beta_2(\text{controls})_{it} + \varepsilon_{it} \quad \text{eq 7 – 1}$$

A similar research design is used in the previous paper (chapters 3-5) which examines the effect of corporate governance mechanisms on earnings management before and after the implementation of Law 3693/2008, requiring all Greek listed firms to have an audit committee and complete disclosure of the firm's relationship with the external auditor.

7.2.1 Firm performance measures (measurement of dependent variable)

Corporate governance affects many aspects of firm performance, such as operating performance, market value and stock returns, as discussed in Chapter 6. Operating performance measures profitability either through ROA (return on assets) and/or ROE (return on equity). Market value measures firm performance by calculating 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, measure 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 operating performance measures. The commonly used performance measure, Tobin's Q, is utilized in this study as a market-based 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 operating performance 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, the Tobin's Q calculation has the advantage of not being affected by financial reporting misrepresentations due to tax laws and accounting practices, as is the case in operating performance measures such as ROA (Campbell and Mínguez-Vera, 2008). The value of the 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). Research indicates that Tobin's Q and ROA should not be considered as substitute measures of firm performance but complement each other, and thus both measures should be utilized in studies (Elsayed, 2007).

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:

$$\text{Tobin's } Q = \left(\frac{\text{MV of Equity} + \text{Debt}^{101}}{\text{Total Assets}} \right) \quad \text{eq 7 - 2}$$

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, the 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). However, for capital markets that are not well-developed, such as the case of the Greek capital market during the period of analysis, market-based performance measures, such as Tobin's Q, may not accurately reflect firm performance (Jackling and Johl, 2009). Thus, in line with prior relevant research (e.g. Bhagat and Bolton (2008) and Drakos and Bekiris (2010)), as a complimentary measure of firm performance, ROA, is also used.

ROA is measured as follows:

$$\text{Return on Assets} = \left(\frac{\text{Net Income before extraordinary items}}{\text{Total Assets}} \right) \quad \text{eq 7 - 3}$$

Operating performance in prior research also utilizes ROE as a performance measure. However, investors of firms that are highly leveraged expect a higher return so as to be compensated for the increased risk due to the firm's higher leverage, and thus the residual return to equity becomes more variable in such capital markets. ROA mainly reflects operating results, and not capital structure decisions, and therefore is the operating performance measure used in the current study (Elsayed, 2007).

7.2.2 Governance quality measures (measurement of key independent variable)

Governance quality is measured through the use of individual corporate governance items, such as board size, board independence and the absence of CEO duality and through the use of CG indices, as in the previous study. However, this study's sample

¹⁰¹ Total debt represents all interest-bearing and capitalized lease obligations. It is the sum of long and short-term debt.

uses more data since it includes six years and consists of 1,205 firm year observations, while the previous study includes four years and has 788 firm year observations.

7.2.2.1 Board of directors' composition

The first measurement of governance quality is board of directors' composition, studied through board size, board independence and the absence of CEO duality.

- Board size (*bsize*): the number of members on the board as a measure of board size.
- Board independence (*bindep*): the percentage of independent board members in relation to the total board size.
- The absence of CEO Duality (*ceodual*): an indicator variable, taking the value of one if the position of CEO and chairman of the board is separated, or zero otherwise.

7.2.2.2 Corporate Governance indices

Corporate governance is also measured through the use of CG indices, as in the previous study (chapter 4-6). This study estimates the CG indices using both rating schemes, the *Scoring by item* and the *Scoring by category* method.¹⁰² For each rating scheme, two indices are created depending on how the non-disclosed items are recorded, and thus four indices in total are created: when applying the *Scoring by item* method, (1) *cg_pen_total*, all items included in calculation of index, whereby the non-disclosed values are considered as non-existent, therefore firms are penalized in the rating procedure and (2) *cg_non_total*, all items included in calculation of index, whereby the non-disclosed values are excluded in the rating procedure and when applying the *Scoring by category* method (3) *cg2_pen_total*, all items included in calculation of index, whereby the non-disclosed values are considered as non-existent, therefore firms are penalized in the rating procedure and (4) *cg2_non_total*, all items included in

¹⁰² This study employs both rating schemes, the *Scoring by item* and the *Scoring by category* method, while the previous study only employed the *Scoring by item* rating scheme.

calculation of index, whereby the non-disclosed values are excluded in the rating procedure.¹⁰³

7.2.3 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, free cash flows and growth opportunities. 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 performance and corporate governance (Durnev and Kim, 2005; Beiner et al., 2006).

Concentrated ownership, leverage and firm size are control variables also used in the previous study as stated Chapter 4.

Firm size

It is necessary to control for size since it may affect firm performance and the firm's ability to deal with the negative effects of a financial crisis (Mitton, 2002; Leung and Horwitz, 2010). Following the work of Jackling and Johl (2009), Bozec et al. (2010) and Ammann et al. (2011) firm size (*ta*) is controlled for using the logarithm of total assets (*ta*).

Firm size can affect firm performance both positively and negatively. Large firms have better asset utilization due to economies of scale and synergies across business lines. Larger firms are also able to generate higher sales revenue across business segments without needing to have additional asset bases for each segment (Singh and Davidson Iii, 2003). Thus, a positive relationship would exist between firm size and firm performance. However, it is also possible that large firms have increased agency costs due to the greater difficulty involved in monitoring them, and therefore a negative relationship could be expected between firm size and firm value (Campbell and

¹⁰³ For an analytical discussion of how the CG indices are constructed, consult Chapter 4.

Mínguez-Vera, 2010). Therefore, the relationship between firm size and firm performance is not consistent.

Leverage

Leverage (*lev*), similar to Ammann et al. (2011) and Akbar et al. (2016), is defined as the ratio of total debt over total assets.

It can have either a positive or a negative effect on firm performance (Bhagat and Bolton, 2008; Jackling and Johl, 2009; Campbell and Mínguez-Vera, 2010). Higher levels of debt increase the probability of bankruptcy and credit risk, thus reducing the ability of firms to invest in profitable opportunities and ultimately decrease firm value (Campbell and Mínguez-Vera, 2010; Akbar et al., 2016). Additionally, highly leveraged firms have greater difficulty in obtaining equity financing since they stand a greater chance of experiencing sharper declines in equity value, also contributing to lower firm value (Leung and Horwitz, 2010). On the other hand, highly leveraged firms can improve their performance since they are highly scrutinized by creditors, limiting managerial misbehaviour and signaling high quality management (Kowalewski, 2016; Campbell and Mínguez-Vera, 2008; Campbell and Mínguez-Vera, 2010). Higher levels of debt financing decrease the firm's free cash flow, as managers are cautious in their investment decisions, thus limiting potential agency costs (Campbell and Mínguez-Vera, 2010). Additionally, larger levels of debt force managers to work harder so as to create higher levels of cash flow, resulting in increased firm performance (Kowalewski, 2016). Therefore, the overall effect of leverage on firm performance is not consistent.

Concentrated ownership

Ownership concentration (*ownconc*) is measured as the percentage of shares owned by the largest shareholder of the firm, as in Black et al. (2006b).

Research has shown that concentrated ownership influences managerial decisions, suggesting a reduced ability for managerial expropriation, and therefore a positive relationship is expected between ownership concentration and firm performance. Large

shareholders have the motive and ability to monitor and influence managers so as to align the interests of managers and shareholders, thus decreasing agency costs by alleviating the traditional principal-agent problem and thereby improving firm performance (Cheng et al., 2012). They are the key mechanism that aligns the interests of controlling and non-controlling owners (Bennedsen et al., 2008) These benefits of concentrated ownership become more evident in countries that have a relatively weak legal system, as is the case of Greece (La Porta et al., 1999; Denis and McConnell, 2003).¹⁰⁴

Growth opportunities

Growth opportunities (*growth*) is measured as capital expenditures scaled by net sales.

Growth opportunities usually influence the ownership and governance structures of firms (Bhagat and Bolton, 2008). Growth opportunities are included as a control variable to control for potential advantages that are a result of economies of scale and market opportunities and are expected to positively affect firm performance (Klein et al., 2005).

Firms with opportunities for growth generate more profitable investment opportunities and have a greater need for external financing. These conditions provide an incentive for firms to improve their governance practices and firm performance so as to reduce their cost of capital (Beiner et al., 2006). This positive relationship between governance practices and growth opportunities is stronger in firms which operate in countries with weaker legal frameworks and less investor friendly environments (Durnev and Kim, 2005).

Cheng et al. (2012) report that firms with greater growth opportunities tend to demand higher quality managers, while Dah (2016) find that a negative relationship exists between firms with high growth opportunities and managerial entrenchment. Both elements could potentially lead to an increase of firm value.

¹⁰⁴ Concentrated ownership is also a proxy for family ownership, since on average the pooled sample (2006-2012) has 52% family firms, of which 86% has a family member being the largest shareholder of the firm (the variable concentrated ownership). See Appendix VI for more information.

Although growth does not guarantee high returns, continuous innovation is needed to realize growth and sustain the firm's competitive advantage, often leading to increased firm value (Essen et al., 2012).

It is expected that growth opportunities positively affects firm performance, as seen in previous studies such as Durnev and Kim (2005), Cheng et al. (2012) and Dah (2016).

Free cash flows

Free cash flows (*fcf*) is another control variables used in this study and it is calculated as funds from operations minus capital expenditures and minus cash dividends, scaled by total assets

Firms with free cash flows have the ability to invest in positive net present value that lead to higher firm performance. Thus a positive free cash flow ultimately increases firm value (Bozec et al., 2010). Additionally, firms with high levels of free cash flows have fewer liquidity problems, since the internal funding available, assists them in avoiding high levels of external financing. This has a positive effect on firm value (Phung and Mishra, 2016). However, free cash flows could also have the opposite effect on firm value. When firms have free cash flows that are more than the positive net present value projects available to them, they could choose to invest in negative net present value projects, the so-called over-investment problem (Campbell and Mínguez-Vera, 2010). In such cases, free cash flows can have a negative effect on firm value. Additionally, agency costs can be created due to free cash flows. Conflicts of interest between shareholders and managers can arise on how to disgorge free cash flows whereby managers can be motivated to invest them in below cost of capital investments or waste them on organizational inefficiencies. This can lead to a reduction in firm value (Jensen, 1986).

Thus, the overall effect of free cash flows on firm performance is not consistent.

7.3 Empirical research model

The study examines the role of governance on firm performance before and during the Greek sovereign debt crisis. The data is decomposed into two periods: the pre-crisis

sample in 2006, 2008, and 2009, and the crisis sample in 2010, 2011 and 2012.¹⁰⁵ A crisis year dummy variable equaling one is given to the crisis years, and zero to the pre-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 sovereign debt crisis, as in the research of Yeh et al. (2011). For this reason, the use of interaction variables between the dummy variable and the corporate governance variables is implemented in this study. The coefficient of such interaction variables shows the marginal effects of corporate governance variables, before and during the Greek sovereign debt crisis. It is expected that firms with stronger governance quality will have higher firm performance during the crisis years.

Since both individual governance variables and a CG index are used to capture governance quality, the research applies two models to test the research hypotheses. The first model examines individual governance variables in terms of board of directors' composition such as in Jackling and Johl (2009) and Veprauskaitė and Adams (2013), and in the second model governance attributes are incorporated in a CG index, as in Ammann et al. (2011) and Rose (2016). All regressions are run twice: once with firm performance captured by Tobin's Q and once with firm performance captured by ROA.

7.4 Statistical properties and econometric issues

7.4.1 Univariate analysis

The data for this study are analyzed through the use of both parametric tests, focusing on mean values, and non-parametric tests, focusing on median values, as stated in Chapter 4. Differences in years are examined using *t*-tests, focusing on mean values, and Mann-Whitney tests, focusing on median values. Differences in subsamples, such

¹⁰⁵ For robustness the sample is also decomposed into the following two periods: the pre-crisis period sample in 2008 and 2009, and the crisis period sample in 2011 and 2012. These sensitivity tests are presented in Chapter 8.

as the CG index rating methods, are tested with the use of both mean and median differences, using the ANOVA F-test / Welch F-test¹⁰⁶ and the Kruskal-Wallis test.

7.4.2 Multivariate analysis

Data are 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).

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

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

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

Governance is captured through the use of board of directors' composition variables and a CG index so as to deal with the issue of multicollinearity. However, high correlation exists among the corporate governance variables and collinear variables should be excluded from the regression. Therefore, two models are created, one with board of directors' variables and one with a CG index. As in Chapter 4, two multicollinearity diagnostics are used: bivariate correlations using Pearson and Spearman's rank correlation coefficients and Variance Inflation Factor (VIF) tests.

¹⁰⁶ 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.

An additional important issue, as discussed in Chapter 4, in all studies pertaining to corporate governance is that of controlling for the possible issue of endogeneity between the variables that could bias the results. The existence of at least one source of endogeneity could potentially cause estimates to be biased and could lead to inaccurate results (Schultz et al., 2010; Carcello et al., 2011).

Three sources of endogeneity are seen in corporate governance research - *dynamic endogeneity*, *simultaneous endogeneity* and *unobserved heterogeneity* - as discussed in chapter 4 (Wintoki et al., 2012).

A system of simultaneous equations is used in this study to examine the hypotheses and to contend with the issue of endogeneity. In the spirit of Bhagat and Bolton (2008) and Jackling and Johl (2009), 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. Studies have shown that the perspectives on the optimal choice of debt could potentially differ among shareholders and managers. Although it is expected that leverage is negatively related to firm performance, there are cases where increased levels of debt motivate managers to work harder so as to generate additional cash flows and thus increase firm performance. Additionally, managers might choose to increase debt levels so as to increase their voting power, thus decreasing the probability of a takeover and/or loss of employment. 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 used in this study to deal with all three potential sources of endogeneity in panel data models, namely *dynamic endogeneity*, *simultaneous endogeneity* and *unobserved heterogeneity* (Duru et al., 2016; Wintoki et al., 2012).

The choice of an appropriate variable as a proper instrument is crucial. Such a variable is one that is correlated with the regressors and uncorrelated with the error terms (Tsonas et al., 2012). Based on the research of Bhagat and Bolton (2008) and Jackling

and Johl (2009) the exogenous variables chosen are prior year performance¹⁰⁷, powerful CEO and Altman's z-score.

Based on the work of Lewbel (1997), the entire set of instruments consists of the predetermined variables and the cross-products of all with the dependent variables. Moreover, all instruments used for this study will be deviations from their means.

Finally, a crucial point is to test if the instruments are 'weak', leading to biased results under GMM, even in large samples, where the distribution can be far from normal. Stock et al. (2002) propose various tests to examine the issue of 'relevant' instruments (Tsonas et al., 2012). Stock and Watson (2003: 350) affirm that running a first-stage regression and examining the F-statistic is an accurate way to examine if the potential instruments are weak. If F is greater than 10, the choice of instrument is fine and GMM results are accurate (Verbeek, 2008:157).

The analysis is carried out using GMM¹⁰⁸ as follows:

$$\begin{aligned}
 FP = & c(1) + c(2) * \textit{governance quality} + c(3) * \textit{ownconc} + c(4) * \textit{ta} + c(5) * \textit{lev} + c(6) * \\
 & \textit{growth} + c(7) * \textit{fcf} + \mathbf{c(8)} * \mathbf{\textit{prior}} + c(9) * \textit{industry dummies} + c(10) * \\
 & \textit{dummy crisis year} + c(11) * \textit{dummy crisis year} * \textit{governance quality} + \\
 & \varepsilon
 \end{aligned}
 \tag{eq 7 - 5}$$

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

¹⁰⁷ Bhagat and Bolton (2008) use the level of treasury stock to assets as an instrument for performance. Jacking and Johl (2009) use lagged performance as an instrumental variable for performance, while Bhagat and Bolton (2008) use lagged performance only as a sensitivity test.

¹⁰⁸ The analysis originally is carried using OLS, however due to endogeneity issues GMM is utilized.

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

Table 7-1 presents the measurement of the variables used in the analysis of this project.

Table 7-1 Measurement of the variables used in the analysis

Firm Performance			WorldScope identifiers
Tobin's Q (<i>Tobin</i>)		Datastream	MV; WC03255; WC02999
Return on Assets (<i>ROA</i>)		Datastream	WC01551; WC02999
Governance Quality			
board size (<i>bsize</i>)	total number of board members	Data hand-collected from annual reports	
board independence (<i>bindep</i>)	percentage of independent directors' on the firm's board	Data hand-collected from annual reports	
absence of CEO duality (<i>ceodual</i>)	An indicator variable taking the value of 1 if the position of the CEO and chairman of the board is separate, or 0 otherwise	Data hand-collected from annual reports	
<i>cg_pen_total</i>	CG index (all items included in calculation of index), whereby the non-disclosed values were considered as non-existent, therefore firms were penalized in the rating procedure. The <i>Scoring by item</i> rating approach is utilized.	Data hand-collected from annual reports	
<i>cg_non_total</i>	CG index (all items included in calculation of index), whereby the non-disclosed values were excluded in the rating procedure. The <i>Scoring by item</i> rating approach is utilized.	Data hand-collected from annual reports	
<i>cg2_pen_total</i>	CG index (all items included in calculation of index), whereby the non-disclosed values were considered as non-existent, therefore firms were penalized in the rating procedure. The <i>Scoring by category</i> rating approach is utilized.	Data hand-collected from annual reports	
<i>cg2_non_total</i>	CG index (all items included in calculation of index), whereby the non-disclosed values were excluded in the rating procedure. The <i>Scoring by category</i> rating approach is utilized.	Data hand-collected from annual reports	
Control Variables			
<i>ownconc</i>	the percentage owned by the largest shareholder of the firm	Data hand-collected from annual reports	
<i>ta</i>	natural log of total assets	Datastream	WC02999
<i>lev</i>	total debt over total assets	Datastream	WC03255; WC02999
<i>growth</i>	growth opportunities calculated as capital expenditures scaled by net sales	Datastream	WC04601; WC01001
<i>fcf</i>	free cash flow is calculated as funds from operations - capital expenditures - cash dividends paid scaled by total assets	Datastream	WC04201; WC04601
Exogenous Variables			
<i>prior</i>	prior year performance calculated as the prior year's Tobin's Q or return on assets	Datastream	MV; WC03255 WC02999; WC01551
<i>pshare</i>	powerful CEO, measured as the percentage of ownership held by the CEO	Data hand-collected from annual reports	
<i>zscore</i>	Altman's Z score (1968), as a proxy for financial distress	Datastream	WC02201; WC03101; WC02999 R_E; WC01250; MV WC03351; WC01001
Dummy Variable			
<i>crisis year</i>	an indicator variable taking the value of 0 for 2006, 2008 and 2009 and 1 for 2010, 2011 and 2012		

The variables examined in this analysis are governance quality and firm performance before and during the sovereign debt crisis in Greece. Governance quality is examined in model #1 through board of directors' composition (board size, board independence and the absence of CEO duality) and in model #2 through CG indices. The relationship between governance quality and firm performance is initially tested and a positive relationship between the two is expected. In order to examine the role of corporate governance during the Greek sovereign debt crisis, the governance-performance relationship is tested through the use of a crisis year dummy variable. The data is divided into two sub-samples, the pre-crisis period sample (2006, 2008, 2009) and the crisis period sample (2010, 2011, 2012) through the use of a dummy variable equaling one if the sample is in 2010, 2011, 2012 or zero otherwise. It is expected that firms with stronger corporate governance are able to resolve crisis problems, and thus efficiently improve their firm's financial performance. Each regression is run separately for the pre-crisis, the crisis and the pooled sample. A structural change in the model between the two periods is reflected in the potential change in the coefficient between the pre-crisis and crisis periods. This is tested by using a crisis year dummy variable in the regression of the pooled sample.

7.5 Sample selection and data collection procedures

This study consists of all Greek listed firms on the ASE for the years 2006, 2008, 2009, 2010, 2011 and 2012, excluding only firms in financial, real estate and insurance industries. They are excluded from the sample since they are subject to additional governance regulations and it is often difficult to calculate Tobin's Q (Jackling and Johl, 2009). However

These years are chosen so as to incorporate data for both the pre-crisis (2006, 2008, 2009) and during the sovereign-debt crisis period (2010, 2011, 2012).¹⁰⁹ This study

¹⁰⁹ Originally the analysis is conducted with the sample decomposed into two periods: the pre-crisis period sample in 2008 and 2009, and the crisis period sample in 2011 and 2012. However, in order to incorporate in the analysis additional data, sample years from the previous paper (CG & EM) is also included in the analysis. Thus, the sample includes the following two periods: the pre-crisis period sample in 2006, 2008 and 2009 and the crisis period sample in 2010, 2011 and 2012. Nonetheless, for robustness the sensitivity tests for the original sample (the pre-crisis period sample in 2008 and 2009 and the crisis period sample in 2011 and 2012) are also presented in Chapter 8.

examines potential changes in the relationship between corporate governance and firm performance before and during the sovereign debt crisis in Greece.

As indicated in Chapter 4, data for corporate governance items are 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 from recent years, while the sample includes data from 2006, 2008, 2009, 2010, 2011 and 2012. Due to that fact that CG data is hand collected from firms' annual reports, limiting the study to six years makes it feasible within the time available.

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 excluded. 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 (i.e. unbalanced panel). This procedure resulted in a final sample of 1,205 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 7-2 illustrates the sample selection procedure.

Table 7-2 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 a small number of firm observations. Like the process applied in chapter 4, Oil and Gas is combined with Industrials; Utilities and Telecommunications is combined with Consumer Services; and Healthcare is combined with Consumer Services and

Consumer Goods, creating the Combined Industries classification.¹¹⁰ Thus, firms in the sample are now classified as Basic Materials 11%, Consumer Goods 31%, Consumer Services 22%, Industrials 26% and Technology 10% as shown in Table 7-3.

Table 7-3 Distribution of sample firms across industries

Industry Classification	Based on ICB						Combined Industries						
	2006	2008	2009	2010	2011	2012	2006	2008	2009	2010	2011	2012	Total
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 is initially based on DataStream and ICB. However, in order to incorporate all firms in the sample, each firm classified in an industry that had few firms is examined separately and is placed in another industry.

7.6 Conclusion

The study examines the relationship between governance quality and firm performance for all Greek listed firms for 2006, 2008, 2009, 2010, 2011 and 2012. This relationship is examined before and during the Greek sovereign debt crisis. The data is broken down into two periods, 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 quality will have higher firm performance during the crisis years.

Individual board of directors' governance items and an all-inclusive governance measure in the form of a CG index are used to measure governance quality. Firm

¹¹⁰ In order to incorporate all firms in the sample, each firm is examined separately and it is decided where it should be placed based on its specific product or service characteristics. More specifically, in 2006, out of the nine healthcare firms, seven are combined with consumer services and two with consumer goods; in 2008, out of the nine healthcare firms, seven are combined with consumer services and two with consumer goods; in 2009, out of the eight healthcare firms, seven are combined with consumer services and one with consumer goods; in 2010, out of the seven healthcare firms, five are combined with consumer services and two with consumer goods; in 2011, out of the eight healthcare firms, six are combined with consumer services and two with consumer goods, and in 2012, out of the seven healthcare firms, six are combined with consumer services and one with consumer goods. See Appendix II for the names of firms that are classified in different industries, where they are classified and why.

performance is measured by Tobin's Q and ROA. Both firm performance measures are employed in this study since the former is a market-based measure, while the latter an operating performance measure, and the use of both is considered necessary since they should not be considered as substitute measures but complements of each other.

An important issue considered in the analysis is that of controlling for the possible endogeneity of the variables that could bias the results obtained. For this reason a system of simultaneous equations is used in this study to examine the hypotheses. The analysis is carried out using GMM.

Data for firm performance is obtained from DataStream, while data for corporate governance items are hand-collected from annual reports found on the ASE website. Financial firms are excluded from the sample since they require different governance regulations and thus the sample consists of all non-financial firms listed on the ASE for the years 2006, 2008, 2009, 2010, 2011 and 2012.

Chapter 8 – Data Analysis and Discussion (CG & FP)

8.1 Introduction

This chapter presents the analysis and discussion of the data testing the effect of corporate governance mechanisms on firm performance before and during the Greek sovereign debt crisis for all Greek non-financial listed firms.

The hypotheses framed in Chapter 6 are tested using individual governance items, such as board size, board independence and the absence of CEO duality, as well as a holistic governance measure in the form of a corporate governance index, as in the previous study for EM. Firm performance is measured using a market-based performance measure, Tobin's Q, and an operating performance measure, ROA. The statistical analysis begins with descriptive statistics in section 8.2 and bivariate tests in section 8.3, and continues with multivariate tests in section 8.4. The discussion of the findings is presented in section 8.5, and section 8.6 concludes the chapter.

8.2 Descriptive statistics

The univariate analysis first examines descriptive statistics for each variable during the pre-crisis and crisis year sample, as well as analysis of the data regarding the pooled sample. The pooled sample consists of 1,113 firm-year observations, with 575 firm-year observations for the pre-crisis period (2006/2008/2009) and 538 firm-year observations for the crisis (2010/2011/2012) period.¹¹¹

For purposes of robustness, the regressions are also run for four years (2008/2009/2011/2012), including a pooled sample 738 firm-year observations, with 386 firm-year observations for the pre-crisis period (2008/2009) and 352 firm-year observations for the crisis (2011/2012) period.¹¹²

¹¹¹ It should be noted that when examining individual governance items the pooled sample consists of 1,008 firm-year observations, with 472 firm-year observations for the pre-crisis period (2006/2008/2009) and 536 firm-year observations for the crisis (2010/2011/2012) period.

¹¹² As mentioned before, when examining individual governance items, the pooled sample consists of 663 firm-year observations, with 312 firm-year observations for the pre-crisis period (2008/2009) and 351 firm-year observations for the crisis (2011/2012) period.

There are more observations in the crisis year sample (2010/2011/2012) compared to the pre-crisis year sample (2006/2008/2009) since there are fewer missing observations in that sample. As of 2010, Law 3873/2010 required listed firms to disclose annual information about their corporate governance in a statement placed in a specific and clearly identifiable section of the annual report. This resulted in more firms disclosing more corporate governance information and thus, there are fewer missing observations in the crisis year period sample.¹¹³ The descriptive statistics are presented in Table 8-1.

¹¹³ It should be noted that this project consists of more hand-collected data, in comparison to the previous project, since more years are included in the sample. More specifically, this study includes six years of data (2006, 2008, 2009, 2010, 2011 and 2012) consisting of 1,113 firm-year observations, while the previous study includes four years of data (2006, 2008, 2010, 2012) consisting of 763 firm-year observations.

Table 8-1 – Descriptive Statistics

	Pooled sample					Pre-crisis years (2006/2008/2009)					Crisis years (2010/2011/2012)					Comparisons across the periods	
	mean	median	min	max	sd	mean	median	min	max	sd	mean	median	min	max	sd	t-test	Mann-Whitney
Tobin's Q	0.72	0.62	0.13	3.17	0.43	0.81	0.68	0.17	5.00	0.57	0.65	0.58	0.12	2.76	0.38	4.79***	6.45***
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***
bsize	7.68	7.00	4.00	14.00	2.33	7.67	7.00	4.00	14.00	2.37	7.69	7.00	4.00	14.00	2.30	-0.84	0.73
bindep	0.29	0.29	0.00	0.60	0.13	0.28	0.29	0.00	0.61	0.14	0.31	0.29	0.00	0.60	0.12	-4.72***	3.75***
ceodual	0.59	1.00	0.00	1.00	0.49	0.58	1.00	0.00	1.00	0.49	0.59	1.00	0.00	1.00	0.49	-0.19	0.19
cgpentotal	0.50	0.49	0.00	0.90	0.21	0.34	0.31	0.10	0.62	0.10	0.65	0.67	0.00	0.95	0.15	-39.4***	26.26***
cgnontotal	0.68	0.70	0.33	0.93	0.12	0.60	0.60	0.33	0.80	0.10	0.76	0.77	0.00	0.95	0.11	-32.28***	24.66***
cg2pentotal	0.53	0.53	0.13	0.90	0.19	0.37	0.34	0.12	0.64	0.11	0.66	0.67	0.27	0.94	0.14	-40.76***	26.53***
cg2nontotal	0.66	0.71	0.31	0.92	0.16	0.53	0.50	0.31	0.82	0.13	0.77	0.78	0.44	0.95	0.08	-39.71***	25.36***
ownconc	0.40	0.36	0.00	0.90	0.19	0.40	0.36	0.10	0.89	0.18	0.41	0.36	0.10	0.91	0.20	-0.78	0.40
ta	11.77	11.67	8.48	15.86	1.47	11.78	11.68	8.99	15.91	1.43	11.77	11.67	8.31	15.88	1.50	0.61	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	0.18	0.06	0.03	0.00	0.74	0.11	3.56***	5.22***
free cf	-0.03	-0.01	-0.36	0.11	0.08	-0.02	-0.01	-0.33	0.13	0.08	-0.03	-0.02	-0.47	0.10	0.08	1.28	1.25
prior Tobin's Q	0.81	0.70	0.18	2.78	0.44	0.93	0.80	0.22	2.84	0.48	0.70	0.62	0.17	2.68	0.36	8.91***	10.40***
prior ROA	-0.01	0.01	-0.31	0.18	0.08	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	0.20	0.17	0.08	0.00	0.72	0.20	0.16	0.06	0.00	0.77	0.20	0.05	0.00
zscore	0.77	0.57	-0.01	5.90	0.83	0.80	0.61	0.00	5.10	0.77	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; *bsize* board size; *bindep* board independence; *ceodual* absence of duality; *cgpentotal* penalized total CG index using the *Scoring by item* method; *cgnontotal* non-penalized total CG index using the *Scoring by item* method; *cg2pentotal* penalized total CG index using the *Scoring by category* method; *cg2nontotal* non-penalized total CG index using the *Scoring by category* method; *ownconc* ownership concentration; *ta* total assets; *lev* leverage; *growth* growth opportunities; *free cf* free cash flow; *prior Tobin's Q* previous year's Tobin's Q; *prior ROA* previous year's ROA; *pshare* powerful CEO; *zscore* Altman's z-score

All continuous variables are winsorized at the top and bottom 1% of the distribution.

*** significant at level 1%; ** significant at level 5%; *significant at level 10%

8.2.1 Descriptive statistics for Board of Director' composition

Board size

Board size is the first variable examined. Greek law No.2190/1920 (Article 18) requires a minimum of three board members and does not set an upper limit. All sample firms complied with the minimum board requirement of three members, as seen in Table 8-1, where the minimum board size of the pooled sample is four. The Greek CG Code, Section A, Part II (2013), suggests that the boards of Greek listed firms should be from seven to 15 members. Most Greek firms adhered to the recommendations of the Greek CG Code, since the pooled sample shows a mean (median) of 7.68 (7.00) and a range of four to 14 members for Greek firms' boards, as seen in Table 8-1. The mean (median) value of board size in the pre-crisis period (2006/2008/2009) is 7.67 (7.00) and in the crisis period (2010/2011/2012) is 7.69 (7.00). More specifically, 192 firms in the pre-crisis period (41% of the sample) and 180 firms in the crisis period (34% of the sample) have boards with less than 7 members, while no boards have more than 15 members.¹¹⁴

The board size of Greek firms did not change significantly in the crisis period compared to the pre-crisis as seen by the insignificant differences between the mean and median values for the pre-crisis and crisis period samples.

Board independence

Another governance variable examined is board independence. The mean (median) value of board independence of Greek listed firms during the pre-crisis years is 28% (29%) and in the crisis years is 31% (29%). All firms included in the sample throughout the years examined, should comply with Law 3016/2002, which requires that Greek listed firms' boards have at least 1/3 non-executive members, of which at least two are independent. There are firms, however, that do not comply with the CG law, as seen in the pooled sample where board independence ranges from 0% to 60% throughout the years examined. Nonetheless, it could be said that on average, Greek firms comply with the CG law since they have a mean of 7.68 board members and thus, should have

¹¹⁴ Results are in line with Drakos and Bekiris (2010) and Zhou et al. (2018).

on average 26% (2/7.68) board independence. Since the mean of board independence is 29% for the pooled sample, on average they comply with the law. More specifically, 442 firms (94% of the sample) in the pre-crisis period and 520 firms in the crisis period (97% of the sample) disclose that their boards have at least two independent board members. Furthermore, the Greek CG Code, Section A, Part II (2013), suggests that at least 1/3 of the boards of Greek listed firms should be comprised of independent non-executive members, thus 33% on average should be independent. However, the mean values of board independence ranges from 28% in the pre-crisis period to 31% in the crisis period, indicating that the recommendations of the CG Code are not satisfied.¹¹⁵

Significant differences across the two periods, at the 1% level, for the independence of Greek boards is evident in both the mean and median values, as seen in Table 8-1, suggesting some improvements over the sample period.

CEO duality

The last variable regarding board of directors' composition is the absence of CEO duality. The pre-crisis period sample has a mean (median) of 0.58 (1.00) and the crisis period sample has a mean (median) of 0.59 (1.00), as seen in Table 8-1. An average of 59% of Greek listed firms included in the pooled sample have a separate CEO and chairman of the board. More specifically, 75% (356/472) of Greek firms in the pre-crisis period sample and 63% (340/536) in the crisis period sample do not have CEO duality. Although the absence of CEO duality is not mandated by any governance law or by the 2010 Greek CG Code, as is the case in many other codes and governance systems in Europe, most Greek listed firms prefer to separate the roles.¹¹⁶

Table 8-1 indicates that there are no significant differences in the mean (median) score concerning the absence of CEO duality between the two periods examined.

¹¹⁵ Results are in line with Drakos and Bekiris (2010) and Zhou et al. (2018).

¹¹⁶ Results are in line with Drakos and Bekiris (2010).

8.2.2 Descriptive statistics for *CG indices*

The model examines the effect of a corporate governance index on firm performance. The Greek CG index created for this study is based on CG laws and best practice items as per the Greek CG Code. The non-disclosed items are recorded as either missing (penalized CG index) or non-applicable (non-penalized CG index) and thus two versions for the CG index are created. Additionally, the penalized and non-penalized CG indices are measured using two rating methods, the *Scoring by item* and the *Scoring by category* method, thus four different versions of the CG index are generated and used to measure governance quality.¹¹⁷

As seen in Table 8-1, the mean (median) of the penalized CG index, using the *Scoring by item* rating scheme for the pre-crisis period is 34% (31%), while the crisis period exhibits a mean (median) of 65% (67%).¹¹⁸ Similar results are seen in the penalized CG index, using the *Scoring by category* rating scheme, whereby in the pre-crisis period the mean (median) is 37% (34%), and in the crisis period the mean (median) is 66% (67%).¹¹⁹

As for the non-penalized CG index, using the *Scoring by item* method, the pre-crisis mean (median) is 60% (60%) and the mean (median) of the crisis period is 76% (77%).¹²⁰ The non-penalized index, using the *Scoring by category* method, has a mean (median) of 53% (50%) during the pre-crisis period and a mean (median) of 77% (78%) during the crisis period.

Greater values are evident for the non-penalized indices (for both rating schemes) compared to the respective penalized indices. The reason for this is that in the non-

¹¹⁷ A description of the exact process of creating the CG indices can be found in chapter 4.

¹¹⁸ In the previous study examining CG and EM, the rating score applied is the *Scoring by item* rating scheme and the mean (median) score for the penalized CG index is 31% (25%) in the pre-law period (2006/2008) and 67% (69%) in the post-law period (2010/2012). The pooled sample has a mean (median) of 49% (48%).

¹¹⁹ Results are in line with Hermes and Katsigianni (2012). Their index is calculated using the *Scoring by category* rating scheme.

¹²⁰ In the previous study examining CG and EM, the mean (median) score for the non-penalized CG index is 56% (57%) in the pre-law period (2006/2008) and 77% (78%) in the post-law period (2010/2012). The pooled sample has a mean (median) of 66% (69%).

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.

CG index scores in the crisis years (2010, 2011, 2012), for both rating schemes, is much higher than in the pre-crisis years (2006, 2008, 2009) due to firms' greater compliance and disclosure of corporate governance items over the years. One reason for this increase in CG scores is the implementation of Law 3693/2008, which requires all listed firms to have an audit committee. Additionally, in 2010, Law 3873/2010 required listed firms to disclose annual information about their corporate governance in a statement placed 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 CG items suggested by the Greek CG Code, created by the Hellenic Federation of Industries in 2010.

The differences in the scores of all CG indices between the pre-crisis and crisis years are reported in Table 8-1 where it is evident that the differences in the mean and median values are significantly different at the 1% level, for all CG indices. Additionally, when comparing the results of the two rating methods, *Scoring by item* and *Scoring by category*, significant differences are observed between the two in both the mean and median at the 1% significance level, as seen in Table 8-2.

Table 8-2 Comparison of results using the two rating methods

		Penalized CG indices	Non-penalized CG indices
		$cgpentotal / cg2pentotal$	$cgnontotal / cg2nontotal$
Pooled sample	Welch F-test	2829.81***	1340.52***
	Kruskal-Wallis test	1029.04***	871.27***
Pre-crisis years	Welch F-test	1181.64***	258.16***
	Kruskal-Wallis test	484.99***	263.73***
Crisis years	Welch F-test	902.98***	179.74***
	Kruskal-Wallis test	474.85***	381.71***

Variables: *cgpentotal* penalized total CG index using the *Scoring by item* method; *cgnontotal* non-penalized total CG index using the *Scoring by item* method; *cg2pentotal* penalized total CG index using the *Scoring by category* method; *cg2nontotal* non-penalized total CG index using the *Scoring by category* method; *** significant at level 1%.

8.2.3 Descriptive statistics for *Firm Performance*

Firm performance is measured using Tobin's Q, a market-based performance measure, and Return on Assets, an operating performance measure. Table 8-1 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 values of both performance measures at the 1% level, as expected.

Firm performance – Tobin's Q

Firm performance estimated using Tobin's Q has a mean (median) of 0.72 (0.62) in the pooled sample, whereby the minimum value is 0.13 and the maximum is 3.17. More specifically, in the pre-crisis years the mean (median) is 0.81 (0.68), while in the crisis years it is 0.65 (0.58).¹²¹ As expected, smaller values of Tobin's Q are observed in the crisis years due to the lower levels of market value of equity during the crisis years.¹²²

¹²¹ Results are in line with Drakos and Bekiris (2010) and Hermes and Katsigianni (2012).

¹²² Market value of equity of the pooled sample has a mean (median) of 171 million € (20 million €), with a minimum value of 1 million € and a maximum value of 4 million €. The market value of equity for the pre-crisis period shows a mean (median) of 225 million € (29 million €), ranging from 2 million € to a maximum value of 5 billion €. The crisis period exhibits a mean (median) of 123 million € (14 million €), with a minimum of 716,400 € and a maximum of 3 billion €. It is evident that there is a significant decrease in the market value of equity in the crisis period, as expected.

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).¹²³ As expected, ROA decreased during the crisis period due to a decline in the net income of the firms included in the sample.¹²⁴

8.2.4 Descriptive statistics for *Control Variables*

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

Ownership concentration

The mean (median) values of ownership concentration of 40% (36%) in the pre-crisis and 41% (36%) in the crisis years, while overall ownership in the pooled sample shows a mean (median) of 40% (36%). As expected, no significant differences are observed in the mean and median values of ownership concentration between the years, as seen in Table 8-1.

Total Assets

Total assets, as an indicator of size, and measured as the natural logarithm of total assets, has a mean (median) score of 11.78 (11.68) in the pre-crisis years and a mean (median) score of 11.77 (11.67) in the crisis years. No significant differences are

¹²³ Results are in line with Drakos and Bekiris (2010) and Hermes and Katsigianni (2012).

¹²⁴ Net Income for the pooled sample has a mean (median) of 7 million € (-78,000€), with a minimum of -88 million € and a maximum of 413 million €. The pre-crisis net income has a mean (median) of 13 million€ (860,500€), ranging from -73 million€ to 433 million €. The net income for the crisis period has a mean (median) of 495,802€ (-2 million€), with a minimum value of -116 million € and a maximum value of 374 million €. As expected, significant differences, at the 1% level, are observed between the mean and median scores of net income for the pre-crisis and crisis year periods.

observed between the mean and median scores of total assets during the pre-crisis and crisis years, contrary to expectations.¹²⁵

Leverage

Leverage shows a mean (median) score of 36% (36%) for the pooled sample, where leverage increased from a mean (median) of 32% (33%) in the pre-crisis years, to 39% (39%) in the crisis years, as seen in Table 8-1. Significant differences in the mean and median, at the 1% level, are seen for leverage, as expected.¹²⁶

Growth opportunities

The mean (median) score of growth opportunities decreased from 9% (4%) in the pre-crisis years to 6% (3%) in the crisis years, with the pooled sample showing a mean (median) of 8% (3%), as seen in Table 8-1. Although the minimum value (0%) of growth is the same for the pre-crisis and crisis periods, there is a decrease in the maximum value between the pre-crisis (116%) and crisis period (74%). Significant differences, at the 1% level, in the mean and median scores are evident for growth opportunities between the two periods, where growth opportunities in the crisis period are smaller compared to the pre-crisis period, as expected.¹²⁷

Free cash flow

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. The overall free cash flow for the pooled sample shows a mean (median) score of -0.03 (-0.01), with a minimum value of -0.36 and a maximum value of 0.11. Although a significant difference for free cash flows is expected, no significant differences for free cash flows in the mean and median values are evident between the years, as seen in Table 8-1.

¹²⁵ Results are in line with Drakos and Bekiris (2010) and Hermes and Katsigianni (2012).

¹²⁶ Results are in line with Drakos and Bekiris (2010) and Hermes and Katsigianni (2012).

¹²⁷ Results are in line with Drakos and Bekiris (2010) and Hermes and Katsigianni (2012).

8.2.5 Descriptive statistics for *Instruments*

Prior year performance – Lag Tobin's Q

The mean (median) score of prior year's Tobin's Q for the pre-crisis period is 0.93 (0.80) and for the crisis period it is 0.70 (0.62). These results are similar to Tobin's Q for the current year. Significant differences, at the 1% level, in the mean and median is evident for prior year's Tobin's Q between the years, as seen in Table 8-1. This decrease is expected, since it is a result of the sovereign debt crisis in the country.

Prior year performance – Lag ROA

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 periods respectively. The results, as in the case of Tobin's Q, are similar to the current year's ROA results. Significant differences, at the 1% level, in the mean and median scores for prior year's ROA are evident between the years. Similar to Tobin's Q this decrease is expected, since it is a result of the sovereign debt crisis in the country.

Powerful CEO

Powerful CEO is estimated as the percentage of share ownership held by the CEO. The mean (median) of CEO share ownership is 17% (8%) and 16% (6%) for the pre-crisis and crisis periods respectively, while the mean (median) scores for the pooled sample is 17% (7%), as observed in Table 8-1. The percentage of CEO ownership did not change significantly from 2006 to 2012, as is evident from the insignificant differences in the mean and median scores.¹²⁸

Z-score

Altman's z-score is an indicator of the probability of bankruptcy for a firm. The mean (median) scores for the pre-crisis period are 0.80 (0.61) and for the crisis period are 0.74 (0.53), while the pooled sample shows a mean (median) of 0.77 (0.57). Significant

¹²⁸ Results are in line with Drakos and Bekiris (2010).

differences exist between the pre-crisis and crisis periods in the mean scores (at the 5% level) and the median scores (at the 1% level). The decrease in Altman's z-score during the crisis period is as expected, since more firms have a greater probability of bankruptcy during the crisis years compared to the pre-crisis ones.

8.3 Correlation coefficients

In this section, the bivariate correlations among the variables is examined using the Pearson and Spearman rank correlation coefficients as presented in Table 8-3.¹²⁹

Model # 1 (H1)

Looking at the bivariate correlation between firm performance, using Tobin's Q, and board size, included in H1a, there is a significant positive correlation (0.073), at the 5% level, between the two variables based on the Spearman correlation coefficient. The correlation coefficient is however only 0.073, signifying a very low correlation. An insignificant relationship is seen between the two variables based on the Pearson product moment correlation coefficient. A similar positive correlation at the 1% level is observed when firm performance is measured using ROA, for both the Pearson product moment and Spearman rank-order correlations, with values of 0.154 and 0.131 respectively. Both coefficients signify a very low correlation. These findings indicate a positive, albeit weak, correlation between board size and firm performance, which aligns with H1a.

A significant negative correlation, at the 10% level, is observed between board independence and firm performance, measured by Tobin's Q, based on the Spearman rank-order correlation. However, the coefficient (-0.053) signifies a very low correlation. There is an insignificant correlation based on the Pearson product moment correlation coefficient. As for ROA and board independence, a significant negative correlation, at the 5% and 1% levels, is seen between the two, based on both the Pearson product moment and Spearman rank-order correlation coefficients, which are -0.066

¹²⁹ Both the Pearson and Spearman rank correlation coefficients are examined since for some variables the null hypothesis of normality is rejected, but other variables are considered normal, and therefore both parametric tests, focusing on mean values, and non-parametric tests, focusing on median values, are applied.

and -0.091 respectively, illustrating a very low correlation. Concerning the variables included in H1b, a negative, albeit weak correlation exists between board independence and firm performance, results that are contrary to H1b.

As for the variables included in H1c, an insignificant correlation between the absence of CEO duality and firm performance, measured by Tobin's Q and ROA, is evident based on both the Pearson product moment and the Spearman rank-order correlation coefficients.

No correlation coefficients values are high enough in this model to suggest future multicollinearity issues in the regressions that could potentially affect the interpretation of the results.

Model # 2 (H2)

Examining the bivariate correlation between firm performance, using Tobin's Q, and the independent governance variable, measured using the CG indices, which are included in H2, there are significant negative correlations with both of the penalized CG indices, at the 10% level of significance, based on the Pearson product moment correlation coefficient, with values of -0.057 for *cgpentotal* and -0.061 for *cg2pentotal*, indicating very low correlations. Negative correlations between Tobin's Q and all CG indices are also evident from the Spearman rank-order correlation coefficients, with significant negative values ranging from -0.088 to -0.118, demonstrating very low correlations. The bivariate correlations between the second proxy for firm performance, ROA, and the CG indices, indicate a significant negative correlation between the two variables, with values ranging from -0.078 to -0.137, at the 1% significance level, for the Pearson product moment correlation coefficients, and ranging from -0.142 to -0.182, at the 1% significance level, for the Spearman rank-order correlation coefficients. All coefficients indicate very low correlations. These initial statistics appear to contradict H2, where a positive relationship is proposed between corporate governance and firm performance.

Very high correlations, at the 1% significance level, are evident between all of the CG indices (ranging from 79.3% to 95.7%) so these independent variables will not be used

simultaneously in the same regression but will be implemented in separate regressions, so as to avoid multicollinearity issues that may affect the interpretation of the results.

Table 8-3 Pearson product moment correlation coefficient (*right*) Spearman rank-order correlation (*left*)

	Tobin's Q	ROA	bsize	bindep	ceodual	cgpentotal	cgntotal	cg2pentotal	cg2nontotal	ownconc	ta	lev	growth	free_cf	lagtobin	lagroa	pshare	zscore
Tobin's Q		0.003	0.040	-0.034	-0.004	-0.057*	-0.024	-0.061*	-0.040	0.042	0.029	0.195***	0.051	0.001	0.636***	0.064**	-0.042	0.102***
ROA	0.108***		0.154***	-0.066**	0.009	-0.104***	-0.078**	-0.096***	-0.137***	0.037	0.231***	-0.434***	0.031	0.538***	0.143***	0.612***	0.048	0.171***
bsize	0.073**	0.131***		-0.289***	0.241***	0.082***	0.167***	0.092***	0.098***	0.015	0.459***	-0.042	0.021	0.069**	0.112***	0.168***	-0.287***	0.040
bindep	-0.053*	-0.091***	-0.434***		-0.178***	0.242***	0.320***	0.267***	0.267***	-0.063**	-0.141***	0.082***	-0.046	0.010	-0.068**	-0.108***	0.172***	0.009
ceodual	0.013	0.002	0.273***	-0.217***		0.100***	0.256***	0.130***	0.144***	0.003	0.185***	0.018	-0.016	-0.048	-0.009	0.046	-0.466***	-0.005
cgpentotal	-0.102***	-0.158***	0.109***	0.188***	0.108***		0.856***	0.935***	0.793***	-0.031	0.094***	0.111***	-0.097***	0.062*	-0.177***	-0.139***	-0.083***	-0.024
cgntotal	-0.088***	-0.142***	0.185***	0.209***	0.250***	0.893***		0.922***	0.876***	-0.001	0.126***	0.098***	-0.092***	0.075**	-0.132***	-0.118***	-0.154***	0.014
cg2pentotal	-0.118***	-0.147***	0.124***	0.196***	0.135***	0.957***	0.933***		0.838***	-0.024	0.103***	0.100***	-0.102***	0.073**	-0.191***	-0.125***	-0.090***	-0.001
cg2nontota l	-0.101***	-0.182***	0.135***	0.201***	0.195***	0.812***	0.908***	0.847***		0.009	0.090***	0.126***	-0.098***	0.052	-0.130***	-0.169***	-0.088***	0.002
ownconc	0.053*	0.079**	0.003	-0.071**	-0.019	-0.026	-0.019	-0.019	-0.010		0.109***	-0.041	0.067**	0.008	0.045	0.029	0.065**	0.034
ta	0.071**	0.203***	0.449***	-0.224***	0.213***	0.082***	0.116***	0.097***	0.104***	0.144***		0.119***	0.112***	0.146***	0.113***	0.234***	-0.290***	0.048
lev	0.388***	-0.381***	0.009	0.048	0.037	0.101***	0.091***	0.093***	0.110***	-0.022	0.178***		-0.008	-0.278***	0.097***	-0.431***	-0.017	-0.068**
growth	0.095***	0.188***	0.133***	-0.053*	0.008	-0.099***	-0.083***	-0.090***	-0.100***	0.078**	0.241***	-0.012		-0.372***	0.093***	0.059*	-0.005	-0.183***
free_cf	-0.041	0.572***	0.069**	-0.014	-0.056*	0.054*	0.059*	0.059*	0.048	0.077**	0.122***	-0.296***	-0.145***		0.049	0.354***	0.066**	0.129***
lagtobin	0.685***	0.178***	0.127***	-0.071**	0.011	-0.228***	-0.206***	-0.247***	-0.182***	0.051	0.109***	0.217***	0.086***	0.045		-0.376***	-0.017	-0.042
lagroa	0.092***	0.743***	0.146***	-0.113***	0.020	-0.196***	-0.182***	-0.183***	-0.215***	0.063**	0.194***	-0.368***	0.207***	0.416***	0.198***		0.046	0.217***
pshare	-0.075**	0.028	-0.324***	0.217***	-0.451***	-0.104***	-0.162***	-0.108***	-0.129***	-0.052*	-0.326***	-0.031	-0.037	0.065**	-0.057*	0.022		-0.011
zscore	0.060*	0.329***	0.065**	-0.002	-0.005	-0.034	-0.013	-0.011	-0.033	0.085***	0.081***	-0.042	-0.193***	0.263***	0.119***	0.341***	0.0380	

Variables: *Tobin's Q* market based measure of firm performance; *ROA* operating performance measure of firm performance; *bsize* board size; *bindep* board independence; *ceodual* absence of duality; *cgpentotal* penalized total CG index using the *Scoring by item* method; *cgntotal* non-penalized total CG index using the *Scoring by item* method; *cg2pentotal* penalized total CG index using the *Scoring by category* method; *cg2nontotal* non-penalized total CG index using the *Scoring by 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%

8.4 Multivariate analysis

8.4.1 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 GMM, as discussed in Chapter 7. To account for endogeneity various instruments are implemented when running the regressions. Discussion of results for each model are presented separately.

8.4.2 Results– H1

This section provides the analysis and discussion of H1 looking at the effect of board composition on firm performance before and during the sovereign debt crisis in Greece. Although extensive research has been conducted on the impact of the board of directors' composition on firm performance, the results are inconclusive. This study builds on existing research by using the Greek sovereign debt crisis to examine how boards affect firm performance in crisis situations.

In order to highlight the role of board composition during the Greek sovereign debt 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 pre-crisis period sample (2006, 2008, 2009) and the crisis-period sample (2010, 2011, 2012). As stated earlier for purposes of robustness, regressions are also run with data for 2008 and 2009 for the pre-crisis period and 2011 and 2012 for the crisis period samples. It is expected that firms with stronger corporate governance, reflected in board size, board independence and the absence of CEO duality, are able to resolve crisis problems and thus improve financial performance.

The analysis is broken into two sections, based on the two variables used to measure firm performance: *Tobin's Q* and *ROA*.

Firm performance – Tobin’s Q

Table 8-4 reports the GMM regression of firm performance, measured using Tobin’s Q, on the individual governance variables: board size, board independence and the absence of CEO duality. It illustrates the results for 2006/2008/2009 (pre-crisis period) and 2010/2011/2012 (crisis period), as well as the results of 2008/2009 (pre-crisis period) and 2011/2012 (crisis period) that are run for robustness. The p-value of the J statistic ranges from 0.1080 in the pooled sample to 0.1683 in the pre-crisis period sample, indicating that the residuals are uncorrelated with the chosen instruments.

Board size (H1a)

A significant positive relationship (+0.268), at the 5% significance level, between the first key variables of interest, board size, and firm performance is observed in the pre-crisis period sample. A similar significant positive relationship is also observed in the sample run for robustness, in both the pre-crisis (+0.242) and crisis period (+0.184) samples, at the 1% and 5% level of significance respectively. Thus, firms that have larger boards perform best, in line with H1a.

Examining board size with the interaction crisis year dummy variable, and its effect on Tobin’s Q, an insignificant relationship is observed. However, when examining the pooled sample (2008/2009 and 2011/2012), a significant positive relationship (+0.832), at the 5% significance level, is observed between Tobin’s Q and board size with the interaction crisis year dummy variable, in line with H1a. This suggests that during the crisis period, firms that had more members on their boards performed better, as indicated by the higher levels of Tobin’s Q.

Board independence (H1b)

An insignificant relationship between board independence and firm performance is seen in the pre-crisis period, crisis period and pooled samples.

A similar insignificant relationship is observed between board independence with the interaction crisis year dummy variable and its effect on Tobin’s Q. These results do

not support H1b, which posits a significant positive relationship between firm performance and board independence.

CEO duality (H1c)

The absence of CEO duality and firm performance has a significant negative relationship (-0.631), at the 1% significance level, in the crisis period. A similar significant negative relationship (-0.824), at the 1% level, is observed in the 2011 and 2012 crisis period sample as well. This illustrates that during the crisis period, firms that did not have CEO duality performed more poorly. However, in the pooled sample, which includes 2008, 2009, 2011 and 2012 a significant positive relationship (+4.046), at the 1% level, is noticed.

Turning to the absence of CEO duality with the interaction crisis year dummy variable, and its effect on Tobin's Q, a significant negative relationship (-3.811), at the 5% level, is observed. A similar negative relationship (-7.387), at the 1% significance level, between these two variables is also observed when examining the pooled sample (2008/2009 and 2011/2012). This result indicates that firms that did not have a unitary board leadership structure, in the sense of CEO duality, performed more poorly, compared to those that did. This is contrary to H1c.

Control Variables

Looking at the effect of firm size on firm performance, a significant negative relationship, at the 5% significance level, is observed for both the pre-crisis (-0.256) and crisis period (-0.162) samples, indicating that smaller firms have higher firm performance.

A significant positive relationship, at the 1% and 10% significance levels, is observed between leverage and firm performance, for the crisis year (+1.130) and pooled sample (+0.976) respectively. Thus, firms that are highly leveraged have higher firm performance.

As for free cash flow and firm performance, a significant positive relationship at the 10% level is seen for the pooled sample (+2.010), where firms that have greater levels of free cash flow have higher levels of Tobin's Q.

Insignificant results are observed between ownership concentration and growth opportunities and firm performance.

In summary, using Tobin's Q as the dependent variable, a statistically significant negative relationship is seen between Tobin's Q and the absence of CEO duality and firm size, while a statistically significant positive relationship is seen between Tobin's Q and board size, free cash flows and leverage. All other independent variables have a statistically insignificant relationship with Tobin's Q.

Firm performance – ROA

Table 8-4 reports the GMM regression of firm performance, measured using ROA, on the individual governance variables: board size, board independence and the absence of CEO duality. The p-value of the J statistic ranges from 0.1074 in the pooled sample to 0.1636 in the pre-crisis period sample, indicating that the residuals are uncorrelated with the chosen instruments.

Board size (H1a)

Examining the relationship between board size and operating performance, a significant positive relationship (+0.036), at the 5% significance level, is seen between these two variables for the crisis period, indicating that larger boards have the resources to increase firm performance during the crisis years. A similar significant positive relationship is also observed in the sample run for robustness, in the crisis period (+0.055) sample, at the 1% significance level. These results are consistent with the results found when Tobin's Q is used to measure firm performance and are in line with H1a.

Examining board size with the interaction crisis year dummy variable, and its effect on operating performance, an insignificant relationship is observed.

Board independence (H1b)

Table 8-4 shows that a significant negative relationship (-0.393), at the 1% level, between board independence and firm performance is evident in the pre-crisis period sample, while this relationship becomes significantly positive (+0.423), at the 10% level, in the crisis period sample. A similar negative (-0.228) relationship, at the 1% level, is observed in the pre-crisis period sample (2008/2009), contrary to H1b.

Examining board independence with the interaction crisis year dummy variable, and its effect on operating performance, an insignificant relationship is observed, as in the case of board size.

CEO duality (H1c)

The absence of CEO duality significantly positively (+0.184) affects, at the 10% level, firm performance in the pooled sample, as seen in Table 8-4, in line with H1c.

Looking at the absence of CEO duality with the interaction crisis year dummy variable, and its effect on operating performance, an insignificant relationship is observed, similar to the other two board composition variables.

Control Variables

Looking at the effect of firm size on firm performance, a significant positive relationship (+0.026), at the 10% significance level, in the pooled sample is observed. Thus, larger firms have higher operating performance.

A significant negative relationship, at the 1% significance level, is observed between leverage and firm performance, in the pre-crisis period (-0.255), crisis period (-0.227) and pooled (-0.224) samples. Similar results are also observed in the pre-crisis period (-0.134), crisis period (-0.297) and pooled (-0.207) samples for the sample run for robustness. Thus, firms that are highly leveraged have lower operating performance.

A significant positive relationship, at the 1% significance level, exists between growth opportunities and company performance in all three samples (+0.121/+0.254/+0.197),

indicating that firms that invest in capital expenditures have higher operating performance. A similar positive relationship in the pre-crisis period (+0.105), crisis period (+0.222) and pooled (+0.345) samples is observed for the sample run for robustness.

Similarly, firms that have more free cash flows have greater ability to invest in profitable opportunities, resulting in higher firm performance. This is evident in the significant positive relationship, at the 1% significance level, in the pre-crisis period (+0.531), crisis period (+0.730) and pooled (+0.569) samples, as seen in Table 8-4. A similar positive relationship is observed in the pre-crisis period (+0.730), crisis period (+0.630) and pooled (+0.925) samples for the sample run for robustness.

Insignificant results are observed between ownership concentration and firm performance.

In summary, using ROA as the dependent variable, a statistically significant negative relationship is observed between ROA and the independent variables, board independence in the pre-crisis period sample and leverage, while a statistically significant positive relationship is seen between ROA and the independent variables board size, board independence in the crisis year period sample, the absence of CEO duality, firm size, growth opportunities and free cash flows. All other independent variables have a statistically insignificant relationship with ROA.

Table 8-4 Board composition and firm performance – Model 1

Variables	ROA			ROA			Tobin's Q			Tobin's Q		
	2006/2008/2009	2010/2011/2012		2008/2009	2011/2012		2006/2008/2009	2010/2011/2012		2008/2009	2011/2012	
	Pre-crisis period	Crisis period	Pooled sample	Pre-crisis period	Crisis period	Pooled sample	Pre-crisis period	Crisis period	Pooled sample	Pre-crisis period	Crisis period	Pooled sample
	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)					
bsize	-0.005 (-0.412)	0.036 (2.129)**	-0.018 (-1.007)	0.002 (0.253)	0.055 (2.933)***	0.028 (1.530)	0.268 (2.223)**	0.031 (0.418)	0.063 (0.194)	0.242 (2.808)***	0.184 (2.360)**	-0.315 (-1.370)
bindep	-0.393 (-3.055)***	0.423 (1.691)*	0.401 (1.191)	-0.228 (-2.759)***	0.414 (1.222)	0.424 (0.890)	-1.286 (-0.906)	-0.474 (-0.470)	-3.466 (-0.705)	-1.138 (-1.332)	1.644 (1.251)	-4.251 (-1.285)
ceodual	0.044 (1.302)	0.023 (0.441)	0.184 (1.766)*	0.015 (0.764)	-0.050 (-0.953)	0.123 (1.023)	-0.473 (-1.478)	-0.631 (-2.684)***	1.476 (1.252)	-0.222 (-0.817)	-0.824 (-3.535)***	4.046 (3.152)***
ownconc	-0.060 (-1.444)	-0.008 (-0.157)	0.005 (0.108)	-0.030 (-1.151)	-0.036 (-0.577)	-0.009 (-0.139)	-0.051 (-0.132)	-0.084 (-0.412)	-0.117 (-0.270)	0.017 (0.056)	0.147 (0.621)	-0.456 (-0.938)
ta	0.008 (0.785)	-0.009 (-0.557)	0.026 (1.820)*	-0.001 (-0.152)	-0.017 (-1.129)	-0.019 (-0.994)	-0.256 (-2.010)**	-0.162 (-2.561)**	-0.301 (-1.428)	-0.257 (-2.708)***	-0.206 (-2.997)***	-0.138 (-0.980)
lev	-0.255 (-4.744)***	-0.227 (-5.414)***	-0.224 (-4.007)***	-0.134 (-5.110)***	-0.297 (-8.321)***	-0.207 (-3.176)***	0.187 (0.445)	1.130 (5.247)***	0.976 (1.927)*	0.349 (0.915)	1.089 (5.363)***	0.418 (0.888)
growth	0.121 (3.468)***	0.254 (3.657)***	0.197 (3.661)***	0.105 (7.510)***	0.222 (2.421)**	0.345 (4.884)***	-0.144 (-0.366)	-0.116 (-0.235)	0.609 (1.060)	0.145 (0.679)	0.196 (0.478)	0.418 (0.812)
free_cf	0.531 (8.153)***	0.730 (6.004)***	0.569 (4.874)***	0.730 (14.795)***	0.630 (6.615)***	0.925 (7.354)***	0.895 (1.046)	1.099 (1.449)	2.010 (1.723)*	0.556 (0.836)	0.556 (0.766)	-0.840 (-0.779)
crisis_year			-0.033 (-0.156)			0.303 (1.017)			-1.239 (-0.400)			-2.856 (-1.312)
bsize*crisis_year			0.029 (1.329)			-0.012 (-0.356)			0.254 (0.747)			0.832 (2.570)**
bindep*crisis_year			-0.558 (-1.219)			-0.675 (-1.247)			5.226 (1.158)			2.808 (0.770)
ceodual*crisis_year			-0.085 (-0.476)			-0.058 (-0.323)			-3.811 (-2.030)**			-7.387 (-3.693)***
J-statistic	0.1636	0.1340	0.1074	0.1765	0.1515	0.1186	0.1683	0.1470	0.1080	0.1866	0.1678	0.1146
N	476	536	1012	314	351	665	472	536	1008	312	351	663

Variables: *Tobin's Q* market based measure of firm performance; *ROA* operating performance measure of firm performance; *bsize* board size; *bindep* board independence; *ceodual* absence of duality; *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 (or 2008 and 2009) and one for 2010, 2011, 2012 (or 2011 and 2012); industry dummies are included in all regressions.
 *** significant at level 1%; ** significant at level 5%; *significant at level 10%

8.4.3 Results – H2

This section provides the analysis and discussion of H2 about the effect of CG indices on firm performance before and during the sovereign debt crisis in Greece. Two versions of the CG indices, the penalized CG index and the non-penalized CG index are created based on how the non-disclosed items are recorded. Additionally, two rating schemes: *Scoring by item* and *Scoring by category* are used for each version of the CG index. Hence four regressions are run, two for the penalized CG index and two for the non-penalized CG index, as shown in Table 8-5, Table 8-6, Table 8-7, and Table 8-8.

Firm performance – Tobin's Q

Penalized CG indices

Examining the penalized CG indices, as seen in Table 8-5, it is evident that firms with higher CG index scores have higher firm performance, as seen by the positive relationship at the 1% level, evident in the pre-crisis year (+2.109 / +3.655) and the pooled sample (+4.099 / +4.006) for both rating systems, *Scoring by item* and *Scoring by category*, in line with H2. However, in the crisis year sample, for both rating schemes, a negative relationship (-4.075 / -4.722) between the CG indices and firm performance is observed, contrary to H2.

This negative effect of governance (measured through the CG index) on firm performance, is also evident when examining the CG index with the interaction crisis year dummy variable and firm performance for both rating schemes (-3.156 / -4.676). During the crisis year, firms that have higher CG index scores have lower firm performance.

Control Variables

A significant negative relationship for the pre-crisis sample is evident, at the 10% significance level, between firm size and firm performance (-0.101 / -0.109), indicating that smaller firms have higher firm performance. This is evident for both rating methods, as seen in Table 8-5.

Significant positive results, at the 1% level, for the crisis year (+0.918 / +0.830) and the pooled samples (+0.559 / +0.648) are found between leverage and firm performance, indicating that firms with higher leverage also have higher performance. These results are similar for both rating schemes.

A significant negative relationship, at the 5% level, in the pre-crisis (-0.693 / -0.716) and crisis year samples (-0.777 / -0.789), for both rating schemes, is found between growth and firm performance, as observed in Table 8-5. This indicates that firms that have higher growth opportunities perform worse.

Significant positive results, at the 1% significance level, in the crisis period sample (+1.492 / +1.522) is observed between free cash flows and firm performance, for both rating schemes. Firms that have more free cash flow perform better.

Insignificant results are observed between firm performance and ownership concentration for both rating schemes.

Non-penalized CG indices

Similar positive results, at the 5% level, are observed between firm performance and non-penalized CG indices, as is the case with penalized CG indices for the pre-crisis (+2.344 / +1.756) and pooled samples (+3.492 / +2.921), as seen in Table 8-6, in line with H2. These results are observed for both rating schemes.

Conversely, in the *Scoring by category* rating scheme, a significant negative relationship (-5.618), at the 1% significance level, is seen between the CG index and firm performance during the crisis period. This significant negative result (-8.206 / -13.636) is also observed between firm performance and the CG index with the interaction crisis year dummy variable, for both rating schemes. This result shows that during the crisis years, firms with higher CG index scores have lower firm performance, contrary to H2.

Control Variables

A significant negative relationship between firm size and firm performance, at the 1% and 10% levels respectively, for both rating schemes, is observed in the crisis year sample (-0.101/ -0.074). Larger firms perform worse during the crisis years.

Significant positive relationships, at the 1% level, between leverage and firm performance are observed in the crisis year (+0.887 / +0.976) and pooled sample (+0.623 / +0.611) for both rating schemes, as seen in Table 8-6.

Additionally, a significant negative relationship, at the 5% and 10% significance levels, for the pre-crisis year sample (-0.717 / -0.630) under both rating schemes is seen between growth opportunities and firm performance. Thus, sample firms in the pre-crisis period sample that have higher growth opportunities have weaker performance.

Finally, under both rating schemes, *Scoring by item* and *Scoring by category*, a significant positive relationship, at the 1% and 5% level, is noticed between free cash flows and firm performance for the crisis period (+1.408 / +1.637) and pooled sample (+0.935 / +1.421) respectively. This result is expected since firms that have more free cash flow have the ability to invest in various projects, thus increasing firm performance.

Insignificant relationships are seen between firm performance and ownership concentration.

In summary, using Tobin's Q as a dependent variable, a statistically significant positive relationship is observed between both the penalized and non-penalized indices under both rating schemes in the pre-crisis period and in the pooled sample. However, in the crisis period sample a statistically significant negative relationship is seen for both rating schemes for both the penalized and non-penalized indices. This negative effect on firm performance is also evident when examining the CG index with the interaction crisis year dummy variable. A statistically significant negative relationship is also seen between firm size and growth opportunities and firm performance. A statistically significant positive relationship is seen between leverage and free cash flows and firm

performance, and an insignificant relationship exists between firm performance and ownership concentration.

Firm performance - ROA

Penalized CG indices

Similar results are observed between the penalized CG indices and firm performance, when examining both rating schemes of CG indices, the *Scoring by item* and *Scoring by category* methods.

More specifically, significant positive relationships at the 1%, 5% and 10% level are observed between firm performance and the penalized CG indices as seen in Table 8-7 in the pre-crisis (+0.211 / +0.337), crisis year (+0.364 / +0.553) and pooled (+0.478) samples for both rating schemes. In line with H2, firms with higher CG index scores have higher levels of performance. Nonetheless, when examining the 2008/2009/2011/2012 sample, which is the sample used to verify the results of the original sample, a significant negative relationship (-0.883 / -0.782), at the 10% level is observed between firm performance and the CG index with the interaction crisis year dummy variable for both rating schemes. This shows that during the crisis, firms that had better governance, measured by higher CG index scores, had lower firm performance, contrary to H2.

Control Variables

Significant negative relationships, at the 1% level, are observed between firm performance and leverage for the pre-crisis (-0.107 / -0.097), crisis (-0.248 / -0.242) and pooled (-0.228 / -0.214) samples. Higher leveraged firms perform worse since they have limited cash flows, have additional expenses and thus their net income is negatively affected.

Significant positive relationships, at the 1% level, between firm performance and growth opportunities in the pre-crisis (+0.102 / +0.100), crisis (+0.256 / +0.267) and pooled samples (+0.205 / +0.212) are seen in Table 8-7, for both rating schemes.

Significant positive relationships, at the 1% level, are also observed between firm performance and free cash flow in the pre-crisis (+0.510 / +0.482), crisis (+0.636 / +0.583) and pooled (+0.666 / +0.623) samples. Firms that have higher levels of free cash flow, as expected, perform better, under both rating schemes.

Insignificant relationships are observed between firm performance and both ownership concentration and firm size, as evident in Table 8-7 .

Non-penalized CG indices

Significant positive relationships, at the 5% and 10% levels, are observed between firm performance and non-penalized CG indices for the pre-crisis (+0.121) and pooled (+0.815 / +0.791) samples, as seen in Table 8-8, for both rating schemes, in line with H2. On the other hand, as in the case of the penalized CG indices, when examining the 2008/2009/2011/2012 sample, a significant negative relationship, at the 5% level, is observed between firm performance and both the CG index for the crisis period sample (-0.486) and the CG index with the interaction crisis year dummy variable (-1.651), for the *Scoring by category* rating method is used. Both results are contrary to H2. This verifies the results stated earlier that during the crisis years, firms that had better governance, measured by higher CG index scores, had lower firm performance.

Control Variables

Under the *Scoring by category* rating method, a significant positive relationship (+0.007), at the 1% significance level, is seen in the pre-crisis period sample between firm size and firm performance.

Similar to the penalized CG indices a significant negative relationship at the 1% level is observed between firm performance and leverage, in the pre-crisis (-0.120 / -0.116), crisis (-0.234 / -0.234) and pooled (-0.267 / -0.279) samples. These results exist in both rating schemes.

Additionally, looking at Table 8-8, a significant positive relationship at the 1% level is observed between firm performance and growth opportunities for pre-crisis (+0.098 / +0.113), crisis (+0.295 / +0.282) and pooled (+0.243 / +0.217) samples. Similar

significant positive relationship at the 1% level are also observed between free cash flows and firm performance for pre-crisis (+0.523 / +0.544), crisis (+0.691 / +0.602) and pooled (+0.614 / 0.554) samples. Thus, the results for the non-penalized CG indices are similar to the penalized CG indices.

Insignificant results are observed between firm performance and ownership concentration.

In summary, using ROA as a dependent variable, a statistically significant positive relationship is observed between both the penalized and non-penalized indices under both rating schemes in the pre-crisis period, crisis period and pooled samples. A statistically significant negative relationship is observed between leverage and firm performance. A statistically significant positive relationship is also evident between firm size, growth and free cash flows and firm performance, and an insignificant relationship exists between firm performance and ownership concentration.

Table 8-5 Penalized CG indices and firm performance (Tobin's Q) – Model 2

Variables	Tobin's Q			Tobin's Q			Variables	Tobin's Q			Tobin's Q		
	2006/2008/2009	2010/2011/2012		2008/2009	2011/2012			2006/2008/2009	2010/2011/2012		2008/2009	2011/2012	
	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
cgpentotal	2.109 (1.888)*	-4.075 (-3.538)***	4.099 (3.145)***	3.170 (3.906)***	-1.178 (-1.317)	6.323 (5.490)***	cg2pentotal	3.655 (2.921)***	-4.722 (-3.736)***	4.006 (3.407)***	3.381 (5.031)***	-1.101 (-1.143)	6.636 (5.806)***
ownconc	0.029 (0.101)	-0.416 (-1.477)	0.374 (1.485)	0.047 (0.211)	0.016 (0.083)	0.307 (1.979)**	ownconc	0.159 (0.513)	-0.419 (1.476)	0.342 (1.368)	0.057 (0.259)	0.055 (0.292)	0.347 (2.199)**
ta	-0.101 (-1.898)*	-0.033 (-0.875)	0.015 (0.316)	-0.119 (-3.195)***	-0.014 (-0.346)	-0.020 (-0.650)	ta	-0.109 (-1.954)*	0.003 (0.082)	0.011 (0.231)	-0.125 (-3.447)***	-0.011 (-0.262)	-0.030 (-0.939)
lev	0.247 (0.829)	0.918 (5.988)***	0.559 (2.832)***	0.227 (1.223)	0.718 (8.191)***	0.746 (6.425)***	lev	0.418 (1.368)	0.830 (4.974)***	0.648 (3.187)***	0.315 (1.483)	0.726 (8.407)***	0.786 (6.498)***
growth	-0.693 (-2.125)**	-0.777 (-2.132)**	-0.423 (-1.479)	-0.121 (-0.654)	-0.649 (-2.213)**	0.040 (0.204)	growth	-0.716 (-2.202)**	-0.789 (-2.119)**	-0.384 (-1.336)	-0.137 (-0.756)	-0.633 (-2.124)**	0.087 (0.449)
free_cf	0.067 (0.105)	1.492 (4.410)***	0.392 (0.788)	-0.265 (-0.535)	0.705 (2.370)**	-0.052 (-0.191)	free_cf	-0.274 (-0.411)	1.522 (4.684)***	0.591 (1.244)	-0.323 (-0.678)	0.730 (2.518)**	-0.046 (-0.167)
crisis_year			0.509 (0.644)			1.497 (2.966)***	crisis_year			1.636 (1.782)*			1.872 (3.357)***
cgpentotal* crisis_year			-3.156 (1.927)*			-6.021 (-4.802)***	cg2pentotal* crisis_year			-4.676 (-2.768)***			-6.464 (-5.057)***
<i>J</i> -statistic	0.1438	0.1500	0.1455	0.1576	0.1754	0.1575	<i>J</i> -statistic	0.1425	0.1507	0.1448	0.1572	0.1754	0.1570
<i>N</i>	575	538	1113	386	352	738	<i>N</i>	575	538	1113	386	352	738

Variables: *Tobin's Q* market based measure of firm performance; *cgpentotal* penalized total CG index using the *Scoring by item* method; *cg2pentotal* penalized total CG index using the *Scoring by 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 (or 2008&2009) and one for 2010, 2011, 2012 (or 2011&2012); industry dummies are included in all regressions; *** significant at level 1%; ** significant at level 5%; *significant at level 10%

Table 8-6 Non-penalized CG indices and firm performance (Tobin's Q) – Model 2

	Tobin's Q			Tobin's Q			Variables	Tobin's Q			Tobin's Q		
	2006/2008/2009	2010/2011/2012		2008/2009	2011/2012			2006/2008/2009	2010/2011/2012		2008/2009	2011/2012	
	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
Variables	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	Variables	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)
cgntotal	2.344 (2.123)**	-0.417 (-0.971)	3.492 (2.207)**	3.034 (3.493)***	-2.076 (-1.854)	6.006 (4.976)***	cg2ntotal	1.756 (2.353)**	-5.618 (-3.662)***	2.921 (1.725)*	2.142 (3.727)***	-0.767 (-0.676)	5.307 (5.056)***
ownconc	-0.049 (-0.157)	0.144 (0.419)	0.120 (0.448)	-0.223 (-0.865)	0.056 (0.315)	0.284 (1.759)*	ownconc	0.095 (0.325)	-0.138 (-0.564)	-0.085 (-0.272)	0.071 (0.341)	0.144 (0.817)	0.379 (2.082)**
ta	-0.067 (-1.167)	-0.101 (-3.218)***	-0.002 (-0.031)	-0.123 (-2.762)***	-0.037 (-1.040)	-0.017 (-0.540)	ta	-0.027 (-0.461)	-0.074 (-1.778)*	0.003 (0.045)	-0.108 (-2.801)***	-0.044 (-1.278)	-0.006 (-0.172)
lev	0.243 (0.770)	0.887 (6.934)***	0.623 (2.759)***	0.117 (0.439)	0.777 (7.046)***	0.680 (5.245)***	lev	0.132 (0.410)	0.976 (4.703)***	0.611 (2.223)**	0.185 (0.734)	0.786 (5.798)***	0.647 (4.582)***
growth	-0.717 (-2.211)**	-0.339 (-1.137)	-0.328 (-1.016)	-0.197 (-1.060)	-0.608 (-1.869)*	0.175 (0.847)	growth	-0.630 (-1.816)*	-0.665 (-1.343)	-0.177 (-0.498)	-0.128 (-0.720)	-0.352 (-1.159)	0.252 (1.148)
free_cf	0.199 (0.309)	1.408 (3.541)***	0.935 (1.821)*	-0.410 (-0.710)	0.748 (2.113)**	-0.007 (-0.024)	free_cf	0.286 (0.423)	1.637 (3.636)***	1.421 (2.170)**	-0.311 (-0.573)	1.013 (2.682)***	0.058 (0.192)
crisis_year			5.380 (2.316)**			3.120 (2.896)***	crisis_year			9.559 (3.033)***			1.296 (1.073)
cgntotal* crisis_year			-8.206 (-2.551)**			-5.811 (3.613)***	cg2ntotal* crisis_year			-13.626 (-3.364)***			-3.478 (-2.188)**
<i>J</i> -statistic	0.1412	0.1554	0.1394	0.1544	0.1799	0.1551	<i>J</i> -statistic	0.1424	0.1522	0.1457	0.1593	0.1765	0.1572
<i>N</i>	575	538	1113	386	352	738	<i>N</i>	575	538	1113	386	352	738

Variables: *Tobin's Q* market based measure of firm performance; *cgntotal* non-penalized total CG index using the *Scoring by item* method; *cg2ntotal* non-penalized total CG index using the *Scoring by 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 (or 2008&2009) and one for 2010, 2011, 2012 (or 2011&2012); industry dummies are included in all regressions; *** significant at level 1%; ** significant at level 5%; *significant at level 10%

Table 8-7 Penalized CG indices and firm performance (ROA) – Model 2

Variables	ROA			ROA			Variables	ROA			ROA		
	2006/2008/2009	2010/2011/2012		2008/2009	2011/2012			2006/2008/2009	2010/2011/2012		2008/2009	2011/2012	
	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)	coefficient (t-stat)
cgpentotal	0.211 (3.650)***	0.364 (2.117)**	0.379 (1.198)	0.272 (3.880)***	0.141 (0.952)	0.896 (1.749)*	cg2pentotal	0.337 (5.202)***	0.553 (2.602)***	0.478 (1.678)*	0.248 (4.153)***	0.187 (1.216)	0.789 (1.749)*
ownconc	0.010 (0.620)	0.025 (0.727)	0.010 (0.180)	-0.014 (-0.894)	-0.064 (-2.223)**	-0.062 (-0.937)	ownconc	0.023 (1.245)	0.042 (1.094)	0.017 (0.325)	-0.015 (-0.909)	-0.062 (-2.137)**	-0.063 (-0.971)
ta	0.002 (0.862)	0.003 (0.436)	0.004 (0.496)	0.003 (1.071)	-0.004 (-0.464)	-0.014 (-1.149)	ta	0.000 (0.149)	-0.003 (-0.353)	0.001 (0.115)	0.002 (0.670)	-0.006 (-0.610)	-0.015 (-1.247)
lev	-0.107 (-5.603)***	-0.248 (-10.602)***	-0.228 (-4.716)***	-0.111 (-5.697)***	-0.287 (-18.153)***	-0.244 (4.910)***	lev	-0.097 (-4.642)***	-0.242 (-10.335)***	-0.214 (-4.735)***	-0.110 (-5.760)***	-0.288 (18.533)***	-0.240 (-4.923)***
growth	0.102 (5.554)***	0.256 (5.454)***	0.205 (4.395)***	0.102 (7.397)***	0.263 (5.036)***	0.298 (5.496)***	growth	0.100 (5.613)***	0.267 (5.235)***	0.212 (4.635)***	0.101 (7.408)***	0.272 (5.072)***	0.294 (5.392)***
free_cf	0.510 (11.266)***	0.636 (8.175)***	0.666 (6.950)***	0.613 (11.206)***	0.596 (8.602)***	0.822 (8.106)***	free_cf	0.482 (10.701)***	0.583 (7.795)***	0.623 (6.875)***	0.620 (11.473)***	0.592 (8.988)***	0.821 (8.206)***
crisis_year			-0.137 (-1.057)			0.227 (1.288)	crisis_year			-0.259 (-1.784)*			0.224 (1.189)
cgpentotal* crisis_year			0.000 (0.000)			-0.883 (-1.803)*	cg2pentotal* crisis_year			0.148 (0.536)			-0.782 (-1.702)*
<i>J-statistic</i>	0.1481	0.1433	0.1433	0.1588	0.1624	0.1547	<i>J-statistic</i>	0.1460	0.1430	0.1423	0.1586	0.1623	0.1538
<i>N</i>	582	538	1120	390	352	742	<i>N</i>	582	538	1120	390	352	742

Variables: *ROA* operating performance measure of firm performance; *cgpentotal* penalized total CG index using the *Scoring by item* method; *cg2pentotal* penalized total CG index using the *Scoring by 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 (or 2008&2009) and one for 2010, 2011, 2012 (or 2011&2012); industry dummies are included in all regressions; *** significant at level 1%; ** significant at level 5%; *significant at level 10%

Table 8-8 Non-penalized CG indices and firm performance (ROA) – Model 2

	ROA			ROA				ROA			ROA		
	2006/2008/2009	2010/2011/2012		2008/2009	2011/2012			2006/2008/2009	2010/2011/2012		2008/2009	2011/2012	
	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
Variables	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	Variables	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)
cgntotal	0.121 (1.843)*	0.078 (0.955)	0.815 (2.215)**	0.166 (1.822)*	0.146 (0.798)	1.484 (2.261)**	cg2ntotal	0.054 (1.292)	0.114 (0.642)	0.791 (2.185)**	0.143 (2.217)**	-0.486 (-2.176)**	0.839 (1.772)*
ownconc	-0.007 (-0.393)	-0.034 (-1.132)	0.014 (0.258)	-0.20 (-1.167)	-0.063 (-2.398)**	-0.043 (-0.568)	ownconc	-0.005 (-0.379)	-0.028 (-0.883)	0.004 (0.084)	-0.018 (-0.991)	-0.115 (2.846)***	-0.071 (-1.019)
ta	0.004 (1.276)	0.004 (0.599)	0.001 (0.125)	0.004 (1.378)	0.002 (0.207)	-0.015 (-0.953)	ta	0.007 (2.822)***	0.008 (1.061)	0.007 (0.709)	0.006 (1.804)*	0.009 (0.897)	-0.005 (-0.411)
lev	-0.120 (-6.037)***	-0.234 (-9.468)***	-0.267 (-4.698)***	-0.125 (-5.584)***	-0.284 (14.766)***	-0.272 (-4.126)***	lev	-0.116 (-7.310)***	-0.234 (-7.078)***	-0.279 (-5.050)***	-0.128 (-5.885)***	-0.280 (-9.320)***	-0.275 (-4.196)***
growth	0.098 (5.161)***	0.295 (4.761)***	0.243 (4.795)***	0.097 (5.738)***	0.262 (4.749)***	0.360 (5.559)***	growth	0.113 (5.294)***	0.282 (3.708)***	0.217 (4.467)***	0.106 (6.748)***	0.199 (2.275)**	0.300 (4.676)***
free_cf	0.523 (10.937)***	0.691 (8.105)***	0.614 (5.998)***	0.618 (11.029)***	0.601 (8.977)***	0.812 (6.334)***	free_cf	0.544 (12.317)***	0.602 (7.040)***	0.554 (4.982)***	0.628 (12.643)***	0.519 (5.483)***	0.806 (6.326)***
crisis_year			-0.755 (-2.070)**			0.528 (1.175)	crisis_year			-0.815 (-1.865)*			1.044 (2.011)**
cgntotal* crisis_year			0.798 (1.630)			-1.103 (-1.552)	cg2ntotal* crisis_year			0.803 (1.473)			-1.651 (-2.407)**
<i>J</i> -statistic	0.1477	0.1440	0.1371	0.1570	0.1649	0.1506	<i>J</i> -statistic	0.1494	0.1407	0.1439	0.1613	0.1671	0.1537
<i>N</i>	582	538	1120	390	352	742	<i>N</i>	582	538	1120	390	352	742

Variables: *ROA* operating performance measure of firm performance; *cgpentotal* penalized total CG index using the *Scoring by item* method; *cg2pentotal* penalized total CG index using the *Scoring by 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 (or 2008&2009) and one for 2010, 2011, 2012 (2011&2012); industry dummies are included in all regressions; *** significant at level 1%; ** significant at level 5%; *significant at level 10%

8.5 Discussion of results

8.5.1 H1 – Board composition and firm performance

Board composition is examined using board size, board independence and the absence of CEO duality. Firm performance is studied through a market-based performance measure, Tobin's Q, and an operating based performance measure, ROA.

8.5.1.1 – Board composition and Tobin's Q

Board size (H1a)

A significant positive relationship between board size and firm performance is observed in the pre-crisis period sample and the crisis year samples. Thus, firms that have larger boards perform best. These results are consistent with the research of Jackling and Johl (2009) and Veprauskaitė and Adams (2013) which find a positive relationship between board size and firm performance and state that small boards lack access to resources provided by larger boards, thus negatively affecting firm performance. Additionally, Klein (2002a) suggest that larger boards reduce CEO dominance, thus enhancing the value of corporate governance.

Examining board size with the interaction crisis year dummy variable, and its effect on Tobin's Q, a significant positive relationship between these two variables is seen, in line with H1a. This result demonstrates the need for larger boards during the financial crises so as to improve firm performance.

Board independence (H1b)

An insignificant relationship between board independence and firm performance is seen in the pre-crisis, crisis and pooled samples. Similar insignificant results between board independence and firm performance are reported by Toudas (2009), Jackling and Johl (2009), Drakos and Bekiris (2010) and Veprauskaitė and Adams (2013).

A similar insignificant relationship is observed between board independence and Tobin's Q with the interaction crisis year variable. These results do not coincide with

H1b, where a significant positive relationship between firm performance and board independence is expected. Examining a crisis-period setting, similar insignificant results between the two variables are also reported by Leung and Horwitz (2010) and Francis et al. (2012).

CEO duality (H1c)

The absence of CEO duality has a significant negative relationship with firm performance in the crisis period sample. The results of this contradict the work of Jermias (2007) and Veprauskaitė and Adams (2013), who argue that the absence of CEO duality positively affects firm performance. According to this line of thinking, in periods of crisis, a unitary leadership structure is preferred and positively affects firm performance. Good governance prescriptions as prescribed by agency theory can prove to be counterproductive in a crisis setting. Similar to the findings of Leung and Horwitz (2010) in the Asian financial crisis setting and Essen et al. (2013) in the 2007-2008 credit crisis setting, the findings of this research conclude that CEO duality positively affects firm performance. Studies such Finkelstein and Hambrick (1990) and Finkelstein and D'Aveni (1994), find that powerful CEOs, who occupy both roles in a firm have a favourable effect on firm performance in uncertain times, such as a financial crisis. When fewer constraints are implemented on their roles, they have the ability to make quick decisions without the need for continuous consensus. A unitary leadership structure leaves little ambiguity about who is in charge, an element necessary to deal with crisis situations. This positive effect of CEO duality is also evident in this research when examining the absence of CEO duality with the interaction variable crisis year and its effect on Tobin's Q. A significant negative relationship is observed indicating that firms that did not have a unitary board leadership structure, in the sense of CEO duality, performed more poorly, compared to those that did. These results contradict hypothesis H1c.

8.5.1.2 – Board composition and ROA

Board size (H1a)

Board size and operating performance exhibit a significant positive relationship for the crisis period, validating H1a, consistent with the results found when Tobin's Q is the proxy for firm performance. Larger boards have the resources to increase firm performance during the crisis years. Consistent with resource dependency theory, large boards have access to resources that add value through external links to the environment, such as key suppliers, customers and significant stakeholders (Jackling and Johl, 2009). Van den Berghe and Levrau (2004) state that large boards have an increased pool of knowledge and expertise in comparison to smaller ones, thus providing increased value to firms. Additionally, larger boards have the ability to reduce CEO dominance that could lead to negative firm performance. Similar positive results are observed in Dalton et al. (1998) and Jackling and Johl (2009). A similar significant positive relationship between board size and firm performance, in a Greek setting, is also reported by Zhou et al. (2018).

However, when considering the crisis year interaction variable in the pooled sample, an insignificant relationship is observed. This suggests that the positive influence of a larger board is less effective during a financial crisis.

Board independence (H1b)

A significant negative relationship between board independence and firm performance is evident in the pre-crisis sample, while this relationship reverses and becomes significantly positive in the crisis years. This result is similar to the results reported by Bhagat and Bolton (2013). They study the effect of board independence on firm performance during 1998-2007 using US data, separating their sample into pre and post 2002 periods, focusing on the SOX Act regulation enforced in 2002. In their research, a negative relationship between the two variables is identified in the pre-2002 sample, and this relationship is reversed in the post-2002 sample. They state that these results are driven by firms that increase their independent directors in the post-2002 period due to them conforming to the regulation, and this leads to a positive reaction by the market.

These results are also supported by event study results of Chhaochharia and Grinstein (2007) and DeFond et al. (2005) that provide independent evidence of the reversal of the relationship between board independence and firm performance when firms shift from non-compliance to compliance with SOX's board independence regulation. More specifically, Chhaochharia and Grinstein (2007) find that companies that had a lower compliance rate with SOX rules had higher positive abnormal returns on the announcement of compliance with these rules. DeFond et al. (2005) report a positive stock market reaction when a member with accounting expertise is appointed to the audit committee. This indicates that although SOX specifically affects board independence, the increased scrutiny and interest in corporate governance forces firms to implement better governance practices, that in turn potentially positively affects firm performance (Bhagat and Bolton, 2013). Similarly, in Greece firms in the crisis year sample (2010, 2011, 2012) comply and disclose more governance items compared to the pre-crisis years (2006, 2008, 2009) due to various governance laws (i.e. Law 3693/2008 and Law 3873/2010) and the Greek CG code created and enforced after 2010. Corporate governance received greater scrutiny and interest by stakeholders and this could explain the significant positive effect of board independence on firm performance during the crisis period. However, Zhou et al. (2018) for the period 2008-2012 report a significant negative relationship between board independence and firm performance, indicating that independent directors lack firm-specific knowledge that could potentially decrease firm performance and when the board's advisory role is more important than its monitoring role, more independence directors decrease firm performance.

Examining board independence with the interaction crisis year variable and its effect on operating performance, an insignificant relationship is observed, as in the case of board size.

CEO duality (H1c)

The absence of a dual leadership structure positively affects firm performance in the pooled sample. This result is consistent with the work of Bhagat and Bolton (2013), Veprauskaité and Adams (2013) and Duru et al. (2016). They find that CEO duality

places extensive power in the hands of CEOs that have the opportunity to manipulate it to their benefit, which is detrimental for firm's performance.

Looking at the absence of CEO duality with the interaction variable crisis year and its effect on operating performance, an insignificant relationship is observed, similar to the other two board composition variables.

8.5.2 H2 – CG index and firm performance

8.5.2.1 – Penalized CG indices and Tobin's Q

Positive significant relationships are seen between firm performance and CG indices in the pre-crisis and pooled samples. These results are consistent with the work of Bhagat and Bolton (2008) and Gompers et al. (2003). However, when examining the crisis year sample, a negative relationship is observed between the two variables. These results indicate that governance practices that are applicable in a non-crisis setting are not always appropriate in a crisis setting. These results are consistently found in both rating schemes.

Overall, the results support H2 that presumes a significant positive association between CG and performance only in a non-crisis setting. These results are in line with the work of Ammann et al. (2011), Bauer et al. (2008), Black et al. (2006c), Drobetz et al. (2004) and Alves and Mendes (2004). However in a crisis setting, H2 is not supported, contrary to the results of Gupta et al. (2013), who also examine corporate governance, through CG indices, and firm performance in a crisis setting, and find either positive or insignificant results between the two variables.

8.5.2.2 – Non-penalized CG indices and Tobin's Q

The results found using the penalized CG indices previously stated, are also confirmed through the use of non-penalized indices as well, again under both rating schemes. Again, as in the penalized CG indices, results differ between pre-crisis and crisis year samples, whereby in the crisis years a significant negative relationship is observed between CG indices and firm performance.

8.5.2.3 –Penalized CG indices and ROA

When examining the effect of CG index scores on ROA, H2 is supported, in all three sample periods, the pre-crisis, crisis and pooled samples, whereby a positive relationship exists between the CG index and firm performance. It should be noted however, that when considering the years 2011 and 2012 as the crisis period (and not 2010, 2011, 2012), a significant negative relationship exists between the two variables. This could potentially indicate that as firms further enter the sovereign debt crisis period, governance practices that are applicable in a normal, non-crisis setting might not have beneficial effects on firm performance in a crisis setting.

8.5.2.4 – Non-penalized CG indices and ROA

The results found using the penalized CG indices, reported in section 8.5.2.3, are also found when non-penalized indices are used, again under both rating schemes. In the crisis years a significant negative relationship is noticed between CG indices and firm performance, but only when the crisis period examined is 2011 and 2012 and not when the crisis period is 2010, 2011 and 2012.

8.6 Conclusion

Using non-financial Greek listed firms from 2006-2012, this study examines the differences in the CG-performance relationship before and during the Greek sovereign debt crisis. The use of an interaction crisis year dummy variable is implemented so as to observe the marginal effect of corporate governance variables on firm performance before and during the crisis.

The first strand of research examines the effect of board composition on firm performance before and during the sovereign debt crisis (H1). Board composition is studied through board size, board independence and the absence of CEO duality. Firm performance is examined through the use of Tobin's Q, a market-based performance measure and ROA, an operating performance measure. It is expected that board size, board independence and the absence of CEO duality will positively affect firm performance before and during the crisis periods. This study confirms that board

composition, either through board size, board independence or the absence of CEO duality does affect firm performance in both the pre-crisis period and the crisis period.

More specifically, board size has a positive effect on firm performance before and during the crisis, indicating that larger boards are beneficial to Greek firms and help them improve their performance.

As for board independence, although a negative effect on firm performance is seen in the pre-crisis sample period, its effect on firm performance becomes positive during the crisis period. This could potentially illustrate that during times of crisis, independent directors actively improve the firm's governance practices, resulting in improved performance.

A crucial point of the study is examining the effect of a dual leadership structure on firm performance. Although the pooled sample indicates that the absence of CEO duality has a positive effect on firm performance, when examining the crisis period sample and the effect of the CG index with the interaction crisis year variable on firm performance, it is clear that the absence of CEO duality is unfavorable. These findings imply that governance practices aimed at constraining CEOs power may not be appropriate in times of crisis, where boards should 'loosen the reins' and allow CEOs to respond promptly and effectively to changing business environments.

Overall, the results of this study support H1a and H1b, concerning board size and board independence, while H1c, concerning the absence of CEO duality, is challenged.

The second element explored in this study is the effect of a multi-dimensional governance proxy, in the form of a CG index, which incorporates many governance items, on firm performance. The literature basically illustrates a positive effect of a CG index on firm performance, which is the basis for H2.

Using either penalized CG indices or non-penalized CG indices and the two rating schemes, *Scoring by item* and *Scoring by category*, similar results are found. More specifically, in the pre-crisis period and pooled sample a positive relationship between the CG indices and firm performance is found, supporting H2. However, it is important

to note that during crisis times the positive relationship is transformed into a negative one. This illustrates that during crisis period the positive effects of 'traditional' good governance practices may be detrimental to firm performance. What is considered as good governance in steady times can prove to be counterproductive in times of crisis.

Chapter 9 – Concluding Remarks

9.1 Restatement of the research problem and research questions

This study examines the effect of corporate governance mechanisms in Greece on earnings management and firm performance. Two distinct research questions are examined, focusing on corporate governance quality in Greece measured through governance attributes pertaining to the board of directors and audit committee effectiveness, as well as a holistic measure of corporate governance, in the form of a corporate governance index, created to evaluate Greek listed firms' overall corporate governance mechanisms. The study encompasses all non-financial Greek listed firms for the period 2006-2012.¹³⁰

The first research question examines whether corporate governance mechanisms in Greece restrain earnings management practices and whether this relationship is stronger after the implementation of Law 3693/2008. Motivated by Law 3693/2008, which obliges all Greek listed firms to have an audit committee, as well as full disclosure of their relationship with the external auditor, the ability of corporate governance mechanisms to mitigate earnings management practices is tested. Changes in corporate governance mechanisms, as a result of this law, are examined through audit committee characteristics and corporate governance indices. Earnings management is measured using the cross-sectional version of the modified Jones model by Dechow et al. (1995) and the DeFond and Park (2001) model. This study covers all non-financial Greek listed companies for the fiscal years 2006, 2008, 2010, and 2012 for a pooled sample of 788 firm year observations. These specific years are intentionally chosen to examine any potential change in the effect of corporate governance on earnings management before and after the implementation of Law 3693/2008. The data is broken down into two periods, the pre-law period sample (2006/2008) and the post-law period sample (2010/2012). It is expected that the effect of corporate governance variables on earnings management will be stronger after the implementation of the governance law.

¹³⁰ Due to the fact that data for corporate governance variables had to be hand-collected from firms' annual reports, limiting the study to six years makes the task feasible within the time available.

The second research question initially examines the relationship between corporate governance mechanisms and firm performance and this relationship is also tested in light of the sovereign debt crisis in Greece. The relationship between corporate governance and firm performance in a crisis setting is not a priori clear. Firms will be more resilient if their corporate governance mechanisms respond effectively in a crisis setting, as mechanisms that are successful in a non-crisis context might not prove to be effective in a crisis setting. As such, it is of interest to ascertain the role played by corporate governance during the sovereign debt crisis in Greece. Corporate governance mechanisms are examined before and during the crisis, through individual variables measuring board of directors' composition and through a holistic corporate governance score, in the form of a corporate governance index. Firm performance is measured using the market-based performance measure, Tobin's Q, and an operating performance measure, ROA. This study covers all non-financial Greek listed companies for the fiscal years 2006, 2008, 2009, 2010, 2011 and 2012 for a pooled sample of 1,205 firm year observations. The data is decomposed into two periods: the pre-crisis sample in 2006, 2008 and 2009 and the crisis sample in 2010, 2011 and 2012. It is expected that firms with stronger governance quality will have higher firm performance during the sovereign debt crisis years.

9.2 Summary of research methodology

The following regression model is used for both research questions, where EM represents Earnings Management and FP represents Firm Performance:

$$EM/FP = \beta_0 + \beta_1(\text{governance quality})_{it} + \beta_2(\text{controls})_{it} + \varepsilon_{it} \quad \text{eq 9 - 1}$$

Panel data estimation is used to analyze the data so as to allow 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). Governance quality is tested through different proxies, i.e. board of directors' composition, audit committee effectiveness and a corporate governance index created for the purpose of this study. The analysis is carried out for both studies using Generalized Methods of Moments (GMM).

For the first project, motivated by Law 3693/2008, the relationship between CG and EM is tested. As such, each regression is run separately for the pre-law period (2006/2008), the post-law period (2010/2012) and the pooled sample. The potential change in the coefficients between the pre-law and post-law period tests indicate whether there is a difference (structural change) in the model between the two periods. This is tested by using pre-law and post-law data for each sample firm and utilizing a dummy year variable in the regression of the pooled sample. All regressions are run twice: once with earnings management captured with the modified Jones model and once with the DeFond and Park (2001) model.

For the second project the relationship between governance quality and firm performance is initially tested and a positive relationship between the two is expected. In order to examine the role of corporate governance during the sovereign debt crisis in Greece, the governance-performance relationship is tested through the use of a crisis year dummy variable. It is expected that firms with stronger corporate governance are able to more effectively manage crisis problems, and thus improve their financial performance. Each regression is run separately for the pre-crisis period sample (2006/2008/2009), the crisis period sample (2010/2011/2012) and the pooled sample. A structural change in the model between the two periods is reflected in the potential change in the coefficient between the pre-crisis and crisis period samples. All regressions are run twice: once with firm performance captured by Tobin's Q and once with firm performance captured by ROA.

9.3 Summary of research results

The first study examines the effect of CG on EM (H1/H2).

When examining the relationship between audit committee effectiveness and EM (H1), a significant negative relationship between the two variables is observed in the pooled sample when EM is measured with both the Modified Jones model and the DeFond and Park (2001) model. This result is in line with H1. However, a significant positive relationship between audit committee effectiveness and EM is seen in the post-law sample, as well as when examining audit committee effectiveness with the interaction

year dummy variable and its effect on EM, for both measures of EM. This is not in line with H1. This change in the post-law period is a result of firms adhering to the letter of the law and not its spirit. Firms' audit committees have the appropriate size, independence, number of meetings and expertise, but do not successfully perform their role in constraining EM.

As for H2, concerning the effect of CG indices on EM, mixed results are observed. When examining the Modified Jones model to measure discretionary accruals and penalized CG indices, a significant negative relationship between EM and the total CG index is observed in the pre-law and pooled samples, a result that is in line with H2. Similarly, a significant negative relationship is also seen when examining the effect of the penalized mandatory CG index on EM in the pre-law and pooled samples, as well as the effect of the best practice CG index with the interaction year dummy variable on EM. However, a significant positive relationship is seen between the total CG index and the mandatory CG index and EM in the post-law sample period, as well as when examining the effect of the total CG index with the interaction year dummy variable on EM. Additionally, a significant positive relationship also exists between the best practice CG index and EM in the pre-law and post-law periods and for the pooled sample, contrary to H2. These positive results suggest that firms were more concerned with following the letter of the law rather than its spirit. Similar positive results are also observed between EM, when using the Modified Jones model, and non-penalized indices. However, a significant negative relationship is observed between the non-penalized best practice CG index with the interaction year dummy variable and EM, in line with H2. This result indicates that firms that follow optional, best practice recommendations, appear to follow the substance and not the form of these governance attributes, and thus are able to mitigate EM.

When discretionary accruals are measured using the DeFond and Park (2001) model and governance quality is measured with penalized CG indices, significant negative relationships are observed between the penalized total CG index in the pre-law and pooled samples, as well as with the penalized mandatory CG index in the pre-law, post-law and pooled samples, and with the penalized best practice CG index in the post-law sample. These results are in line with H2. However, when examining the penalized

CG indices with the interaction dummy variable, a significant positive relationship between EM and the penalized total CG index and the penalized mandatory CG index is observed, contrary to H2, suggesting that form supersedes substance. When using the DeFond and Park (2001) model to measure EM and non-penalized CG indices, a significant positive relationship is observed between the non-penalized total CG index in the post-law sample, as well as with the non-penalized mandatory CG index in the pre-law sample, with the non-penalized best practice CG index in the pooled sample and the total CG index with the interaction dummy variable - results that all contradict H2. However, a significant negative relationship, in line with H2, is seen between EM and the non-penalized best practice CG index in the post-law period, as well as the non-penalized best practice CG index with the interaction dummy variable.

The second study examines the effect of CG on firm performance (H1/H2).

Examining H1, about the relationship between board composition and firm performance measured with Tobin's Q, a significant positive relationship between board size and firm performance is evident in the pre-crisis period sample, in line with H1a. A significant negative relationship between the absence of CEO duality and firm performance is seen in the crisis period sample, as well as between the absence of CEO duality with the interaction crisis year dummy variable and firm performance. These results contradict H1c and suggest that a unitary leadership structure has a positive effect on firm performance in uncertain times, such as the period of the sovereign debt crisis. CEO duality leaves little ambiguity about who is in charge, allowing quick decisions to be made without the need for continuous consensus.

As for firm performance measured using ROA, a significant positive relationship between board size and firm performance is observed in the crisis period sample, in line with H1a. A significant negative relationship between board independence and firm performance is seen in the pre-crisis period sample, while this relationship becomes positive in the crisis-period sample, in line with H1b. This reversal could be explained by corporate governance receiving greater scrutiny and interest during the crisis period, thus accounting for the positive effect of board independence on firm performance. As

for the relationship between the absence of CEO duality and firm performance, a significant positive relationship exists, in line with H1c.

H2 examines the relationship between CG indices and firm performance. A significant positive effect of penalized CG indices on Tobin's Q is observed in the pre-crisis sample and the pooled sample for both rating schemes, *Scoring by item* and *Scoring by category*, in line with H2. However, this relationship becomes negative, for both rating schemes, in the crisis period sample and when examining the CG indices with the interaction crisis year dummy variable. These results suggest that corporate governance practices that are appropriate in a non-crisis setting are not always suitable in a crisis setting.

When examining the relationship between the penalized CG indices and ROA, a significant positive relationship for both rating schemes is seen in the pre-crisis, crisis and pooled samples, in line with H2.

Similar results to those for the penalized CG indices are also seen with the non-penalized CG indices and firm performance, for both Tobin's Q and ROA.

9.4 Limitations of the research

The main limitations of the thesis can be summarised as follows.

Although the necessary procedures were followed to ensure validity and reliability when constructing the corporate governance index created for the purpose of this study some limitations inevitably exist. In terms of the validity of the CG index, there is no theory that provides guidance on what exact items should be included in a CG index. Furthermore, the items chosen had to be quantifiable, verifiable through annual reports and as inclusive as possible in the nature of governance items. However, there is a chance that some corporate governance items are missing. As for reliability, although the CG index was also scored independently for a sample of 10 firms by two experts, and no significant differences were found in the CG index scores, indicating that the research instrument is reliable, CG scoring still entails a degree of subjectivity.

Furthermore, the choice of governance attributes is not exhaustive and other governance items could also be used to proxy governance quality. For example, additional characteristics of the board, such as board diversity in terms of gender and ethnicity, have also been examined in the literature. Female representation on a firm's board is another internal governance mechanism that can influence a firm's performance and earnings management. Studies such as Carter et al. (2003) and Campbell and Minguez-Vera (2008) reveal that the presence of women on boards improve firms' financial performance. Krishnan and Parsons (2008) find higher earnings quality for firms with more female directors and argue that women are more ethical in their behaviour and judgement compared to men. Arun et al. (2015) find that more female directors and more independent female directors on boards have a negative effect on EM, while Thiruvadi and Huang (2011) find that the presence of female directors on audit committees constrains EM. Additionally, other earnings management and firm performance measures are not used in this study due to data and time constraints. For example, more recent EM measures, such as classification shifting, as in the research of Malikov et al. (2018), could also have been used in this study. Additionally, Cheng et al. (2016), and Kang and Kim (2012) examine the relationship between real earnings management and corporate governance variables. As for firm performance, Shaukat and Trojanowski (2018) using Return on Equity (ROE) find a positive relationship between firm performance and a board governance index, while Mitton (2002) examine CG attributes effect on firm performance measured using stock returns.

Another limitation is the availability of data. The sample consists of all non-financial listed firms on the ASE for the period 2006-2012. Although the total number of listed firms in the ASE for this period is 1,684 firm-year observations, the exclusion of firms in financial, real estate and insurance industries, as well as firms with missing financial and corporate governance data, resulted in a final sample consisting of 1,205 firm-year observations, representing approximately 72% of the firms listed on the ASE. Additionally, some governance attributes were not disclosed in the firms' annual reports.

When investigating the effect of corporate governance mechanisms on earnings management after the implementation of Law 3693/2008, although the sample period (2006-2012) includes the Greek sovereign debt crisis, the impact of this crisis on the results is not examined. However, when examining the effect of corporate governance on firm performance in a crisis setting, over the same period, the impact of the Greek sovereign debt crisis is examined. Nevertheless, as the period captures only the beginning of the Greek sovereign debt crisis in 2010, some findings may not be generalized to the entire crisis period.

9.5 Avenues for future research

The findings of this study point to a number of avenues for future research. Some of the areas for which the present study can provide motivation are highlighted below.

This study examines the effect of corporate governance mechanisms on earnings management and firm performance using quantitative research methods based on publicly available data. Future research examining Greek companies could use qualitative research methods, for example by using interviews with board members and other stakeholders, to examine the relationship between corporate governance and both earnings management and firm performance, thus complementing the results found in this quantitative study.

Future research could also include additional governance items to measure governance quality, such as board diversity, the number of board meetings per annum, the qualifications of the directors, the level of CEO pay, thereby creating a complementary proxy for the governance quality of Greek listed firms. Additionally, new variables for which data exists in Greece could be included. For example, the level of supervisory oversight in Greece, reflected in the number of employees in the Hellenic Capital Market Commission (HCMC), could be incorporated. Family ownership, an important ownership structure variable in the Greek context could also feature as an independent variable in future research.

Finally, the fact that some firms have limited disclosure of board structure data is an interesting detail. Future research could consider using the level of disclosure about

the board as an additional governance variable, and could for example consider the use of a dummy variable to record the quality of such disclosure.

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Appendices

Appendices

Appendix I - Percentage of firms meeting the requirement of each individual measure of CG in the index

	2006	2008	2009	2010	2011	2012
<u>Board of Directors</u>						
1. Board of directors consists of both executives and non-executives	83%	79%	84%	99%	100%	99%
2. Non-executive directors are $\geq 1/3$ of the total board size	83%	78%	81%	99%	100%	98%
3. Board of directors includes at least two independent non-executives	76%	66%	72%	96%	96%	96%
4. Board size should be between 7 and 15	67%	63%	68%	70%	70%	67%
5. Board should consist of a majority of non-executives	39%	30%	40%	57%	59%	63%
6. Board should consist of at least 2 executive members	78%	77%	81%	91%	92%	88%
7. Independent members are at least 1/3 of the members of the board	37%	31%	36%	54%	46%	51%
8. Split between the chairman and the CEO roles	57%	60%	56%	58%	60%	58%
9. If CEO duality exists, an independent vice-chairman exists	3%	4%	1%	10%	1%	7%
10. A financial chief executive officer is appointed to the management team	75%	17%	22%	52%	57%	65%
<u>Internal Auditing and Corporate Services</u>						
11. Internal auditors are independent	55%	24%	12%	96%	56%	64%
12. Internal auditors are supervised by the board	50%	13%	12%	96%	73%	90%
13. Internal auditors are appointed by the board	50%	13%	12%	96%	75%	88%
14. Internal auditors are full-time employees of the company	55%	14%	12%	95%	75%	91%
15. Internal auditors are not members of the board	57%	13%	13%	95%	72%	95%
16. The company has an internal audit function	95%	100%	100%	100%	99%	98%
17. The company has an investor relations function	68%	8%	18%	41%	51%	43%
18. The company has a corporate announcements function	98%	100%	100%	100%	100%	99%

Appendices

<u>Board Committees</u>						
19. Existence of an audit committee	20%	8%	31%	97%	98%	97%
20. Audit committee consists of 3 non-executives, of which 1 is an independent non-executive	6%	3%	21%	88%	91%	90%
21. The independent non-executive member of the audit committee has financial/accounting expertise	6%	0%	4%	55%	58%	66%
22. The company has a nomination committee	1%	0%	0%	8%	13%	9%
23. The nomination committee has at least 3 members	1%	0%	0%	14%	20%	18%
24. The majority of the nomination committee should be non-executive	1%	0%	0%	8%	17%	15%
25. The nomination committee should be chaired by an independent non-executive member	1%	0%	0%	5%	13%	10%
26. The audit committee should be composed exclusively of non-executive board members	10%	4%	22%	91%	92%	93%
27. The audit committee is chaired by an independent non-executive member	7%	2%	3%	35%	30%	48%
28. The company has a remuneration committee.	3%	0%	1%	14%	18%	17%
29. The remuneration committee should be composed of entirely non-executive members.	1%	0%	0%	11%	19%	24%
30. The majority of the remuneration committee should be independent	1%	0%	0%	10%	22%	23%
31. The members of the remuneration committee should be at least 3	1%	0%	0%	24%	32%	35%
32. The chair of the remuneration committee should be an independent- non-executive member	1%	0%	0%	6%	16%	16%
<u>Disclosures and Transparency</u>						
33. Separate disclosure of the remuneration of non-executive directors in the account notes	12%	7%	7%	9%	6%	10%
34. Disclosure of the ownership structure (from Law2190/1920)	100%	100%	100%	100%	100%	100%
35. Disclosure of corporate targets and prospects	80%	92%	100%	97%	100%	98%
36. The corporate governance statement discloses the term of appointment of each board member and contains their brief biographies.	19%	0%	2%	49%	52%	53%
37. The work of the nomination committee and the number of meeting is described in the corporate governance statement.	0%	0%	0%	15%	12%	20%
38. The annual corporate governance statement illustrates how the performance evaluation of the board and its committees has been conducted.	2%	1%	4%	82%	1%	78%
39. The annual corporate governance statement describes the work of the audit committee and the number of meetings held during the year.	2%	2%	0%	81%	62%	81%
40. The annual corporate governance statement summarizes the work of the remuneration committee and the number of meetings held during the year.	0%	0%	0%	27%	21%	29%

Appendix II – Combined Industry Classification

Firms	Classification based on ICB	Classification based on combined industries	Justification for combined industries
Alapis	Healthcare	Consumer goods	Healthcare firms that are involved in the production of medicine are classified as consumer goods.
Lavipharm	Healthcare	Consumer goods	
Euromedica	Healthcare	Consumer services	Healthcare firms that are hospitals are classified as consumer services.
Ygeia	Healthcare	Consumer services	
Iatriko Athinon	Healthcare	Consumer services	
Axon	Healthcare	Consumer services	
Medicon Hellas	Healthcare	Consumer services	
Praxiteleio	Healthcare	Consumer services	
IASO	Healthcare	Consumer services	
Ellinika Petrelaia	Oil & Gas	industrials	All oil & gas firms are classified as industrials
Motor Oil	Oil & Gas	industrials	
OTE	Telecommunications	Consumer services	All telecommunication firms are classified as consumer services.
Lannet	Telecommunications	Consumer services	
Eydap	utilities	Consumer services	All utilities firms are classified as consumer services
DEH	utilities	Consumer services	
Thes/niki water	utilities	Consumer services	
Terna	utilities	Consumer services	

Appendix III – Audit Committee Effectiveness and Earnings Management – Model 1 (signed ni / earn)

Variables	Modified Jones model			DeFond and Park (2001) model		
	Pre-Law Period (2006/2008)	Post-Law Period (2010/2012)	Pooled Sample	Pre-Law Period (2006/2008)	Post-Law Period (2010/2012)	Pooled Sample
	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)
weighase	0.013 (3.122)***	0.038 (5.979)***	-0.164 (-1.520)	0.006 (1.375)	0.036 (5.046)***	-0.111 (-1.205)
ownconc	-0.003 (-0.209)	-0.002 (-0.164)	-0.008 (-0.436)	0.012 (0.978)	0.008 (0.590)	0.011 (0.924)
ta	-0.010 (-5.530)***	-0.014 (-6.122)***	-0.003 (-1.069)	-0.006 (-3.606)***	-0.014 (-6.105)***	-0.006 (-2.603)***
lev	0.025 (1.266)	-0.070 (-4.627)***	-0.002 (-0.079)	0.019 (1.127)	-0.026 (-1.927)*	-0.011 (-0.747)
ni	-0.043 (-0.999)	-0.268 (-6.201)***	-0.202 (-3.679)***	-0.116 (-1.992)**	-0.177 (-5.300)***	-0.217 (-5.310)***
earn	-0.076 (-1.221)	0.038 (0.947)	0.119 (2.127)**	-0.034 (-0.507)	0.012 (0.359)	0.073 (1.423)
salesgrowth	0.013 (1.241)	0.019 (1.267)	0.010 (0.781)	0.016 (1.575)	0.023 (2.431)**	0.016 (1.884)*
dummy			0.025 (1.207)			-0.018 (-1.003)
dummy*weighase			0.130 (1.305)			0.107 (1.270)
<i>J-statistic</i>	0.0690	0.064	0.1323	0.0695	0.0730	0.1352
<i>N</i>	392	371	763	392	371	763

Variables: *EM* discretionary accruals using the Modified Jones model; *AWCA* abnormal working capital accruals using the DeFond and Park (2001) model; *weighase* weighted audit committee effectiveness; *ownconc* ownership concentration; *ta* total assets; *lev* leverage; *ni* value of current earnings; *earn* value of changes in earnings; *ni* current earnings; *earn* changes in earnings; *salesgrowth* changes in sales from prior year; *dummy* an indicator variable where 1 is for 2010/2012 and 0 for 2006/2008.

*** significant at level 1%; ** significant at level 5%; *significant at level 10%

Appendix IV – Penalized CG indices and Earnings Management – Model 2 (signed ni / earn)

	Modified Jones model			DeFond and Park (2001) model				Modified Jones model			DeFond and Park (2001) model		
	Pre-Law period (2006/2008)	Post-Law period (2010/2012)	Pooled Sample	Pre-Law period (2006/2008)	Post-Law period (2010/2012)	Pooled Sample		Pre-Law period (2006/2008)	Post-Law period (2010/2012)	Pooled Sample	Pre-Law period (2006/2008)	Post-Law period (2010/2012)	Pooled Sample
variables	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	variables	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)
cgpentotal	0.328 (6.120)***	0.107 (2.035)**	-0.267 (-2.463)**	0.251 (3.485)***	-0.056 (-0.961)	0.054 (0.430)	cgpenmand	0.006 (0.234)	0.036 (5.508)***	-0.105 (-2.954)***	0.078 (2.906)***	-0.100 (-14.493)***	-0.039 (-1.255)
							cgpenbp	0.276 (4.635)***	0.002 (0.115)	0.772 (3.391)***	-0.001 (-0.024)	-0.199 (-13.148)***	0.547 (2.680)***
ownconc	0.022 (1.231)	0.012 (0.979)	-0.019 (-1.425)	0.036 (2.333)**	0.008 (0.761)	0.015 (1.222)	ownconc	0.006 (0.514)	-0.008 (-0.781)	0.008 (0.819)	0.021 (2.318)**	-0.010 (-1.044)	0.016 (1.725)*
ta	-0.014 (-6.509)***	-0.010 (-5.413)***	-0.007 (-3.949)***	-0.009 (-4.295)***	-0.006 (-3.665)***	-0.008 (-4.6886)***	ta	-0.013 (-8.359)***	-0.011 (-8.196)***	-0.014 (-6.708)***	-0.006 (-5.177)***	-0.006 (-3.920)***	-0.011 (-5.384)***
lev	0.049 (2.400)**	-0.027 (-2.028)**	-0.002 (-0.099)	0.036 (1.748)*	0.000 (0.016)	-0.004 (-0.341)	lev	0.040 (2.405)**	-0.017 (-2.053)**	-0.023 (-1.715)*	0.023 (1.725)*	0.029 (2.870)***	-0.014 (-1.124)
ni	-0.088 (-1.545)	-0.235 (-6.231)***	-0.187 (-4.019)***	-0.175 (-2.707)***	-0.132 (-3.749)***	-0.226 (-5.270)***	ni	-0.097 (-3.090)***	-0.112 (-18.633)***	-0.237 (-5.934)***	-0.159 (-5.382)***	-0.003 (-0.847)	-0.234 (-6.005)***
earn	-0.106 (-1.596)	0.040 (1.148)	0.099 (1.950)*	-0.047 (-0.554)	0.015 (0.490)	0.045 (0.908)	earn	0.008 (0.142)	-0.077 (-3.217)***	0.055 (1.669)*	0.033 (0.480)	-0.100 (-4.498)***	0.029 (0.782)
salesgrowth	0.011 (1.037)	0.008 (0.655)	0.019 (1.685)*	0.018 (1.656)*	0.010 (0.932)	0.016 (1.738)*	salesgrowth	0.014 (1.713)*	0.021 (2.738)***	0.011 (1.312)	0.023 (3.090)***	0.015 (1.903)*	0.015 (1.750)*
dummy			0.050 (1.110)			0.027 (0.585)	dummy			0.106 (2.919)***			0.128 (3.954)***
cgpentotal* dummy			0.022 (0.247)			-0.094 (-1.098)	cgpenmand* dummy			0.051 (1.330)			0.013 (0.384)
							cgpenbp*dummy			-0.767 (-3.670)***			-0.624 (-3.394)***
<i>J</i> -statistic	0.0872	0.0597	0.1309	0.0766	0.0733	0.1346	<i>J</i> -statistic	0.1227	0.1179	0.1387	0.1252	0.1266	0.1434
<i>N</i>	392	371	763	392	371	763	<i>N</i>	392	371	763	392	371	763

Variables: *EM* discretionary accruals using the Modified Jones model; *AWCA* abnormal working capital accruals using the DeFond and Park (2001) model; *cgpentotal* penalized total CG index; *cgpenmand* penalized mandatory CG index; *cgpenbp* penalized best practice CG index; *ownconc* ownership concentration; *ta* total assets; *lev* leverage; *ni* value of current earnings; *earn* value of changes in earnings; *salesgrowth* changes in sales from prior year; *dummy* an indicator variable where 1 is for 2010/2012 and 0 for 2006/2008. *** significant at level 1%; ** significant at level 5%; *significant at level 10%

Appendix V – Non-Penalized CG indices and Earnings Management – Model 2 (signed ni / earn)

	Modified Jones model			DeFond and Park (2001) model				Modified Jones model			DeFond and Park (2001) model		
	Pre-Law period (2006/2008)	Post-Law period (2010/2012)	Pooled Sample	Pre-Law period (2006/2008)	Post-Law period (2010/2012)	Pooled Sample		Pre-Law period (2006/2008)	Post-Law period (2010/2012)	Pooled Sample	Pre-Law period (2006/2008)	Post-Law period (2010/2012)	Pooled Sample
variables	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	variables	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)	coefficient (t-stat)
cgpnontotal	0.359 (6.027)***	0.055 (2.584)**	-0.182 (-2.484)**	0.346 (5.033)***	-0.014 (-0.582)	0.281 (2.487)**	cgnonmand	0.002 (0.199)	0.016 (1.945)*	-0.006 (-0.312)	0.064 (6.098)***	-0.024 (-3.586)***	0.001 (0.034)
							cgnonbp	0.200 (7.902)***	0.060 (6.036)***	0.258 (4.894)***	0.012 (0.477)	-0.036 (-3.020)***	0.324 (5.186)***
ownconc	0.017 (0.930)	-0.004 (-0.368)	-0.008 (-0.749)	0.037 (2.241)**	0.007 (0.737)	0.023 (1.936)*	ownconc	0.008 (0.751)	-0.000 (-0.033)	0.009 (0.904)	0.018 (2.021)**	0.008 (1.043)	0.023 (2.409)**
ta	-0.017 (-7.216)***	-0.009 (-5.192)***	-0.008 (-5.323)***	-0.011 (-4.644)***	-0.008 (-5.060)***	-0.012 (-6.072)***	ta	-0.015 (-8.220)***	-0.013 (-10.158)***	-0.012 (-8.743)***	-0.006 (-3.932)***	-0.011 (-8.382)***	-0.012 (-7.062)***
lev	0.057 (2.798)***	-0.031 (-2.482)**	-0.002 (-0.155)	0.047 (2.133)**	0.000 (0.022)	-0.007 (-0.508)	lev	0.035 (2.201)**	-0.012 (-1.500)	-0.014 (-1.322)	0.011 (1.014)	0.023 (3.454)***	-0.015 (-1.398)
ni	-0.020 (-0.338)	-0.255 (-7.364)***	-0.211 (-4.669)***	-0.114 (-1.622)	-0.156 (-4.687)***	-0.227 (-4.902)***	ni	-0.098 (-3.172)***	-0.105 (-20.485)***	-0.215 (-6.447)***	-0.190 (-7.212)***	-0.021 (-3.265)***	-0.218 (-6.488)***
earn	-0.179 (-2.641)***	0.042 (1.363)	0.079 (1.687)*	-0.132 (-1.492)	-0.021 (-0.660)	0.018 (0.384)	earn	0.006 (0.123)	-0.071 (-3.154)***	0.041 (1.255)	0.090 (1.712)*	-0.105 (-4.823)***	0.006 (0.156)
salesgrowth	0.008 (0.706)	0.012 (0.978)	0.019 (1.889)*	0.008 (0.650)	0.017 (1.719)*	0.015 (1.442)	salesgrowth	0.014 (1.588)	0.025 (3.168)***	0.015 (1.723)*	0.019 (2.660)***	0.010 (1.307)	0.013 (1.453)
dummy			0.052 (0.686)			-0.041 (-0.629)	dummy			0.112 (2.704)**			0.128 (2.857)***
cgpnontotal* dummy			-0.057 (-0.557)			-0.033 (-0.378)	cgpnontotal* dummy			-0.046 (-2.248)**			-0.056 (-2.301)**
							cgpnontotal* dummy			-0.251 (-4.114)***			-0.274 (-4.171)***
<i>J</i> -statistic	0.0880	0.0826	0.1202	0.0774	0.1005	0.1287	<i>J</i> -statistic	0.1312	0.1363	0.1300	0.1298	0.1367	0.1327
<i>N</i>	392	371	763	392	371	763	<i>N</i>	392	371	763	392	371	763

Variables: *EM* discretionary accruals using the Modified Jones model; *AWCA* abnormal working capital accruals using the DeFond and Park (2001) model; *cgpnontotal* non-penalized total CG index; *cgpnontotal* non-penalized mandatory CG index; *cgpnontotal* non-penalized best practice CG index; *ownconc* ownership concentration; *ta* total assets; *lev* leverage; *ni* value of current earnings; *earn* changes in earnings; *salesgrowth* changes in sales from prior year; *dummy* an indicator variable where 1 is for 2010/2012 and 0 for 2006/2008. *** significant at level 1%; ** significant at level 5%; *significant at level 10%

Appendix VI – Concentrated ownership (family ownership)

Year	# of firms	total family firms	% family firms	from family firms how many have a family member as the largest shareholder (ownership concentration)	% of family firms that are biggest shareholder
2006	220	107	49%	88	82%
2008	217	112	52%	96	86%
2009	221	115	52%	97	84%
2010	187	105	56%	92	88%
2011	203	105	52%	90	86%
2012	190	102	54%	92	90%