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Carmen Lorca
Juan Pedro Sánchez-Ballesta
Emma García-Meca

Board Effectiveness and Cost of Debt

ABSTRACT. Does the board of directors influence cost of debt financing? This study of a sample of Spanish listed companies during the period 2004–2007 provides some evidence about the question. The results suggest that two board attributes – director ownership and board activity – appear to influence in the risk assessment of debtholders because of their ability to reduce agency cost and information asymmetry. We also find a non-linear relationship between board size and cost of debt, suggesting that from certain levels the benefits of large boards may be outweighed by the cost of poorer communication and increased decision-making time.

KEY WORDS: Board of Directors, corporate governance, cost of debt

Introduction

Although previous research has addressed the relation between corporate governance control mechanisms and the manager–shareholder agency problems, relatively little is known about their relation with agency conflicts involving debtholders and how they affect borrowing costs. However, debt financing is culturally more prevalent than equity capital in some continental countries in the satisfaction of corporate needs. These funds provided by debtholders can be diverted from their initial goal by corporate managers acting in their self-interest, or in that of the shareholders, at the expense of debtholders (Jensen and Meckling, 1976).

This article empirically investigates the effect of different attributes of Board of Directors on the cost of borrowing. Our study is consistent with the argument that stronger corporate governance can result in lower cost of debt, due to reduced agency problems involving debtholders and improved monitoring, and through reduction in information asymmetry.

When it comes to studying the relationship between corporate governance and cost of debt, most of the limited, recent previous research is focussed within the framework of the conventional US/UK model of corporate control and deals with the effect of mechanisms such as ownership structure (Anderson et al., 2003; Bhojraj and Sengupta, 2003; Roberts and Yuan, 2006; Zoido, 1998), the exposure to the market for corporate control (Chava et al., 2009; Klock et al., 2005), or both (Cremers et al., 2007) on the cost of borrowing.

Fewer studies have addressed the effect of the board of directors on the cost of debt financing (Anderson et al., 2004; Bhojraj and Sengupta, 2003; Ertugrul and Hegde, 2008; Piot and Missonier-Piera, 2007). Most of the research is based in the framework of the conventional US/UK model of corporate control and on the cost of public debt. Unlike this model, the Spanish one is characterised by ''comply or explain'' principle in the enforcement of corporate governance regulations, the presence of a few large dominant shareholders who may exert a strong influence on management, low independence of boards with the members of the board mainly representing the controlling shareholders, low developed capital markets and no active market for control. Thus, whereas in US and UK control is exerted mainly by the markets, in Spain internal control mechanisms are prevalent. Board implemented internal controls may be the way to manage divergences between managers and stakeholders (like debtholders). Moreover, in Spain (and other countries like Germany and Japan) corporations rely heavily on bank loans for external financing, whereas in US most funds are raised through

public capital and debt markets. According to Denis and Mihov (2003), Mazumdar and Sengupta (2005), Roberts and Yuan (2006) and Chava et al. (2009), banks and other private lenders are more efficient and effective monitors than public bondholders because of their ongoing relationship with the borrowing firm and superior access to information than public lenders. As a consequence, this will lead to a more sensitive response to good governance in terms of the characteristics of the loans, such as the interest rate. For this motive, as proposed by Roberts and Yuan (2006), it is worth questioning whether board effectiveness may affect the cost of debt for firms in a bank-based financial system, where banks, and not capital markets, are the main channels to obtain financial resources. In this sense, we think that Spain is a good paradigm for studying the effectiveness of the internal governance mechanisms in improving the cost of the financial sources.

We focus on certain board attributes based on the role that previous research assigns them as determinants of board monitoring effectiveness. Specifically, we study the relation between cost of debt and board and audit committee independence, board size, split of chairman and CEO roles, level of director ownership and director's expertise. We have also considered another attribute – board activity – whose relation with cost of debt has not been examined before.

Our study provides empirical evidence that some board characteristics have an economic impact on the cost of debt. Specifically, we obtain compelling evidence that board activity significantly reduces the cost of debt financing. The results also support the role played by director ownership in reducing agency conflicts between the firm and creditors. We have also found a non-linear relationship between board size and the cost of debt.

This study offers a number of contributions to the literature. First, we focus on the role that corporate governance plays in protecting the interests of debtholders – a kind of stakeholder studied less in the academic literature – and identify factors that explain debt cost beyond those traditionally used (i.e. board activity). Furthermore, we focus on a country where bank debt predominates over public debt and one whose institutional, legal and corporate governance peculiarities make it different from the Anglo-Saxon countries, more analysed in the previous literature. In this sense, our results show that these peculiarities seem to affect the association between board attributes and cost of debt: unlike previous research, our evidence shows no influence on the cost of debt financing of board independence, whereas it does for director ownership, meeting frequency and board size, supporting, for the last variable, the recommendations of the Spanish Corporate Governance Code (Unified Good Governance Code -UGGC- 2006).

Previous literature and hypotheses development

Some studies have specifically addressed the effect of the board of directors on the cost of debt financing (Anderson et al., 2004; Ashbaugh-Skaife et al., 2006; Bhojraj and Sengupta, 2003; Ertugrul and Hegde, 2008; Piot and Missonier-Piera, 2007). Their results are consistent with the argument that debtholders favour monitoring mechanisms that are likely to limit managerial opportunism and consider board monitoring effectiveness as a source of greater assurance with respect to the integrity of accounting numbers, so improving the financial accounting process. Therefore, the quality of monitoring corporate governance devices may mitigate debtholders' risk and, consequently these creditors allow a reduction in their risk premium.

Board independence

The literature has generally posited that independence of the board of directors from management provides effective monitoring and control of firm activities (i.e. Fama and Jensen, 1983). However, a second view is that independent directors may be ineffective, either because they are appointed by company managers or because the board culture discourages conflict (Jensen, 1993; Mace, 1986).

The literature on the cost of debt is less controversial in this aspect and there seems to be a strong consensus amongst researchers that creditors value board independence as an effective way to monitor management and consequently mitigate their risk. Anderson et al. (2004) and Piot and Missonier-Piera

(2007) find that the cost of debt financing is inversely related to board independence. Likewise Bhojraj and Sengupta's (2003) results showed that bond yields on new debt issues are negatively associated with the fraction of the board made up by outsiders. Ashbaugh-Skaife et al. (2006) observe that firm credit ratings are positively related to overall board independence, resulting in significant debt cost savings for firms. We therefore formulate the following hypothesis in its alternative form:

Hypothesis 1: Board independence is associated with corporate cost of debt.

Audit committee independence

In relation to monitoring the financial discretion of management, it is the audit committee that is likely to provide stakeholders with the greatest protection in maintaining the credibility of a firm's financial statements.

In order to perform its role effectively, an audit committee should have adequate resources and authority to discharge its responsibilities. Recent regulations put forth by the major stock exchanges[1] requiring that a minimum of three independent directors serve on the audit, nomination and remuneration committees, suggest that the effectiveness of a committee depends on the extent to which the committee is independent. This is supported by research that demonstrates a relationship between audit committee independence and a higher quality of financial reporting (Carcello and Neal, 2000; Davidson et al., 2005; McMullen and Raghundan, 1996).

If audit committee composition influences the financial accounting process, then the corporate cost of debt will exhibit an inverse relation to committee independence (Anderson et al., 2004). So we pose the following hypothesis in its alternative form:

Hypothesis 2: Audit committee independence is associated with corporate cost of debt.

Director ownership

In general, the literature suggests that directors with higher equity stakes are associated with greater monitoring (Jensen and Meckling, 1976; Patton and Baker, 1987). Apart from incentives to improve monitoring, the relatively undiversified stakes of directors tends to induce them towards a risk averse behaviour that may result in efforts to reduce firm risk.

If director equity ownership creates incentives for directors to monitor firm management more closely and mitigate firm risk, it is expected that debtholders may benefit from this. Ashbaugh-Skaife et al. (2006) analyse the effect of the percentage of shares held by officers or directors on firm credit ratings and find a positive relationship whereas Ertugrul and Hegde (2008) find that equity-based compensation increases the monitoring incentives of outside directors and is negatively associated with bond yield spreads.

Thus we test the following hypothesis in its alternative form:

Hypothesis 3: Board stock ownership is associated with corporate cost of debt.

Board expertise

It is expected that boards comprised members who are more competent or knowledgeable will do a better job of monitoring the activities of management and make better decisions, leading to lower default risk. Like Klein (1998) and Ashbaugh-Skaife et al. (2006), we measure board competency or expertise by the percentage of board members that sit on boards of other companies, supporting the view that directorships serve as a measure of a director's reputation as a monitor (Fama, 1980; Fama and Jensen, 1983). However, some studies suggest that too many directorships may lower the effectiveness of directors as corporate monitors (Fich and Shivdasani, 2006; Shivdasani and Yermack, 1999) and Ferris et al. (2003) claim that busy boards are as effective as non-busy boards at monitoring.

In relation to cost of debt, Ashbaugh-Skaife et al. (2006) show that credit ratings are positively associated with board expertise and this can be translated into a lower debt cost for firms.

We address the competing views by testing the following hypothesis in its alternative form:

Hypothesis 4: Board expertise is associated with the cost of debt.

CEO duality

A number of studies (Fama and Jensen, 1983; Goyal and Park, 2002; Jensen, 1993) suggest that when a single individual has the authority of both the CEO and the chairperson positions, managerial monitoring is greatly affected since that individual is more aligned with management than with stockholders. Separating the two roles could signal to investors that proper monitoring is taking place (Bitar, 2003).

It should be noted, however, that although the separation of roles is generally seen as positive in classical agency theory, it could also create an occasion for communication breakdown and hence further information asymmetry between the CEO and the Chairman. Brickley et al. (1997) provide contrasting evidence that the costs of separating the CEO and chairman positions may exceed the benefits.

If CEO duality is generally associated with a lack of interest in monitoring, a negative relation between separation and cost of debt is then expected. Ashbaugh-Skaife et al. (2006) document that credit ratings are negatively associated with CEO power, but Piot and Missonier-Piera (2007) fail to document an association between these variables. So, we pose the following hypothesis in its alternative form:

Hypothesis 5: Split of chairman–CEO roles is associated with the cost of debt.

Board size

Recent research indicates that board size may play an important role in directors' ability to monitor and control managers. Several researchers argue that larger boards may be beneficial because they increase the pool of expertise and resources available to the organisation (Adams and Mehran, 2005; Chaganti et al., 1985; Klein, 2002b) and also because a smaller board could be more "manageable" by the CEO.

On the other hand, John and Senbet (1998) suggest that whilst the board's monitoring capacities increase as the number of members on the board increases, this benefit may be offset by the incremental cost of poorer communication and increased decision-making time that are often associated with large groups (Yermack, 1996).

The literature on the effect of board size on cost of debt is scarce. Anderson et al. (2004) find that cost of debt financing is negatively related to board size as larger boards may increase the level of managerial monitoring. Piot and Missonier-Piera (2007) also examine this relationship but they fail to document any association between board size and the borrowing cost. We test the following hypothesis in its alternative form:

Hypothesis 6: Board size is associated with the cost of debt.

Board activity

Vafeas (1999), Adams (2003) and García Lara et al. (2009) suggest that the number of board meetings is a good proxy for the directors' monitoring effort. As Menon and Williams (1994) note, boards (audit committees) that do not meet, or meet only a small number of times, are unlikely to be effective monitors. An opposing view is that board meetings are not necessarily useful because routine tasks absorb much of the limited time directors spend together and CEOs almost always set the agenda for board meetings. Anderson et al. (2004) find that audit committee meeting frequency decreases debt costs, indicating debtholders' concern with directors actively monitoring the financial accounting process. This leads to our last hypothesis:

Hypothesis 7: Board activity is associated with corporate cost of debt.

Methodology

Sample

The sample is drawn from the population of Spanish non-financial firms listed on the Spanish Stock Exchange during 2004–2007. Financial companies are excluded both because government regulation leads to more limited roles for their boards of directors, and may have a potential effect on the cost of debt, and because of their special accounting practices.

We collected information from two sources: the OSIRIS database made by Bureau Van Dijk, which provides data for public firms, from where we obtain the market value of these companies; and the Spanish Securities Market Commission (Comisión Nacional del Mercado de Valores, CNMV). We have collected corporate governance information from Annual Corporate Governance Reports filled in by Spanish listed companies since 2003 and published it on the CNMV website. CNMV also provides consolidated financial statements for listed companies (reported under IFRS standards since 2005, including 2004 comparative information).

After extreme observations have been suppressed, as we explain in the next paragraph, combining the three data sets (corporate governance, financial statements and market data) yields a sample of 496 firm-year observations and 151 firms for the period 2004–2007.

Dependent variable: the cost of debt

The dependent variable is the interest rate on the firm's debt, which is calculated as the interest expense for the year divided by the interest-bearing debt (Francis et al., 2005; Piot and Missonier-Piera, 2007; Pittman and Fortin, 2004; Zoido, 1998).

The descriptive statistics indicate that this variable, as often happens with some accounting ratios (Dechow, 1994), shows some extreme observations due to there being some firms with a very small denominator (interest-bearing debt). Following Pittman and Fortin (2004), we discard some observations, those outside the 99th percentile of the pooled distribution, which represents observations with cost of debt from 129 to 259% (seven observations).

Independent variables

Corporate governance variables: measuring board effectiveness

Following previous research (Anderson et al., 2004; Bhojraj and Sengupta, 2003) our primary measure of board independence is the proportion of independent directors on the board (*%Indep*). We have also developed a binary variable (*Indep50*) that equals one when the board comprises at least 50.1% independent directors, and zero otherwise. Finally we have measured the proportion of independent directors on the audit committee (*%Indepcaudit*). We have measured board size as the number of directors serving on the board (*Bsize*) (Piot and Missonier-Piera, 2007). Board activity (*Frequency*) is calculated by the number of board meetings. We measure board expertise (*Expertise*) by the percentage of board members that sit on boards of other companies. We have developed a binary variable (*Separation*) that equals one when CEO is not the Chairman of the board and zero otherwise. Director ownership (*Dir_own*) is defined as the percentage of shares held by directors.

Control variables

We include some control variables that are shown to have significant impact on borrowing costs in prior studies (Anderson et al., 2003, 2004; Ashbaugh-Skaife et al., 2006; Bharath et al., 2008; Pittman and Fortin, 2004):

Firm performance is measured by return on assets (*ROA*) (Ashbaugh-Skaife et al., 2006; Ertugrul and Hegde, 2008). Interest Coverage Ratio (*Int_cov*) is calculated as the ratio of operating profit over interest expense for the period. It is used to proxy for a firm's ability to service its debt. Both variables also proxy for firm's default risk, where lower *ROA* and *Int_cov* values reflect greater default risk. Leverage (*Leverage*), calculated as total book debt to the market value of assets, is also included in the model to control for differences in firm's financial structure and to proxy for default risk. Firms with greater debt intensity present higher risk to debt providers, and thus are expected to have higher cost of debt. We include firm size (*Log_assets*), measured by the natural logarithm of total assets, to capture information asymmetry and any residual risk effect. Larger firms have lower risk and are expected to face economies of scale in debt costs (Blackwell et al., 1998; Petersen and Rajan, 1994). Collateral (*Collater*), calculated as net property, plant and equipment over total assets (Ashbaugh-Skaife et al., 2006; Chava et al., 2009), controls for differences in firm's assets structure, where firms with greater collateral present lower risk to debt providers and, consequently, lower cost of

debt. The literature also supports the notion that auditor reputation attributes lead to lower interest rates on the firm's debt (Mansi et al., 2004; Pittman and Fortin, 2004; Simunic et al., 2007). We measure auditor quality using a binary variable (*Big4*) that assumes a value of one when the firm has a Big four auditor and zero otherwise. We include market-to-book value of equity (*MBV*) as a proxy for growth opportunities (Bhojraj and Sengupta, 2003). Finally industry dummy variables (*Ind_Dum*) are included to control the possible industry effects.

Regression model

Due to the high correlation between two independent explanatory variables, board independence (%*Indep*) and audit committee independence (%*Indepcaudit*), we, like Xie et al. (2003), do not include them simultaneously in the same regression equation and test these two models:

$$\begin{aligned} Cost\ of\ debt_{it} = {} & \beta_0 + \beta_1(\%Indep_{it}) \\ & + \beta_2(Dir\_own_{it}) + \beta_3(Expertise_{it}) \\ & + \beta_4(Separation_{it}) + \beta_5(Bsize_{it}) \\ & + \beta_6(Frequency_{it}) + \beta_7(Log\_Assets_{it}) \\ & + \beta_8(Leverage_{it}) + \beta_9(Collater_{it}) \\ & + \beta_{10}(Int\_cov_{it}) + \beta_{11}(ROA_{it}) \\ & + \beta_{12}(Big4_{it}) + \beta_{13}(MBV_{it}) \\ & + \sum_j (\beta_j Ind\_Dum_j) + \varepsilon_{it} \end{aligned} \quad (1)$$

$$\begin{aligned} Cost\ of\ debt_{it} = {} & \beta_0 + \beta_1(\%Indepcaudit_{it}) \\ & + \beta_2(Dir\_own_{it}) + \beta_3(Expertise_{it}) \\ & + \beta_4(Separation_{it}) + \beta_5(Bsize_{it}) \\ & + \beta_6(Frequency_{it}) + \beta_7(Log\_Assets_{it}) \\ & + \beta_8(Leverage_{it}) + \beta_9(Collater_{it}) \\ & + \beta_{10}(Int\_cov_{it}) + \beta_{11}(ROA_{it}) \\ & + \beta_{12}(Big4_{it}) + \beta_{13}(MBV_{it}) \\ & + \sum_j (\beta_j Ind\_Dum_j) + \varepsilon_{it}. \end{aligned} \quad (2)$$

Following Petersen (2009), we use *t-statistics* based on standard errors clustered at the firm and the year level, which are robust both to heteroscedasticity and within-firm serial correlation.[2]

Results

Descriptive statistics

Table Ia presents the descriptive statistics for the continuous variables.

Table Ib presents the frequencies for the dichotomous variables: the majority of independent directors variable (*Indep50*), the split of chairman and CEO roles (*Separation*), and the auditor quality (*Big4*).

The cost of debt in the sample has a mean of 7.78%, a median of 5.45%, a standard deviation of 8.73%, and 10th and 90th percentile values of 2.66 and 12.81%, respectively.

The average board has approximately 10 members and includes 29.64% independent directors. The mean of independent directors on audit committees is 43.49% and the average director stake is 25.44%. These data confirm that low independence and high director ownership is a predominant characteristic of Spanish boards.

Table II provides the Pearson correlation coefficients between the cost of debt, board variables, and the control variables. The cost of debt shows significant negative correlations with director ownership, board size and board activity, and significant positive correlations with the independence of audit committee and the separation of CEO and chairman roles.

The highest correlations for the independent variables are between both variables of board independence (%*Indep* and *Indep50*, correlation of 0.69), between audit committee independence and %*Indep* (correlation of 0.79) and between board size (*Bsize*) and firm size (correlation of 0.70). Collinearity is, therefore, a possible concern which we will deal within the following section.

Table III provides descriptive statistics of the cost of debt by dichotomous variables in the model and the *Student test* (*t*-stat) of difference of means.

T-stat shows the same results as Pearson correlations. As shown in the correlation matrix, auditor quality (significant at 10%) is associated with lower cost of debt whereas separation of CEO and chairman roles (significant at 10%) is associated with higher costs.

Table IV provides descriptive statistics of the cost of debt by industry and an *F*-test (ANOVA) of difference of means, which turns out to be significant at

TABLE I

Descriptive statistics

(a) Continuous variables

	N	Mean	Median	SD	Perc. 10	Perc. 90
Cost of debt	496	0.0778	0.0545	0.0873	0.0266	0.1281
%Indep	496	29.64%	28.59%	19.52%	0.00%	57.10%
%Indepcaudit	496	43.49%	33.33%	29.77%	0.00%	76.50%
Dir_own	496	25.44%	13.81%	27.04%	0.02%	65.01%
Expertise	496	24.30%	20.00%	21.15%	0.00%	55.56%
Bsize	496	10.52	10.00	4.12	6.00	16.00
Frequency	496	9.23	9.00	3.93	5.00	13.00
Log_assets	496	13.50	13.36	2.01	10.98	16.34
Leverage	496	0.4443	0.4420	0.2130	0.1654	0.7333
Collater	496	0.3595	0.3174	0.2238	0.0809	0.6735
Int_cov	496	9.48	3.48	24.66	−0.05	23.04
ROA	496	0.0393	0.0405	0.0902	−0.0010	0.1016
MBV	496	3.10	2.08	3.65	0.72	6.68

(b) Dichotomous variables	0		1	
Indep50	432	87.10%	64	12.90%
Separation	270	54.44%	226	45.56%
Big4	81	16.33%	415	83.67%

This table provides summary statistics for the data employed in the analysis.
Cost of debt is the interest expense for the year divided by the interest-bearing debt; *%Indep* is the proportion of independent directors on the board; *%Indepcaudit* is the proportion of independent directors on the audit committee; *Dir_own* is the percentage of shares held by directors; *Expertise* is the percentage of board members that sit on boards of other companies; *Bsize* is the number of directors serving on the board; *Frequency* is the number of board meetings per year; *Log_assets* is the natural logarithm of total assets; *Leverage* is the ratio of total book debt to market value of assets; *Collater* is the ratio of net property, plant and equipment over total assets; *Int_cov* is the ratio of operating profit over interest expense for the period; *ROA* is calculated as net profit over the book value of total assets; *Big4* is a dummy variable which takes 1 if the firm has a Big four auditor and zero otherwise; *MBV* is the market value of equity to book value of equity.
Indep50 is a binary variable that equals one when the board comprises at least 50.1% independent directors and zero otherwise; *Separation* is a binary variable that equals one when CEO is not the Chairman of the board and zero otherwise.

1%. Whereas Technology and Telecommunications, Consumer services and Consumer goods are the industries with a higher cost of debt (higher than 8%), the Real Estate industry has a cost of debt of only 5.7%, similar to the Oil and Energy industry (5.8%).

Regression results

Table V presents the estimates of models 1 and 2. We use *t*-statistics based on standard errors clustered at the firm and the year level (Petersen, 2009), which are robust both to heteroscedasticity and within-firm serial correlation.

First, in columns 1–8, we report the results of regressing cost of debt on board variables individually and control variables. Columns 9 and 10 of Table V report the regression results using Eqs. 1 and 2, respectively.

The results indicate a negative and significant association between the cost of debt and three board variables: director ownership ($p < 0.05$), board size ($p < 0.05$) and board meeting frequency ($p < 0.05$). These findings seem to support the view that

TABLE II

Data on the correlations between variables used in this study (see Table I for definition of variables)

	Cost of debt	*%Indep*	*%Indepcaudit*	*Indep50*	*Dir own*	*Bsize*	*Frequency*	*Separation*	*Expertise*	*Log_assets*	*Leverage*	*Collater*	*Int_cover*	*Roa*	*Big4*	*MBV*
Cost of debt	1.00															
%indep	0.06	1.00														
%indepcaudit	0.10**	0.79***	1.00													
indep50	0.01	0.66***	0.44***	1.00												
Dir_own	−0.12***	−0.23***	−0.11**	−0.24***	1.00											
Bsize	−0.17***	0.01	−0.02	−0.04	−0.14***	1.00										
Frequency	−0.12***	0.12***	0.11**	0.10**	−0.10**	0.22***	1.00									
Separation	0.08*	−0.14***	−0.17***	−0.11**	−0.02	−0.05	−0.04	1.00								
Expertise	−0.02	0.15***	0.14***	0.07	−0.15***	0.39***	0.08*	−0.10**	1.00							
Log_assets	−0.14***	0.20***	0.16***	0.07	−0.19***	0.70***	0.32***	−0.18***	0.49***	1.00						
Leverage	−0.09*	−0.16***	−0.19***	−0.04	0.04	0.07	0.14***	−0.01	−0.13***	0.20***	1.00					
Collater	−0.12***	−0.02	−0.04	0.01	−0.07	0.11**	0.01	0.02	0.04	0.13***	0.11	1.00				
Int_cover	−0.11**	0.01	0.03	0.03	−0.03	0.01	−0.14***	−0.01	0.06	0.01	−0.32***	0.12***	1.00			
Roa	−0.05	0.03	0.03	0.06	−0.03	0.16***	−0.02	−0.08*	0.15***	0.21***	−0.27***	−0.11**	0.52***	1.00		
Big4	−0.13***	0.25***	0.16***	0.09**	−0.10	0.32***	0.21***	−0.13***	0.34***	0.42***	−0.20***	0.02	0.12***	0.19***	1.00	
MBV	0.15***	0.02	0.07	−0.01	−0.05	0.07	−0.03	−0.01	0.14***	0.08*	−0.39***	−0.23***	0.20***	0.18***	0.16***	1.00

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

TABLE III

Data on the descriptive statistics of cost of debt by dummy variable and the *Student test* (*t*-stat) of equality of means

Dummy variables		0	1	*t*-Stat
Indep50	Mean	0.077	0.081	−0.277
	SD	0.089	0.071	
Separation	Mean	0.071	0.086	−1.757⋆
	SD	0.066	0.107	
Big4	Mean	0.103	0.073	1.866⋆
	SD	0.141	0.072	

⋆$p < 0.1$.

debtholders take certain firm's board attributes into account when estimating its default risk, due to their ability to reduce agency costs and information asymmetry and improve monitoring.

These results are in line with those obtained by Ertugrul and Hegde (2008) and Ashbaugh-Skaife et al. (2006), who confirmed the hypothesis that increases in director ownership reduce information asymmetry and debtholder's risk. Our findings are also similar to those of Anderson et al. (2004), which showed a negative relationship between board size and cost of debt.

In addition, in model 2 we find, in contrast to Ashbaugh-Skaife et al. (2006), a positive and significant relation ($p < 0.05$) between the split of CEO and chairman roles and the cost of debt financing. One possible explanation for this finding could be that debtholders consider that the costs of separating the CEO and chairman positions (communication breakdown and further information asymmetry) may exceed the benefits (Brickley et al., 1997). Anyway, this relation is not observed in any of the other model specifications (specifically in columns 6, 9 and 11).

The economic significance of the coefficient −0.0004 on director ownership (*Dir_own*) in model 1 is that an increase of 1 percentage point in director ownership would reduce the cost of debt by 0.04 percentage points. Regarding board size (*Bsize*) and board activity (*Frequency*), an increase of one director and one meeting, would produce, respectively, a reduction in the cost of debt by 0.33 and 0.21 percentage points.

We do not find an association between board independence, audit committee independence, board expertise and cost of debt. Both coefficients are positive although not statistically significant.

In column 11 of Table V we use a different proxy for board independence, replacing the proportion of independent directors on the board (%*Indep*) by a dummy variable that takes 1 if the board has a majority of independent directors (*Indep50*). The conclusions are the same as in columns 9 and 10. We will go into this result in depth in the next subsection (Analysis extension).

In terms of the control variables, the coefficient for *Collater* is significant and negative ($p < 0.05$), as expected, showing that the nature of firms' assets is a main factor in signalling guarantees and, consequently, in influencing the cost of debt financing.

TABLE IV

Number and percentage of firm-year observations for each industry group in the sample (using 1 digit Spanish Stock Exchange classification codes) and data on the descriptive statistics of cost of debt by industry together with the ANOVA test of equality of means

Industry	No. of observations	Percentage of observations	Mean	SD
Oil and Energy	56	11.29	0.058	0.031
Industrial goods, construction and materials	126	25.40	0.075	0.086
Consumer goods	139	28.02	0.082	0.085
Consumer services	71	14.31	0.094	0.095
Real Estate	75	15.12	0.057	0.100
Technology and Telecommunications	29	5.85	0.119	0.102
	496	100.00	*F*-test: 3.442⋆⋆⋆	

⋆⋆⋆$p < 0.01$.

TABLE V

Regressions of cost of debt on board variables and control variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	Model 1 (9)	Model 2 (10)	(11)
Indep50	0.0027										−0.0075
	(0.38)										(−0.72)
%Indep		0.0004							0.0002		
		(1.51)							(0.66)		
%Indepcaudit			0.0003							0.0002	
			(1.28)							(1.07)	
Dir_own				−0.0005					−0.0004	−0.0004	−0.0004
				(−2.52)**					(−2.44)**	(−2.62)**	(−2.47)**
Expertise					0.0002				0.0002	0.0002	0.0002
					(1.40)				(1.01)	(0.95)	(1.01)
Separation						0.0109			0.0122	0.0134	0.0112
						(1.29)			(1.58)	(1.98)**	(1.35)
Bsize							−0.0033		−0.0033	−0.0031	−0.0036
							(−2.35)**		(−2.08)**	(−1.97)**	(−2.46)**
Frequency								−0.0020	−0.0021	−0.0022	−0.0021
								(−1.96)**	(−2.28)**	(−2.27)**	(−2.28)**
Log_assets	−0.0022	−0.0030	−0.0033	−0.0031	−0.0034	−0.0016	0.0021	−0.0015	0.0014	0.0007	0.0021
	(−0.97)	(−1.44)	(−1.74)*	(−1.35)	(−1.39)	(−0.76)	(0.71)	(−0.67)	(0.46)	(0.25)	(0.70)
Leverage	−0.0161	−0.0086	−0.0058	−0.0134	−0.0122	−0.0170	−0.0205	−0.0120	−0.0072	−0.0016	−0.0116
	(−0.56)	(−0.33)	(−0.26)	(−0.43)	(−0.43)	(−0.58)	(−0.74)	(−0.44)	(−0.27)	(−0.07)	(−0.39)
Collater	−0.0228	−0.0220	−0.0218	−0.0250	−0.0222	−0.0235	−0.0240	−0.0252	−0.0285	−0.0282	−0.0290
	(−1.86)*	(−1.85)*	(−1.88)*	(−2.01)**	(−1.78)*	(−1.90)*	(−2.06)**	(−2.01)**	(−2.24)**	(−2.27)**	(−2.25)**
Int_cover	−0.0005	−0.0005	−0.0005	−0.0004	−0.0005	−0.0005	−0.0005	−0.0004	−0.0004	−0.0004	−0.0004
	(−1.42)	(−1.40)	(−1.46)	(−1.34)	(−1.45)	(−1.37)	(−1.43)	(−1.35)	(−1.23)	(−1.27)	(−1.23)
ROA	−0.1063	−0.1011	−0.0998	−0.0995	−0.1042	−0.1018	−0.1086	−0.1063	−0.0960	−0.0924	−0.0964
	(−0.89)	(−0.84)	(−0.84)	(−0.86)	(−0.87)	(−0.85)	(−0.91)	(−0.94)	(−0.89)	(−0.87)	(−0.89)
Big4	−0.0410	−0.0430	−0.0410	−0.0419	−0.0425	−0.0409	−0.0393	−0.0371	−0.0380	−0.0369	−0.0369
	(−1.98)**	(−2.02)**	(−1.92)*	(−1.95)*	(−2.06)**	(−1.98)**	(−2.02)**	(−1.91)*	(−2.05)**	(−1.93)*	(−2.01)**
MBV	0.0028	0.0031	0.0030	0.0028	0.0028	0.0028	0.0027	0.0027	0.0027	0.0027	0.0025
	(0.84)	(0.93)	(0.91)	(0.79)	(0.84)	(0.83)	(0.83)	(0.82)	(0.82)	(0.83)	(0.76)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.1073	0.1126	0.1155	0.1250	0.1091	0.1107	0.1189	0.1139	0.1498	0.1544	0.1494

*$p < 0.1$; **$p < 0.05$.

See Table I for definition of variables. Models include industry dummies. Regressions are run using two-way cluster standard errors (Petersen, 2009) at the time and firm level which are robust to both heteroscedasticity and within-firm serial correlation.

The coefficient of *Big4* is also negative and significant ($p < 0.05$ in model 1 and $p < 0.1$ in model 2). This means that firms with higher auditor quality face lower cost of debt financing, since they are perceived as less risky by creditors.

Since Table II shows that firm size (*Log_assets*) is correlated with most of the other variables, the variance inflation factors of independent variables (VIF) are estimated for each of the models as a check for multicollinearity. VIF values fall within acceptable levels (below 3.5 in all cases and below 2.3 if we put Log_assets aside), consistent with limited, if any, collinearity problems.[3] Anyway, we have tested the results of removing the control for firm size (not reported), and we find the same results as those reported in Table V for models 1 and 2.

As previously noted, the highest correlation of firm size is with board size (0.70). To address this

TABLE VI

Results of main regressions replacing *Bsize* by *R_bsizeat*

	(1) Model 1	(2) Model 1	(2) Model 2	(2) Model 2
%Indep	0.0002	0.0001		
	(0.66)	(0.53)		
%Indepcaudit			0.0002	0.0002
			(1.07)	(0.96)
Dir_own	−0.0004**	−0.0004**	−0.0004**	−0.0004**
	(−2.44)	(−2.30)	(−2.62)	(−2.44)
Expertise	0.0002	0.0001	0.0002	0.0000
	(1.01)	(0.44)	(0.95)	(0.31)
Separation	0.0122	0.0135*	0.0134**	0.0148**
	(1.58)	(1.70)	(1.98)	(2.16)
R_bsizeat	−0.0033**	−0.0033**	−0.0031**	−0.0031**
	(−2.08)	(−2.08)	(−1.97)	(−1.96)
Frequency	−0.0021**	−0.0023***	−0.0022**	−0.0024**
	(−2.28)	(−2.65)	(−2.27)	(−2.63)
Log_assets	−0.0033		−0.0037*	
	(−1.37)		(−1.67)	
Leverage	−0.0072	−0.0183	−0.0016	−0.0141
	(−0.27)	(−0.77)	(−0.07)	(−0.67)
Collater	−0.0285**	−0.0309**	−0.0282**	−0.0308**
	(−2.24)	(−2.39)	(−2.27)	(−2.44)
Int_cover	−0.0004	−0.0004	−0.0004	−0.0004
	(−1.23)	(−1.23)	(−1.27)	(−1.27)
ROA	−0.0960	−0.1094	−0.0924	−0.1074
	(−0.89)	(−1.03)	(−0.87)	(−1.02)
Big4	−0.0380**	−0.0428**	−0.0369*	−0.0425**
	(−2.05)	(−2.36)	(−1.93)	(−2.26)
MBV	0.0027	0.0025	0.0027	0.0025
	(0.82)	(0.76)	(0.83)	(0.76)
Industry dummies	Yes	Yes	Yes	Yes
Adjusted R^2	0.1498	0.1472	0.1544	0.1512

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

See Table I for definition of variables.

R_bsizeat is the absolute value of the residuals from the regression of *Bsize* on *Log_assets*.

Models include industry dummies. Regressions are run using two-way cluster standard errors (Petersen, 2009) at the time and firm level which are robust to both heteroscedasticity and within-firm serial correlation.

issue, and to avoid a possible specification error if we remove the control for firm size, we introduce, as in Piot and Missonier-Piera (2007), the residuals from the regression of *Bsize* on *Log_assets*, denoted *R_bsizeat*, instead of board size. Doing this renders the information from board size orthogonal to firm size, and residuals capture the portion of *Bsize* that is not explained by firm size. Table VI reports regression results for the new models (including *R_bsizeat* instead of *Bsize*), before and after removing the firm size variable (*Log_assets*). Once again the conclusions are the same as those presented in Table V for models 1 and 2.

Analyses extension

Non-linearities in board attributes

As we have shown in the literature review section, there are competing views about the effect of certain board attributes (board size, expertise and board activity) on the cost of debt.

In this section we extend the previous analyses by testing possible non-linear relations between these board mechanisms and the cost of debt. As we have pointed out before, whilst the board's capacity for monitoring increases as more directors are added, from certain levels the benefits may be outweighed by the incremental cost of poorer communication and increased decision-making time associated with larger groups. Similarly, the higher the number of boards a director sits on, the more experience he has. Nevertheless, very busy directors may become ineffective. Hence, there could be a kind of turning point after which the positive effect of expertise may be outweighed by the lack of time due to too many directorships.

Also, there are conflicting explanations about the effect of the activity of the board. A higher number of meetings can mean more directors' effort but, contrarily, it can point to problems within the company too. Indeed, boards in troubled companies meet more often.

We have re-tested models 1 and 2, including the quadratic terms for board size, expertise, and board activity. The main results are reported in Table VII.

The coefficient of the linear term for board size remains significant and negative whereas the coefficient of the quadratic term is positive and significant (Table VII, column 1, 4, 5 and 8). The turning point in the quadratic board size-cost of debt relationship is about 15 directors. This result endorses recommendation no. 9 of the Spanish Corporate Governance Code (UGGC) that advises that boards of director comprise a minimum of five members so as to ensure a broader debate enriched by a greater number of viewpoints, and a maximum of 15 directors to avoid undermining its effectiveness and internal cohesion.

For the rest of variables the results discard a non-linear relation with the cost of debt: *Expertise*'s coefficients remain non-significant for both the linear and the quadratic term (Table VII, columns 2, 4, 6 and 8) and the coefficient of the linear term of board activity (*Frequency*) remains significant and negative (Table VII, columns 3, 4, 7 and 8) whereas the coefficient of the quadratic term is not significant (although it is positive as predicted and it appears at significant at the 10% level in Table VII, column 7, which means a turning point of 22 meetings, which represents only a 0.8% of the sample).

Interaction between independence and director ownership

In contrast with previous research we do not find a significant association between board independence or audit committee independence and cost of debt. One explanation for this finding could be the "*substitution effect hypothesis*".

It has been suggested (Agrawal and Knoeber, 1996; Bozec and Bozec, 2007; Rediker and Seth, 1995) that firms form an efficient set of controls internally, in which deficiencies in one mechanism can be compensated by the action of an alternative one. Anderson et al. (2006) point out that because creditors potentially benefit from shareholder implemented governance devices and bear an implicit cost (opportunity cost) from the implementation of these mechanisms, they (similar to shareholders) should also view these mechanisms as substitutes.

We have tested the possible substitution effect on the cost of debt between board independence and director ownership, suggested by the previous literature and by the negative and significant correlations of director ownership with board independence (*%Indep* and *Indep50*) shown in Table II. To address this issue we include two interaction terms in the complete model (including the quadratic term of board size): the

TABLE VII

Check of non-linearities in board size, director ownership, expertise, and frequency

	(1) Model 1	(2) Model 1	(3) Model 1	(4) Model 1	(5) Model 2	(6) Model 2	(7) Model 2	(8) Model 2
%Indep	0.0002	0.0002	0.0001	0.0001	0.0003	0.0002	0.0002	0.0002
	(0.82)	(0.66)	(0.61)	(0.76)	(1.20)	(1.07)	(1.08)	(1.24)
Dir_own	−0.0004**	−0.0004**	−0.0004**	−0.0010**	−0.0004**	−0.0004***	−0.0004***	−0.0004***
	(−2.37)	(−2.60)	(−2.44)	(−2.53)	(−2.57)	(−2.81)	(−2.63)	(−2.76)
Expertise	0.0001	0.0000	0.0002	0.0003	0.0001	0.0001	0.0001	0.0004
	(0.81)	(0.06)	(1.04)	(0.50)	(0.74)	(0.11)	(0.98)	(0.58)
$Expertise^2$		−0.0000		−0.0000		0.0000		−0.0000
		(−0.20)		(−0.33)		(0.12)		(0.44)
Separation	0.0122	0.0122*	0.0124	0.0116	0.0135**	0.0135**	0.0136**	0.0134**
	(1.56)	(1.66)	(1.63)	(1.63)	(1.97)	(2.05)	(2.06)	(2.05)
Bsize	−0.0134**	−0.0033**	−0.0032**	−0.0126***	−0.0135***	−0.0030**	−0.0030*	−0.0136***
	(−2.62)	(−2.10)	(−2.04)	(−2.92)	(−2.69)	(−1.98)	(−1.93)	(−3.07)
$Bsize^2$	0.0004**			0.0004***	0.0004**			0.0004**
	(2.28)			(2.62)	(2.34)			(2.79)
Frequency	−0.0017**	−0.0021**	−0.0043**	−0.0032**	−0.0017**	−0.0022**	−0.0044**	−0.0036**
	(−2.08)	(−2.28)	(−2.29)	(−2.06)	(−2.07)	(−2.29)	(−2.35)	(−2.10)
$Frequency^2$			0.0001	0.0001			0.0001*	0.0001
			(1.64)	(1.47)			(1.68)	(1.51)
Log_assets	0.0025	0.0014	0.0017	0.0022	0.0019	0.0007	0.0010	0.0019
	(0.76)	(0.44)	(0.56)	(0.73)	(0.61)	(0.25)	(0.36)	(0.56)
Leverage	−0.0217	−0.0076	−0.0100	−0.0285	−0.0165	−0.0019	−0.0042	−0.0179
	(−0.73)	(−0.28)	(−0.36)	(−0.76)	(−0.63)	(−0.08)	(−0.18)	(−0.65)
Collater	−0.0283**	−0.0285**	−0.0284**	−0.0308**	−0.0280**	−0.0282**	−0.0281**	−0.0278**
	(−2.40)	(−2.24)	(−2.22)	(−2.36)	(−2.47)	(−2.26)	(−2.25)	(−2.40)
Int_cover	−0.0004	−0.0004	−0.0004	−0.0004	−0.0004	−0.0004	−0.0004	−0.0004
	(−1.27)	(−1.23)	(−1.23)	(−1.24)	(−1.31)	(−1.26)	(−1.26)	(−1.27)
ROA	−0.1007	−0.0961	−0.1041	−0.1115	−0.0973	−0.0925	−0.1005	−0.1037
	(−0.93)	(−0.89)	(−0.93)	(−0.95)	(−0.92)	(−0.87)	(−0.91)	(−0.94)
Big4	−0.0361**	−0.0378**	−0.0375**	−0.0363**	−0.0347*	−0.0367**	−0.0365*	−0.0347*
	(−2.05)	(−2.09)	(−2.03)	(−2.06)	(−1.91)	(−1.97)	(−1.91)	(−1.92)
MBV	0.0025	0.0027	0.0027	0.0024	0.0025	0.0027	0.0027	0.0024
	(0.74)	(0.83)	(0.83)	(0.75)	(0.75)	(0.84)	(0.85)	(0.76)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.1589	0.1499	0.1522	0.1608	0.1642	0.1545	0.1545	0.1663

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

See Table I for definition of variables.

$Expertise^2$ is *Expertise* squared; $Bsize^2$ is *Bsize* squared; $Frequency^2$ is *Frequency* squared.

Models include industry dummies. Regressions are run using two-way cluster standard errors (Petersen, 2009) at the time and firm level, which are robust to both heteroscedasticity and within-firm serial correlation.

interaction term between board independence (*%Indep*) and the dummy of majority of independent directors (*Indep50*), named *%Indep*Indep50*, and the interaction term between director ownership (*Dir_own*) and the dummy of majority of independent directors (*Indep50*), denoted as *Dir_own*Indep50*.

Specifically, we test the following model:

$$\begin{aligned} Cost\ of\ debt_{it} = {} & \varphi_0 + \varphi_1(\%Indep_{it}) \\ & + \varphi_2(\%Indep^{\star} Indep50_{it}) + \varphi_3(Dir\_own_{it}) \\ & + \varphi_4(Dir\_own^{\star} Indep50_{it}) + \varphi_5(Expertise_{it}) \\ & + \varphi_6(Separation_{it}) + \varphi_7(Bsize_{it}) + \varphi_8(Bsize_{it}^2) \\ & + \varphi_9(Frequency_{it}) + \varphi_{10}(Log\_Assets_{it}) \\ & + \varphi_{11}(Leverage_{it}) + \varphi_{12}(Collater_{it}) \\ & + \varphi_{13}(Int\_cov_{it}) + \varphi_{14}(ROA_{it}) \\ & + \varphi_{15}(Big4_{it}) + \varphi_{16}(MBV_{it}) \\ & + \sum_j (\varphi_j Ind\_Dum_j) + \varepsilon_{it}. \end{aligned} \quad (3)$$

Table VIII presents the results of the new regression. Although conclusions of our main analysis persist, neither φ_1 nor the *F*-test of the sum $(\varphi_1 + \varphi_2)$ is significant, suggesting that there is no significant relationship between board independence and borrowing cost at any level of independence, even in the case of a majority of independent directors on the board. Therefore, the "*substitution effect hypothesis*" does not occur in our sample.

Regarding director ownership, φ_3 remains negative and significant at the 0.05 level, supporting the fact that for low levels of independence director ownership contributes to reducing the cost of debt. However, our *F*-test for the sum $(\varphi_3 + \varphi_4)$ is not significant, suggesting that ownership does not have an incremental effect for high levels of independence to reduce the cost of debt. An explanation for this could be that high levels of independence in our sample come together with low levels of director ownership that may not provide enough "alignment of interest" to ensure that this board mechanism limits managerial expropriation and opportunism properly (the average director stockholding for boards with a majority of independent directors is 8.35% whereas it is 27.97% when there is no majority of independent directors).

TABLE VIII

Check of substitution effect between board independence and director ownership on the cost of debt

%Indep = φ_1	0.0006
	(1.55)
*%Indep*Indep50* = φ_2	−0.0004⋆
	(−1.74)
Dir_own = φ_3	−0.0004⋆⋆
	(−2.44)
*Dir_own*Indep50* = φ_4	−0.0003
	(−0.76)
Expertise	0.0002
	(0.95)
Separation	0.0118
	(1.51)
Bsize	−0.0140⋆⋆⋆
	(−2.70)
$Bsize^2$	0.0004⋆⋆
	(2.38)
Frequency	−0.0015⋆
	(−1.86)
Log_assets	0.0018
	(0.60)
Leverage	−0.0179
	(−0.64)
Collater	−0.0275⋆⋆
	(−2.18)
Int_cover	−0.0004
	(−1.22)
ROA	−0.0903
	(−0.81)
Big4	−0.0382⋆⋆
	(−2.10)
MBV	0.0026
	(0.79)
Industry dummies	Yes
Adjusted R^2	0.1655
F-test $(\varphi_1 + \varphi_2)$	*p*-value = 0.6012
F-test $(\varphi_3 + \varphi_4)$	*p*-value = 0.1258

⋆$p < 0.1$; ⋆⋆$p < 0.05$; ⋆⋆⋆$p < 0.01$.
See Table I for definition of variables.
$Bsize^2$ is *Bsize* squared; (*%Indep*Indep50*): interaction term between board independence (*%Indep*) and the dummy of majority of independent directors (*Indep50*); (*Dir_own*Indep50*): interaction term between director ownership (*Dir_own*) and the dummy of majority of independent directors (*Indep50*).
Models include industry dummies. Regressions are run using two-way cluster standard errors (Petersen, 2009) at the time and firm level which are robust to both heteroscedasticity and within-firm serial correlation.

Having discarded the existence of a substitution effect, an alternative explanation for the non-significance of board independence in reducing borrowing costs for our sample of Spanish listed firms could lie in the lack of investor confidence in the role and true independence of "independent" directors in Spain. Reservations regarding the real

independence of these directors in Spain have been expressed by investors and professionals in different reports (Aldama Report, 2003; Heidrick and Struggles Report, 2003, 2005, 2007; Olivencia Report, 1998), by newspapers' articles[4] and researchers (Crespí-Cladera et al., 2007; García and Gill-de-Albornoz, 2007) have also echoed these concerns. All of them agree that the existence and composition of a nomination committee are vital to guarantee this independence. According to Crespí-Cladera et al. (2007), if we do not consider as independent directors those not appointed by the nomination committee, the average 3.56 independent directors reported by Spanish listed companies in 2006 would be reduced to 1.93.

Endogeneity issues

In this section we consider the potential endogeneity issue between cost of debt and board variables. Although the causality between board attributes and the cost of debt is more likely to run from board to cost[5] (Ashbaugh-Skaife et al., 2006), it is also possible that the cost of debt could affect board attributes.

We approach this matter by performing a Durbin–Wu–Hausman test of endogeneity for all independent variables. The results of the Durbin–Wu–Hausman tests for model 1 (p-value = 0.2546) and 2 (p-value = 0.2239) do not reject the non-endogeneity hypothesis.

We provide further evidence on the issue of causation by estimating a two-stage least-squares model (2SLS) (Anderson et al., 2003; Klock et al., 2005). Two-stage procedures rely on instrumental variables to generate predicted values of the independent variables (in our case, the set of governance variables) that are uncorrelated with the error term in the structural model.

Since we expect board attributes to be highly persistent over time, we follow a similar approach to that of Caramanis and Lennox (2008), and consider that board variables lagged 1 year are powerful predictors of the current year's board variables. In addition, we consider other variables traditionally considered determinants of board attributes: size, leverage, ROA and market-to-book ratio (Anderson et al., 2004; Ashbaugh-Skaife et al. 2006; Klein, 2002a; Yermack, 1996).

TABLE IX

2SLS regression

%Indep	0.0000
	(−0.01)
Pred_Dir_own	−0.0004⋆
	(−1.77)
Pred_bsize	−0.0174⋆⋆⋆
	(−2.80)
Pred_bsize^2	0.0006
	(2.86)⋆⋆⋆
Pred_frequency	−0.0037⋆⋆⋆
	(−3.38)
Separation	0.0092
	(1.54)
Expertise	0.0001
	(0.42)
Log_assets	−0.0037
	(1.18)
Leverage	−0.0292
	(−1.23)
Collater	−0.0247⋆
	(−1.68)
Int_cover	−0.0002
	(−1.04)
ROA	−0.0732
	(−0.69)
Big4	−0.0205
	(−0.91)
MBV	0.0018
	(1.63)
Industry dummies	Yes
Adjusted R^2	0.1401

⋆$p < 0.1$; ⋆⋆$p < 0.05$; ⋆⋆⋆$p < 0.01$.

See Table I for definition of variables.

Pred_Dir_own, *Pred_bsize*, *Pred_bsize*^{2} *and Pred_frequency* are the predicted values of the corresponding board variables in the first stage of the 2SLS procedure. Regressions in the first stage are also run using two-way cluster procedure.

Models include industry dummies. Regressions are run using two-way cluster standard errors (Petersen, 2009) at the time and firm level which are robust to both heteroscedasticity and within-firm serial correlation.

So, in the first stage we estimate the following models for board attributes that have proved to be significantly related to cost of debt:

$$\begin{aligned} Board\ variable_{it} = {} & \beta_0 + \beta_1(Board\ variable_{it-1}) \\ & + \beta_2(Cost\ of\ debt_{it}) + \beta_3(Size_{it}) \\ & + \beta_4(Leverage_{it}) + \beta_5(ROA_{it}) + \beta_6(Mbv_{it}) \\ & + \sum_j (\beta_j Ind\_Dum_j) + \varepsilon_{it}. \end{aligned} \quad (4)$$

Table IX presents the results of the 2SLS regression of the main model, which confirms that the results are similar to our main findings.

Concluding remarks

Although recent corporate scandals have highlighted the negative credit implications of exceptionally poor governance, relatively little is known about the relation between the role of the board of directors in the agency conflicts involving debtholders, and how it affects borrowing costs. This article empirically investigates the effect of different board attributes on the cost of debt for a sample of Spanish listed non-financial companies during the period 2004–2007. The findings offer new insights into these relationships in an institutional context that greatly differs from those of the countries considered in the previous literature (particularly the US system).

Our analysis indicates that director ownership and board activity contribute to a reduction in the agency cost of debt financing. This suggests that their monitoring role of management activities leads to a decrease in the opportunistic behaviour of managers and information asymmetry, with the consequent reduction of creditors' perception of likelihood of default in loan repayments, which results in a lower cost of debt.

We also find a non-linear relationship between board size and cost of debt with a turning point of around 15 directors, which endorses the recommendation of UGGC regarding an advisable maximum of 15 members on a board to ensure its effectiveness and internal cohesion.

On the other hand, unlike previous research in other countries, board independence proxies do not show a significant association with the cost of debt. This result could be due to the fact that the proxy for board independence in Spain may reflect not really independent directors, as expressed by investors and professionals in different reports.

Work in this area would lead to determining the underlying factors which contribute to influence the cost of debt financing and to ascertaining the key factors that shape the effectiveness of different corporate governance mechanisms. As a result, this article tries to provide valuable input for regulators who are requesting continuous analytical work to ascertain the credit implications of exceptionally poor governance. The evidence is also important to credit agencies, which are concerned with governance because weak firm governance can impair a firm's financial position and leave debtholders vulnerable to losses. In addition, this field of research will provide firms with a more refined sense of how companies' cost of debt might be affected through the composition, attributes and working of the board of directors.

Notes

[1] In other words, in Spain, recommendation 44 of the Unified Good Governance Code (UGGC).

[2] The results are similar if we cluster by firm and include dummy variables for each time period.

[3] Similar high correlations and VIF are obtained with alternative measures of firm size as the natural log of sales or the natural log of market value.

[4] For example in the article ''Consejeros dependientes'' (''Dependent directors'') published in 19 July 2009 edition of ''El País'', available from http://www.elpais.com/articulo/dinero/Consejeros/dependientes/elpepueconeg/20090719elpnegdin_2/Tes.

[5] Ashbaugh-Skaife et al. (2006) posit that one feature that supports that we have appropriately modelled cost of debt (credit ratings in their case) is the evidence from credit rating agencies themselves that indicates that governance features are an important input in the credit rating process: ''three major rating agencies (S&P, Moody's and Fitch Ratings) have developed infrastructures and have invested significant resources to evaluate firms' governance structures. These actions clearly signal that governance is important to the credit rating process''.

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Carmen Lorca and Juan Pedro Sánchez-Ballesta
Department of Accounting,
Faculty of Economics and Business,
University of Murcia,
Campus de Espinardo, 30100 Murcia, Spain
E-mail: clorca@um.es;
juanpsb@um.es

Emma García-Meca
Department of Accounting, Faculty of Business Studies,
Technical University of Cartagena (UPCT),
Calle Real, 3, 30201 Cartagena (Murcia), Spain
E-mail: emma.garcia@upct.es