

How do board characteristics influence bond ratings?

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ABSTRACT,

This paper investigates how board characteristics have an influence on corporate bond ratings. Two theories, the agency- and the resource dependency theory, are used to explain the behavior of board characteristics on bond ratings. The empirical research provides significant evidence that larger boards lead to a higher bond rating at issuance date. Furthermore, the size of the audit committee has a positive impact on bond ratings. Contradicting to previous research in the field of corporate governance, board independence fails to have a meaningful influence on bond ratings neither equity ownership of board members.

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Keywords

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1. Introduction

The role of corporate governance in the business environment becomes more important increasingly, yet many problems remain unsolved. Recognized by many firms, Corporate Governance is essential for value creation. Forbes published the article “Quality Corporate Governance Leads to Superior Business Model”, which demonstrates that above average corporate governance leads to a higher return of invested capital.¹ As one corporate governance mechanism, the executive board contributes to value creation. In detail, this paper investigates how characteristics influence corporate bond ratings. For companies, a high board rating is desired and affects their cost of borrowing since it indicates a low default probability.

Many scholars demonstrate how diverse corporate policies affect corporate bond ratings. Ashbaugh-Skaife et al. (2006) provide convincing empirical research suggesting that strong governed firms receive better credit ratings – proving that rating agencies value corporate governance. Bhagat and Bolton (2008) find that corporate governance, measured by the Gompers et al. (2003) index, is positively correlated with operating performance, lowering default risk. From a company’s perspective, Anderson et al. (2004) provide strong evidence that strong corporate governance enables a more efficient external financing through lowering the cost of debt.

The importance of board characteristics to bondholders is caused by the nature of claims. Whereas shareholders look for a risky corporate strategy which promises high residual income, bondholders favor risk avoidance and aim to cover their interest claims. Managerial risk choices and corporate governance are strongly related shown by Pirson and Turnbull (2011) and John et al. (2008). In order to reduce default risk, corporate bond investors should study the governance structure of a company to predict whether future board decisions are low risk and in their favor.

Fama and Jensen (1983) lay down the substantial threat that bondholders can face through board characteristics. The separation of ownership and control describes the creation of information asymmetry problems between managers and external stakeholders. In detail, selfish managers, who own equity of the company, can reduce expected cash flow by increasing the dividend pay-out or share repurchase programs. However, to the bondholder’s disadvantage, default risk increases when the cash flow decreases. Therefore, credit agencies urge the independent and effective monitoring of management – enabled through certain board characteristics.

Ultimately, this paper aims to point out the most influential board characteristics to bond holders and rating agencies. Research suggests additional control mechanisms to enhance supervision and performance of board members. Companies give little attention to research pointing out the issue of selfish directors and optimization of corporate governance. Unfortunately, recent events show the consequence. Within one month, the Wirecard share price dropped from 100 euro per share to 3 euro per share (25.06.2020). Many investors and debtors lost a fortune through the overvaluation of assets caused by fatal errors in corporate governance, lack of control mechanisms and, of course, the selfish behavior of some board members.

The motivation to study this field comes from interest in corporate scandals followed by the question: “What corporate mechanisms enable the competitive advantage for a company?” Corporate bond ratings indicate default probability which affects the companies cost of borrowing. Therefore, the corporations strive for high bond ratings. Most of the studies related to corporate governance and external financing take into account the cost of debt or equity performance. Additionally, most research is from the shareholders perspective regarding corporate governance, highlighting a gap for bondholders. Nevertheless, even though when bond rating is investigated, the real time market data at which the corporate bond is traded is used and not the value at issuance date. This paper aims to close this research gap.

This paper analyses bond ratings of 533 US companies listed on the Nasdaq, Dow Jones and S&P 500 over the period from 2010 to 2020. Board characteristics include the components of board size, audit committee size, board independence, and board equity ownership. As research pioneers, Dalton et al. (1999) found a positive influence of board size on performance, which suggests indirect evidence that board size impacts companies default risk. In terms of board independence, research indicates that independent directors may reduce corporate defaults, cost of debt and influence bond ratings positively (Anderson et al., 2004; Ashbaugh-Skaife et al., 2006; Beasley, 1996; Klein, 2002; Fields et al., 2012). Researching equity ownership among board members and its effect is fascinating since scholars’ opinions divide extremely.

Although corporate governance research faces the danger of an endogeneity bias, a robust ordinal logistic regression model is presented. The paper is structured as followed: In section 2, the literature review discusses relevant theories and recent research exploring the board characteristics. The hypotheses development is found in section 3. Section 4 consists of the methodology of the empirical research followed by the sample description in section 5. In section 6, the empirical results as well as robustness is discussed. Section 7 contains the limitations of the research. Lastly, the conclusion and managerial implementations are presented in section 8.

2. Literature Review

2.1 Board size

2.1.1 Theoretical framework

The impact of board size on board ratings is estimated through the resource dependency theory by Pfeffer and Salancik (1978). It is assumed that all companies depend on resources which directly affect the company’s behavior. According to resource dependency theory, larger boards are more effective since each member adds both, knowledge and resources, to the corporation. Especially, external members bring new resources to the board. Resources are defined through access to new markets, raw materials and new technologies. According to theory, those added resources lead to a greater performance additionally reducing default risk – concluding into higher bond ratings by rating agencies.

2.1.2 Empirical evidence

In terms of board size, Anderson et al. (2004) and Paige Fields et al. (2012) suggest a positive impact of board size

¹ Trainer, D. (2019). Quality Corporate Governance Leads To Superior Business Model. Retrieved from: <https://www.forbes.com/sites/greatspeculations/2019/04/24/quality-corporate-governance-leads-to-superior-business-model/#6fa8bec01d6e> at 24.07.2020

on the cost of borrowing. Since high bond ratings decrease the cost of borrowing, their work is indirect evidence that size may increase bond ratings. Both research states that board size and audit committee size have a significant impact ($p < 0.1$) towards the cost of borrowing.

All investors of corporate bonds fear the risk of corporate default. Fernando et al. (2016) study the effect of corporate governance on corporate defaults. Overall, the degree of default correlation is highly sensitive to concentrated ownership, low board effectiveness, low transparency and disclosure, and low shareholder rights. The measurement of board effectiveness includes board size and the number of outside directors. Their research finds evidence that low levels of effectiveness, caused by small boards and missing outside directors, are associated with higher default risk. Especially during a crisis, a weak governance increases the risk of default. The sample data observes 835 companies over the period 2000 to 2015. It is implied that corporate governance needs to be considered when credit risk is evaluated.

Su et al. (2019) investigate board size and its effect on corporate risk taking. They make a new contribution by applying the group decision-making theory from social psychology to explain the effect of board size on risk. In general, decisions within a group are more time intensive due to compromising and the risk of an unfavorable decision is minimized. The conducted multiple regression analysis finds evidence that larger boards decrease the probability of a choosing an extreme risky project – highly favorable to the bondholder. On the other side, Pirson and Turnbull (2011) state that since the decision making is split among a group, individuals do not feel directly responsible for the outcome of the decision. Hence, this may lead to high risk decisions since members just go with the flow and do not feel accountable in case the project turns out to be a loss.

Indirect evidence of a negative impact of board size on bond ratings is found by Yermack (1996). He suggests that small boards enhance the company's performance and therefore sees larger boards less favorable. He samples 452 US industrial companies between 1984 and 1991. Moreover, he provides evidence that companies with small boards produce more beneficial financial ratios than companies with large boards. All rating agencies use financial ratios to evaluate ratings and therefore it is indirectly indicated that companies with large boards would receive a lower bond rating.

2.2 Independent directors

2.2.1 Theoretical framework

Many scholars use the agency theory as foundation to address the impact that independent directors have on companies and bond ratings. In detail, the relation between managers and owners as well as the creation of additional costs is described. This inherent conflict between the interest of owners (principal) versus management (agent) is described as agency issues by Ross (1973), often resulting in agency costs for the owner. To reduce the agency issues and the agency costs, the agency theory implies that owners need to monitor the management to protect shareholders from the self-interest of managers. Excessive monitoring lowers the risk of falsifying financial statements which also has severe consequences to the bondholder. Financial instruments also help to align interests between owners and managers. High agency costs raise the risk of default of outstanding corporate bonds.

Fama and Jensen (1983) argue the board should consist of a mix of inside and independent managers to ensure the viability of internal control mechanisms. Independent directors bring additional knowledge from different sectors to the firm as well as acting as an arbitrage in terms of agency issues. Independent directors fulfill their role as an arbitrage by the motivation to develop their reputation as experts, diminishing moral hazard.

In general, the term independent director has varying definitions among scholars, corporate governance codes and companies. Anderson et al. (2004: p.10) define independent directors as "individuals whose only business relationship with the firm is their directorship." Non independent directors are characterized as either insiders or affiliated directors. Insiders are family members of existing board members, and current or retired employees. Affiliate directors are considered as lawyers, financiers, or investment bankers whose operations may have existing business ties interfering with their duty of independent and objective decisions making. Bradford et al. (2019) state that the proportion of non-executive directors among the board represents board independence.

Companies usually have their own guidelines about director's independence. The majority of companies state that the independent director has no interfering relationship that disturb objective decision making. Equity ownership does not necessarily result in biased decision making to companies. The reason why companies prefer independent directors who still participate in stock plans is based on the agency theory since giving out equity, helps to align interests between the principal and agent.

Contrary to the company's definition, Corporate governance codes are much more detailed in defining the director's independence. Since section 2.3 discusses how equity compensation may interfere with independence, the codes are compared with a focus of equity ownership. The EU corporate governance code does not see a director as independent when he had held a managing position in the company in the previous 5 years nor an employee for the past 3 years. Moreover, a director qualifies as independent when he does not participate in any share options (see Table 1: European Union Commission recommendation on the role of non-executive directors of listed companies (February 15, 2005), (c)). The NYSE corporate governance code states that no director who participates in any material relationship such equity ownership qualifies as independent (see Table 1: NYSE corporate governance rule for U.S. domestic issuers, Section 303A.02). To summarize, both the EU and US perspective is strict on equity ownership. However, the corporate governance codes are non-binding and do not affect companies selection process of independent directors.

2.2.2 Empirical evidence

Following the agency theory, independence of directors may have a positive influence companies and especially on bond ratings. A positive relationship between independence and bond ratings is given by Bhojraj and Sengupta (2003) suggesting that companies with strong external monitoring profit from lower bond yields and superior bond ratings. They contribute to research by defining to two types of risk which substantially affect bond ratings. The first risk, named agency risk, describes that the management may deviate from maximizing firm value due to self-interest and incompetence. Moreover, the information risk arises to the rating agencies, assuming that managers have insider information that would affect

default risk. Both risks can be reduced through governance mechanisms which aim at enabling control and transparency.

Indirect evidence of a positive effect by board characteristics including board independence towards external financing is given by Anderson et al. (2004), and Paige Fields et al. (2012) – both investigating the effect on cost of borrowing. Even though the dependent variable differs from this paper, cost of debt is an indicator for external financing and the sample is similar with US companies within the S&P 500 and 1500 respectively. Both papers hypothesize that board independence leads to an improved managerial oversight. Especially the research provided by Anderson et al. (2004) is extensive by including the variables of interest board size, independence and ownership. In terms of independence, Anderson et al. (2004) find that independence, whether on the board or in the audit committee, has a positive impact on the bond yield spread at the 1% - significance level. Independence is tested on six different models, representing a high degree of robustness. Paige et al. (2012) confirm previous mentioned findings. However, the impact of board independence on borrowing costs is slightly less significant ($p < 0.5$). Already mentioned, evidence towards an inverse relationship of independent board members and cost of borrowing is given.

Ashbaugh-Skaife et al. (2006) assess the determinants of credit ratings by measuring ownership structure and board independence. It is argued that firms are poorly governed caused by the CEOs motivation to earn excess compensation. Moreover, the management disciplining hypothesis is used which demands independent and effective monitoring of the managers. Significant evidence supporting that good governance leads to high bond ratings is provided. Four dimensions speak ownership structure and influence, financial stakeholder rights and relations, and board structure, and processes represent corporate governance. Ultimately it is found that blockholders on the board and financial transparency have are positively related to bond rating at the 1% significance level. The independence of audit committee does not show a significant impact on bond ratings, whereas the overall board independence shows significant impact on the 10%-level. Some variables such as the percentage of board experts, based on knowledge make his model questionable. It is strongly assumed that all board members have a great amount of knowledge to even get in the position of an executive director. Confirming the assumption that independent boards increase monitoring, Alali et al. (2012) provide additional evidence that default likelihood is mitigated through effective monitoring. Their research, based on the framework provided by Ashbaugh-Skaife et al. (2006), uses a more recent dataset.

Zhu et al. (2016) investigate the influence of independent directors on firm value. Their OLS regression model shows that Tobin's Q, representing firm value, is significantly impacted by firm size, return of assets and percentage of independent directors. It is suggested that independent directors implement a more effective monitoring, leading to value creation. The sample consists of Chinese companies and characterizes the corporate culture marked by power distance and hierarchy. A new contribution is made by identifying that independent directors' influence depends on their hierarchy among the board.

A negative relationship between board independence on bond ratings is found by Bradley and Chen (2015). They

suggest that board independence has a risk increasing effect to bond holders. Risk is measured by equity volatility and their regression shows that board independence increases volatility ($p < .05$). Moreover, their research shows a negative effect of board independence on bond ratings at the 10 % significance level.

No evidence for a relationship between board independence and an effect on external financing is found by Lorca et al. (2010). The research uses the dependent variable cost of debt which is also affected through bond ratings. Already mentioned, higher bond ratings result in a lower cost of debt. Having a sample of Spanish companies, no significant impact of board independence is found. Still, the sample is rather small with only 151 companies. Meaningful results are that companies being audited by the "big four" (KPMG, PwC, Ernst Young or Deloitte) benefit from a lower cost of debt.

2.3 Equity ownership

2.3.1 Theoretical framework

Previously mentioned in section 2.2.1, the agency theory helps to understand the relationship between management and owner. It also helps to understand the role of equity ownership among the board and its effect on bond ratings. Owner is characterized as an individual or group of persons who own a stake in the corporation. Ownership position of equity among the board is important to consider while assessing a director's independence. Through participating in equity plans, either through stock options or stock-based pension plans, the director becomes an owner of the company and two types of incentives arise – conflicting decision making of the director and impacting the bondholder (Sengupta and Zhang, 2015).

The first incentive is the private wealth maximization, created through equity ownership of the director which may result in biased decision making since the director's wealth is dependent on the company's success. Focusing on raising the stock price results in taking on high risk projects which also increases the bondholder's risk. Furthermore, if the corporation fails to generate positive earnings, the directors may be motivated to disclose transparency, protecting the equity price, to the disadvantage of rating agencies who may rate the corporate bond too high (Bhojrar and Sengupta, 2003). It is likely that the corporate governance codes in section 2.1 assume this incentive.

The second incentive, contradicting with private wealth maximization, is that equity ownership among directors increases the intention to monitor (Jensen and Meckling, 1976). Having directors' wealth aligned and dependent on the company's performance, concludes in a strong reluctance towards corporate scandals since those can lead to a notable drop of the share price.

2.3.2 Empirical evidence

The effect of equity ownership among board members and management is studied by Kuang and Qin (2012). In detail, they investigate the sensitivity of the management wealth consisting out of equity and equity option holdings to the company's performance and its influence on bond ratings. They suggest a positive effect ($p < 0.01$) on bond ratings when managers wealth is aligned with the company's performance. Overall, the sample size covers 8189 firm-year observations over a 15-year period – a robust research to error in variables. Moreover, their results indicate that

rating agencies do value equity compensation of management or board members into the bond ratings since it may increase or decrease debtholders risk.

Ashbaugh-Skaife et al. (2006), apart from investigating board independence, delivers further evidence that equity ownership has a positive influence on bond ratings. The research takes the proportion of board members who own equity out of the total board size and a positive relationship towards bond ratings is found at the 1% significance level. Additionally, Sampling the S&P Composite 1500, Sengupta and Zhang (2015) find that companies which reward independent directors with equity compensation, enjoy a higher disclosure quality and a lower cost of equity capital. Hence, both scholars have strong evidence that the alignment of interests through equity pay reduce agency costs and increase bond ratings.

At first sight, indirect evidence towards value creation of equity ownership among independent directors is found by Fich and Shivdasani (2005). They investigate how the firm value, measured by market to book ratio, is affected by equity ownership. Concluding, a positive relation at the 1% significance level is found that investors value the equity compensation of independent management. Moreover, independent director ownership (IDO) is found to be positively related to accounting performance, measured return on sales (IDO significance: $p < 0.05$), asset turnover (IDO significance: $p < 0.01$) and return of assets (IDO significance: $p < 0.01$). Nevertheless, those results should be interpreted with caution. Having such strong significance in the relationship between directors' ownership of equity and return on sales seems doubtful since return on sales may depend much more on the product or service that is distributed. Moreover, their regressions have a low explanatory effect with an adjusted R^2 at 20.71% (Return on Sales), 11.10% (Asset Turnover) and 26.93% (Return on Assets).

Contradicting to positive impact of equity ownership, Endrawes et al. (2018) provide in direct evidence that equity ownership among board members increases default risk. In detail, the proportion of equity holdings within the accounting committee and its effect on accounting quality is investigated. It is suggested that a higher proportion of equity ownership in the accounting committee increases discretionary accruals ($p < 0.05$). One example of discretionary accruals can be management bonus. Following up, Amara (2017) publishes empirical research about the impact of discretionary accruals on financial statement fraud. Sampling 250 annual reports of French companies, a significant impact at the 1% level is found that a higher value of discretionary accruals increases the probability of financial statement fraud. Her investigating model has a high explanatory effect with an adjusted R^2 of .74 and her findings, that discretionary accruals can be used to detect fraud, are aligned with several other research on discretionary accruals (Beasley et al., 2010; Trompeter et al., 2013). In terms of bond ratings, an increase risk in financial statement fraud also increases default risk – potentially be caused by equity ownership among the board.

3. Hypotheses

3.1 Board size

Due to the ineffective dialogue, boards with many directors may be ineffective in decision making. Unlike having small working teams, a large board of directors needs more time to express their ideas (Lipton and Lorsch, 1992).

Yet, prior research argues that larger board sizes enable greater time devotion to tasks and committees due to a greater division of tasks. Adams and Mehran (2002) argue that companies require larger boards for effective monitoring since a greater number of members participate in control activities. Larger boards are associated to less earnings management since a greater number of experienced members is on board (Aygun et al., 2014). Klein (2002) finds that companies limiting board size have less members on the audit committee. Consequently, larger boards provide greater performance, control over management, and greater financial transparency resulting in higher bond ratings.

Audit committees oversee the auditing process including the appointment of auditors. If numbers are doubtful, the audit committee may detect financial fraud by questioning management. Like the board size, it is assumed that this process is time intensive, a large capacity of members is needed to ensure high quality and guarantee questioning in doubt (Anderson et al., 2004). Rating agencies seek credible financial reports and are aware that larger audit committees are associated with a higher reliability.

Concluding, the first two hypotheses are created:

H1a. A larger board size positively affects the corporate bond rating.

H1b. Larger audit committees increase the corporate bond rating.

3.2 Independent director

The first component is the percentage of external directors among the board.

The placement of independent directors was seriously doubted through the emission scandal of Volkswagen where 20 independent directors failed to detect the manipulation of car systems. While shareholders advocate independent directors, Karmel (2013) sees the independent director as less knowledgeable compared to an inside-directors due to the distance from day to day involvement. It is also argued that independent directors neither have sufficient financial interest in the firm nor enough time to devote to companies' affairs. Moreover, independent directors are critically assessed by Adams and Ferreira (2007), arguing a board with a high proportion of independent directors may lack of insider knowledge about the firm, resulting in poor decision making. Pathan (2009) contends that board independence and board size is positively linked with bank risk taking, defined by the standard deviation of the banks daily stock returns. Masulis et al. (2012) argue that independent directors do not enhance control mechanisms if the CEO hierarchy is high.

Nevertheless, in general, independent directors are placed by owners to add valuable insider knowledge from different sectors to the board and to solve problems from a different perspective. Moreover, having independent directors who do not have close relationships with internal directors, guarantees an objective decision making. Little

incentive to falsify financial statements or participate in any fraud is given since the independent director wants to build a reputation as an expert (Fama and Jensen, 1983). The additional value as well as security to the companies due to leadership seems to be recognized by debt rating agencies since it decreases the likelihood of mismanagement, ultimately leading to debt default.

Thus, the second hypothesis is created:

H2. A higher proportion of independent directors positively affects the bond rating

3.3 Equity ownership

To follow up on section 2.3.1, both incentives, private wealth maximization and increased monitoring lay down a realistic impact on the directors' decision making. However, when equity is spread among board members, none of the members should be interested in fraudulence behaviour since consequences are severe (e.g. Volkswagen, Enron, Wirecard) and ultimately, their own wealth is at risk. Therefore, board members have an increased motivation to monitor the company. Rating agencies are aware of that behavior and value equity incentives among board members positively.

Lastly, the third hypothesis is created:

H3. Equity ownership among the board affects bond ratings positively.

4. Methodology

4.1 Bond ratings

Bond ratings are categorized following prior scholars named Asbaugh-Skaife et al. (2006) and Alali et al. (2012). RATING defines the bond ratings by S&P at issuance date categorized in an ordinal variable from 1 to 7 defining D or lower, B, BB, BBB, A, AA, and AAA.

4.2 Board size

Board size is assessed through closely following Anderson et al. (2004). The first variable of interest is the natural log of the total board members as *BRD_SIZE*. According to the resource dependence theory, a positive correlation coefficient on RATING is predicted.

4.3 Audit Committee Size

Similar to the board size, the audit committee size is assessed by the natural log of total audit committee members as *BRD_AC_SIZE* divided by the natural log of total assets (Anderson et al., 2004; Baxter and Cotter (2009). Once again, the resource dependence theory estimates a positive relationship between accounting committee size and bond ratings since more members add more resources to the committee – recognized by rating agencies.

4.4 Independent director

Section 2.2 emphasizes how equity ownership may infer with the director's independence. Therefore, equity ownership is treated separately. Prior research (Anderson et al., 2004; Bhojraj and Sengupta, 2003; Lorca et al. 2010), defined the primary measure of board independence as the number of independent directors divided by the total amount of seats as *BRD_IND%*. The percentage of independent directors consists of legal people who do not hold any managerial position in the firm nor work for an

affiliated firm, regardless of equity ownership (Huang et al., 2009). Based on the agency theory, a positive regression coefficient on RATING is estimated since objective decision-making and enhanced monitoring decrease the default risk.

4.5 Equity ownership among the board

Following Ashbaugh-Skaife et al. (2006) and Bradford et al. (2019), *BRD_STOCK%* consists of the percentage of board members who hold equity of the company. Since no significant impact on RATING is expected, the regression coefficient remains unclear.

4.6 Control variables

Prior scholars indicated that bond ratings are linked to control variables addressing the corporate performance, bankruptcy risk, and debt structure.

Performance is measured by return of assets as ROA within the previous financial year before issuance date of the bond rating (Ashbaugh-Skaife et al., 2013, Anderson et al., 2004). A higher ROA decreases default risk and therefore is expected to be positively related with rating. Debt structure is assessed through. The latest annual market beta as BETA of the company one-year prior issuance date is the second control (Schmidt and Obermüller, 2013, Lin et al., 2020). BETA represents the systematic risk. Having a high beta can indicate high return but also high volatility. Since volatility is not desired by rating agencies and in general low risk is preferred, a negative regression coefficient is predicted.

The log of total assets as SIZE represents the default risk of a company (Anderson et al., 2004, Ashbaugh-Skaife et al., 2013). Assuming companies are "too big to fail", a higher amount of total assets decreases default risk, therefore the predicted regression coefficient is positive.

Debt structure is assessed through leverage as LEV (Ashbaugh-Skaife et al., 2013; Piot and Missonier-Piera, 2007). A high leverage ratio is an indicator of how much of the companies' value consists out of debt – expected to have negative regression coefficients. To address extreme outliers, a 90% winsorization on the data is applied.

Depending on the industry the corporation is operating in, the risk for the debtholder varies. To control industry effects on bond ratings, the dummy variable IND is coded (Lorca et al., 2011).

4.7 Regression analysis

Previous scholars investigated bond ratings through regression models. Since the bond rating is a categorical variable, an ordinal logistic regression is applied (Ashbaugh-Skaife et al., 2006).

Following regression is used:

$$RATING_{i,t} = \beta_0 + \beta_1 \sum \text{Board Characteristics}_{i,t} + \beta_2 \sum \text{Control Variables}_{i,t-1}$$

In detail:

$$RATING_{i,t} = \beta_0 + \beta_1 BRD_SIZE_{i,t} + \beta_2 BRD_AC_SIZE_{i,t} + \beta_3 BRD_IND\%_{i,t} + \beta_4 BRD_STOCK\%_{i,t} + \beta_5 ROA_{i,t-1} + \beta_6 BETA_{i,t-1} + \beta_7 SIZE_{i,t-1} + \beta_8 LEV_{i,t-1} + \beta_9 IND_i$$

5. Sample selection and data description

The sample investigates corporate bond ratings at issuance date from 2010 to 2020. Only the latest bond issuances from corporations listed in S&P 500, Nasdaq Composite and Dow Jones Industrial Average are considered. 533 different corporations are investigated from 11 different industries (see table 1). Data concerning the board characteristics is sourced at issuance date from Capital IQ, where financial data is sourced at the latest annual before the issuance date.

Table 1 Industry distribution

Industry	Frequencies	%
Utilities	23	4.32
Real Estate	28	5.25
Materials	31	5.81
Communication Services	32	6.00
Consumer Staples	36	6.75
Energy	38	7.12
Health Care	50	9.38
Consumer Discretionary	69	12.94
Industrial	74	13.88
Financial	75	14.07
Information Technology	77	14.44
N	533	100%

Below, Table 2 Panel A displays the median bond rating of BBB.

In Panel B, the board characteristics are described. Median size of boards is 10 people and the auditing committees have a median of 4 people. The sample of Anderson et al. (2004), investigating board characteristics of 1052 US-companies over the period of 1993 to 1998, has a mean value of 12.1 board members. 20 years later, the mean board size seems to decrease. The median of independent directors on the board is 88.89% with a standard deviation of 6.4. Compared with Ashbaugh-Skaife et al. (2006), their sample had a mean of 70% independent directors. Regarding that their sample addresses the fiscal year 2002, a trend towards an increase use of independent directors among the board exists. The board has a mean of 80.19 directors owning equity.

The control variables are described in Panel C of Table 2. Average (mean) ROA is 5.48 per cent with a 25th percentile of .239 and a 75th percentile of 7.86. Mean BETA in the sample is 1.17 with a standard deviation of .72. The median of the log of total assets is 9.77. Corporations leverage has a mean of 35 per cent. Compared to the leverage used in the sample of Ashbaugh-Skaife et al. (2006), a trend towards an increase use of debt financing is indicated by four percent.

Table 3 observes the correlation of key variables. All variables of interest speak, *BRD_SIZE*, *BRD_AC_SIZE*, *BRD_IND%* and *BRD_STOCK%* show a significant correlation with RATING. Out of the variables of interest, *BRD_SIZE* has the highest correlation with RATING (.439). The largest correlation is observed between RATING and SIZE with .601. A red flag is between *BRD_SIZE* and SIZE with a correlation of .457. This issue will be addressed in robustness checks later.

Table 2 Descriptive statistics

Variable	Mean	Median	Std. dev	Quartile 1	Quartile 3
<i>Panel A: Bond rating</i>					
RATING	3.83	4	1.053	3	4
<i>Panel B: Board characteristics</i>					
BRD_SIZE (no ln)	9.39	5	1.18	9	10
BRD_ACM (no ln)	4.14	4	1	3	5
BRD_IND (%)	86.93	88.89	6.40	83.93	90.91
BRD_STOCK% (%)	80.19	70.00	25.47	60.00	86.34
<i>Panel C: Financial Risk Profile</i>					
ROA (%)	5.63	4.75	5.21	2.39	7.86
BETA	1.25	1.17	.72	.82	1.54
SIZE (no ln, \$bn)	31.21	17.31	38.48	6.28	39.72
LEV (%)	34.33	33.19	19.18	24.69	45.87
N = 533					

Table 3 Correlation matrix

	RATING	BRD_SIZE	BRD_AC_SIZE	BRD_IND%	BRD_STOCK%	ROA	BETA	SIZE	LEV
RATING	1								
BRD_SIZE	.439	1							
BRD_AC_SIZE	.287	.342	1						
BRD_IND%	.169	.320	.161	1					
BRD_STOCK%	-.391	-.525	-.283	-.418	1				
ROA	.230	.230	.021	.102	-.088	1			
BETA	-.299	-.260	-.117	-.086	.219	-.191	1		
SIZE	.601	.457	.258	.179	-.417	-.156	-.191	1	
LEV	-.376	-.103	-.068	-.045	-.151	.184	-.041	-.273	1

6. Empirical Results

Below, the results of the regression are presented in table 4. Each variable of interest is investigated separately in Model 1-4, whereas Model 6 investigates how all board characteristics interact with RATING.

Table 4 Ordinal logistic regression results (RATING)

Dependent Variable = RATING							
Variables	Predicted sign	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Panel A Board Characteristics</i>							
BRD_SIZE	+	2.641***				4.278***	2.342***
BRD_AC_SIZE	+	-	1.068**			.972***	.828**
BRD_IND%	+	-		-0.002		-.022	-.024
BRD_STOCK%	?	-			-.794*	-1.586***	-.477
<i>Panel B Firm characteristics</i>							
ROA	+	.212***	.209***	.213***	.212***	.161***	.211***
BETA	-	-.755***	-.757***	-.782***	-.760***	-.788***	-.723***
SIZE	+	1.008***	1.072***	1.096***	1.051***		.995***
LEV	-	-.047***	-.048***	-.047***	-.047***	-.046***	-.048***
IND		Included	Included	Included	Included	Included	Included
Pseudo R ² (Cox and Snell)		.593	.590	.583	.585	.462	.599
Likelihood ratio χ^2		472.845***	468.563***	459.603***	463.134***	325.650***	480.538***

***, **, * denotes significance at the 1%, 5% and 10% level

Bold indicates variables of interest. Upon request, IND coefficients and significance can be sent.

Model 1: Board size & bond rating

Model 2: Audit committee size & bond rating

Model 3: Board independence & bond rating

Model 4: Board equity ownership & bond rating

Model 5: Board characteristics & bond rating (without SIZE)

Model 6: Board characteristics & bond rating

6.1 Board size and bond rating

Model 1 shows the impact of board size on bond ratings. The variable of interest, *BRD_SIZE* has a regression coefficient of 2.641 at the 1 % significance level. Additionally, all control variables affect the dependent variable at the 1 % significance level, where *SIZE* has a dominant regression coefficient of 1.008. Overall, model 1 has a high explanatory effect with a pseudo R^2 of .593 and a likelihood χ^2 of 472.845 ($p < 0.01$). Enough evidence is provided to accept H1a. The predicted coefficient is positive – as expected and explained through the resource dependency theory. Hence, large boards have a positive effect on bond ratings.

6.2 Audit committee size and bond rating

The second model investigates the relationship between the size of the audit committee and bond ratings. A positive impact of *BRD_AC_SIZE* on *RATING* is found with a regression coefficient of 1.068 at the 5% significance level. All control variables remain statistically significant at the 1% level – little change to the previous model is observed. The likelihood χ^2 is 468.563 ($p < 0.01$) and a high explanatory effect is provided by a pseudo R^2 of .590. Concluding, the size of the audit committee has a positive effect on bond ratings – accepting H1b.

6.3 Board independence and bond rating

Having its roots in the agency theory, a positive impact on bond ratings is anticipated. However, the regression coefficient of *BRD_IND%* indicates a non-significant negative impact on bond ratings ($p > .10$). Out of model 1-4, the model has the lowest explanatory effect of .583 and a likelihood χ^2 of 459.603 ($p < 0.01$). Once again, the significance and regression coefficients of the control variables remain in the same range. Summarizing the results, H2 is not accepted, meaning board independence is not considered by rating agencies while evaluating corporate bonds.

6.4 Board equity ownership and bond rating

The variable *BRD_STOCK%* and its impact on bond ratings is investigated. All control variables remain significant at the 1% level where *SIZE* has the largest regression coefficient with 1.051. Surprisingly, a negative regression coefficient with a significance at the 10% level is found. Since section 2.3.1 presented two different incentives which can take place through equity ownership, the results indicate that bond rating agencies fear the selfish behavior of board members who own equity (private wealth maximization). A strong explanatory model is provided with a pseudo R^2 of .585 and a likelihood χ^2 of 463.134 ($p < 0.01$). To summarize, there is weak evidence that board members who own equity influence the bond ratings negatively.

6.5 Board characteristics, control variables and bond rating

Lastly, model 6 presents the impact board characteristics have on bond ratings. *BRD_SIZE* has a regression coefficient of 2.342 and *BRD_AC_SIZE* has a regression coefficient of .828 – both remaining significant at the 1-and 5% level respectively. In terms of *BRD_IND%*, results are aligned with section 6.3 – no reason to support H2. Including all board characteristics variables in Model 6, changes the impact of *BRD_STOCK%* on *RATINGS* to non-significant. Since the explanatory power of Model 6 is

higher than Model 4, the results are updated and there is no evidence to support H3. Hence, bond ratings are not impacted by equity ownership among the board. No changes in the impact of the control variables are observed.

To show the most impactful control variable regarding *RATING*, Model 5 was created. By substituting control variables from Model 6, it was clear, also by the size of the regression coefficient of *SIZE*, that the total asset size is highly valued by rating agencies. Comparing model 5 and 6, the predictive power, represented by R^2 , increases from .462 to 5.99 when *SIZE* is included. The likelihood ratio χ^2 of model 6 is higher with 480.538 ($p < 0.01$) than 325.650 ($p < 0.001$).

6.6 Robustness – proxy *RATING*

Since the percentage of external directors did not show significant impact on bond ratings, unlike the assumption of H2, an alternative dependent variable is chosen to double check the significance. Following Alali et al. (2012), *INVESTMENT_RATING* is used as an alternative for *RATING*. *INVESTMENT_RATING* is a dichotomous variable coded 1 if the bond rating is better than BBB- and 0 otherwise. Hence a binary logistic regression is presented in Appendices B.

Even though the regression results have a lower explanatory power than the regression results in table 4, the results of the binary regression confirm the previous findings. Once again, H1a and H1b are accepted. No evidence to accept H2 or H3 is given – aligned with previous findings.

6.7 Robustness – proxy *BRD_SIZE*

Since *BRD_SIZE* and *SIZE* are positively associated (see table 3) and to exclude multicollinearity, an alternative variable for *BRD_SIZE* is computed. Additionally, prior research also states the assumption that larger firms have larger boards (Anderson et al., 2004). Consequently, *BRD_SIZE_ALT* is introduced which is the ratio of the number of board members divided by *SIZE* (natural log of total assets) to deliver robust results.

Solely focusing on H1a, strong evidence that board size impacts the bond ratings positively at the 1 % significance level is provided.

7. Limitations

Research in the field of corporate governance tends to be biased by the endogeneity issue. It is often ignored that an independent variable is predicted through other variables in the model. Drivers of this issue are error-in- variables, simultaneous causality, and omitted variables (Bascle, 2008). To prevent error in variables, the Capital IQ database is used. The database is owned by Standard & Poor's. During the research, experts from Capital IQ helped to source the data and it is highly assumed that S&P Global Ratings operated with the same database while rating bonds. Moreover, assessing 533 companies, the impact of error in variables on the model is minimized. Simultaneous causality appears when two variables affect each other through codetermination. The variables *SIZE* and *LEV* are affected by simultaneous causality since leverage has total assets in the denominator. Lastly, the issue of omitted variables appears when important explanatory variables are left out in the model. It is assumed that reputation and relationship between the company and the rating agency also influences bond ratings. Turban and Cable (2003) measure reputation is

through assessing media articles which could minimize the issue of omitted variables – still having the risk of non-subjective media reporting. Once again, since the measurement of reputation is difficult, the variable is left out and this research may suffer the issue of omitted variables.

8. Conclusion

In this paper, another contribution relating to the field of corporate governance is made through empirical research on the impact of board characteristics on bond ratings. Findings of a positive effect on bond ratings caused by member size, whether through the total board size or audit committee size, confirm the validity of previous research provided by Anderson et al. (2004).

Despite a suggested positive impact of board independence on bond ratings (Bohjar and Sengupta, 2003), no evidence is not found to confirm this relationship.

At first sight, there was weak evidence of a relationship between board equity ownership and bond ratings. However, while finding the most explanatory model, no sufficient evidence that equity ownership among the board affects bond ratings is found, contradicting with previous literature (Ashbaugh-Skaife et al., 2006; Kuang and Qin, 2012).

Managerial implications of the research are that companies should consider enlarging their board of directors since it enables better external financing opportunities. However, the cost benefit must be analyzed by comparing the additional compensation costs, the benefits of a high bond rating and the new cost of debt, representing external financing. Moreover, companies should not expect higher bond ratings when they increase their proportion of independent directors among the board.

For the future, the research in the field of corporate governance still impacts companies and becomes increasingly important. Especially since the last years have shown a trend towards “Green Planet”, corporate governance is needed to create innovation, achieve climate goals and reduce regulating exposure. All in all, I am looking forward reading upcoming contributions by scholars.

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Appendix A. Variable definitions

Variable name	Definition
<i>Panel A: Bond rating</i>	
RATING	S&P bond rating from 1 to 7 defining D or lower, B, BB, BBB, A, AA, and AAA.
INVESTMENT_RATING	One if the bond rating is higher than BBB, zero otherwise
<i>Panel B: Board characteristics</i>	
BRD_SIZE	The natural log of the total number of board members
BRD_SIZE_ALT	The natural log of the total number of board members divided by the natural log of total assets
BRD_AC_SIZE	The natural log of the total number of board members on the accounting committee
BRD_IND%	The percentage of independent directors on the board
BRD_STOCK%	The percentage of Board members that own equity of the company
<i>Panel C: Firm characteristics</i>	
ROA	Net income divided by total assets (book value)
BETA	Market beta calculated through daily stock returns over a one-year period
SIZE	The natural log of the total assets (book value)
LEV	Ratio of total debt divided by total assets (book value)
IND	Industry classification by standard industry classification codes (SIC)

Appendix B. Corporate governance codes comparison EU and USA

<i>European Union Commission recommendation on the role of non-executive directors of listed companies (February 15, 2005)²</i>	<i>NYSE corporate governance rule for U.S. domestic issuers, Section 303A.02 (Amended November 25, 2009)³</i>
“(a) not to be an executive or managing director of the company or an associated company, and not having been in such a position for the previous five years; (b) not to be an employee of the company or an associated company, and not having been in such a position for the previous three years, except when the non-executive or supervisory director does not belong to senior management and has been elected to the (supervisory) board in the context of a system of workers’ representation recognised by law and providing for adequate protection against abusive dismissal and other forms of unfair treatment; (c) not to receive, or have received, significant additional remuneration from the company or an associated company apart from a fee received as non-executive or supervisory director. Such additional remuneration covers in particular any participation in a share option or any other performance-related pay scheme; it does not cover the receipt of fixed amounts of compensation under a retirement plan (including deferred compensation) for prior service with the company (provided that such compensation is not contingent in any way on continued service); (d) not to be or to represent in any way the controlling shareholder(s) (control being determined by reference to the cases mentioned in Article 1(1) of Council Directive 83/349/EEC (1)); (e) not to have, or have had within the last year, a significant business relationship with the company or an associated company, either directly or as a partner, shareholder, director or senior employee of a body having such a relationship. Business relationships include the situation of a significant supplier of goods or services (including financial, legal, advisory or consulting services), of a significant customer, and of organisations that receive significant contributions from the company or its group; (f) not to be, or have been within the last three years, partner or employee of the present or former external auditor of the company or an associated company; (g) not to be executive or managing director in another company in which an executive or managing director of the company is non-executive or supervisory director, and not to have other significant links with executive directors of the company through involvement in other companies or bodies; (h) not to have served on the (supervisory) board as a non-executive or supervisory director for more than three terms (or, alternatively, more than 12 years where national law provides for normal terms of a very small length);” (i) not to be a close family member of an executive or managing director, or of persons in the situations referred to in points (a) to (h);”	“This section establishes general standards to determine directors’ independence. No director qualifies as “independent” unless the Board of Directors affirmatively determines that the director has no material relationship with the listed company (whether directly or as a partner, shareholder, or officer of an organization that has a relationship with the company), and emphasizes that the concern is independence from management. The board is also required, on a case by case basis, to express an opinion with regard to the independence or lack of independence, of each individual director. (ii) In addition, in affirmatively determining the independence of any director who will serve on the compensation committee of the listed company’s board of directors, the board of directors must consider all factors specifically relevant to determining whether a director has a relationship to the listed company which is material to that director’s ability to be independent from management in connection with the duties of a compensation committee member, including, but not limited to: (A) the source of compensation of such director, including any consulting, advisory or other compensatory fee paid by the listed company to such director; and (B) whether such director is affiliated with the listed company, a subsidiary of the listed company or an affiliate of a subsidiary of the listed company. (b) In addition, a director is not independent if: A. the director is or has been within the last three years, an employee, or an immediate family member is, or has been within the last three years, an executive officer, of the listed company, its parent or a consolidated subsidiary. Employment as interim chairman or CEO or other executive officer shall not disqualify a director from being considered independent; B. the director has received, or has an immediate family member who has received, during any twelve-month period within the last three years, more than U.S.\$120,000 in direct compensation from the listed company, its parent or a consolidated subsidiary, other than director and committee fees and pension or other forms of deferred compensation for prior services (provided such compensation is not contingent in any way on continued service); C. (i) the director is a current partner or employee of a firm that is the listed company’s internal or external auditor; (ii) the director has an immediate family member who is a current partner of such firm; (iii) the director has an immediate family member who is a current employee of such firm and personally works on the company’s audit; or (iv) the director or an immediate family member was within the last three years a partner or employee of such firm and personally worked on the company’s audit within that time; D. the director, or an immediate family member is, or has been with the last three years, employed as an executive officer of another company where any of the listed company’s present executive officers at the same time serves or served on that company’s compensation committee; E. the director is a current employee, or an immediate family member is a current executive officer, of a company that has made payments to, or received payments from the listed company its parent or a consolidated subsidiary for property or services in an amount which, in any of the last three fiscal years, exceeds the greater of U.S.\$1 million, or 2% of such other company’s consolidated gross revenues.”

² Retrieved from: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2005:052:0051:0063:EN:PDF> at 15.08.2020

³ Retrieved from: <https://www.sec.gov/rules/sro/nyse/2009/34-60653.pdf> at 15.08.2020

Appendix C. Proxy RATING

Table 5 Binary logistic regression results (INVESTMENT_RATING)

Dependent Variable = INVESTMENT_RATING Variables	Predicted sign	Model 1	Model 2	Model 3	Model 4	Model 5
Constant		-10.174***	-8.407***	-5.707***	-5.859***	-8.713**
<i>Panel A Board Characteristics</i>						
BRD_SIZE	+	2.214**	-	-	-	1.515
BRD_AC_SIZE	+	-	1.612***	-	-	1.444**
BRD_IND%	+	-	-	-.012	-	-.26
BRD_STOCK%	?	-	-	-	-.515	-.193
<i>Panel B Control Variables</i>						
ROA	+	.261***	.259***	.264	.257***	.257***
BETA	-	-.793***	-.779***	-.793	-.792***	-.757***
SIZE	+	1.141***	1.230***	1.264	1.205***	1.180***
LEV	-	-.076***	-.080***	-.077	-.076***	-.079***
IND		Included	Included	Included	Included	Included
Pseudo R ² (Cox and Snell)		.459	.464	.455	.456	.466
Likelihood ratio χ^2		318.563***	313.261***	321.885***	321.489***	330.178***
Wald χ^2		80.430	80.430	80.430	80.430	80.430

***, **, * denotes significance at the 1%, 5% and 10% level

Bold indicates variables of interest. Upon request, IND coefficients and significance can be sent.

Model 1: Board size & INVESTMENT_RATING

Model 2: Audit committee size & INVESTMENT_RATING

Model 3: Board independence & INVESTMENT_RATING

Model 4: Board equity ownership & INVESTMENT_RATING

Model 5: Board characteristics & INVESTMENT_RATING

Appendix D. Proxy BRD_SIZE

Dependent Variable = RATING Variables	Model 1	Model 2
<i>Panel A Board Characteristics</i>		
BRD_SIZE_ALT.	2.615***	2.251***
BRD_AC_SIZE	-	.872**
BRD_IND%	-	-.022
BRD_STOCK%	-	-.530
<i>Panel B Control Variables</i>		
ROA	.213***	.212***
BETA	-.752***	-.713***
Size	1.283***	1.305***
LEV	-.048***	-.048***
IND	Included	Included
Pseudo R ² (Cox and Snell)	.591	.598
Likelihood ratio χ^2	470***	477.135***

***, **, * denotes significance at the 1%, 5% and 10% level

Bold indicates variables of interest. Upon request, IND coefficients and significance can be sent.

Model 1: Board size & INVESTMENT_RATING

Model 2: Audit committee size & INVESTMENT_RATING

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