TECHNICAL UNIVERSITY OF CRETE

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The Effects of Corporate Governance on Credit Ratings

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ABSTRACT

The implementation of "good" Corporate Governance in firms has been of increasing importance during the last two decades. The effect on corporate performance and firm value has been the subject of much research. We use an ordinal regression and analyze a set of 906 different firm during the period 2003-2009 to investigate the link between corporate governance (as provided by RiskMetric's commercial ratings) and credit ratings (Moody's). We find that credit ratings seem increasingly linked to size and the statistical power of the commercial governance ratings is very little. However due to the penetrating nature of our analysis we find some interesting insights when more the more detailed subscores are used.

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1. Introduction

All types of organizations and especially the ones which deal with money and have the purpose of making profits and creating wealth deploy all kinds of managing schemes in order to exist and work properly, pursuing their goals.

These organizations to exist need resources, mainly capital, to pay for their infrastructure and implement their business plans in hope of having positive returns on their investments. To acquire these resources - the capital they need to finance their plans - a typical firm would usually resort in outside financing, provided either from a bank or by shareholders and bondholders (stakeholders). But when dealing with large organizations (especially publicly owed ones), the typical stakeholders, have little control or actual knowledge of the decisions made by the management as to how the finance they provided to the firm is used. Even banks in cases where their exposure in a firm is not great (with respect to the size of the firm) are faced with this problem.

To address these types of transparency problems corporate governance norms which deal with the outside supervision of a firm's management were developed. Although a corporation's financial performance is a major factor when its probability of default is computed, the behavior and the mentality of the higher management under which a company operates is also very important and should be taken into account. The latter is not an easy task to do as the quantification of quality characteristics presents challenges in itself.

The scope of this research is to evaluate whether these corporate governance provisions if taken into account affect-explain firm credit ratings. This is done by implementing an ordinal regression analysis on a data set of US companies during the period 2003-2009. We find that RiskMetrics's corporate governance quotient (CGQ) does not provide any real statistical explanatory power to our classification models. The remainder of this paper is organized as follows. In section 2 an introduction to the concept and need of corporate governance as well as RiskMetric's governance variables which aggregate the several dimensions of corporate governance. In section 3 we present the link between corporate governance, performance and credit ratings. In section 4 we present the analysis of our data. We find a strong relation between size and credit ratings supporting a too big to fail logic. The selected methodology is presented. Section 5 explains our results and section 6 concludes our analysis.

2. Corporate governance

2.1 The concept of corporate governance

As stated in Shleifer & Vishny, (1997) "Corporate Governance deals with the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment". Managers having the control of a firm could misuse capital either by expropriating it or by making decisions based on maximizing their own gain and

not that of the firm's. The protection of minority shareholders, whose interests are usually at stake from managers self-dealing and the establishment of a legal framework in order to safeguard for such behaviors are aspects of corporate governance provisions. Corporate governance is primarily about transparency and reduction of information asymmetry and these values affect everyone that comes in contact with a firm.

 Alongside with the shareholders, bondholders which in return for their money only receive the promise of return with interest and a legal commitment from the firm to repay them, also benefit from corporate governance and the reduction in information asymmetry that derives from these norms, but not in the same way as shareholders because of the diverging interests between them. For example in typical cases where shareholders would push management to undertake riskier projects because of their higher returns if successful; this means that bondholders find themselves exposed to the same risk without the additional costs being valued when they purchased the firms debt thus reducing the value of their portfolio at an ex post time. Information about a company's shareholder rights, which with the adoption of good governance practices would become more evident, is crucial for a bondholder to make an informed decision and assessment of the company's debt value, which should be mirrored in credits ratings as well.

A typical practice to ensure better management behavior and increase the corporate governance valuation of the firm is to align the interests of top management with that of the firm's by compensating senior staff with larger stock ownership and to ensure the independency of the board, so as to monitor its decision making (e.g., by introducing external non-executive directors which are not selected by the CEO, ensuring that the positions of CEO and board chairperson are occupied by different individuals, etc.). The scope of these provisions is to safeguard from management's opportunistic behavior which results in wealth loses or transfers between all involved stakeholders and a reduction of the firm's value.

Large ownership from an outside investor or institutional investor is also generally considered as an effective measure of good governance as these types of investors have the necessary power to monitor management's decisions and protect the rights of minority shareholders. It should, however, be kept in mind that there is too much of a good think as Sengupta & Bhojraj, (2003) shows that shareholder rights have an ambiguity and probably an "ad hoc" effect on credit rating valuation.

Depending on the country of operation Corporate Governance mechanisms can be perceived as general guide lines of financial transparency that can be used by firms in order to attract finance. That tends to be the case in emerging countries and transitional economies where the legal environment concerning corporate decision making monitoring is weak in comparison with developed countries and thus better governance results in higher valuations and operating performance(Chhaochharia & Laeven 2009; Klapper & Love 2004; Morey et al. 2009). In many developed countries

however mandatory regulations are set by governments to protect stakeholders and as such comprise "economic and legal institutions that can be altered through the political process – sometime for the better" (Shleifer & Vishny 1997). Bruno & Claessens, (2010) found that firm value depends on country-level shareholder protection laws as well as firm-level corporate governance attributes.

Bozec & Bozec, (2012) note the difference in the approach of implementing corporate governance provisions between European countries and Canada which follow a principle-based approach and the United States where a rule-based approach is implemented. The difference is that the former follows a comply or explain control over the stated governance provisions, requiring the disclosure of the extend that a firm has implemented the proposed guidelines in their annual reports and to explicitly explain the reasons for not following some of them. The latter requires a reverential implementation of the stated and in extent detailed provisions.

2.2   The need for corporate governance

 The origin of the problem which corporate governance provisions deal with is based on the notion of the Agency Problem (Jensen & Meckling 1976). This concept is based on the separation between the ownership of the firm and that of the control of the firm. The people who invest in a firm providing finance (either bondholders or stockholders) and thus have ownership rights do not have direct control in the workings of the firm. The higher management of the firm which may or may not have any ownership rights is responsible for the control of the firm.

Because of this separation the finance providers need ways to assure that the money they provide are not expropriated or misused. Corporate governance provides limitation to managers' discretion and control power so as to provide protection to the stakeholders from abuse. One of the main reasons why investors are abused from the management is the fact that in many cases they have a very small percentage of ownership in a firm. Also they are usually poorly informed about the firm which they have invested in and lack the technical skills and knowledge necessary to fully evaluate the management's decisions and even then they do, they lack the necessary amount of shareholdings to impose their will. As a result management is left with a lot of decision making power at their discretion.

Expropriating money from a firm can be as easy as setting up a company owned by the manager and selling the output of the firm that he manages to the firm that he owns at below market prices. Even simpler controlling the buying decisions for the resources needed for the firm he manages he could take a hidden commission raising the price of the resources. Also although less obvious the use of costly perquisites ranging from high priced company cars to frequent use of company aircrafts (Yermack, 2006), to overcompensating themselves and so on.

In general, corporate governance especially in the US is an actively enforced, via law, instrument of outside monitoring of the firm's managerial decision making processes and disclosure of its financial state. Through these provision firms become more transparent to prospective outside investors providing at the same time protection especially to minority stakeholders. To accomplish the monitoring of firm compliance to the "good" governance concept rating agencies employ several dimensions of corporate governance (which we report latter on) and the firms conform to them is controlled.

This need for transparency and the magnitude of the effect governance has to a company became evident in the start of decade, when major financial failures (such as Enron, Tyco International, Worldcom, etc.) caused turmoil in the global markets. The reactions to these failures in the U.S. was the Sarbanes-Oxley Act of 2002 (SOX) which enacted a number of major revisions on the federal securities law, covering issues like auditor independence, enhanced financial disclosure, internal control assessment and corporate governance, imposing more strict and legally accountable rules to management decisions. Until now the act has stern a lot of ongoing controversy about its benefits and net costs of implementation to stakeholders and firms respectively.

2.3 The Risk Metrics' corporate governance index

The way for a researcher to evaluate a firm's implementation of corporate governance provisions is to use either self-gathered data or commercially provided ones. In this study the corporate governance data are provided by Risk Metrics Group.

The methodology used by Risk Metrics[1] is divided into three stages. In the first stage an analyst using publicly disclosed information profiles a company against specific indicators. In the second stage the "raw" score achieve by a company is calculated from the profile and relative rankings are created that compare each company's corporate governance quotient with other companies in the same index and in the same industry group. The third stage concerns the continuous updating process of the data as new information is incorporated to the rankings.

There are four broad rating categories-dimensions that envelop different issues within them. These are a) board, b) antitakeover, c) compensation/ownership, d) audit. Risk Metrics provides the CGQ index score which represents the percentage of companies in the relevant market index, that a specific company outperforms and the CGQ industry scores which relays how many (as percent) of the companies in the industry peer group (based on the S&P Global Industry Classification System), are outperformed by a specific company. The scale used in both is 0 to 100%.

As index and industry scores express an overall comparison between firms RiskMetrics also provides CGQ subscores where a company's governance in a particular governance area is evaluated. Companies are ranked into quintiles relative

to a relevant index and industry group. The subscores are expressed in a 1 to 5 scale where 5 indicates that a company is in the top quintile in a governance area and 1 indicates that a company is in the bottom quintile in a governance area. Subscores are calculated for board, takeover defenses, compensation and audit.

In detail the CGQ comprises of 67 variables which are divided into eight core topics: 1) Board, 2) Audit, 3) Charter/Bylaws, 4) State of Incorporation, 5) Ownership, 6) Executive and Director Compensation, 7) Progressive Practices, 8)Director Education.

Board

1. Board composition
2. Nominating committee composition
3. Compensation committee composition
4. Governance committee
5. Board structure
6. Board size
7. Changes in board size
8. Cumulative voting
9. Boards served on – CEO
10. Boards served on – Other than CEO
11. Former CEOs on the board
12. Chairman/CEO separation
13. Governance guidelines
14. Response to shareholder proposals
15. Board attendance
16. Board vacancies
17. Related-party transactions -- CEO
18. Related-party transactions – Other than CEO
19. Majority Voting
20. ISS Recommendation of Withhold Votes

Audit

21. Audit committee

22. Audit fees
23. Auditor ratification
24. Financial experts
25. Financial Restatements
26. Options Backdating

Charter/Bylaws

27. Poison pill adoption
28. Poison pill – shareholder approval
29. Poison pill – TIDE provision
30. Poison pill – sunset provision
31. Poison pill – qualified offer clause
32. Poison pill – trigger
33. Vote requirements – charter/bylaw amendments
34. Vote requirements – mergers
35. Written consent
36. Special meetings
37. Bylaw amendments
38. Capital structure – dual class
39. Capital structure – blank check preferred

State of Incorporation

40. State of incorporation antitakeover provisions
41. Control share acquisition

42. Control share cashout

43. Freezeout

44. Fair price

45. Stakeholder law

46. State endorsement of poison pills

Ownership

47. Director stock ownership

48. Executive stock ownership guidelines

49. Director stock ownership guidelines

50. Officer and director stock ownership levels

51. Mandatory holding period for stock options

52. Mandatory holding period for restricted stock

Executive and Director Compensation

53. Cost of option plans

54. Option repricing permitted

55. Shareholder approval of option plans

56. Compensation committee interlocks

57. Director compensation

58. Option burn rate

59. Performance-based compensation

60. Option expensing

Progressive Practices

61. Board performance reviews

62. Individual director performance reviews

63. Meetings of outside directors

64. CEO succession plan

65. Board can hire outside advisors

66. Directors resign upon job changes

Director Education

67. Directors participating in director education programs

3. Corporate governance and corporate performance

3.1 Literature overview

The logic behind the corporate governance norms is the protection of the owners and creditors of a firm from loses due to management expropriation, self-dealing, and incompetence. Corporate governance aims to align the management's goals with those of the shareholders acting as a monitoring device to prevent agency conflicts and to provide accountability. Thus it would be a logical assumption to expect that given a firm that implements better governance practices, it would present better performance and have greater stock price returns and generally better long-term performance relative to a peer which does not. The existing literature, however, has presented mixed findings.

Core, Holthausen, & Larcker, (1999) find that firms with weaker governance structures have greater agency problems as CEOs at these firms extract greater compensations and these firms perform worse. Gompers, Ishii, & Metrick, (2003)

(GIM) produced a governance index of the level of shareholder rights using a sample of 1500 firms and found that firms with stronger shareholder rights have higher firm value, profits, sales growth, lower capital expenditures, and made fewer corporate acquisitions. Sengupta & Bhojraj, (2003) find that firms which have greater institutional ownership and stronger outside control of the board enjoy lower bond yields and higher ratings on their new issues. However, concentrated institutional ownership has an adverse effect on yields and ratings. Their results also indicate that institutional ownership and outside director representation have stronger effects on bond yields and ratings for lower rated bonds. This is due to the fact that for high-risk firms past profitability and leverage may not be very informative about future cash flows so lenders and rating agencies would rely more on the firm's governance structure using it as a proxy for conditions of greater default risk. Brown & Caylor, (2004) produced their own governance score, which was a composite measure of 51 factors from eight categories of corporate governance (provided by the Institutional Shareholder Services - ISS) and found that good governance as measured with executive and director compensation is most highly associated with good performance (higher profitability, value and cash pay outs to shareholders). (Ashbaugh-Skaife et al. 2006) also provide evidence that firms with speculative-grade credit ratings overcompensate their CEO's, a similar finding to Core et al., (1999). Bhagat & Bolton, (2008) considering seven different governance measures find that better governance as measured by the GIM and BCF[2] indices, stock ownership of board members, and CEO-Chair separation is significantly positively correlated with better contemporaneous and subsequent operating performance but none of the governance measures are correlated with future stock market performance. In several instances inferences regarding the (stock market) performance and governance relationship do depend on whether or not one takes into account the endogenous nature of the relationship between governance and (stock market) performance. Given poor firm performance, the probability of disciplinary management turnover is positively correlated with stock ownership of board members, and with board independence, but board independence is negatively correlated with contemporaneous and subsequent operating performance. However, better governed firms as measured by the GIM and BCF indices are less likely to experience disciplinary management turnover in spite of their poor performance. In their study they proposed the dollar ownership of the board members as a governance measure which is less prone to measurement error, and not subject to the problem of weighting a multitude of governance provisions in constructing a governance index. The logic behind this measure is that as the board controls the company and makes all the important decision concerning its operation, board ownership is a good proxy for overall board governance itself since more involved boards should make better decisions.

Heracleous, (2001) finds no significant relationship between two of the considered as "best practices" in corporate governance, the CEO/Chair duality and the

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[2] Bebchuk, Cohen and Ferrell [Bebchuk, L., Cohen, A., and Ferrell, A.], 2004, What matters in corporate governance?, Working paper, Harvard Law School]

insider/outsider composition with organizational performance. Epps & Cereola, (2008) used the ISS corporate governance quotient ratings (CGQ) for years during 2002-2004 and found no statistical evidence between performance measures like return on assets (ROA) and return on equity (ROE) with the corporate governance ratings. Ertugrul & Hegde, (2009) find that summary scores of the three premier US commercial governance ratings (provided by The Corporate Library (TCL), Institutional Shareholder Services (ISS), Governance Metrics International (GMI)), are generally poor predictors of primary (summary measures that cover operating performance and stock returns) and secondary measures (related to four corporate events: the propensity to delist, the likelihood of bankruptcy, the exposure to class action lawsuits, and the exposure to accounting-related SEC enforcement actions) of future firm performance. In contrast, several of the TCL sub-ratings[3] exhibit significant predictive power with respect to the primary and secondary measures of firm performance, but others have incorrect or unexpected signs. Daines, Gow, & Larcker, (2010) examine four major commercial corporate governance rating agencies (RiskMetric/ISS, GovernanceMetrics International, The corporate Library and Audit Integrity) for their predictive ability on accounting restatements, class action lawsuits and traditional measures of corporate performance like accounting operating performance, Tobin's Q and excess stock returns. They also examine the relationship of governance ratings and cost of debt (effectively credit ratings). They find no substantial overall effect between the governance ratings and the performance of the evaluated firms. In fact, the authors note that "none of the ratings are able to predict the subsequent changes in a firm's cost of debt, as measured by tis credit rating." and "… CGQ (perhaps the most visible governance rating) exhibits virtually no predictive ability, and when CGQ is significant, more often than not it has an unexpected sign (e.g., higher CGQ seems to be associated with lower Tobin's Q, and in some models more class-action lawsuits)". It is their suggestion that commercial ratings contain a large amount of measurement error which renders them ineffective in the role they wish to fulfill. Tian and Twite (2011) using a sample of Australian companies find that internal corporate governance affects firm productivity differently. Better governance (i.e., more non-executive directors, smaller boards and higher CEO stock-based compensation) has a positive impact on productivity. However, when a firm operates in a competitive industry, the tougher product market competition reduces agency problems (namely the opportunity for managerial slack or inefficiency) which weakens the effectiveness of internal corporate governance to firm productivity due to this strong substitution effect. In non-competitive industries, internal corporate governance – measured either by board independence or CEO stock-based compensation – is more useful and has a positive influence on Total Firm Productivity (TFP).

So the link between corporate governance attributes and performance has inherently a lot of ambiguity and many times an "ad hoc" approach concerning the time frame (as

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[3] They refer primarily to the accounting-related TCL subratings which assess the quality of the reported earnings

part of the business cycle, weather in "normal" or crisis periods), the place (as to the development of the market and tis spatial positioning) and even the strength of the competition in its environment, relative to its findings, especially when prefabricated commercial governance ratings are involved in the evaluation process to aggregately proxy for governance characteristics. Leung & Horwitz, (2010) for example evaluated the effects of management ownership and other governance variables on Hong Kong firms' stock performance following the onset of the Asian Financial Crisis (AFC) of 1997-1998. Hong Kong firms (unlike US firms) have a skewed management ownership distribution toward concentrated ownership (strong insider ownership), as according to the 1994 statistics, family owned firms were worth about US$155 billion, representing 60% of the total market capitalization (Weidenbaum and Hughes 1996). However, Hong Kong has a public investor protection system that ranks alongside the U.S., U.K. and Australia. They find that firms with a relative more concentrated stock ownership (by the number of board executives) experienced a smaller stock price decline during the AFC period, suggesting that a more concentrated management ownership preserves the stock value for outside (minority) investors. Also a higher stock ownership by non-executive (outside) board members leads to better performance, but the proportion of non-executive directors on corporate boards has no effect on performance. Finally, for the CEO/chair separation practice they find that firms where a single person occupied both positions experienced a lower stock price decline during the AFC which contrasts with what is usually perceived as a good governance norm. They conclude that the strengthening of securities regulation, judicial enforcement and board independence while allowing the market to determine the extent and degree of management ownership could be a more effective governance measure.

The latter could reveal that investors perceive positively the intuitive nature of "good" governance even when there is no immediate or highlighted connection with firm performance. Heracleous, (2001) refers to a study by McKinsey Consultants[4] (Felton et al. 1996; Hawkins 1997) which concluded that investors were willing to pay an average of 11% premium (on stock price) for companies they perceive as having good corporate governance. Although (as he explicitly states) this result demonstrates the investors' perceptions of the existence of best practices on stock price and is based on what investors say that they would do and not what they actually do, another set of three surveys conducted by Coombes & Watson, (2000) and highlighted in Sengupta & Bhojraj, (2003) discover how shareholders perceive and value corporate governance in developed and emerging markets, where 75% of the investors surveyed said that board practices are at least as important as financial performance when they evaluate companies for investment and over 80% noted that they would pay a premium for well-governed firms.

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[4] The study explored the possibility of placing a monetary value on good governance defined as having a majority of outsiders on the board; having independent directors with no management ties and who own a significant amount of the stock of the company; who are remunerated to a large extent by stock and who are formally evaluated; and lastly, who are responsive to investor requests

To summarize, it is evident by this brief review that there are no golden bullets when it comes to corporate governance and especially commercial produced governance ratings, but rather the intuitive, and many times logical perception of how to safeguard firms from mishaps either from top management unfortunate governance practices of appropriation or incompetence. An interesting note of this fact is derived by the findings of Brown & Caylor, (2009) who found that from the nine governance provisions mandated by the three major U.S. exchanges[5] in late 2003, none were significantly and positively related to firm operating performance with respect to others not so mandated.

The addition of external directors and separating the positions of CEO and chairperson, however, are indeed some of the most common practices. The latter is usually a good way to control for arbitrary decision making in "normal" periods of operation, while the former seems to have a more universal value of implementation. For example, in an empirical assessment of bankrupt firms by Daily & Dalton, (1994) joint CEO/board structures where not found to be more likely associated with bankrupt firms, and bankrupt firms did not have fewer independent directors or lower proportions of such directors on their boards. Firms however that are characterized by joint CEO/chairperson structures and that have lower proportions of independent directors, are associated with bankruptcy. This interaction term proved its statistical significance for both 5 and 3 years prior to bankruptcy filings, not providing additional explanatory power only for the year of filing.

Even though the link between corporate governance, firm performance and bankruptcy seem to be existent, the connection is difficult to be modeled or measured properly. The same should also be expected when corporate governance is associated with credit ratings.

3.2 Credit ratings

Credit ratings are assessments provided from rating agencies' of the possibility that a certain company will default on its debt. To do this, agencies evaluate a company's future cash flows and if these cash flows will be sufficient to cover future liabilities. The lower the mean of the future cash flows, or the higher the variance, the higher the probability of default.

As all information in the financial markets is not accessible to all interested parties and not everyone is able to conduct highly technical investment analysis, investors and companies use credit rating agencies as a proxy to alleviate information asymmetry in the capital market. Agencies relay their opinion about the credit worthiness of a firm using both sophisticated prediction models as well as "inside" information from the firms themselves.

Usually an agency appoints an analyst or analysts to a company under evaluation, which keep direct channels of communication with the companies they follow having

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[5] New York Stock Exchange, Nasdaq Stock Market, and American Stock Exchange

also access to confidential information. This information is in turn included in their evaluations and thus disseminated to the financial markets beyond that publicly disclosed (Ederingtona1 & Goh 1998). As presented by Jorion, Liu, & Shi, (2005) analysts are given minutes on board meetings and are informed about financial projections, new product plans, capital spending plans and even information about product line and division financial achievements. Tang, (2009) states that this behavior is followed so an agency can incorporate this information to the credit ratings without the company needing to disclose specific details to the public and thus avoid benefiting competitors, the latter being supported also by Kisgen, (2006, 2009).

Understandably all firms are interested in having the highest possible credit rating as this will result in paying lower interest when issuing new debt and enjoying greater and easier coverage of equity base increases versus low credit rated firms. Having lower financing costs means higher cash flows and better profit margins thus more stable firms.

3.3 Corporate governance and credit ratings

Following the agency theory's assumptions, in every firm where the management is separated from the ownership, exists a danger of expropriation. As quoted by Adam Smith himself:

"The directors of such [joint-stock] companies, however, being the managers rather of other people's money than of their own, it cannot well be expected, that they should watch over it with the same anxious vigilance with which the partners in a private copartnery frequently watch over their own".[6]

The role of a credit rating is, as mentioned, to project a forecast of a company's future financial state. In order to do so effectively the behavior of its management needs to be taken into account. That is where corporate governance comes into play. The norms developed having the main goal of controlling managers' behavior and companies' attitude toward their stakeholders, disclose the inner state of the firm. This information helps both rating agencies and inside and outside investors to evaluate how well a company is managed relaying information about management's expropriating behavior which is disseminated through the credit rating.

The evaluation however of a firm's corporate governance is not a straightforward process. That means that the corporate governance provisions affect differently the interests of stockholders and bondholders. For example management's shareholder driven decisions of pursuing higher risk projects, which if successful would increase stock value, will reduce the value of a bondholder's portfolio as these decisions elevate the risk of bankruptcy, thus reducing debt value (lower credit rating). Policies

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[6] Adam Smith. The Wealth of Nations, 1776, Cannan Edition (Modern Library, New York, 1937) p. 700.

that affect stakeholders' rights in the company also have different results for stockholders and bondholders. Klock, Mansi, & Maxwell, (2005) provide evidence that firms with stronger anti-takeover provisions (which mean that shareholders rights are weaker) have a lower cost of debt financing compared with weaker anti-takeover provisions. So, prospective bond buyers are affected favorably towards this type of corporate governance provisions.

Although the difference in interests in specific management decisions, good corporate governance allows companies to achieve better results. Both Brown & Caylor, (2006) and Chung, Elder, & Kim, (2010) find that firms with better governance are more profitable and valuable (appearing to have higher Tobin's q) and having lower spreads, lower price impact of trades, smaller probability of information based trading having at the same time a higher market quality index, respectively. This can be considered evidence of the fact that when manager actions express due diligence and respect to their "duty of loyalty" to their shareholders, firms achieve better results which off course affects their credit ratings.

With good corporate governance, less enforced provisions need to be made in order to restrict management's opportunistic behavior, a fact which is also reflected in the ratings. Such provisions are, as Grossman & Hart, (1982) noted, the use of additional debt which increases the risk of default so as to restrain managers from overconsumption of perquisites and to increase their efficiency. This is imposed especially when a firms appears to have excess amounts of "free" cash (Jensen 1986) available. The intention is to force management to pay interest payments so as not to over consume perquisites and also not leave any available cash for expropriation. Jiraporn, Kim, Kim, & Kitsabunnarat, (2012) not only provides evidence of the inverse relation between leverage and corporate governance but also determines that the direction of causality is towards the fact that better governance brings about lower levels of leverage. As lower debt is considered positive from a credit rating perspective the evaluation of such firms (and is retrospect their corporate governance "scores") is expected to result in better ratings.

4. Empirical setting

4.1 Sample selection and descriptive statistics
The data were collected from three separate sources. Corporate governance (CG) data were collected from Risk Metrics while the financial data from Osiris and credit ratings from Moody's. After matching companies to their respective financial and corporate governance data we ended up with 5481 firm-years observations. Controlling for credit rating availability and excluding financial companies (banks, insurance etc.) and companies with no available rating from Moody's we ended with 3418 firm-year observations from 2003 to 2009 with a total of 906 different firms. These observations increased steadily though time starting from 393 in 2003 reaching to 609 in 2009. (Figure 1)
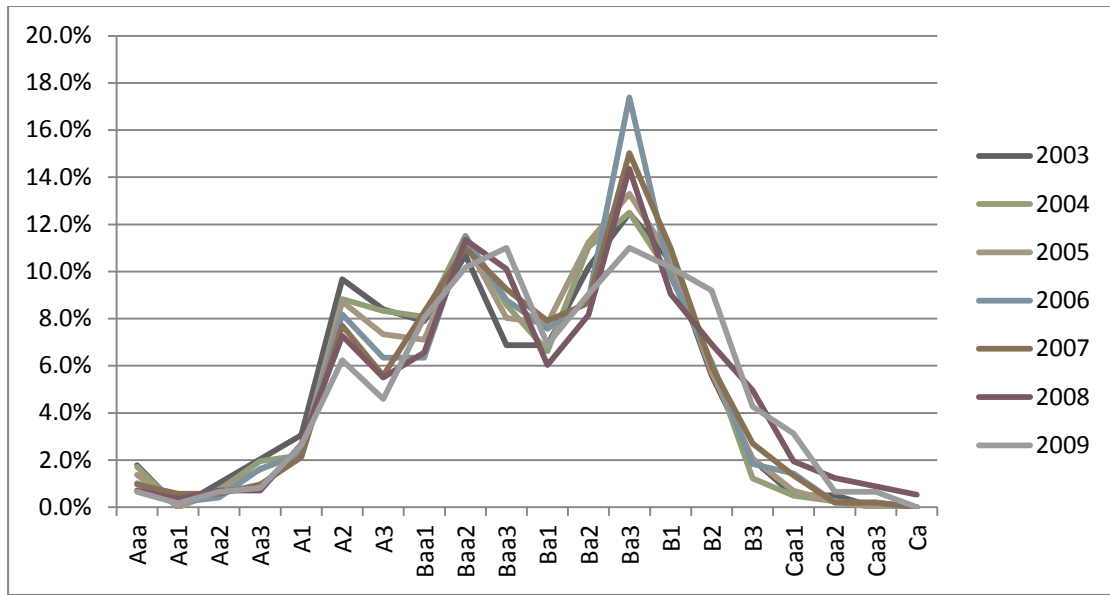
Figure 1. Distribution of firms per rating per year.

Despite this increase, we consider our sample to be balanced and steady with no big differences in numbers from year to year and covering 29 different industry sections as provided by Moody's (table 1).

The average (median) percent per business sector of total firms was 3.33% (2.43%), with the five biggest sector being energy 13.17% (450 firms), manufacturing 9.36% (320 firms), consumer products 8.57% (293 firms), retail 7.72% (264 firms) and utilities 7.28% (249 firms) composing a total of 46.11% (1576 firms). The ratings provided by Moody's where quite fine grained as Moody's is oriented in providing short term accuracy changing credits faster than other agencies.

However for our analysis we aggregated Moody's 20 categories in 6 larger groups appointing an ordinal category number ranging from **1** for Aaa to Aa3 3.31% (113 firms), **2** for A1 to A3 16.76% (573 firms), **3** for Baa1 to Baa3 27.62% (944 firms), **4** for Ba1 to Ba3 30.25% (1034 firms), **5** for B1 to B3 19.66% (672 firms) and **6** for Caa1 to Ca 2.4% (82 firms).

This aggregation gives a distribution (Table 1) that resembles the normal distribution. We should note at this point that as our evaluation in conducted on annual bases. In particular, for the accounting data of year t, the final credit rating at the end of the first quarter of t+1 was recorded. To have an understanding of the firms size and characteristics, the smallest firm in our data set had a total assets size of $115 million while the biggest one $798 billion. This wide range imposes some limitation to generalizing findings, particularly for small companies. Renders, Gaeremynck, & Sercu, (2010) found a positive relationship between corporate governance ratings and performance after controlling for this selection bias and endogeneity simultaneously,

noting that their findings seemed to be dependent on the quality of the institutional environment.

Table 1. Distribution of firms per rating, years 2003-2009

Rating Group	Rating	Number of firms per Rating	Percentage of firm per industry
1	Aaa Aa1 Aa2 Aa3	113	3,31%
2	A1 A2 A3	573	16,76%
3	Baa1 Baa2 Baa3	944	27,62%
4	Ba1 Ba2 Ba3	1034	30,25%
5	B1 B2 B3	672	19,66%
6	Caa1 Caa2 Caa3 Ca	82	2,40%

Interestingly they also found that the benefits that improvements in corporate governance bring to performance are marginally reducing over time. Firms in each group have a total assets value between a range (average, median) as follows; **group 1**: 8 to 800 billion (110.7b, 40.5b), **group 2**: 1.5 to 276 billion (22.7b, 10.6b), **group 3**: 561 million to 310 billion (14b, 7b), **group 4**: 186 million to 269 billion (5.2b, 2.6b), **group 5**: 115 million to 192 billion (3.4b, 1.6b) and **group 6**: 250 million to 279 billion (13.7b, 2.2b), US dollars respectively. As can already be observed by both average and median there is a strong correlation between firm size and credit rating group. (Figure 2)
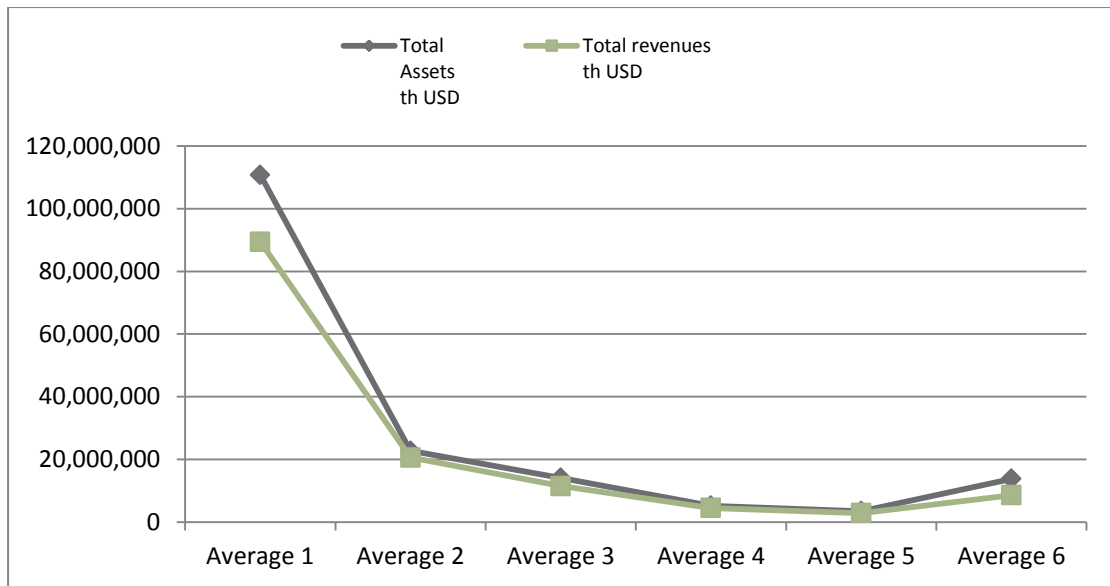
Figure 2. The relation between rating group and average firm size

Interestingly enough while the average firm size (and absolute number of firms in our sample) increase through time, being in 2003 12.6 billion and peaking at 15billion in 2008, there is a reduction back to 14.2 billion in 2009, the year with the most observations. The median however is quite lower being in 2003 3.6 billion and remaining steady at 4 billion from 2004 to 2006, peaking in 2008 at 4.75 billion and dropping to 4.63 billion in 2009.

This is explained as after the 2008 start, 2009 was the first year that the financial crisis was truly evident and this is observed also in a shift to the right in figure 1 in the percentage of firms appointed a credit rating lower than B1 and the massive reduction in the average number of employees both in year 2008 and 2009. (Figure 3). Revenues followed the same trend as size but with a steeper drop during 2009. It is noticeable that even with this radical reduction of labor, although the average gross profit margins were retained, the average net profit margins drop more than 7% from 2007 to 2008 and 2009 (8.61, 1.71, 2.42 respectively) indicating the severity of the crisis of 2008.

Figure 3. Firm size through time
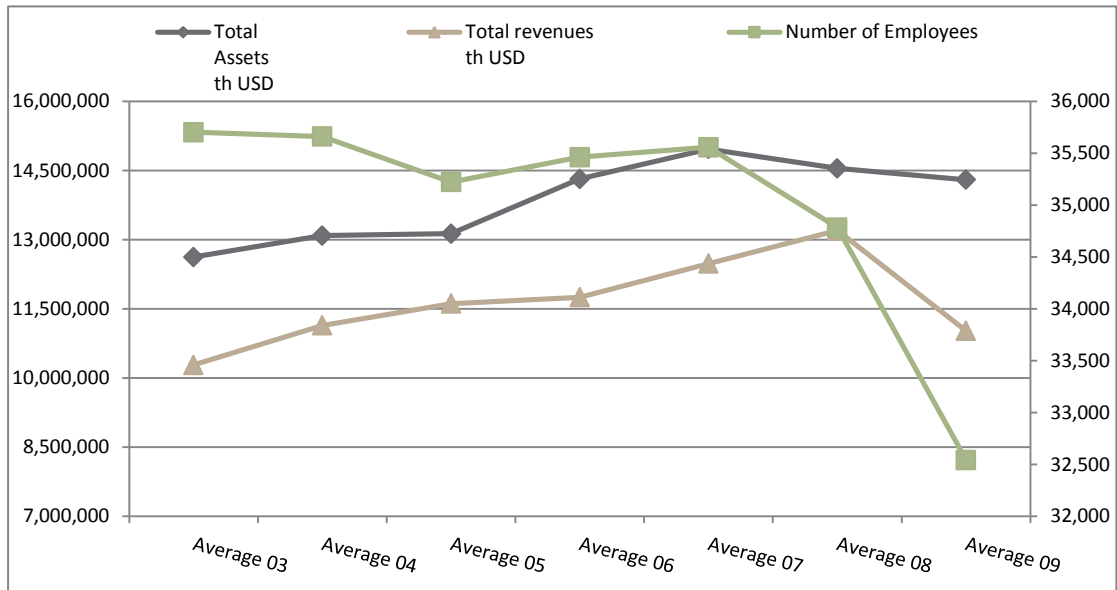
4.2 Financial and corporate governance variables

Our data set has a rich collection of 25 financial ratios (also includes firm total assets size, total revenues, and total number of employees), which are listed in Table 2. To deal with outliers in the financial data we winsorized all ratios at the 1% and 99% percentiles, but kept total assets, revenues and number of employees intact.

The calculation formula for the financial ratios is presented in the Table 2. The Corporate Governance Quotient (CGQ) provided by Risk Metrics Group consisted of two Index and Industry CGQ indicators which express four broad rating categories 1) board of directors, 2) audit, 3) antitakeover, 4) compensation/ownership. Each company's CGQ is compared with other companies in the same index and industry group. These indicators are continuous variables ranging from 0 to 100% and express the percentage of the companies a certain company outperforms in its index and industry respectively.

Furthermore 8 CGQ subscores total are provided, 4 for Index and 4 for Industry indicators in 4 categories. These are Board subscore, Compensation subscore, Takeover Defenses subscore and Audit subscore. The values assigned are expressed from1 to 5, 1 indicating that the company is in the bottom quintile in a governance area and 5 indicating that the company is in the top quintile in a governance area, thus making the values ordinal in nature.

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Table 2. Calculation formulas of financial ratios

Return on shareholder funds (%)	(P/L Before tax / Shareholders Funds) * 100
Return on capital employed (%)	(P/L Before tax Interest Expense) / (Shareholders Funds + Non-Current Liabilities) * 100
Return on total assets (%)	(P/L Before tax / Total Assets) * 100
Profit margin (%)	P/L Before tax / Operating Revenue (Turnover) * 100
Gross margin (%)	(Gross Profit / Operating Revenue) * 100
EBITDA margin (%)	(EBITDA / Operating Revenue) * 100
EBIT margin (%)	(EBIT / Operating Revenue) * 100
Cash flow/ Operating revenue (%)	(Cash Flow / Operating Revenue) * 100
ROE (%)	(P/L for period / Shareholders Funds) * 100
ROA (%)	(P/L for period / Total Assets) * 100
ROCE (%)	[(P/L for period - Interest Expense) / (Shareholders Funds + Non-Current Liabilities)] * 100
Net assets turnover	Operating Revenue / (Shareholders Funds + Non-current Liabilities)
Interest cover	(Operating P/L / Interest Expense) -1
Stock turnover	Operating Revenue / Stock
Collection period (days)	(Debtors / Operating Revenue) * 360
Credit period (days)	(Creditors / Operating Revenue) * 360
Current ratio	Current Assets / Current Liabilities
Liquidity ratio	(Current Assets Stocks) / Current Liabilities
Shareholders liquidity ratio	Shareholders Funds / Non-current Liabilities
Solvency ratio (%)	(Shareholders Funds / Total Assets) * 100

Consistent with previous literature where better corporate governance is considered to be associated with better financial performance and as a result better credit ratings, we were expecting a negative correlation between the CGQ indicators and our group rating category. This is due to the fact that our first group contains the higher rated firms (Aaa thru Aa3) and the sixth the bottom rated (Caa1 thru Ca). However that was the case mainly for the Industry CGQ scores and less for the Index CGQ scores as shown in the average and median (not presented) values for each group (Figure 4).
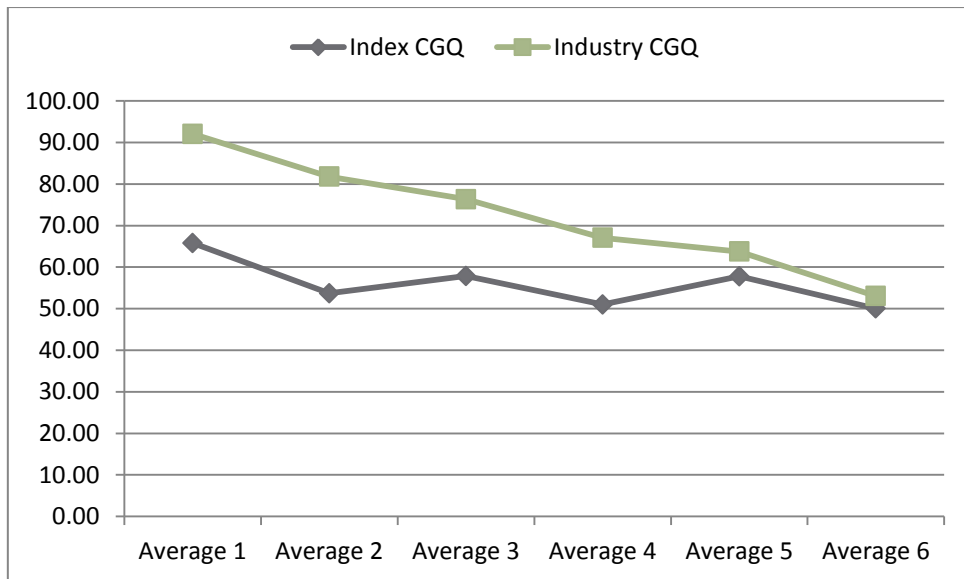
Figure 4. Average CGQ score per rating group

Subscores volatility was very low with average (and median) values remaining relatively steady throughout the rating groups conveying little additional statistical information to our models. Both CGQ and subscores weak volatility could be attributed to the fact that in the US a rule-based approach to Corporate Governance is enforced. Firms are mandatory complied to the regulation and this fact could account for a wider implementation of "better" governance schemes explaining the low volatility of our data as is also noted by Bozec & Bozec (2012). To support even further this claim, it is observed that in none of the groups the average or median of any subscore drops below 2 (Figure 5).
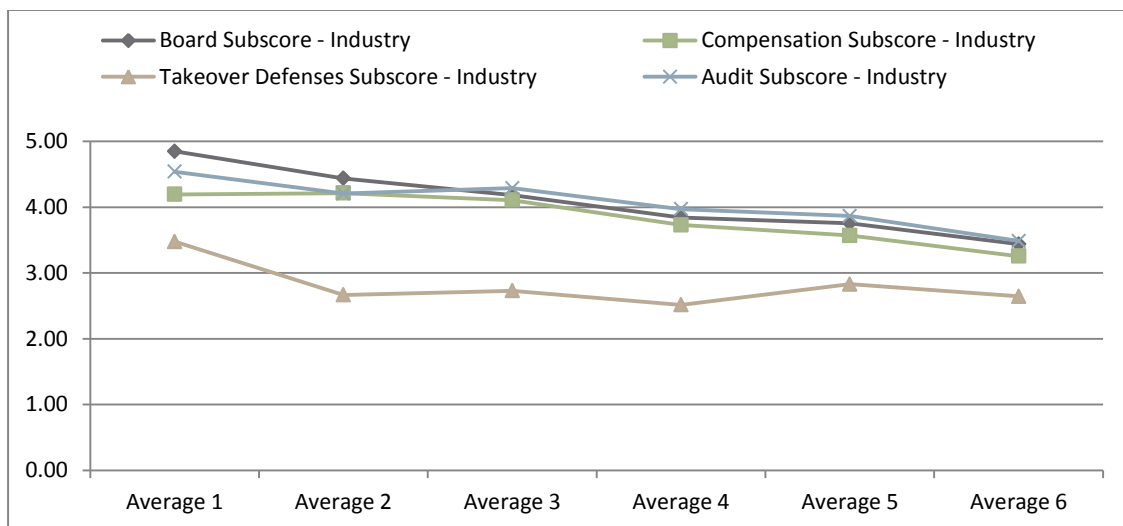
Figure 5. Industry subscores average per rating group

Qualitatively however, there were some interesting observations. While all the subscore Industry averages retain a very slight downward trend which is also the case for the three subscore Index, the Compensation subscore Index   has the lowest

average score for group 1 at 2.9 rising for group 3 to 3.4 and settling for group 6 at 3.2. So it appears that the Compensation governance subscore index is worse for the high credit rated companies (Figure 6). This could be attributed to a point in agency problems of overcompensation and perquisites consumption as portrayed in relevant literature (see Core et al., 1999; Shleifer & Vishny, 1997; Yermack, 2006, for some examples).
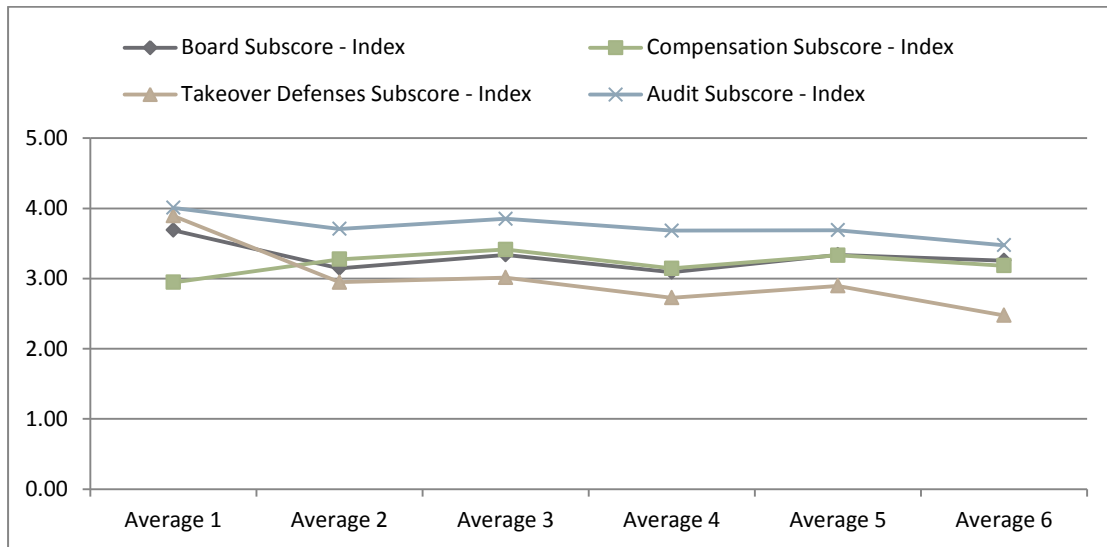
Figure 6.Index subscores average per rating group

To select the appropriate variables for our model from the pool available we first controlled for any high correlations between them. We ended up with the variables in table 3.

All the Index and Industry CGQ scores and subscores respectively, due to their parallel nature had a high correlation between them and for this reason only one of the two indicators was selected for our trials each time. Also in each trial only scores or subscores alone were used as there was a high correlation problem between them as well.

Table 3. Correlation matrix of selected variables for modeling

	Ret_Tot_Assets	Cashflow_to_Oper_Revenue	Solvency_Ratio	collection_minus_credit_days	Log_Tot_Revenues	Ret_Shareh_Funds	GrossMargin	Current_Ratio	Net_Assets_Turnover	Interest_Cover	Stock_Turnover	Index_CGQ	Industry_CGQ	Board_Subsc_Index	Board_Subsc_Industry	Compensation_Subsc_Index	Compensation_Subsc_Industry	TakeOv_Defenses_Subsc_Index	TakeOv_Defenses_Subsc_Industry	Audit_Subsc_Index	Audit_Subsc_Industry
Ret_Tot_Assets	1	,181**	,336**	.033	,279**	,419**	,100**	-,064**	,139**	,486**	-,038*	.020	,190**	.004	,146**	.021	,119**	,037*	-.015	.020	,068**
Cashflow_to_Oper_Revenue	,181**	1	,165**	,067**	-,150**	,049**	,594**	-,155**	-,436**	,120**	,140**	-,064**	-.013	-,035*	-.026	-,078**	-,034*	-.011	-.022	.010	.027
Solvency_Ratio	,336**	,165**	1	,057**	,067**	,046**	.030	,301**	-,035*	,305**	-,079**	-,060**	,144**	-,062**	,134**	-.008	,104**	.011	-,050**	-,070**	-.025
collection_minus_credit_days	.033	,067**	,057**	1	-,132**	.008	,136**	,190**	-,233**	.005	-,089**	-.010	,062**	-.001	,086**	-.027	.016	-.019	-.009	.005	-.002
Log_Tot_Revenues	,279**	-,150**	,067**	-,132**	1	,138**	-,164**	-,193**	,371**	,248**	-,053**	,063**	,395**	.030	,325**	.009	,245**	,159**	,106**	,062**	,190**
Ret_Shareh_Funds	,419**	,049**	,046**	.008	,138**	1	.024	-,054**	,071**	,178**	-,059**	.006	,078**	-.005	,053**	-.013	,036*	,034*	.011	.021	,045**
GrossMargin	,100**	,594**	.030	,136**	-,164**	.024	1	-,222**	-,488**	,042*	,075**	-,045**	-,073**	.001	-,064**	-,074**	-,070**	-.003	.002	.020	.032
Current_Ratio	-,064**	-,155**	,301**	,190**	-,193**	-,054**	-,222**	1	-,056**	,047**	-,196**	-,086**	-,041*	-,073**	-.009	-,046**	-.033	-,043*	-.030	-,041*	-,068**
Net_Assets_Turnover	,139**	-,436**	-,035*	-,233**	,371**	,071**	-,488**	-,056**	1	,135**	-,092**	,082**	,143**	,063**	,133**	,072**	,092**	,060**	.024	.014	,037*
Interest_Cover	,486**	,120**	,305**	.005	,248**	,178**	,042*	,047**	,135**	1	-.032	.015	,171**	.024	,136**	-.012	,073**	,075**	,040*	.009	,050**
Stock_Turnover	-,038*	,140**	-,079**	-,089**	-,053**	-,059**	,075**	-,196**	-,092**	-.032	1	-,035*	-,043*	-.030	-,048**	-,040*	-,042*	,048**	,067**	-.009	-.004
Index_CGQ	.020	-,064**	-,060**	-.010	,063**	.006	-,045**	-,086**	,082**	.015	-,035*	1	,709**	,732**	,539**	,571**	,428**	,315**	,294**	,269**	,235**
Industry_CGQ	,190**	-.013	,144**	,062**	,395**	,078**	-,073**	-,041*	,143**	,171**	-,043*	,709**	1	,528**	,818**	,411**	,613**	,258**	,201**	,238**	,317**
Board_Subsc_Index	.004	-,035*	-,062**	-.001	.030	-.005	.001	-,073**	,063**	.024	-.030	,732**	,528**	1	,667**	,262**	,182**	,143**	,131**	,172**	,135**
Board_Subsc_Industry	,146**	-.026	,134**	,086**	,325**	,053**	-,064**	-.009	,133**	,136**	-,048**	,539**	,818**	,667**	1	,201**	,398**	,104**	,060**	,149**	,221**
Compensation_Subsc_Index	.021	-,078**	-.008	-.027	.009	-.013	-,074**	-,046**	,072**	-.012	-,040*	,571**	,411**	,262**	,201**	1	,773**	.032	.007	,089**	,064**
Compensation_Subsc_Industry	,119**	-,034*	,104**	.016	,245**	,036*	-,070**	-.033	,092**	,073**	-,042*	,428**	,613**	,182**	,398**	,773**	1	,041*	-.005	,081**	,135**
TakeOv_Defenses_Subsc_Index	,037*	-.011	.011	-.019	,159**	,034*	-.003	-,043*	,060**	,075**	,048**	,315**	,258**	,143**	,104**	.032	,041*	1	,925**	.027	,037*
TakeOv_Defenses_Subsc_Industry	-.015	-.022	-,050**	-.009	,106**	.011	.002	-.030	.024	,040*	,067**	,294**	,201**	,131**	,060**	.007	-.005	,925**	1	.016	.019
Audit_Subsc_Index	.020	.010	-,070**	.005	,062**	.021	.020	-,041*	.014	.009	-.009	,269**	,238**	,172**	,149**	,089**	,081**	.027	.016	1	,907**
Audit_Subsc_Industry	,068**	.027	-.025	-.002	,190**	,045**	.032	-,068**	,037*	,050**	-.004	,235**	,317**	,135**	,221**	,064**	,135**	,037*	.019	,907**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

4.3 Methodology

Since the nature of the credit ratings is ordinal we decided to pursue an ordinal proportional odds logistic regression model for our analysis. This kind of analysis takes into account all the given ordinal groups and if accepted gives a parsimonious one line equation which describes the data set. In the ordinal logistic regression, the event of interest is observing a certain score or more. That means that for m categories the model is of the form:

$$P(Y_i > j) = g(X\beta) = \frac{\exp(a_j + X_i\beta)}{1 + \exp(a_j + X_i\beta)}, \qquad j = 1, 2, \dots, m - 1$$

As can be observed the betas are the same across all groups, while different constants (alphas) are used to define the category thresholds. It is important to notice that when m>2 the model is considered to be equivalent to repeating binary logistic regressions in which the dependent variables categories are combined. In our case where m=6 when group 1 is considered it is contrasted to groups 2, 3, 4, 5 and 6 together. When group 2 is considered, the contrast becomes between groups 1 and 2 together versus 3, 4, 5 and 6 together and so on.

Keep in mind that in our categorization the group score 1 has the top rated companies and group score 6 has the bottom rated thus the inference is made in this set; that means that we expect a negative sign for the independent variables which are considered to be favored for higher credit ratings. As observed the β coefficient is the same for every logit which is also why it is called the parallel line assumption and is the reason the model is also called the proportional odds models. For the model to be accepted as is this assumption needs to be confirmed.

The calculation of the probability that a firm will belong to a certain category is produced by sequentially deducting the previous category's probability from the following as explained below.

$$P(Y_i = 1) = 1 - g(X_i\beta_1)$$

$$P(Y_i = j) = g(X_i\beta_{j-1}) - g(X_i\beta_j), \qquad j = 2, \dots, m - 1$$

$$P(Y_i = m) = g(X_i\beta_{m-1})$$

Unfortunately (as is many times the cases with so restrictive models) this assumption was repeatedly rejected in every trial as proportionality was not met in our group ranking categories for all of our tested independent variables. The answer was to allow partial proportionality in our evaluation of the effect of our independent variables. The Generalized logistic regression / Partial proportional odds model: gologit2, (Williams 2006) implemented in Stata was selected to determine which variables were in terms with the proportional odds assumption and which were not. The form of the model is:

$$P(Y_i > j) = g(X\beta) = \frac{\exp(a_j + X1_i\beta 1 + X2_i\beta 2 + X3_i\beta 3_j)}{1 + \exp(a_j + X1_i\beta 1 + X2_i\beta 2 + X3_i\beta 3_j)}, \quad j = 1, 2, \dots, m-1$$

In this case some of the beta coefficients can be the same for all categories while some are different in each category. (In the equation above X1, X2 have a steady coefficient whereas X3 differs among categories).

To find which variable complies with the parallel line assumption an initial trial with no constrains is implemented. Then after a series of individual Wald tests is carried out it is determined which variables effects do not significantly differ across equations thus complying with a steady β and proportionality constrains are imposed. If the Wald test proves to be insignificant for one or more variables, the variable which has the least significant value on the test is constrained to have equal effects (betas) across all equations (categories)

5. Results

We modeled the relation of credit ratings as the dependent variable in respect to the financial and governance variables in two stages. We were interested mainly for the Industry scores as we expected them to be more focused and oriented towards each industry's particularities, however to have a more round view we also tested models with Index CGQ score variables and Index CGQ subscore variables. These models appeared not having any statistical value and where rejected.

In the first stage the credit ratings where modeled as a function of only the financial ratios. In the analysis a limited subset of financial variables are employed making sure to eliminate highly correlated ratios (a correlation cut-off value of about 0.6 was used), while covering all aspects of a firm's financial performance (e.g., profitability, operational performance, solvency, and liquidity, and asset structure.

5.1 Financial variable models

The results are presented in table 4 have been obtained with Stata 12. The results produced an overall fit of 31.5% (pseudo R^2) and the final model has fewer than the initial set ratios, as only the reported ones proved to be statistically significant. All of the financial control variables have the expected negative sign, with the constant dividing the groups following a monotone trend from better rated firms in group 1 to the worse one's in group 5 where, as can be observed in the final group, the constant ceases to be of statistical significance.

The latter is normal considering that in the ordinal regression, groups (categories) are sequentially and aggregately compared with the remaining groups above them and the constant has a value so close to zero. So group 1 is contrasted against groups 2, 3, 4, 5 and 6 contemporaneous; group 1 and 2 against group 3, 4, 5 and six and so on.

Table 4. Generalized Ordered Logit Estimates

	Financial Only		Financials + CGQ		Financials + CGQ SubScores	
Group_Ranking	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|
1						
Ret_Tot_Assets	-0.109	0.000	-0.107	0.000	-0.108	0.000
Cashflow_to_Oper_Revenue	-0.040	0.001	-0.034	0.008	-0.036	0.006
Solvency_Ratio	-0.002	0.835	-0.005	0.555	-0.007	0.425
collection_minus_credit_days	-0.011	0.000	-0.012	0.000	-0.013	0.000
Log_Tot_Revenues	-3.405	0.000	-3.214	0.000	-3.162	0.000
Industry_CGQ	-	-	-0.035	0.003	-	-
Board_Subsc_Industry	-	-	-	-	-0.668	0.011
Compensation_Subsc_Industry	-	-	-	-	-0.014	0.653
TakeOv_Defenses_Subsc_Industry	-	-	-	-	-0.180	0.061
Audit_Subsc_Industry	-	-	-	-	-0.216	0.097
_cons	29.722	0.000	31.408	0.000	32.835	0.000
2						
Ret_Tot_Assets	-0.146	0.000	-0.147	0.000	-0.145	0.000
Cashflow_to_Oper_Revenue	-0.013	0.027	-0.013	0.036	-0.013	0.031
Solvency_Ratio	-0.019	0.000	-0.018	0.000	-0.017	0.000
collection_minus_credit_days	-0.019	0.000	-0.019	0.000	-0.019	0.000
Log_Tot_Revenues	-2.680	0.000	-2.646	0.000	-2.742	0.000
Industry_CGQ	-	-	-0.003	0.360	-	-
Board_Subsc_Industry	-	-	-	-	-0.129	0.074
Compensation_Subsc_Industry	-	-	-	-	-0.014	0.653
TakeOv_Defenses_Subsc_Industry	-	-	-	-	0.130	0.004
Audit_Subsc_Industry	-	-	-	-	0.057	0.291
_cons	22.305	0.000	22.287	0.000	22.720	0.000
3						
Ret_Tot_Assets	-0.099	0.000	-0.098	0.000	-0.098	0.000
Cashflow_to_Oper_Revenue	-0.033	0.000	-0.033	0.000	-0.033	0.000
Solvency_Ratio	-0.030	0.000	-0.029	0.000	-0.029	0.000
collection_minus_credit_days	-0.014	0.000	-0.013	0.000	-0.013	0.000
Log_Tot_Revenues	-3.206	0.000	-3.075	0.000	-3.078	0.000
Industry_CGQ	-	-	-0.007	0.002	-	-
Board_Subsc_Industry	-	-	-	-	-0.155	0.003
Compensation_Subsc_Industry	-	-	-	-	-0.014	0.653
TakeOv_Defenses_Subsc_Industry	-	-	-	-	0.041	0.262
Audit_Subsc_Industry	-	-	-	-	-0.045	0.292
_cons	23.948	0.000	23.557	0.000	23.809	0.000

Observing the coefficients it is evident that the logarithm of total revenues has the highest discriminating power, which does suggest a too big to fail concept underlining this fact. The return of total assets also has a strong effect. The remaining three variables (cash flow to operating revenue, solvency ratio, and collection minus credit days) have an increasing effect when moving to lower rated firm groups (the coefficients increase for the first two ratios, while for the third one the coefficient becomes more important when group 5 is considered). This result indicates that such financial variables are more important for explaining the credit ratings of smaller firms.

Table 4. Generalized Ordered Logit Estimates (continued)

Group_Ranking	Financial Only		Financials + CGQ		Financials + CGQ SubScores	
	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|
4						
Ret_Tot_Assets	-0.075	0.000	-0.075	0.000	-0.074	0.000
Cashflow_to_Oper_Revenue	-0.041	0.000	-0.041	0.000	-0.040	0.000
Solvency_Ratio	-0.037	0.000	-0.037	0.000	-0.038	0.000
collection_minus_credit_days	-0.011	0.000	-0.011	0.000	-0.011	0.000
Log_Tot_Revenues	-2.277	0.000	-2.272	0.000	-2.262	0.000
Industry_CGQ	-	-	0.000	0.858	-	-
Board_Subsc_Industry	-	-	-	-	0.045	0.354
Compensation_Subsc_Industry	-	-	-	-	-0.014	0.653
TakeOv_Defenses_Subsc_Industry	-	-	-	-	0.137	0.000
Audit_Subsc_Industry	-	-	-	-	-0.044	0.294
_cons	15.586	0.000	15.542	0.000	15.192	0.000
5						
Ret_Tot_Assets	-0.093	0.000	-0.094	0.000	-0.094	0.000
Cashflow_to_Oper_Revenue	-0.035	0.002	-0.038	0.001	-0.035	0.002
Solvency_Ratio	-0.043	0.000	-0.042	0.000	-0.044	0.000
collection_minus_credit_days	-0.013	0.007	-0.011	0.024	-0.012	0.018
Log_Tot_Revenues	-0.781	0.000	-0.694	0.002	-0.693	0.002
Industry_CGQ	-	-	-0.012	0.014	-	-
Board_Subsc_Industry	-	-	-	-	-0.044	0.691
Compensation_Subsc_Industry	-	-	-	-	-0.014	0.653
TakeOv_Defenses_Subsc_Industry	-	-	-	-	-0.098	0.309
Audit_Subsc_Industry	-	-	-	-	-0.236	0.009
_cons	2.630	0.073	2.776	0.053	3.412	0.023
Number of obs = 3134	Prob > χ^2 = 0.000		Prob > χ^2 = 0.000		Prob > χ^2 = 0.000	
	LR χ^2 = 3066.97		LR χ^2 = 3094.97		Wald χ^2 = 1890.87	
	Log lik. = -3326.54		Log lik. = -3312.54		Log lik. = -3291.37	
	Pseudo R2 = 0.315		Pseudo R2 = 0.318		Pseudo R2 = 0.323	

Another point worth mentioning is that while the separation imposed by the constant values between group 1 and 2 and between group 3 and 4 and between 4 and 5 is very clear with relatively big differences between the values, groups 2 and 3 not just have a very small difference in actual value appointed to the constant but group 3 has a higher constant value than group 2. Considering that group 2 includes firms with credit ratings of A1, A2, A3, while group 3 has firms with Baa1, Baa2 and Baa3 it appears that firms that are appointed a credit rating of Baa1 are very close to firms appointed a rating of A3.

5.2 Financial and corporate governance models

In the second stage, the corporate governance score and subscore variables were added to the model with the results presented also in table 4. The addition of the corporate governance industry CGQ score increased the fitting of the models only marginally (pseudo R^2=31.84%). The CGQ variable is found statistically insignificant for groups 2 and 4 (but with a wrong sign).

The results for the subscores industry's CGQ's are interesting. Most of the subscore variables appear to be statistically insignificant (some at the 10% level) in most of the groups, with the compensation variable meeting the parallel line assumption although it was statistically insignificant in every group. The model's fitting increased to a pseudo R^2=32.28%.

At the first regression level (in which the highly rated firms are compared to the rest of the rating categories) the only corporate governance variable that is statistically significant at the 1% level is the Board Subscore, thus confirming that for highly rated and large firms the board's behavior (i.e., "good" board governance) is of major importance and it is an characteristic feature of top rated firms. The TakeOver Defenses and Audit variables are statistically important only at the 10% level both having a negative sign.

At the second level, the previous Board variable becomes significant at the 10% level, while all the other variables, except of TakeOver Defenses, appear statistically insignificant. The positive sign of the takeover coefficient indicates that firms with stronger takeover defenses (and lower shareholders rights) are appointed a lower credit rating. This finding could be attributed to the fact that in the U.S. a takeover is consider a measure of corporate governance (as large shareholders execute their power) to provide agency control over management, as managers usually resist these takeovers to protect their private interest (for more explanations see Shleifer & Vishny, 1997) consistent with agency theory, as they will probably lose their positions after the takeover (as presented in Sengupta & Bhojraj, 2003 p.458 6:15). This finding is also supported by Gompers et al., (2003) but is contradicted by Ashbaugh-Skaife et al., (2006) who found that firms with stronger shareholders rights have lower ratings, thus higher cost in financing their debt. We argue that this result for our firms is due to the fact of the penetrating nature of the ordinal analysis to six groups. We would expect the sign for takeover defenses to be either positive or negative. A positive sign would express strong shareholders rights and protection from agency problems, whereas a negative sign expresses wealth redistribution effects that benefit bondholders instead. If the governance variables were of better quality and had more levels of separating their data (i.e. having more levels that described takeover defenses in more detail and not so aggregate) we would expected to achieve clearer results.

When considering a dichotomous analysis like Ashbaugh-Skaife et al., (2006) between investment and speculative grade as presented below in the robustness test, our results still find a positive sign for the TakeOver Defenses variable although not statistically significant. We should note that in Ashbaugh-Skaife et al., (2006) their analysis focused on data for 2002 and their governance provider is TCL in contrast to our seven-year study and RiskMetrics governance ratings.

Another fact to be highlighted is that our data are for years 2003 to 2009 where the SOX act was set in place elevating shareholders protection and aligning firms to

higher and stricter governance norms, something that could also add to the reasons why RiskMetrics governance ratings lacked explanatory power as discussed in the descriptive statistics section (and noted by Bozec & Bozec, (2012).

For level 3 the board variable is clearly statistically significant at the 1% level with the expected negative sign, while all other variables are insignificant. In level 4 the situation turns to takeover defenses being statistically significant (at the 1% level) with a positive coefficient and all other variables being statistically insignificant. At the fifth level of the regression (which is based on contrasting the low rated firms to all higher rating categories) only the Audit subscore appears as statistically significant (at the 1% level) with an expected negative sign, which indicates that for low rated firms accurate and timely accounting results could relay crucial information for the creditworthiness status of the firms.

To further support these findings we modeled the credit ratings against the Industry CGQ subscores only. The board variable is statistically significant in all groups with the expected negative sign, which is an intuitive and expected result. In regression level 1 only the compensation variable appears statistically insignificant, with all others retaining a negative sign. For levels 2 and 3 all variables have negative signs, with takeover defenses and audit variables in level 2 and takeover defenses at level 3 being statistically insignificant. So level 2 retains the statistical significance of board and compensation structures and the same applies to level 3 with the audit variable added to the statistically significant variables. In level 4 all variables are statistically significant and takeover defenses takes a positive sign, similarly to the model which contains the financial variables. Finally, in level 5 the takeover variable is the only one that does not appear to be statistically significant while all others retain a negative sign (which as mentioned means that "more or better" elevates the credit rating appointed). The model as expected produced a small pseudo R^2=4.91%.

The classification results of the model where almost the same for financial and financial and corporate governance models with the latter having a total accuracy of 52.36% (Table 5). For the first three levels of the regression the subscores model seem to underrate the firms placing them in the following caterories while for the three last it tends to overrate them. In both cases the misclassifications for more than two notches where very few. The accuracy of the first three levels which included the investment grade firms is 46.42% while for the speculative grade (levels 4, 5, 6) is 57%.

Table 5. Classification matrix of the financial and subscore CGQ model

| | | Estimated rating groups | | | | | |
		1	2	3	4	5	6
Actual rating groups	1	34.51%	52.21%	11.50%	0.88%	0.88%	0.00%
	2	1.88%	51.98%	35.22%	10.92%	0.00%	0.00%
	3	0.14%	18.67%	44.25%	34.10%	2.84%	0.00%
	4	0.00%	2.00%	17.20%	64.70%	16.00%	0.10%
	5	0.00%	0.60%	3.29%	44.69%	49.48%	1.94%
	6	0.00%	0.00%	3.66%	12.20%	58.54%	25.61%
		Total accuracy: 52.36%					

5.3 Robustness test

To test our findings we conducted a dichotomous analysis where all the groups where collapsed in to two discrete categories. In the first category following Skaife et al. (2006) separation of investment grade and speculative grade we appointed all the firms rated from Aaa to Baa3 and from Ba1 to Ca in the second category. This way the first category now contains the firms of levels 1, 2 and 3 (1630 firms) and the second the remaining 4, 5 and 6 (1788 firms).

The results from the model that only considers the financial variables indicate that the coefficients of all variables are negative, and the model has a pseudo $R^2=44.32\%$. When the Industry CGQ Score variable was added to the model it appeared with the correct negative sign. However, it only marginally improved the fit reaching a pseudo $R^2=44.68\%$, which confirms our findings for the multi-category model discussed in the previous section. Using the CGQ subscores variables, the model produced an pseudo $R^2=44.87\%$ and the board variable was the only variable of statistical significance having the correct negative sign, while all other variables where statistically insignificant. Although the statistical power of RiskMetrics variables was only marginal in all the tests they appear to have the expected behavior, as shown in Table 6.

The total classification accuracy for the binary model is 83.25%, with the accuracy rate for the investment grades being 79.1%, whereas for the speculative grades it is 86.52%.

Table 6: Binary logistic regression results

Dichotomous	Financials Only		Financials + CGQ		Financials + CGQ Subscores	
	Coef.	P>|z|	Coef.	P>|z|	Coef.	P>|z|
Ret_Tot_Assets	-0.108	0.000	-0.106	0.000	-0.107	0.000
Cashflow_to_Oper_Revenue	-0.033	0.000	-0.032	0.000	-0.032	0.000
Solvency_Ratio	-0.032	0.000	-0.032	0.000	-0.032	0.000
collection_minus_credit_days	-0.014	0.000	-0.013	0.000	-0.013	0.000
Log_Tot_Revenues	-3.302	0.000	-3.141	0.000	-3.143	0.000
Industry_CGQ	-	-	-0.010	0.000	-	-
Board_Subsc_Industry	-	-	-	-	-0.166	0.003
Compensation_Subsc_Industry	-	-	-	-	-0.076	0.096
TakeOv_Defenses_Subsc_Industry	-	-	-	-	0.038	0.322
Audit_Subsc_Industry	-	-	-	-	-0.067	0.130
_cons	24.699	0.000	24.291	0.000	24.771	0.000
Number of obs = 3134	Prob > χ^2 = 0.000 LR χ^2 = 1906.22 Log lik. = -1197.56 Pseudo R2 = 0.443		Prob > χ^2 = 0.000 LR χ^2 = 1921.97 Log lik. = -1189.68 Pseudo R2 = 0.447		Prob > χ^2 = 0.000 LR χ^2 = 1929.90 Log lik. = -1185.72 Pseudo R2 = 0.449	

6. Conclusions

We set out to discover the link between firms implementing corporate governance provisions and their credit ratings. Using an ordinal regression approach we expected a more detail view of the effects governance has on credit ratings. The use however of commercial governance ratings proved having no significant incremental explanatory power over our data. This result is in line with Daines et al. (2010) findings that the RiskMetrics Corporate Governance Quotient (CGQ) do not contain effectively any explanatory statistical power. This could be the result of the ratings having a relative scaling in respect to other firms in their index or industry category and the implementation of corporate governance provision not being recorded in absolute terms. During our analysis we showed that to a great extend size of the firms is of crucial importance on the appointed credit rating following a too big to fail concept.

We would argue that the use of more detailed corporate governance ratings and not aggregate ones could be of more value especially when more statistically insightful analysis is used that could reveal the behavior and effect of each variable.

Future research could focus to other countries outside the US using also other types of analysis like multicriteria analysis and artificial intelligence techniques (i.e. neural networks).

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