Universität Siegen

12th Annual Conference on Risk Governance

Risk Governance in Corporate Crisis Management: Unveiling the Impact of Board Gender Diversity on Credit Rating

Giráldez-Puig, P.
Samaniego-Medina, R.

Universidad Pablo de Olavide Sevilla

This study was partially funded by the following research projects: (1) Research project financed by the Spanish Ministerio de Ciencia e Innovación (Ref: PID2021-128420OB-100) and (2) Research project financed by Consejería de Universidad, Investigación e Innovación, Junta de Andalucía 2021-073/ PAI/PAIDI2020/PR (Ref. “ProyExcel_00934")

Ministerio de Ciencia e Innovación · Unión Europea, Fondo Europeo de Desarrollo Regional · Agencia Estatal de Investigación · Junta de Andalucía, Consejería de Universidad, Investigación e Innovación

Research Questions and relevance

CREDIT RATINGS

Most widely accepted tool for assessing a firm's creditworthiness (Cantor & Packer, 2000)

Research Questions and relevance

ASSIGNING RATINGS

> “ Ratings represent an art as much as a science.
>
> Standard & Poors, 2002

Research Questions and relevance

BOARD GENDER DIVERSITY

Agency Theory

Reduced agency problems (Ain et al., 2020)

Better monitoring function (Maxfield & Wang, 2024)

Resource Dependence Theory

Skills that contribute to enhanced risk management (Darmawan, 2024)

Foster strong communication channels improving resource access (Khan et al., 2023)

Growing societal demand for increased gender equality

Research Questions and relevance

BOARD GENDER DIVERSITY AND CREDIT RATINGS

The literature linking female board members to credit ratings remains sparse and inconsistent; limited in scope and geographic relevance

BOARD GENDER DIVERSITY → **CREDIT RATING**

Grassa (2016) finds a positive correlation in Islamic banks

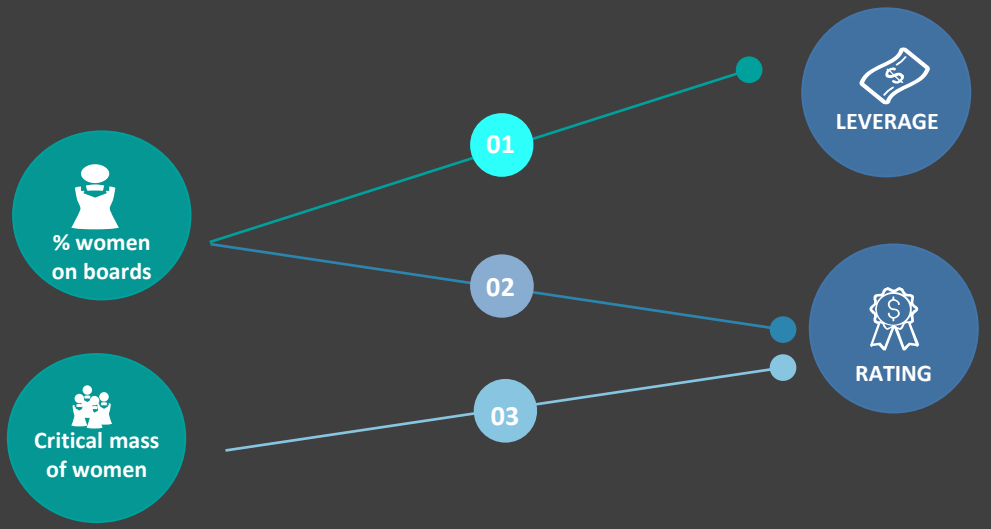
Joong & Su-In (2022) report that female CEOs and executives positively impact credit ratings among Korean listed firms

Muricken *et al.*, (2024) discovered that firms in India improved their credit ratings after adding women to their boards

Iryanti and Mawardi (2021) found no significant impact in Indonesia

Research Questions and relevance

DESING OF THE RESEARCH



Methodology:

1. We applied the Arellano–Bond generalised method of moments (GMM) to study the relationship between female board membership and leverage.

2. For hypotheses 2 and 3 we used an ordinal extension of the binary logit model and estimated the marginal effects of female board membership in order to measure its real implications. Finally, robustness was tested in.

Research Questions and relevance

CONTRIBUTIONS

Women on Board & Credit Rating

Financial implications of a substandard gender diversity on the board

Risk Governance

Transition from speculative to investment-grade ratings

Crisis Management

2008-2017 Aftermath of Financial Crisis in US

Social Justice

Validate ongoing efforts to improve corporate governance through enhanced BGD

Brief Literature focus

LEVERAGE

Are women more risk averse than men?

Li et al., 2022

Faccio et al., 2016

Jianakoplos & Bernasek, 1998

Palvia et al., 2015

There is, however, no consensus about the link between **women in the boardroom and risk-taking**.

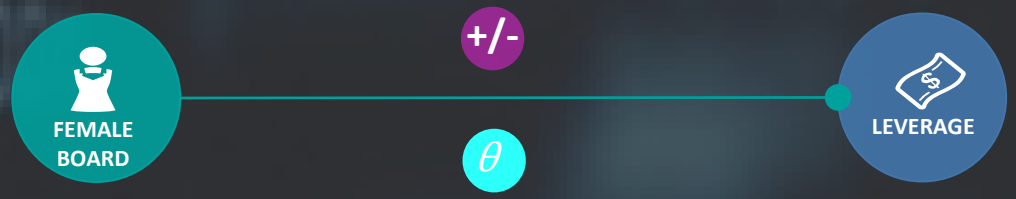
Negative relationship (Azzim-Gulamhussen and Fonte Santa, 2015; Lenard *et al.*,2014; Adams and Ferreira, 2009).

Positive relationship (Berger *et al.*,2014; Adams and Funk, 2012)

Finally, there are studies that do not find any association (Mathew *et al.*, 2016; Sila *et al.*, 2016; Maxfield *et al.*, 2010; Van Der Walt *et al.*, 2006).

Brief Literature focus

LEVERAGE



Hypothesis 1a: The percentage of women in the board has a positive effect in the leverage level.

Hypothesis 1b: The percentage of women in the board has a negative effect in the leverage level.

Hypothesis 1c: The percentage of women in the board has a null effect in the leverage level.

Brief Literature focus

CREDIT RATING

Description

According to agency and resource dependency theories, Gender diversity on the board is one of the factors that influences CSR.

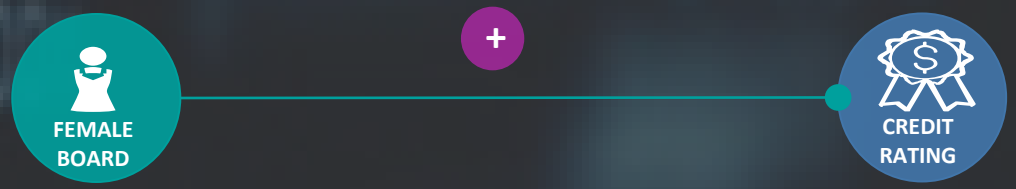
In line with this argument, Sila et al. (2016) point out that boardroom gender diversity is included among the ESG factors used to identify socially responsible firms, and as a relevant dimension of the criteria of many social investment indexes such the Dow Jones Sustainability Index.

Commitment to gender equality also boosts company reputation and signals to stakeholders a firm's dedication to diversity and social responsibility (Marquez-Cardenas et al., 2022; Yahya et al., 2021; Bear et al., 2010).

Given the established connections between gender diversity on boards, CSR performance, and company reputation, and their correlation with credit ratings, we propose the following hypothesis:

Brief Literature focus

CREDIT RATING



Hypothesis 2: ***The percentage of women in the board has a positive effect in the credit rating***

Brief Literature focus

CREDIT RATING

THE CRITICAL MASS OF WOMEN

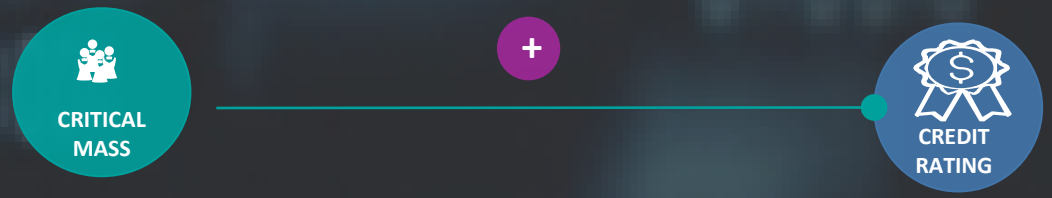
The underrepresentation of women probably implies that their voices are not being heard (Bear et al., 2010), which can be explained by critical mass theory, proposed by **Kanter (1977)**.

Trinh et al. (2023) found that achieving a critical mass of minority group members, including at least two women on the board, is essential to decision-making effectively.

Bear et al. (2010) and Boulouta (2013) demonstrated that such teams are more likely to generate alternative solutions and make innovative decisions. Konrad et al. (2008)

Brief Literature focus

CREDIT RATING



Hypothesis 3: ***The existence of a critical mass of women on a firm's board increases its probability of obtaining better ratings.***

Methods

ORBIS - REFINITIV EIKON & DATASTREAM

SOURCES:

1. Company fundamentals were consulted in the **Orbis database from Bureau Van Dijk.** From this database, we gathered information to identify every firm through CUSIP and ISIN codes, in order to merge these data with those obtained from Refinitiv Eikon and Datastream.
2. Credit ratings, corporate governance variables and market information were extracted from **Eikon and Datastream**. Information about gender relative to managers and board members was also collected here.

Time period	10 years
Sample: observations	5,816
Sample: firms	1,037

1,037
FIRMS

10
YEARS: 2008-2017

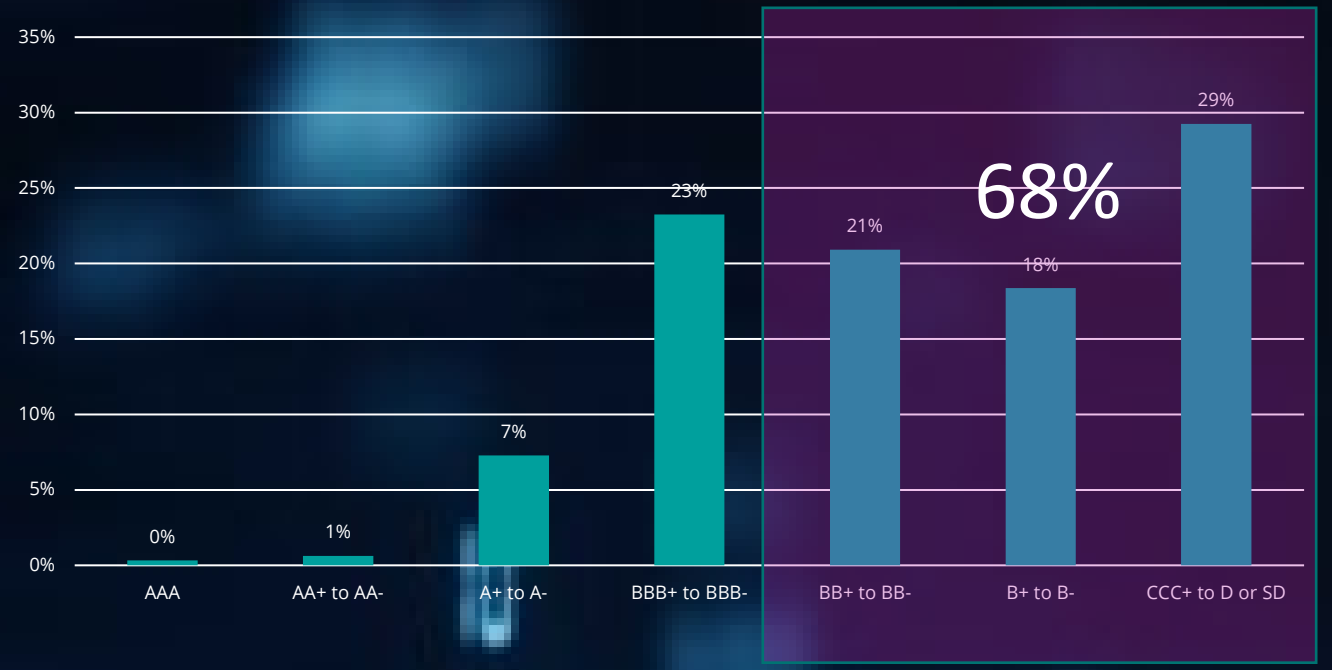
5,816
OBSERVATIONS

Data Analysis

Distribution

Regarding total observations, we can see in this exhibit that 68 per cent of the firms are in the speculative grade.

As the investment grade increases, this percentage falls dramatically. AAA firms are the less numerous ones, not even reaching 1%.



Data Analysis

Firms with women on their board by rating.

We examine the distribution of women on boards by the companies' credit ratings. Here we can observe that in firms with better ratings, the participation of women is also substantially higher. Actually, 91.5 per cent of AAA firms have women on their board, whereas 81.4 per cent of CCC firms have exclusively men on their boards, although this number has generally been increasing over time. We can also see that the safer the firm, the higher the percentage of women on boards.

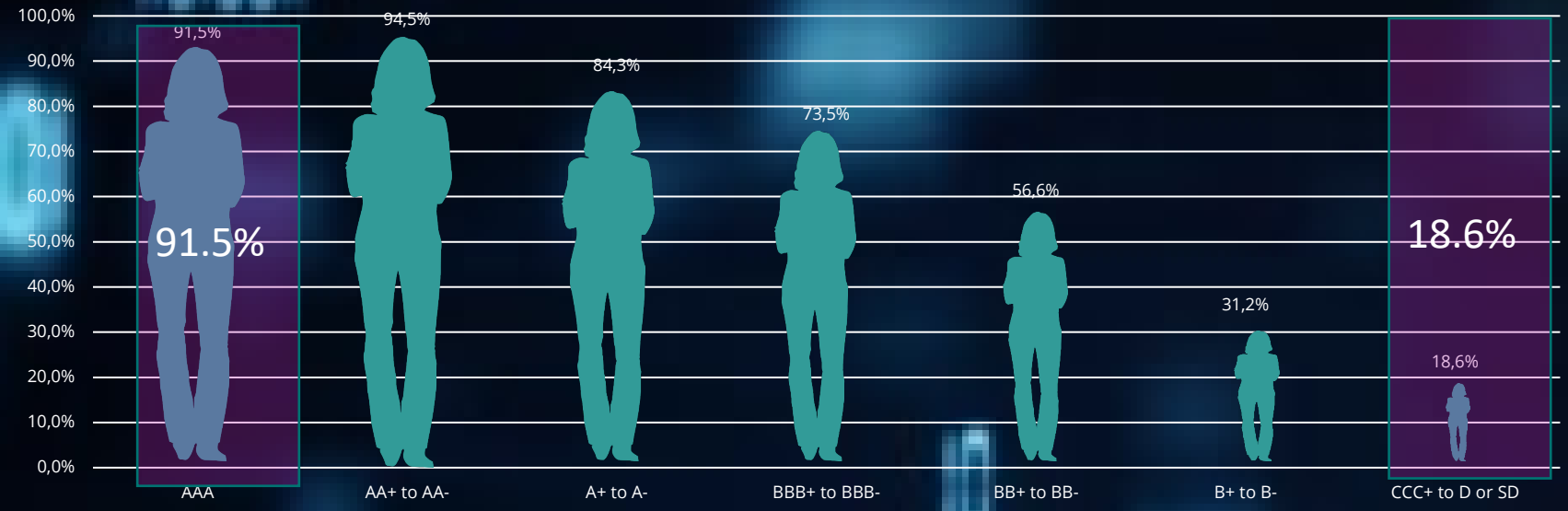


Table 4

Description of the variables

Variable	Definition	Notation	Expected Sign on Rating	Source
	Dependent Variables			
Leverage ratio[1]	Ratio of total debt to total assets	*Leverage*		Orbis
Rating	Ordinal variable with seven thresholds from 1 to 7 depending on the rating score given by Standard & Poor	*Rating*		Eikon
	Gender Variables			
Gender	Percentage of women on the board of directors	*Femaleboard*	+	Eikon
Gender-equitable board	Dummy variable equal to 1 if there are at least two women on the board	*Bequitable*	+	Eikon
	Corporate Governance Variables			
Board independence	Percentage of independent directors on the board	*Boardindep*	+	Eikon
Duality	Dummy variable that takes a value of 1 if the CEO serves also as chairperson and 0 otherwise	*Duality*	-	Eikon
	Company Fundamentals and control variables			
Interest coverage	Ratio of EBIT to interest expense	*Interestcoverage*	+	Orbis
Negative earnings	Dummy variable that takes a value of 1 if ROA is negative in the current and previous year and 0 otherwise	*Loss*	-	Orbis
Asset structure	Ratio of fixed to total assets	*Tangibility*	+	Orbis
ROA	Ratio of EBIT to total assets	*Roa*	+	Orbis
Firm size	Napierian logarithm of net sales as a proxy of firm size	*Size*	+	Orbis
Market-to-book ratio	Ratio of market value of the share to its book value	*MtB*	+	Eikon
Auditors' report	Dummy variable that takes a value of 1 for firms with a favorable report and 0 otherwise	*Audit*	+	Eikon
Financial sector	Dummy variable that is set equal to 1 if a firm belongs to the 6th group in the SIC	*Financial*		Orbis
Grade[2]	Dummy variable that takes a value of 1 for rating values over BB+ and zero otherwise	*Grade*		Eikon

Hipotheses

RISK TOLERANCE

$$Leverage_{it} = \beta_1\, Leverage_{t-1} + \beta_2\, Boardindep_{it} + \beta_3\, Duality_{it} + \beta_4\, Interestcoverage_t + \beta_5 Loss_t + \beta_6 Tangibility_t + \beta_7 Roa_t + \beta_8 Size_t + \beta_9 MtB_t + \beta_{10} Audit_t + \beta_{11} Grade_t + \beta_{12} Financial_t + n_i + \delta_t + \vartheta_{it}$$

$$Leverage_{it} = \beta_1 Leverage_{t-1} + \beta_2 Femaleboard_t + \beta_3 Boardindep_{it} + \beta_4 Duality_{it} + \beta_5\, Interestcoverage_t + \beta_6 Loss_t + \beta_7 Tangibility_t + \beta_8 Roa_t + \beta_9 Size_t + \beta_{10} MtB_t + \beta_{11} Audit_t + \beta_{12} Grade_t + \beta_{13} Financial_t + n_i + \delta_t + \vartheta_{it}$$

CREDIT RATING

$$Log\left(\frac{\gamma_{ij}}{1-\gamma_{ij}}\right) = \theta + \beta_1 Boardindep_{it} + \beta_2 Duality_{it} + \beta_3 Leverage_t + \beta_4 Interestcoverage_t + \beta_5 Loss_t + \beta_6 Tangibility_t + \beta_7 Roa_t + \beta_8 Size_t + \beta_9 MtB_t + \beta_{10} Audit_t + \beta_{11} Financial_t + \varepsilon_i$$

$$Log\left(\frac{\gamma_{ij}}{1-\gamma_{ij}}\right) = \theta + \beta_1 Femaleboard_t + \beta_2 Boardindep_{it} + \beta_3 Duality_{it} + \beta_4 Leverage_t + \beta_5 Interestcoverage_t + \beta_6 Loss_t + \beta_7 Tangibility_t + \beta_8 Roa_t + \beta_9 Size_t + \beta_{10} MtB_t + \beta_{11} Audit_t + \beta_{12} Financial_t + \varepsilon_i$$

$$Log\left(\frac{\gamma_{ij}}{1-\gamma_{ij}}\right) = \theta + \beta_1 Beqitable_t + \beta_2 Boardindep_{it} + \beta_3 Duality_{it} + \beta_4 Leverage_t + \beta_5 Interestcoverage_t + \beta_6 Loss_t + \beta_7 Tangibility_t + \beta_8 Roa_t + \beta_9 Size_t + \beta_{10} MtB_t + \beta_{11} Audit_t + \beta_{12} Financial_t + \varepsilon_i$$

$$\frac{\partial \Pr(y_i = j)}{\partial x_{ir}} = \{F'(\alpha_{j-1} - x'_i\beta) - F'(\alpha_j - x'\beta)\}\beta_r$$

Results: Leverage

GMM Estimation of the effect of Female Governance on Leverage.

Variable	Definition	Model 1
Leverage$_{t-1}$	Ratio of total debt to total assets	0.9514 ***
Femaleboard	% of women on the board	-0.0018
Boardindep	% of independent directors on the board	-0.0103
Duality	Dummy variable that takes a value of 1 if the CEO is also the chairperson	0.0075
Interestcoverage	A proxy for firms' default risk: EBIT/interest	0.0451***
Loss	Takes a value of 1 if the firm reports negative earnings in the current and prior fiscal years	-0.0415
Tangibility	Ratio of fixed to total assets	0.0890*
Roa	ROA as a percentage of the ratio of EBIT to total assets	0.0590
Size	Napierian logarithm of total assets	-0.0404
MtB	Market-to-book ratio	-0.0355
Audit	Dummy for unqualified audit inform that takes a value of 1 and 0 otherwise	-0.0791**
Financial	Dummy for the financial sector	0.0281
Grade	Dummy variable equal to 1 if the firm has an investment rating and 0 otherwise	0.0207
m1	Arellano–Bond test for AR(1) in first differences	-2.08**
m2	Arellano–Bond test for AR(2) in second differences	-0.69
Hansen	GMM instruments for levels	266.98 (0.160)
Number of observations		5015
Number of instruments		266
Number of groups		907

Results: Rating

Ordered Logistic Regression of the rating.

Assessment of marginal effects of female board representation on rating categories

Rating	AMEs	Sig.	MEMs	Sig.
AAA	0.0002077***	0.006	0.0000243**	0.039
AA+ to AA-	0.0011658***	0.000	0.0004102***	0.000
A+ to A-	0.0131536***	0.000	0.0139676***	0.000
BBB+ to BBB-	0.0186087***	0.000	0.018438***	0.000
BB+ to BB-	-0.0055564***	0.000	-0.0068434***	0.001
B+ to B-	-0.0082796***	0.000	-0.0048226**	0.020
CCC+ to D / SD	-0.0192997***	0.000	-0.021174***	0.000

Results: Rating

Assessment of marginal effects of Female on board.

Having a critical mass of women fosters a better rating, and this promotion is especially important to obtain the investment grade rating.

MEs of gender-equitable boards on firm ratings

Rating categories	AMEs	Sig.	MEMs	Sig.
AAA	0.0001739**	0.020	0.0000211*	0.066
AA+ to AA-	0.0009538 ***	0.001	0.0003375 ***	0.000
A+ to A-	0.0106423 ***	0.000	0.0116719***	0.000
BBB+ to BBB-	0.0149432 ***	0.000	0.0140207***	0.002
BB+ to BB-	-0.0044191 ***	0.000	-0.0049639**	0.016
B+ to B-	-0.0066536***	0.000	-0.0040512**	0.040
CCC+ to D/SD	-0.0156405***	0.000	-0.0170362***	0.000

Note: This table presents the MEs of a critical mass of women on the board on the probability of obtaining every rating category. AME corresponds to the average ME and MEM to MEs when all regressors are at their means. Significance levels are indicated as follows: ***significant at the 1% level, **significant at the 5% level, and *significant at the 10% level.

Robustness Checks

GMM estimation of the effect of BGD on the probability of default.

GMM estimation of the effect of female governance on the default probability

Variable	Definition	Model 10	Model 11
DP_{t-1}	Starmine default probability	0.3951***	0.4364***
Femaleboard	% of women on the board	-0.0362***	
Bequitable	Dummy variable that takes a value of 1 if there are at least 2 women on the board		-0.1140**
Boardindep	% of independent directors on the board	0.0153	0.0085
Duality	Dummy variable that takes a value of 1 if the CEO is also the chairperson	-0.0154	0.0114
Leverage	Ratio of total debt to total assets	0.0998***	0.0803***
Interestcoverage	A proxy for firms' default risk: EBIT/interest	-0.0220	-0.0057
Loss	Takes a value of 1 if the firm reports negative earnings in the current and prior fiscal years	0.2188***	-0.1252
Tangibility	Calculated as the ratio of fixed to total assets	0.0019	0.0181*
Roa	ROA as a percentage of EBIT to total assets	0.0094	-0.0152
Size	Napierian logarithm of total assets	-0.1029*	-0.1301**
MtB	Market to book ratio	0.0039	0.1081**
Audit	Dummy for unqualified audit inform that takes a value of 1 and 0 otherwise	-0.0057	-0.0102
Financial	Dummy for the financial sector	-0.0738*	-0.0837**
m1	Arellano– Bond test for AR(1) in first differences	-1.68 (sig 0.093)	-1.77 (sig 0.077)
m2	Arellano– Bond test for AR(2) in second differences	-0.54 (sig 0.590)	-0.60 (sig 0.551)
Hansen test	GMM instruments for levels	28.33 (0.846)	166.07 (0.295)
Number of observations		5,303	5,740
Number of instruments		140	179
Number of groups		1,037	1,033

Robustness Checks

Propensity Score Matching

Test of the balancing hypothesis

Variables	Unmatched (U)/Matched	Mean		% reduct		p value
		Treated	Control	% bias	|bias|	
Boardindep	U	0.1466	-0.0750	22.5		0.000
	M	0.1466	0.1858	-4.0	82.3	0.107
Leverage	U	-0.0000	-0.1696	20.9		0.000
	M	-0.0000	0.1064	-13.1	37.2	0.000
Interestcoverage	U	-0.0188	-0.0155	-1.6		0.537
	M	-0.0188	-0.0182	-0.3	79.7	0.857
Loss	U	0.1811	0.0465	-16.1		0.000
	M	0.1811	0.0197	-0.9	94.4	0.644
Tangibility	U	-0.0699	0.0514	-12.6		0.000
	M	-0.0699	-0.0264	-4.5	64.2	0.058
Roa	U	0.2166	0.0726	17.2		0.000
	M	0.2166	0.2652	-5.8	66.3	0.012
Size	U	0.2166	0.0726	17.2		0.000
	M	0.2166	0.2651	-5.8	66.3	0.012
MtB	U	-0.0072	-0.0099	4.9		0.066
	M	-0.0072	-0.0095	4.1	17.5	0.212
Audit	U	0.9155	0.8992	5.6		0.032
	M	0.9155	0.9082	2.5	55.2	0.307
Financial	U	0.1258	0.1293	-1.1		0.689
	M	0.1258	0.1255	0.1	91.0	0.970

ATT 0.4323***

Differences between the treatment and the control group that could make a difference in their credit ratings.

Concluding remarks

Our findings indicate that while the percentage of women on the board is not linked to a firm's leverage level, it does have a significant and positive impact on credit ratings.

Additionally, female board presence increases the likelihood of obtaining a higher rating, particularly when aiming for an investment-grade rating.

Finally, having a critical mass of women (more than one) on the board enhances credit ratings and raises the probability of achieving better ratings.

Given that leverage levels are not inherently influenced by gender, our results suggest that rating agencies view female board members as valuable intangible assets. This underscores the importance of gender diversity as a key element in risk governance strategies.

Concluding remarks

For firms – especially those with poor credit ratings or no female representation – achieving gender balance on boards is not only an issue of equity but also a strategic approach to enhance credit ratings and improve risk management.

This positive effect highlights the role of BGD in improving corporate risk governance, as diverse boards are better equipped to manage and mitigate risks.

Enhanced risk governance through gender diversity not only strengthens credit evaluations but also contributes to more robust and resilient corporate strategies.

Thank You!

Risk Governance in Corporate Crisis Management: Unveiling the Impact of Board Gender Diversity on Credit Rating

- Giráldez-Puig, P.
- Samaniego-Medina, R.

Feel free to contact us:

mpgirpui@upo.es

rsammed@upo.es

Universidad Pablo de Olavide

+34 670 370 578